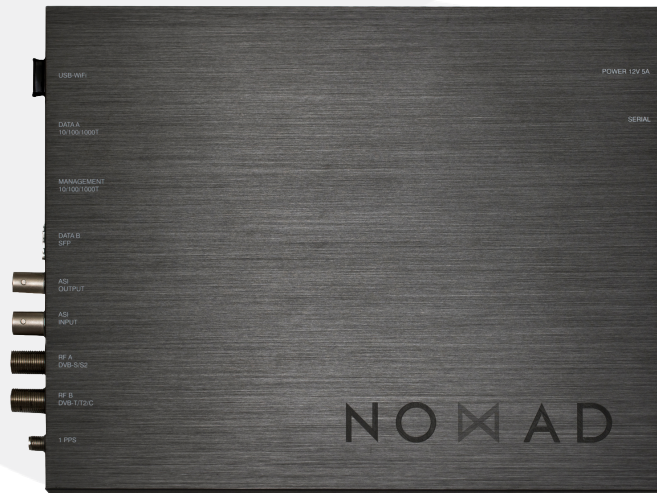




NOMAD Portable Probe **NOMAD US Portable Probe**

Applies to software release v7.0

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NOMAD Portable Probe User's Manual
Revision 5805bfa7 (2026-03-20)

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Document Revision History

<i>Date</i>	<i>Version</i>	<i>Description</i>
March 2026	7.0	Updated manual to reflect changes in v7.0 software
February 2025	6.5	Updated manual to reflect changes in v6.5 software
March 2024	6.3	Updated manual to reflect changes in v6.3 software
June 2023	6.2	Updated manual to reflect changes in v6.2 software
February 2022	6.1	Updated manual to reflect changes in v6.1 software
February 2020	5.6	Updated manual to reflect changes in v5.6 software
February 2019	5.5	Updated manual to reflect changes in v5.5 software
February 2018	5.4	Updated manual to reflect changes in v5.4 software
February 2017	5.3	Updated manual to reflect changes in v5.3 software
March 2016	5.2	Updated manual to reflect changes in v5.2 software
February 2015	5.1	Updated manual to reflect changes in v5.1 software
January 2014	5.0	Updated manual to reflect changes in v5.0 software

1 INTRODUCTION

1.1 About the NOMAD

NOMAD covers all the monitoring needs encountered in hybrid IP multicast, OTT and RF networks. It is the ultimate all-in-one monitoring and analysis solution for the technician on the move.

NOMAD is a breakthrough design with almost every conceivable interface for media signal monitoring and analysis. Featuring optical/electrical Gigabit Ethernet, ASI in/out, DVB-C, Annex A/B/C cable¹, 8VSB ATSC terrestrial¹, DVB-T/T2 COFDM terrestrial, DVB-S/S2 satellite and external 1PPS GPS time-reference, NOMAD can analyse all RF transmitted DVB signals as well as OTT and multicast/unicast IP transmissions.

With comprehensive IP packet analysis tools, NOMAD is ideal for IP transport understanding regardless of media transported. NOMAD also is shipped with the ultimate in user friendly setup. The unit contains a Wi-Fi zone, and by pointing a laptop towards this, NOMAD is ready for use without further configuration.

As technologies become more and more complex, using NOMAD will give invaluable insight into modern media signal behaviours without the need for deep operator knowledge of the media technology used. Cut from a single brick of aluminium, NOMAD sets a new standard for both finish and ruggedness. It is also of very light weight and is the perfect companion to a laptop.

NOMAD ships with extensive functionality for superior digital media understanding right out of the box. Additionally NOMAD has a substantial additional set of extended analysis options, enabling it to outperform the most comprehensive systems on the market in functionality. This also allows NOMAD to be an ideal laboratory tool for desktop analysis in the most demanding environments. NOMAD also sets a new benchmark of affordability in the industry.

Designed to replace old-school PCI cards, USB-based dongles and other laptop-dependent devices, NOMAD is a complete free-standing unit with its own CPU and can be left to monitor signals by itself without the need for a host system.

In the rest of this manual when referring to NOMAD, it is implicit that we refer to both the NOMAD and the NOMAD US version unless otherwise stated. The sections where the two differ are in the sections describing the QAM Annex A/B/C interface (NOMAD US) and the DVB-C/T/T2 interface (NOMAD).

Interfaces

NOMAD features three Gigabit Ethernet ports. One of these is for management; one with a choice of optical or electrical; and a third optional electrical port, ASI in/out, DVB-C QAM cable², DVB-T/T2

¹ITU.T J.83 Annex A/B/C and 8VSB capabilities only in the NOMAD US model.

²Regular NOMAD supports hardware interfaces DVB-C, DVB-T and DVB-T2

COFDM terrestrial², QAM Annex A/B/C³, 8VSB³, DVB-S/S2 satellite and external 1PPS GPS time-reference.

The unit can analyse all RF transmitted DVB signals as well as OTT and multicast/unicast IP transmissions. With comprehensive IP packet analysis tools, NOMAD is ideal for IP transport understanding regardless of media transported.

Ethernet

- 10/100/1000T Gigabit Ethernet interface for video/data analysis
- SFP port for optical Gigabit connectivity
- Optional second Gigabit Ethernet port
- Web-based management interface optionally on all ports
- SSH/TELNET terminal
- Monitor Secure Reliable Transport (SRT) streams across Internet links
- Relay video multicasts to 3rd party targets using RDP
- Laser power received level for fault finding on SFP

WiFi

- Provides 2.4 GHz Wireless Access Point service
- No setup – NOMAD is WiFi Zone
- USB 2.0 IEEE 802.11 b/g/n 150Mbit/s dongle

DVB-S/S2 satellite

- Supports DVB-S and DVB-S2 8PSK, 16APSK, 32APSK, GOLD CODES
- L-band input from 950–2160 MHz
- Symbol rate range between 1–45 MS/s
- 13V/18V/22kHz and DiseqC 1.0 capable for switch control
- High-end RF performance with constellation diagram and over 20 RF parameters
- Auto-scan feature

³NOMAD US hardware version for the United States supports ITU.T J.83 Annex A/B/C and 8VSB instead of DVB-T/T2

DVB-T/T2/C terrestrial and cable (regular NOMAD version)

- Supports DVB-T EN 300-744 and DVB-T2 EN-302-755 (v1.3.1)
- Supports ITU.T J.83 Annex A/C for cable networks (QAM16 up to QAM256)
- Frequency range: 43–1002 MHz. Bandwidth 5, 6, 7 and 8 MHz
- Channel Impulse Response diagram and constellation diagram for DVB-T/T2

QAM Annex A/B/C and 8VSB terrestrial (NOMAD US version only)

- Supports ITU.T J.83 Annex A/B/C for cable networks
- Supports 8VSB ATSC for terrestrial networks
- Frequency range: 43–1002MHz, bandwidth 6, 7 and 8 MHz

1PPS

- Offers GPS synchronization down to 0.1 μ s accuracy
- Allows absolute network delay in SFN/T2MI networks to be measured
- Allows absolute Center Frequency Offset measurements on DVB-T/T2

ASI

- ASI input according to EN 50083-9, Annex B
- Supports Burst mode, Spread Mode and legacy M2S
- Output selectable feed from ASI, DVB-T/T2/C or DVB-S/S2 input
- Up to 211Mbit/s incoming rate (linespeed ASI)

Analytics

Through packet inspection, TS analysis is built in with the award-winning ETR290 Engine, enabling deep understanding of TS streams. IP packet traffic is viewed in real-time, and broken down into individual protocols, giving an unprecedented and simplified understanding of otherwise complex structures in the transport mechanics.

Total passing of OTT multiscreen playlist and manifest files secures coherence and standards, with full insight into segment availability, download times, sequence latency, profile alignment and much more. NOMAD is at the forefront of HLS and DASH understanding and analytics. The same goes for the diverse RF interfaces. Full RF metrics, with best-in-class specifications, visualisations of constellation diagrams and advanced analytics like reflections in digital terrestrial networks are all examples of advanced functions not normally found in affordable equipment of this class.

Technologies

NOMAD features a plethora of award-winning and patented technologies, the culmination of 12 years of accumulated engineering knowledge and R& D in IP and broadcast monitoring. The NOMAD user interface is via the the patented Sencore VideoBRIDGE MediaWindow visualisation technology, which allows complex structures and data to be readily understood by non-expert users, enabling them to identify appropriate corrective actions quickly and easily.

Web interface	Intuitive GUI for remote access via Wi-Fi or cabled Ethernet
Packet analysis	Accurate packet behaviour, IAT histogram, protocol analysis and traffic, autodetection of IP uni/multicast
OTT/Multiscreen	HLS, HDS, M-DASH, SmoothStream™, RTMP, SHOUTcast™, post-CDN URL token support and manifest validation. Innovative framework for measuring delay of OTT service through distribution chain
Multicast/unicast IP	Microsecond-accurate and detailed multicast packet monitoring, analysis and alarming with readout and alarming on key parameters relevant to video
RDP™ forwarding and recording	Return Data Path forwarding of any transport stream monitored with automated alarm triggered recording to 32 Gbyte of on-board Flash memory
Gold TS™	Innovative Gold TS framework: part of the award-winning ETR290 Engine for recording a perfect transport stream table set and then can be compared and alarmed against a template
Powerful IP tools	ICMP PING and TraceRoute can be done from inside a location remotely and PING can be setup to alarm if remote device stops responding
Media format support	MPEG2-TS. H.264/AVC HD, H265/HEVC 4K, AAC, PCM Audio, SCTE-35 signaling, T2-MI encapsulation and more
Media window™	Total packet understanding with the patented MediaWindow™ visualisation technology for RTP/UDP uni- and multicasts
ETR290 analytics	The award-winning ETR290 Engine with detailed analytics of Priority 1, 2 and 3 tests plus extensions to test CA behaviour, alarm history view, timeline view and much more

Design

Built from a single piece of high quality aluminium, NOMAD provides the ruggedness necessary in harsh outdoor broadcast and telecom environments, and at the same time provides unprecedented aesthetics and functionality.

CNC-milled with a precision down to 10 micron, laser engraved logotypes and a form factor resembling a solid tablet, NOMAD stands on recessed rubber feet, allowing the unit to hover 0.2 mm over any surface. All heat from the advanced processors is dispersed through its aluminium chassis, and with exceptional electronics design, the unit provides amazing abilities for the digital media engineer.

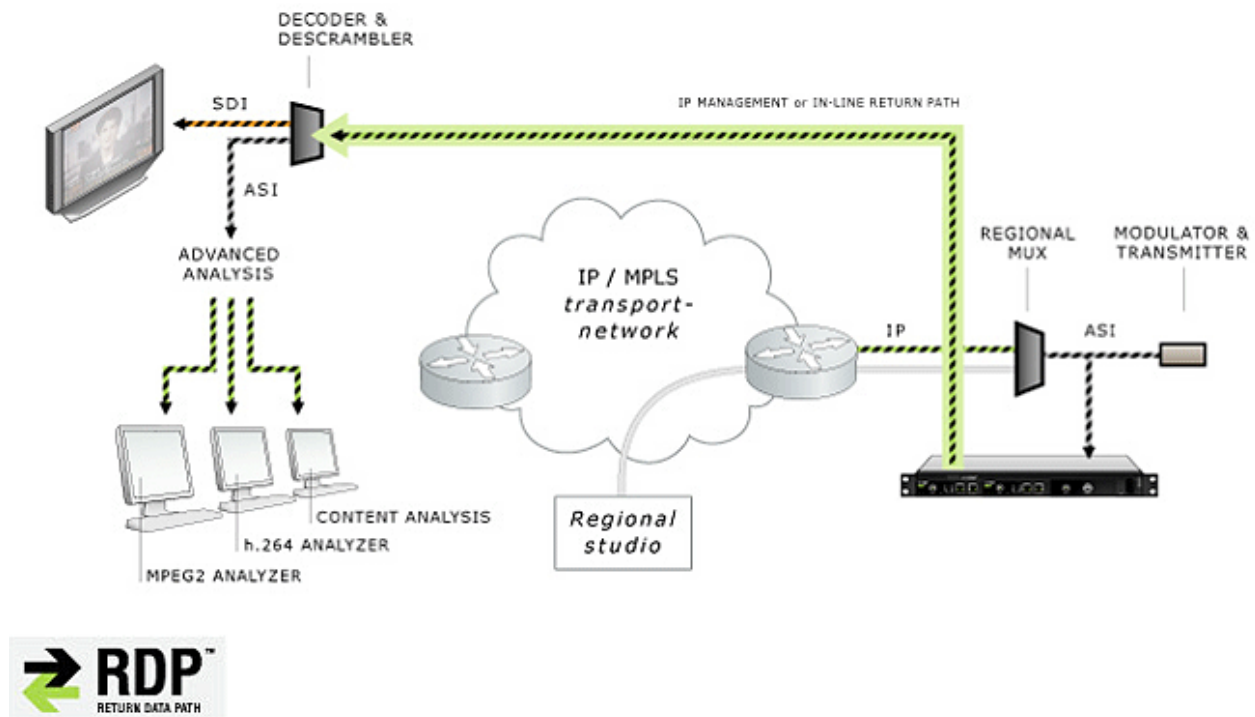
1.1.1 NOMAD – Functionality

An IP-based network is fully transparent with respect to signal contents quality, provided that the IP packets arrive, and provided that they arrive in time. The NOMAD therefore uses the patented MediaWindow to allow monitoring at-a-glance of packet loss and errors in inter-packet arrival time. This way the operator can conveniently ensure correct signal quality at IP-level.

The advanced Ethernet protocol analysis tool automatically detects all protocols carried over Ethernet past the port the NOMAD is connected to, and it displays statistics like percentage utilization of the interface and percentage of the different transported protocols. This gives the NOMAD a real-time sniffer capability.

The NOMAD allows the user to define a Return Data Path (RDP), using the regular video/data network or the management network to return a stream. A faulty signal can then be further analyzed at the studio premises, when necessary.

The recording functionality allows the user to record a stream, either triggered manually by the user or triggered by a user-defined alarm.



Full Service Monitoring (FSM) checks that vital system components like CA-servers are active.

Ethernet TR 290 monitoring allows the operator to check parameters like transport stream sync and PSI/SI standards conformity. This option also performs further PSI/SI analysis, making it possible to view PSI/SI contents. PID and service bitrates are also continuously measured.

OTT monitoring allows the operator to set up active testing of Over-the-top type signals as found in adaptive bitrate streaming architectures. Formats supported include Apple TM HLS, Microsoft TM Smoothstream, RTMP, MPEG DASH, Adobe TM HDS and Nullsoft SHOUTcastTM.

The NOMAD can be expanded through license options to monitor the T2MI protocol layer as found in DVB-T2 networks.

The NOMAD can also be licensed with an SCTE 35 option that allows monitoring and logging of splice time codes embedded in the transport streams.

1.2 How to Use This Manual

This User's Manual is valid for software version 7.0 of the NOMAD portable probe.

Throughout this manual the term stream is often used rather than unicast or multicast. One stream may consist of one or more services, and refers to one IP stream received as a uni- or multicast or over an SRT connection (for Ethernet input) or one transport stream (ITU.T J.83 Annex A/B/C QAM, DVB-T/T2 COFDM, 8VSB, DVB-S/S2, ASI). When the term multicast is used in this manual, it explicitly refers to a stream arriving over the network as a multicast or unicast, including unicasts that use the SRT protocol.

Chapter 2 **PRINCIPLE OF OPERATION** provides a simplified block-diagram overview of the probe.

Chapter 3 **SAFETY** lists safety precautions, and this chapter should be read prior to equipment installation.

Chapter 4 **INSTALLATION AND INITIAL SETUP** explains how to install the equipment and also how to perform the necessary initial configuration of the NOMAD management IP address. A step-by-step quick installation guide is found in section 4.1.

Chapter 5 **QUICK SETUP GUIDE** contains a quick setup guide; a step-by-step description of how to setup the NOMAD once the initial setup has been performed.

Chapter 6 **NOMAD PORTABLE PROBE GRAPHICAL USER INTERFACE** describes the graphical user interface (GUI) as seen when pointing a web browser to the NOMAD's IP address.

Chapter 7 **EXPERT PROBE GRAPHICAL USER INTERFACE** describes the expert view, which is used to configure and dive deeper into the features of the NOMAD.

A **Appendix: NOMAD Versus VBC Alarms** describes the alarm handling in the NOMAD versus the VideoBRIDGE Controller.

B **Appendix: Monitoring Practices** explains some useful monitoring practices.

C **Appendix: OTT Profile Health** explains the OTT profile health bar and timeline.

D **Appendix: SRT Streams** provides a quick introduction to SRT (Secure Reliable Transport).

E **Appendix: On-line License Activation** outlines the on-line license activation procedure.

F **Appendix: Software Maintenance** briefly describes software maintenance licenses and how they are used.

G **Appendix: Software Upload** explains how to upgrade the software on the NOMAD.

H **Appendix: Restoring NOMAD factory defaults** details how to reset the NOMAD to factory default settings.

I **Appendix: SFN drift measurements** describes SFN drift measurements and how they are calculated.

Note that current version of the User's Manual can be obtained from Sencore ProCare support by emailing procare@sencore.com.

2 PRINCIPLE OF OPERATION

The probe module is equipped with two RJ45 Ethernet ports and one SFP optical port. The user selects which transport stream signal input to be used by the monitoring engine, either the Ethernet video/data port or the SFP optical input. Management of the probe is conducted via the Ethernet management port or alternatively in-band via the video/data ports.

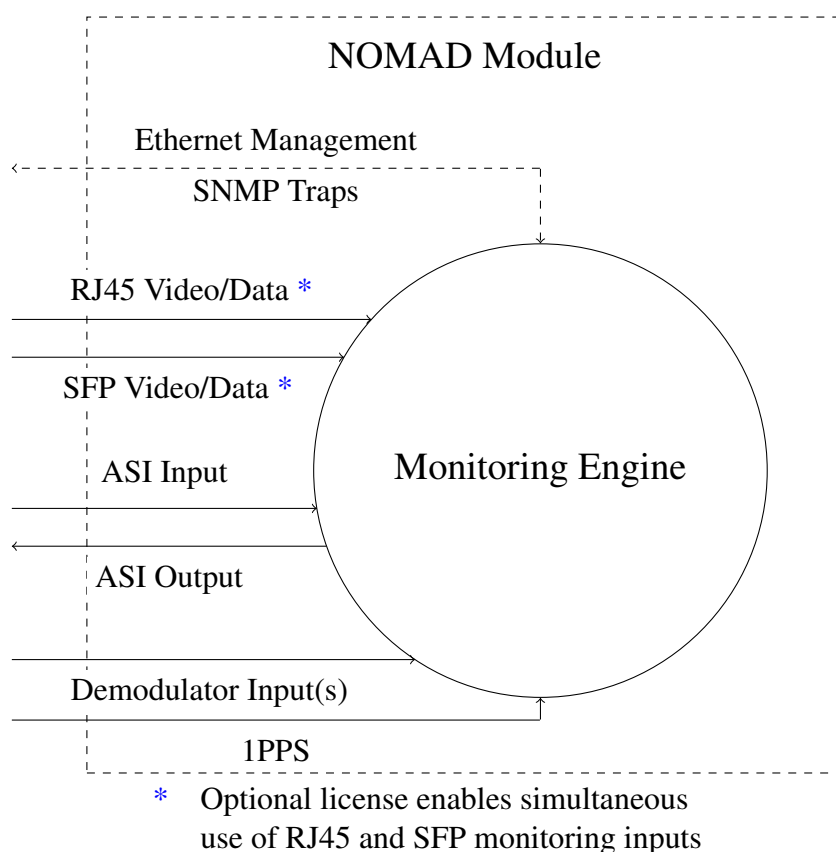


Figure 2.1: The NOMAD Module – Principle of Operation

A simplified diagram of the alarm handling mechanisms of the NOMAD is shown in figure 2.2. The input signals are continuously analyzed, and measured data are checked against user-defined threshold values. If the data do not comply with the threshold values alarms will be generated. The overall alarm settings further make it possible to enable and disable alarms, thus defining which alarms should be reported in the NOMAD alarm list and sent as SNMP traps to an external management system.

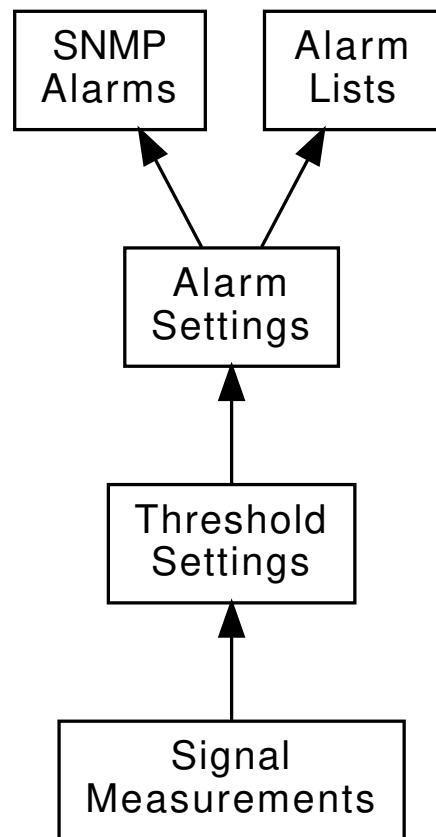


Figure 2.2: Simplified Diagram of the Alarm Handling in the NOMAD

3 SAFETY

Read the installation instructions before connecting the chassis unit to the power source.

The equipment described in this user manual is considered professional equipment to be installed by skilled personnel. The equipment should be connected to protective earth through the ground lug at the back of the chassis marked clearly with the ground symbol.

The NOMAD is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

The NOMAD must only be used with the included power supply. Do not use the power supply if it or its cables are damaged.

Only trained and qualified personnel should be allowed to install, replace or service this equipment.

This equipment must be installed and maintained by service personnel as defined by AS/NZS 3260. Incorrectly connecting this equipment to a general-purpose outlet could be hazardous.

If SFP modules are used ensure proper precautions are taken to protect eyes against harmful infrared radiation. Do not look straight into the SFP module or fibers connected to the SFP module. The SFP modules employed are certified in Laser Class 1.

Ultimate disposal of this product should be handled according to all national laws and regulations.

To prevent the system from overheating, do not operate it in an area that exceeds the maximum ambient temperature of 45 degrees Celsius. Do not place other objects on top of the NOMAD as this may cause heat to build up which could damage the unit. Air needs to flow freely underneath the unit so make sure that the feet of the unit are intact.

Do not work on the system or connect or disconnect cables during periods of lightning activity.

The NOMAD requires short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 120 VAC, 15 A; 240 VAC, 16 A.

4 INSTALLATION AND INITIAL SETUP

4.1 Quick Installation Guide

1. Read the safety instructions, refer to chapter 3
2. Connect the signal cables, refer to section 4.2.4
3. Power up the unit, refer to section 4.3
4. Perform initial set-up of IP addresses, refer to section 4.4
5. Verify that the GUI launches correctly, refer to section 4.4.4

4.2 The NOMAD portable probe

The NOMAD portable probe is built for real world use. Its ruggedized exterior and fan-less design gives engineers the perfect fault-finding tool when roaming in the network or for permanent placement in a harsh environment.

4.2.1 AC Power Supply

The portable chassis is delivered with an external 100–240V AC power supply. **The NOMAD must only be used with the included power supply. Do not use the power supply if it or its cables are damaged.**

4.2.2 Cooling System

The portable unit uses passive cooling and the chassis act as a heat sink. **Do not place other objects on top of the NOMAD as this may cause heat to build up which could damage the unit. Air needs to flow freely underneath the unit so make sure that the feet of the unit are intact.**

4.2.3 Serial number location

The serial number is located at the bottom of the unit. All serial numbers can also be found on the shipping box.

The serial number of the NOMAD probe is also available via the web GUI under **About — License**.



Figure 4.1: The NOMAD portable probe

4.2.4 Interfaces



Figure 4.2: NOMAD front connectors

The NOMAD module is equipped with the following connectors on the front:

USB-WiFi: The USB port used for the WiFi connection. Only the WiFi adapter included with the device can be used in this port

DATA A: (10/100/1000T)	For monitoring a 10/100/1000 electrical/copper signal – RJ-45. The probe can only monitor either the SFP input signal OR the 10/100/1000T input signal (selected from software), unless licensed to use both inputs.
MANAGEMENT: (10/100/1000T)	Interface for running management of the probe on a separate network. The management can also be done using the data ports (if enabled). The interface is RJ45 and supports 10/100/1000T.
DATA B: (SFP)	Alternative SFP input used when connecting to optical networks. Can also be used with an electrical SFP module to monitor two RJ45 ports in parallel. The probe can only monitor either the SFP input signal OR the 10/100/1000T input signal (selected from software), unless licensed to use both inputs.
ASI OUTPUT:	ASI transport stream output – 75 ohm BNC female
ASI INPUT:	ASI transport stream input – 75 ohm BNC female
RF A: (DVB-S/DVB-S2)	RF L-band input with DiSEqC 1.2 – 75 ohm F-connector for monitoring satellite signals. Supported standards are DVB-S and DVB-S2.
RF B: (DVB-T/DVB-T2/DVB-C)	RF input – 75 ohm F-connector for monitoring terrestrial and cable TV signals. Supported standards are DVB-T, DVB-T2 and DVB-C.
1PPS:	1PPS reference clock input – 50 ohm SMA female

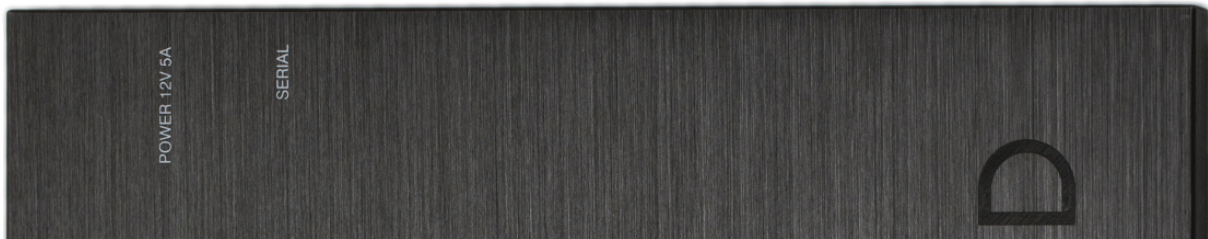


Figure 4.3: NOMAD back connectors

The NOMAD module is equipped with the following connectors on the back:

POWER 12V 5A:	The power input to the probe. Only use the included 12V/5A power supply
SERIAL:	USB serial port emulator for initial set-up of the probe – Type A

4.3 Powering up the Unit

For the NOMAD, connect the power supply to the mains source and the power supply to the probe. The diodes should then light up and the unit will boot.

Note that it will take some time from power-up until the modules can be accessed via the management interface – typically the start-up may take up to two minutes.

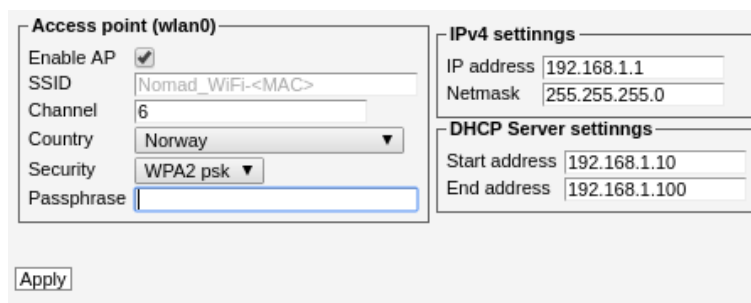
4.4 Initial Configuration

There are three alternative ways of performing an initial configuration of the probe module:

1. Via the built-in NOMAD wireless management network
2. By using the preconfigured IP address of the probe management port
3. Via serial console emulated over USB

For most users the one of the first two methods will be the easiest.

4.4.1 Initial Configuration Using the Built-In Wireless Network



The screenshot shows a web interface for configuring the 'Access point (wlan0)'. It includes fields for 'Enable AP' (checked), 'SSID' (Nomad_WiFi-<MAC>), 'Channel' (6), 'Country' (Norway), 'Security' (WPA2 psk), and 'Passphrase'. To the right, there are 'IPv4 settings' (IP address: 192.168.1.1, Netmask: 255.255.255.0) and 'DHCP Server settings' (Start address: 192.168.1.10, End address: 192.168.1.100). An 'Apply' button is at the bottom left.

Figure 4.4: Configuring the NOMAD wireless network

A brand new NOMAD is accessible as a passwordless Access Point and requires initial configuration in order to secure access to it. For that reason the first time you boot up your device and open WebUI, it will suggest to change the Access Point settings before you proceed further. After you connect to your NOMAD's Access Point, the popup window with the WiFi initial configuration appears. If it has not happened open a browser manually and go to <http://192.168.1.1/>. This will open the initial configuration page, as shown in figure 4.4.

If you do not want to use wireless access to your NOMAD, just disable the Access Point (see figure 4.4) and apply settings.

It is strongly recommended to change the default settings and set at least security method and password.

Also it is a good idea to store a bookmark in your browser pointing to your NOMAD, since you may forget its address over the time and will have to connect to it using an alternative method (e.g wired network interface).

Please refer to chapter 7.15.6 for more details on how to configure the wireless network.

4.4.2 Initial Configuration Using the Pre-Set IP-Address

The NOMAD modules are shipped with the following factory settings for the wired management interface:

Management (eth1) IP address:	10.0.20.101
Management (eth1) subnet mask:	255.255.0.0

In order to connect to the eth1 management port, the PC used for set-up should have corresponding network settings. Typically a lap-top PC is used for initial configuration. Connect directly to the device's eth1 management port using an Ethernet cable.

For Windows, the network parameters are set in the **Control Panel — Network and Internet — Network and Sharing Center — Network Connection — Properties — Internet Protocol Version 4 Properties** view, as shown in figure 4.5. Select the user-defined address, and set the PC's IP address to 10.0.20.100 and the subnet mask to 255.255.0.0.

When the IP address of the PC has been set to match the NOMAD factory setting, the permanent network settings can be configured through the NOMAD web browser interface. Refer to sections 4.4.4 and 7.15.5 for details on how to launch the NOMAD graphical user interface and how to set the network parameters.

4.4.3 Initial Configuration Via Serial Console Emulated Over USB

If the NOMAD for some reason cannot be reached through Ethernet or Wireless communication, the initial set-up may be performed via serial console emulated over USB. For the initial set-up, you must do the following:

1. Installing a driver for the USB communication, if not already supported by the operating system
2. Setting the management IP address

Most operating systems will have native support for the FT232 driver needed. When a USB cable is connected between a PC and the NOMAD, the operating system will detect a new USB device.

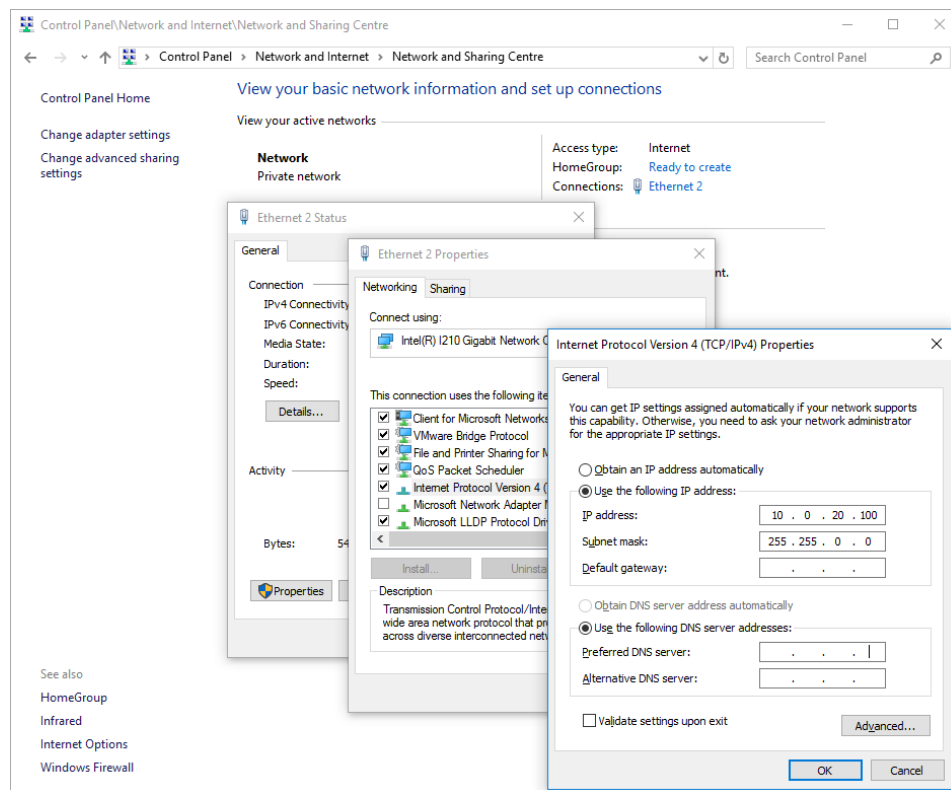


Figure 4.5: Setting the IP address manually in Windows

For Windows, the new device will appear as a COM port in the **Device Manager** view as shown in figure 4.6.

If your operating system does not detect the NOMAD, you may have to download and install a driver for it. The driver may be downloaded directly from the chip manufacturer at <https://www.ftdichip.com/>. Select first Drivers, then VCP followed by the operating system (VCP is short for Virtual COM Port).

If it is not already connected, connect the USB cable between the USB port on the probe and a USB port on the PC.

Start a terminal program. Windows XP users can use Hyperterm, Linux users can use minicom. For modern versions of Windows, that do not ship with a terminal program, the free application **PuTTY** may be downloaded from <https://www.chiark.greenend.org.uk/~sgtatham/putty/>.

Select the new COM port that should appear as the USB cable is plugged in (Linux users should check /var/log/messages to see what device to use) and establish a serial connection to the NOMAD using these communication parameters:

- Baud rate: 9600
- Data bits: 8

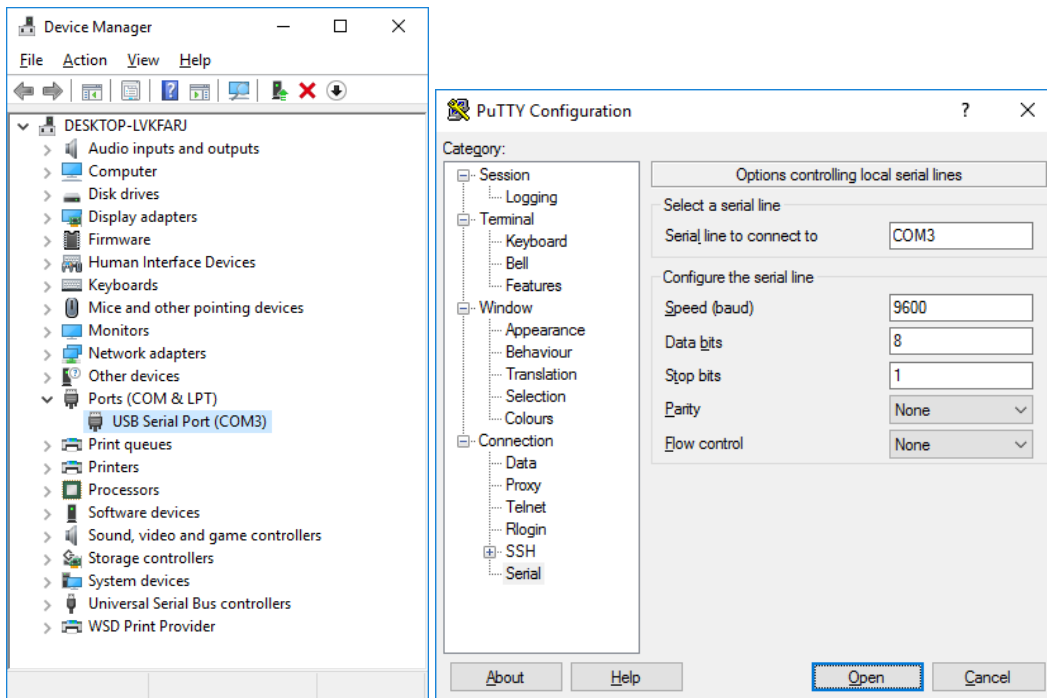


Figure 4.6: Connecting to the serial console over USB

- Parity: None
- Stop bits: 1
- Flow control: None

Press **[Enter]** a few times to bring up the login prompt. Log in using the user name **admin** and the password **elvis** (this password can be changed in the **Setup — Security — Password** view).

A simple text based menu system like the one in figure 4.7 should now be displayed. The actual menu displayed may appear different depending on the software version and license. To change a setting, press the appropriate character from the left-most column, enter the new value and confirm by pressing **[Enter]**. If DHCP is enabled, you can find the currently assigned IP address by selecting the **ethStatusDoc** option.

The NOMAD is equipped with two network interfaces called management (or eth1) and data/video (or eth0). It is necessary to configure at least one of these interfaces from the terminal and then do the rest of the setup from a web browser. Depending on the installed license, an additional data interface, labeled data2 (eth2), may also be available.

The NOMAD supports both in-band management (i.e. using eth0 for both data/video and management) and separate management (i.e. using eth1 for management). In any case make sure that the subnets configured for the network interfaces do not overlap – otherwise the probe will not work

```
Menu: /ewe/probe/core/setup/ethernet/
=====
<0> Back      <9> Exit
<1> ethStatusDoc
-----
<A> data_medium      - Copper          Input for the video traffic
<B> data_dhcp        - false           RJ45 data port (eth0) DHCP
<C> data_ipa         - 10.0.30.101      RJ45 data port (eth0) IP address
<D> data_mask        - 255.255.255.0    RJ45 data port (eth0) netmask
<E> data_gateway     - 10.0.30.1        RJ45 data port (eth0) IPv4 GW
<F> data_management  - true            RJ45 data port (eth0) web-server
<G> dhcp             - false           Management port (eth1) DHCP
<H> ipaddress        - 10.0.20.101      Management port (eth1) IP address
<I> netmask          - 255.255.255.0    Management port (eth1) netmask
<J> mm_gateway       - 10.0.20.1        Management port (eth1) IPv4 GW
<K> management       - true            Management port (eth1) web-server
<L> gateway_interface - eth0            Force default interface
<M> hostname         - gbprobe         Host name to use for device
<N> dns_server       - 208.67.222.222   DNS Server
<O> reboot           - false           Reboot is required for changes
-----
```

Figure 4.7: Text-based menu displayed when connecting over USB

properly. If the IP addresses for network interfaces are configured so that the subnets overlap, the settings will be automatically reverted by the NOMAD.

To configure the management interface, edit values for `ipaddress`, `netmask` and `mm_gateway` or enable `dhcp` instead.

Make sure *Management* is enabled (set to true) – otherwise management via web will not be possible.

To configure the data/video interface, enter values for `data_ipa`, `data_mask`, `data_gateway` or alternatively enable `data_dhcp`. Set `data_management` to true to enable web access via the data interface.

When all the listed parameters have been configured, the probe must be rebooted to let the parameters take effect. This is achieved by selecting the **reboot** option and confirming by selecting ‘t’ for TRUE.

4.4.4 Verifying Correct Initial Setup of the NOMAD

Once the probe management network interface have been configured, all further configuration takes place using a web browser over HTTP.

Launch a web browser application on the management PC. The following web browsers are supported:

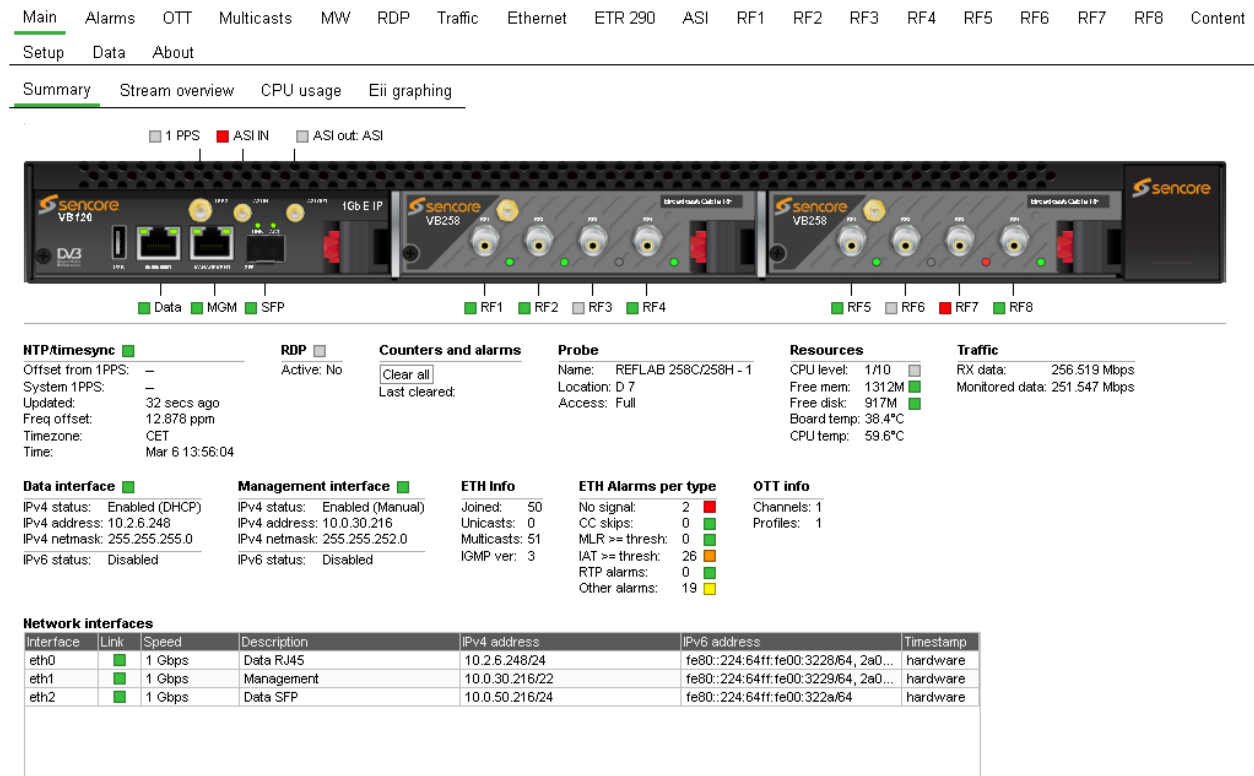


Figure 4.8: Web-based management view

- Google Chrome
- Mozilla Firefox
- Microsoft Edge
- Apple Safari

Type the IP address of the probe in the browser URL field and press . The IP address of the probe is that of the WiFi or Ethernet ports as set in the initial set-up procedure.

The default management view should be displayed inside the browser. The NOMAD interface is shown in figure 4.8. Some functionality may require additional licenses to be installed.

4.4.5 Initial Setup Troubleshooting

If there are problems bringing up the probe web-based management interface, verify the following:

- Verify that the WiFi dongle is inserted and its LED is blinking (in case you can not find the default Access Point and/or you can not connect to it). Try to pull out the dongle and insert again. Reboot the probe if it does not help.

- Verify that the laptop and the probe are configured on the same subnet and that they have different addresses. The network settings of the probe can be verified through RS232/USB as described earlier
- Make sure that the IP address of the gateway and the network interface are not the same
- Verify that the appropriate Ethernet link indicators of the PC and probe are lit
- Verify that web browser proxy settings are not interfering
- Verify that local firewall settings on the laptop are not interfering
- Make sure that the management and data/video subnets do not overlap (even if only one is physically connected)
- Make sure the probe was rebooted to activate the new settings
- Clear the browser's cache

5 QUICK SETUP GUIDE

This quick setup guide is intended to provide a step-by-step explanation of how to setup a probe once the initial setup has been performed (as described in chapter 4).

All of the probe configuration options are available from the **Expert** view, which can be reached by selecting the **Expert** option in the navigation menu in the top left corner of the screen. More detailed instructions on how to configure the probe are found in chapter 7 of this manual.

The Return Data Path and Full Service Monitoring features are not covered by this quick setup guide.

5.1 Basic Setup

1. Set appropriate parameters in the **Setup — Params** and **Setup — Ethernet** views.
2. Enabling Time synchronization is strongly recommended, this can be done in **Setup — Params**. If no time reference for automatic time locking is available set the time manually in the **Setup — Time** view.
3. If access control is required, first log in as the **admin** user using the **Setup — Login** view, and then define users and password and configure firewall settings in the **Setup — Security** view.

Note: it is important to read the instructions in the associated sections of this manual, see chapters 6.6 and 7.15.14.

5.2 Input Signal Definitions

5.2.1 Demodulator Inputs

1. Define one frequency in the **COFDM/QAM/VSF/RF/SAT — Tuning setup** view. As a start the threshold templates named **Default** can be used (for ATSC signals use **ATSC Default** as the ETR threshold).
2. Verify proper reception of signal under the **COFDM/QAM/VSF/RF/SAT — Status** view.
3. Use the **Import tuning from NIT** feature to automatically add frequencies as signaled in NIT or add the remaining frequencies manually.

5.2.2 ASI Input

1. Set appropriate parameters in the **ASI — Setup** view. As a start the threshold templates named **Default** can be used (for ATSC signals use **ATSC Default** as the ETR threshold).

5.2.3 Multicasts

1. Define multicasts using the **Multicasts — Streams** view. You can also import multicast lists from another probe using the **Data — Configuration** view, or add them automatically either by using the multicast detect feature in the **Multicasts — Detect** view, or from SAP announced streams using the **Multicasts — SAP** view.

Note: Often upstream equipment will not transmit multicasts unless join messages have been received, and in this case it will usually not be possible to detect multicasts automatically.

Select predefined threshold templates that seem appropriate for the signal.

Note: The sequence of the multicast definitions will be reflected in monitoring, so order the multicasts correctly if required. Also note that ETR 290 monitoring for Ethernet streams is disabled by default, so if this is required, it will have to be enabled by the user (on a per-stream basis).

2. Define stream page name(s) in the **Setup — Pages** view (not strictly necessary).
3. Join multicasts in the **Multicasts — Join** view or in the **Multicasts — Streams** view.

5.2.4 OTT Input (OTT Engine Option Only)

1. Define the OTT channel manifest URLs and channel names in the **OTT — Channels** view. Leave the Threshold and VBC threshold settings at default values for now. Remember to tick the Enable box in the dialog box. If you have multiple OTT engines installed (1 to 5 are allowed) then select which engine to assign to the channel. Any number of OTT channels can be assigned to each OTT engine. Each engine works in parallel to each other.

Note: When monitoring both multicast (UDP) and OTT (TCP) traffic, we recommend using different network interfaces. Mixing the two traffic types on the same network can have unwanted impact on the monitored signals. The interface used for OTT traffic is controlled using the **Setup — Routing** view.

2. Define stream page name(s) in the **OTT — Settings** view (not strictly necessary).
3. Inspect the OTT monitoring progress using the **OTT — Active testing** dialog. Useful information on OTT monitoring can be found in Appendix C.

5.3 Monitoring

When input signal parameters have been set, the signals may be monitored.

For Ethernet multicasts the relevant monitoring views are **Streams**, **Alarms** and **MW** in the main graphical user interface, as well as the **Main**, **Alarms**, **Multicasts**, **MW**, **Traffic** and **Ethernet** views in the expert graphical user interface. If the probe is equipped with the ETR 290 and/or the OTT option then the views **ETR 290** and **OTT** are of relevance as well.

For ASI input the relevant monitoring views are **Streams** and **Alarms** in the main graphical user interface, and the **Alarms**, **ETR 290** and **ASI — Status** views in the expert graphical user interface.

For demodulator inputs the relevant monitoring views are **Streams** and **Alarms** in the main graphical user interface, and the **Alarms**, **ETR 290** and **COFDM/QAM/VSB/RF/SAT — Status** views in the expert graphical user interface.

Ethernet monitoring hints are found in B Appendix: Monitoring Practices.

5.4 Adjusting Alarm Thresholds

When the probe inputs and streams have been defined using default thresholds, the result will usually be a number of more or less permanent alarms, some which may not be relevant under the current circumstances. In order for the user to get rid of unwanted alarms, the probe provides alarm filtering functionality in the form of alarm thresholds and alarm on/off selection.

Multicasts

By default Ethernet thresholds are set to raise alarms when service affecting errors occur, that are caused by the network. There may however be reasons for these thresholds to be altered, for instance to reflect receiver robustness in the case of IAT, or to reflect a TS into IP mapping different from the default (7TS/UDP). Creating a new threshold template is done either by copying an existing one and altering the copy, or by creating a new threshold template from scratch. The Ethernet thresholds are defined in the **Multicasts — Ethernet thresh.** view. These thresholds are associated with streams in the **Multicasts — Streams** view.

In addition to the miscellaneous thresholds, that affect only the streams with which they are associated, the **Alarm — Alarm setup** view allows the user to enable and disable alarms on an overall basis. You can also define the alarm severity levels for different alarms in this view.

OTT

When an OTT channel is defined the default OTT threshold template is assigned to it. To change threshold values create one or more new templates in the **OTT — Thresholds** view and assign them to OTT channels in the **OTT — Channels — Edit** view.

ETR 290

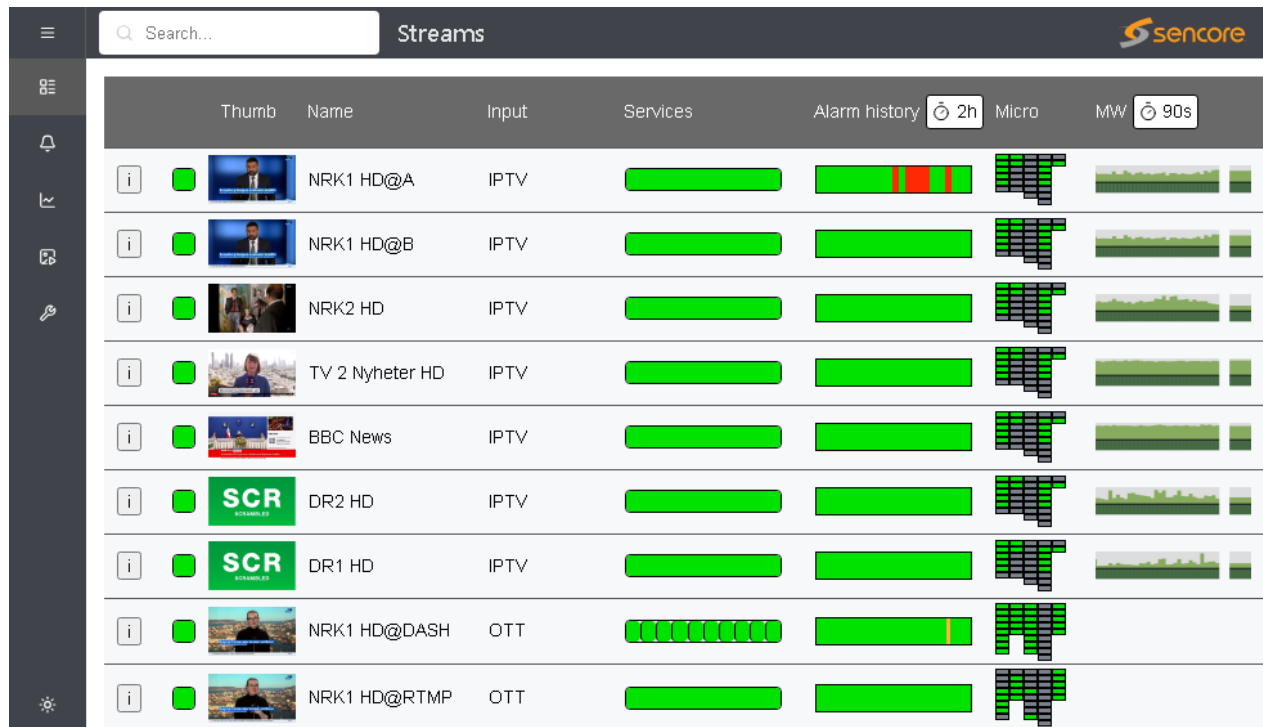
By default the streams configured in the probe will be set up to use the ETR 290 threshold named **Default**. This has the most important alarms enabled but have been adjusted to match real world systems and only alarm on more severe problems. The threshold named **ETSI TR 101 290** is based on the ETSI TR 101 290 guidelines and are fairly strict generating more alarms. The ETR 290 thresholds should be changed if there are tables that are not relevant for a system, or if the user requires alarm functionality that exceeds the ETR 290 guidelines. The ETR engines has a lot of powerful functionality not enabled by default, for instance the ability to raise alarms if the number of services present in a signal is lower than a preset limit.

The default PID and service thresholds do not affect alarming at all, they are completely transparent. The thresholds may be altered for instance in order to mask an alarm generated by an unreferenced PID or to ensure an alarm is raised if a service or PID bitrate is outside preset limits.

Creating a new threshold template is done either by copying an existing one and altering the copy, or by creating a new threshold template from scratch. The thresholds are defined in these views: **ETR 290 — ETR thresh.**, **ETR 290 — PID thresh.**, **ETR 290 — Service thresh.**, and **COFDM/QAM/VSB/RF/SAT — RF threshold**.

The thresholds are associated with streams in these views: **ASI — Setup**, **Multicasts — Streams — Edit** and **COFDM/QAM/VSB/RF/SAT — Tuning setup**.

6 NOMAD PORTABLE PROBE GRAPHICAL USER INTERFACE



The NOMAD web interface is reached by pointing a web browser to the IP address of the NOMAD as shown in the screenshot above. The following web browsers are recommended:

- Google Chrome
- Mozilla Firefox
- Microsoft Edge
- Apple Safari

Note that different web browsers behave differently with respect to memory leaking, and if the NOMAD GUI should be available at all times the browser should be selected carefully. A browser memory leak manifests itself as the browser responding more and more slowly, and this is corrected by closing down the application and restarting.

The interface is easy and intuitive to use. The interface is divided into analysis and monitoring/configuration. The analysis interface is what greets you first when you connect.

The navigation menu is located in the top left corner and can be made visible or hidden by clicking the navigation menu button, which is indicated with three horizontal lines ($\equiv$) and accessible from any page. The navigation menu consists of several different icons that will help you navigate to the preferred view. These views are documented below.

The web interface has been designed to be resizable in both vertical and horizontal directions with a minimum screen resolution of 1280×800 pixels. For operational use it is however highly recommended that a higher screen resolution is used.

Tool-tips are available for most buttons and labels. To access tool-tip information simply navigate your cursor towards a button or a label and leave it hovering for a second or two.

The NOMAD web interface can be displayed in a dark or a light theme, where the dark theme is the default. Pressing the theme selector at the bottom left of the user interface switches between these two modes. The display mode is remembered across sessions, until the browser's session data is cleared. In this User's Manual, screenshots are taken using the light theme, to be friendlier on the environment when printing.

In this manual the term stream is generally used instead of the terms multicast and/or unicast. A stream may thus contain a single service or multiple services.

The **Streams** view is the default view and displays a list containing all monitored streams, across the different input types.

The following information is displayed for each stream:

①: Click the information icon to access stream details.
For multicasts and tunings, this will open the **Stream details** view, which is described below.
For OTT channels, this opens the **OTT details** view described in the following chapter.

Status bulb:	A bulb indicates the current status of the stream, i.e. the most severe alarm status: • Green: OK • Yellow: Warning • Orange: Error • Red: Major • Black/Dark red: Fatal
Thumb:	If thumbnail extraction has been enabled, a thumbnail is displayed for the stream if supported. Thumbnail decoding is a process asynchronous of the analysis and therefore should not be expected to be updated at the same time. The main purpose of the thumbnails is to provide brief information about the channel contents. If the stream is a multi-program transport stream (MPTS), the thumbnail displayed will cycle between all unencrypted services contained in the stream. For OTT channels, the profile selected in the Thumbnails tab of the OTT details pop-up is displayed.
Name:	The configured name of the stream, tuning or channel is displayed here.
Input:	Input type of the stream.
Services:	The stream health bar displays the current status for individual services (TS) or profiles (OTT) inside the stream. A Single Program Transport Streams (SPTS) or an OTT channel with a single profile will show only a single bulb in this column. Hover over the individual status bulbs with your cursor for information on which bulb represents which service or profile. Each bulb color represents the alarm severity level as configured under Alarms — Alarm setup.
Alarm history:	The alarm graph displays the alarm status over time in the form of a status timeline. The timeline bar shows the most severe alarm for all the services (TS) and profiles (OTT) inside the streams for a time span of 120 minutes, 24 hours or four days as selected by clock button at the top of the Alarm history column. The bar color is either green for OK or colored in accordance with the alarm severity if an alarm has occurred. Refer to section 7.2.2 for a description of the alarm color representation.
Micro:	This columns displays the status of the stream in a condensed view. For multicasts and tunings monitored by an ETR 290 engine, the MicroETR overview is displayed here. For more information on how to read the MicroETR, please see chapter 7.9.1). This field is blank if ETR 290 monitoring has not been enabled for this stream. For OTT channels, a minimized view of the alarm overview from the the OTT Alarms view is displayed.

MW: This column displays a minimized version of the Media Window for the stream. Please see chapter 6.3 for full details on the Media Window display. The Media Window displays information for a time span of 90 seconds, 90 minutes, 8 hours, 24 hours or four days as selected by clock button at the top of the MW column. Media Window display is only available for multicast sources.

Note: ST 2022-7 combined streams are not shown in this view, information about these streams can be found in the **Expert** view under **Main — Stream overview** and **Multicasts — Paramaters**.

6.1.1 Stream details view

BBC News





Iran War latest

Israel orders 50 towns and villages in eastern and southern Lebanon to evacuate

Scan QR code for live updates

PSI/SI ETR **MW**

PID	Type	Language	Content
1221	Teletext	eng	-
2091	H264 Video		SIZE 1920x1080 PIXEL ASPECT RATIO 1:1 SAMPLING FORMAT YCbCr 4:2:0 INTERLACED No COLOR PRIMARIES BT.709 MATRIX COEFFICIENTS BT.709 ASPECT RATIO 16:9 CODEC h264 FRAME RATE 25 fps RANGE Narrow range TRANSFER CHARACTERISTICS BT.709
2092	AC-3 Audio	eng	AUDIO CODEC ac3 LAYOUT stereo SAMPLE RATE 48000 CHANNELS 2 CHANNEL ORDER L, R

SID	Name	Provider	PIDs
5001	BBC News	Globecast	1221,2091,2092

Close Open in tab

This view presents a large thumbnail and detailed information about the selected multicast or tuning setup. If the stream is a multi-program transport stream (MPTS), the thumbnail displayed will cycle between all unencrypted services contained in the stream.

By clicking the **Open in tab** button, a new browser tab will appear. This separate tab can be used to display the selected channel even when navigating away from the probe. This also provides the ability to monitor media windows for several streams without starting several browser sessions. Clicking the **Close** button will close the pop-up view.

Below the thumbnail, several tabs are available, displaying different properties of the stream.

6.1.1.1 PSI/SI

This view displays information about the PIDs and services that make up the stream. The information is divided into two data tables.

<i>PID info</i>	
PID:	The PID for which the following parameters apply.
Type:	The type description of the associated PID.
Language:	The language for the content of the PID, if specified.
Content:	Detailed content of the data carried in the PID, if the probe has been configured to decode it. For video PIDs, the information displayed is the same as described in the Video tab of the service view pop-up. For audio PIDs, the information displayed is the same as described in the Audio tab of the service view pop-up.
<i>Service info</i>	
SID:	The service ID for which the following parameters apply.
Name:	The name of the tuning or multicast that is being displayed, as defined by the user.
Provider:	The service provider name as found in SDT. If service information is not available in SDT, or when in ATSC mode, this information is not available.
PIDs:	A list of the PIDs associated with this service.

6.1.1.2 ETR

PSI/SI
ETR
MW

☒ TS sync
☒ Sync byte
☒ PAT
☒ Continuity
☒ PMT
☐ Missing PID

☒ Transport
☒ CRC
☐ PCR
☐ PCR accur. (1 / 1)
☐ PTS
☐ CAT

☐ NIT
☐ SI Rep Rate
☐ Unref PID
☐ SDT
☐ EIT
☐ RST
☐ TDT

☐ CA system
☒ PID min. bitr.
☒ PID max. bitr.
☒ PID checks
☒ Service min. bitr.
☒ Service max. bitr.
☒ Service checks
☐ MIP
☐ Gold TS
☐ Time information

☐ T2MI
☒ Interface overflow

MON STATE
Currently monitored

MON START
10:34:16 (1 h, 54 m ago)

MON END

MON TIME
1 h, 54 m

TOTAL BITRATE
6.83 Mbps

EFFECTIVE BITRATE
6.83 Mbps

TS ID
7

NUM SERVICES
1

NUM PIDS
10

LAST CLEARED
10:34:16

LAST ERROR
Never

ETR THRESHOLD
Default

PID THRESHOLD
Default

SERVICE THRESHOLD
Default

VBC THRESHOLD
Default

GOLD TS THRESHOLD
[None]

This tab is displayed if the stream is being monitored by an ETR 290 engine, and shows an expanded view of the MicroETR available in the streams list, as well as detailed monitoring parameters.

The ETR 290 parameters are grouped into five different categories. The first three groups are defined in the ETSI TR 101 290 guidelines. The fourth category contains checks defined by Sencore allowing CA system checks, custom PID and service checks and the Gold TS reference checks. The last category contains checks of the input interfaces such as RF measurements for demodulators.

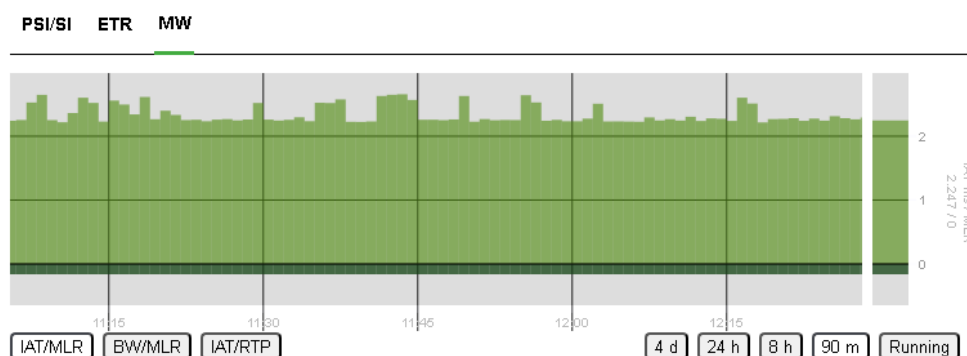
For each check a bulb indicates the current status of that parameter check: green indicates status OK, whereas red indicates an active alarm. When the probe has not yet received data relevant for a particular check, the corresponding bulb is white. Grey color indicates that the check has been deactivated (as set in **ETR 290 — ETR thr. — Edit**).

Monitoring details

Mon state:	Indicates whether the stream is being currently monitored or not. When the ETR engine is operating in round-robin mode, streams are not constantly monitored, please see chapter 7.9 for details.
Mon start:	Shows when the ETR 290 engine started monitoring the stream.
Mon end:	When in round-robin mode, shows when the ETR 290 stopped monitoring the stream.
Mon time:	Shows for how long the stream has been monitored.
Total bitrate:	The total bitrate of the transport stream (including null packets, bits/s).
Effective bitrate:	The effective bitrate of the transport stream (excluding null packets, bits/s).
TS ID:	The transport stream ID as specified in the PAT table.
Num services:	The number of services found in the transport stream.

Num PIDs:	Number of PIDs in the transport stream.
Last cleared:	Shows when status was last cleared for the stream.
Last error:	Shows when the ETR engine last reported an error for the stream.
ETR threshold:	The name of the service ETR threshold template assigned to the stream.
PID threshold:	The name of the service ETR PID threshold template assigned to the stream.
Service threshold:	The name of the service threshold template assigned to the stream.
VBC threshold:	The name of the VBC threshold template assigned to the stream.
Gold TS threshold:	The name of the Gold TS reference threshold assigned to the stream.

6.1.1.3 MW



This tab is only available for multicast sources and displays an expanded version of the Media Window for the stream. Please see chapter 6.3 for full details on the Media Window display.

Use the buttons in the lower left corner of the dialog to select between the different type of Media Window displays.

The Media Window displays information for a time span of 90 seconds, 90 minutes, 8 hours, 24 hours or four days as selected by clicking the time selection buttons in the lower right corner of the dialog.

6.2 Alarms

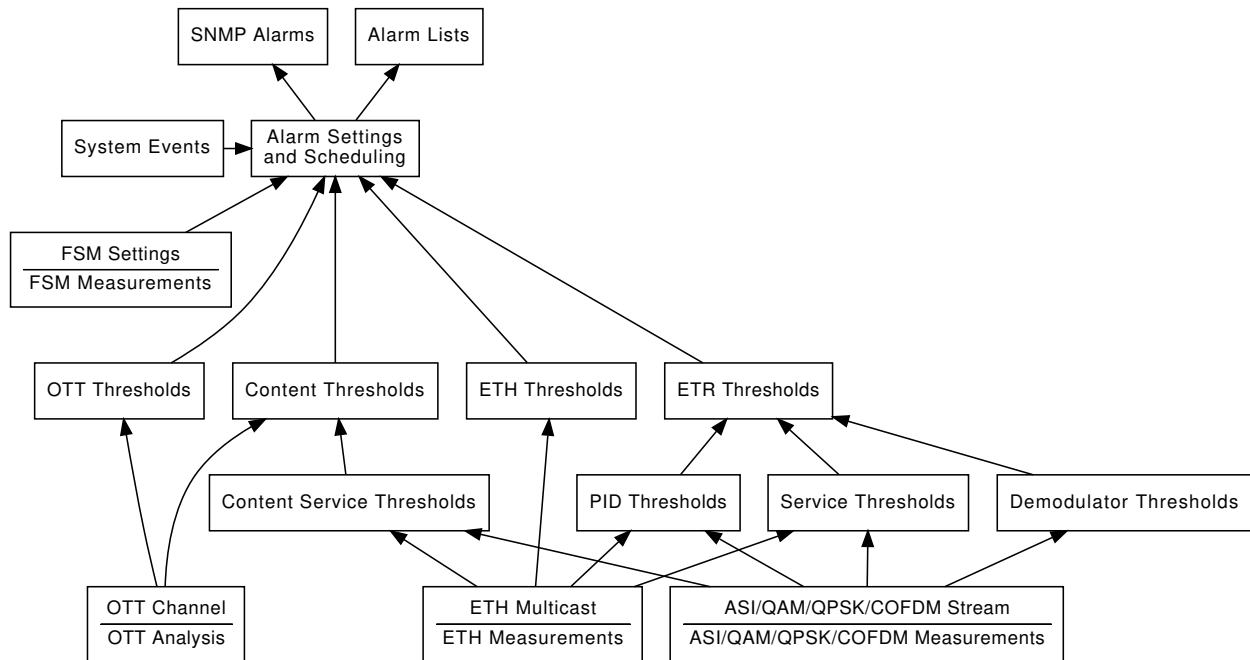


Figure 6.1: Alarm handling in the NOMAD.

Figure 6.1 shows an overview of the alarm handling in the NOMAD. It is useful to obtain an understanding of the alarm processing of the NOMAD – in particular how threshold settings and alarm setup will affect alarm handling.

The NOMAD continuously compares measurement data with user-defined thresholds in order to generate alarms. These alarms are further checked against the settings defined in the **Alarms — Alarm setup** view, and the resulting alarms are presented in the alarm lists. If configured to do so, these alarms will also be sent as SNMP traps to support third party management systems. Refer to Appendix: NOMAD Versus VBC Alarms for a description of alarm handling in the VideoBRIDGE Controller.

The NOMAD distinguishes between events and alarms. The ETR software module will always generate alarms and the Systems software module will always generate events. The Ethernet software module will by default generate events for errors that are resolved within 1 second, otherwise it will generate alarms. This can be overridden by checking the ‘Treat Ethernet events as alarms’ box in the **Setup — Params** view. The OTT module generates alarms only.

6.2.1 Alarm list

Status ↑	Severity	Time	Type	Stream	Description
Active	■	2026-03-05 12:56:33	CNT	NRK1 HD@DASH	MOS below threshold (profile Video: avc1.4d4020 1280x720)
Cleared	■	2026-03-05 12:56:18	CNT	NRK1 HD@RTMP	Audio silence detected (profile RTMP Live) (Mar 5 12:56:08 - Mar 5 12:5...
Cleared	■	2026-03-05 10:31:01	CNT	NRK1 HD@MC:NRK1 HD	MOS below threshold (Mar 5 10:30:01 - Mar 5 10:31:01)
Cleared	■	2026-03-05 10:29:30	OTT	NRK1 HD@DASH	Fewer than minimum number of profiles (Mar 5 10:27:15 - Mar 5 10:29...
Cleared	■	2026-03-05 10:29:00	CNT	NRK1 HD:NRK1 HD	MOS below threshold (Mar 5 10:27:01 - Mar 5 10:29:00)
Cleared	■	2026-03-05 10:26:31	OTT	Audio wdr sportschau hls lig...	HLS playlist URLs unstable, switch to HLS mode "Monitor profile manife...
Cleared	■	2026-03-05 10:26:31	OTT	Audio wdr sportschau hls lig...	HLS playlist URLs unstable, switch to HLS mode "Monitor profile manife...
Cleared	■	2026-03-05 10:26:21	CNT	DELUXE MUSIC:DELUXE MU...	MOS below threshold (Mar 5 10:25:00 - Mar 5 10:26:21)
Cleared	■	2026-03-05 10:26:21	CNT	DELUXE MUSIC:DELUXE MU...	Wrong PAR. 32:17 (Mar 5 09:55:17 - Mar 5 10:26:21)
Cleared	■	2026-03-05 10:26:21	CNT	TV3 HD (N):TV3 HD (N)	MOS below threshold (Mar 5 09:27:01 - Mar 5 10:26:21)
Cleared	■	2026-03-05 10:26:21	CNT	UHD1 by ASTRA / HD+:UHD...	MOS below threshold (Mar 5 10:26:00 - Mar 5 10:26:21)
Cleared	■	2026-03-05 10:25:01	CNT	UHD1 by ASTRA / HD+:UHD...	MOS below threshold (Mar 5 10:17:01 - Mar 5 10:25:01)
Cleared	■	2026-03-05 10:23:58	CNT	SES UHD Demo Channel	IDR PTS gap outside of threshold (124 ms) (Mar 5 10:23:57 - Mar 5 10:...
Cleared	■	2026-03-05 10:20:55	CNT	SES UHD Demo Channel	IDR PTS gap outside of threshold (124 ms) (Mar 5 10:20:54 - Mar 5 10:...
Cleared	■	2026-03-05 10:20:01	CNT	DELUXE MUSIC:DELUXE MU...	MOS below threshold (Mar 5 10:17:01 - Mar 5 10:20:01)

Displaying 46 alarms

The **Alarms** view allows the user to see an updated list of current and past alarms. All alarm types and events are listed here. The search field at the top can be used to filter alarms by stream name or description. By default, the view shows the most recent active alarms first, but you can sort the list by any parameter in the columns.

For additional options, such as displaying an offline list or showing only a single alarm type, the **Alarm list** in the **Expert view** can be used. To configure alarm settings (for example, adjusting alarm severity), the **Alarm setup** is used.

Alarm list

Status: The status of the alarm, either "Active", "Cleared" or "Event".

Severity: The severity of the alarm, classified as either **OK**, **Warning**, **Error**, **Fatal** or **Event**. Each level is shown by a colored bulb, with the following mapping:

- Green: OK
- Yellow: Warning
- Orange: Error
- Red: Major
- Black/Dark red: Fatal

The severity level of an alarm can be changed in Alarm Setup.

Time: The timestamp indicating when the alarm was triggered. For cleared alarms the parameter shows the time range during which the alarm was active.

Type:	The alarm type category. They can either be: CNT Content alarms ETH Ethernet alarms ETR ETR 290 alarms FSM Full service monitoring & Microbitrate alarms LOG Event log OTT OTT alarms SYS System events
Stream:	The name of the stream that triggered the alarm.
Description:	A description detailing the alarm.

For more information about each alarm and their default configuration see **Alarm setup**.

6.3 MW (Media Window)



The **MW** Media Window view provides an at-a-glance status for each of the multicasts/unicasts being monitored. From the graphs it is easy to see the jitter characteristics of the signal and if there is packet loss or CC errors present in the signal. Periods of no signal are also displayed.

The measurements are always aggregated over a time interval – typically one second. The IAT(max) is the maximum time measured between two neighboring IP frames within the measurement time interval (the peak packet Inter-arrival time). IAT is expressed in milliseconds.

The MLR is the peak estimated number of lost MPEG-2 Transport Stream packets inside any second within the actual time period. The number of lost TS packets is derived from the continuity counters inside the TS packet headers.

A common scenario is to have 7 TS packets per UDP frame. Losing an IP packet will therefore usually (but not always) result in an MLR of 7 (not always the case because some TS packets such as null packets or PCR packets do not carry a valid CC field).

The patented Sencore VideoBRIDGE **Media Window** presents both jitter and packet loss measurements in one graph, with jitter (IAT) values growing upwards (+ve Y) and packet loss (MLR) growing downwards (-ve Y). Each sample along the x-axis corresponds to a measurement time-interval that depends on the range of the graph selected. Periods of no sync are also displayed in the graph.

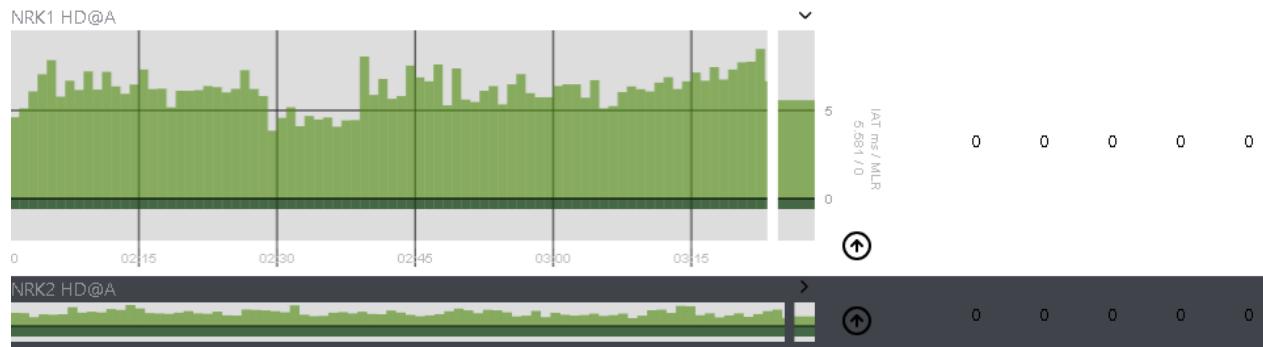
Error-second statistics for the graph-interval is displayed to the right.

The current graph value displayed as the column next to the **MW** provides the maximum MLR and IAT values measured during the last second.

Red color is used to indicate that within the period represented by the bar there has been one or more occurrences of no-signal. Orange is used to indicate error while yellow indicates warning. The error and warning thresholds are allocated to each multicast in the **Multicasts — Streams** view.

The **MW** displays all joined multicasts in the list by default. The drop-down menu at the bottom left can be used to choose only joined multicasts of one page (or switch back to **All pages**). The time window buttons allow selection of x-axis resolution in the graphs. Displaying either **MW** for the last 4 days, the last 24 hours, the last 8 hours, the last 90 minutes or a live stream by clicking 'Now'. The 'Now' graph goes back 90 seconds. The 24 hours view is selected as a default.

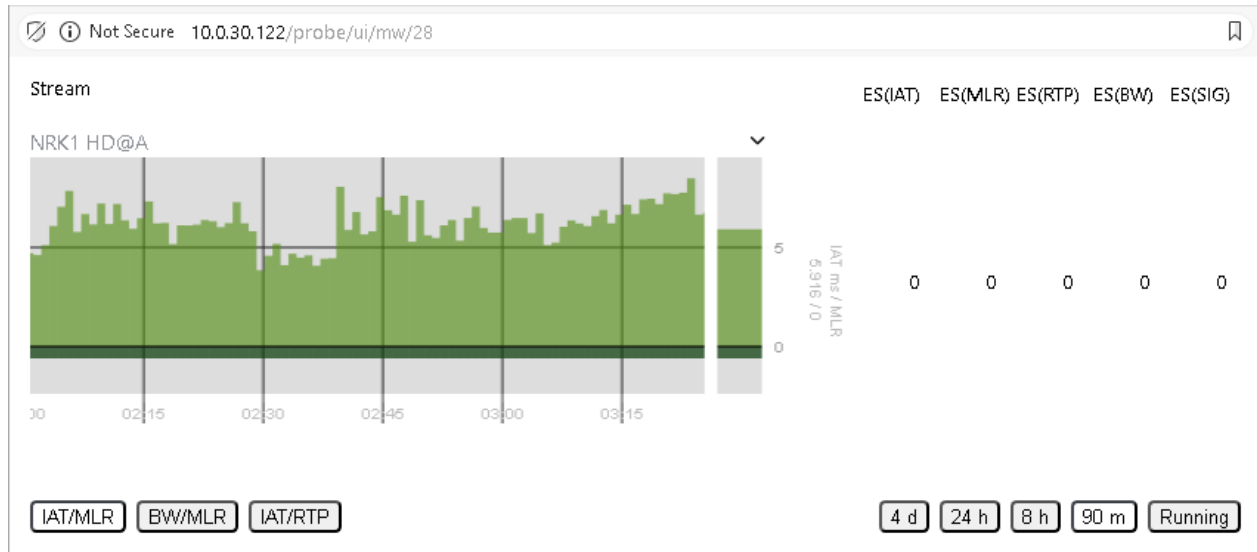
By choosing different resolutions the user can pinpoint more accurately when errors occurred.



Clicking one of the graphs will expand it. The expanded version of the **Media Window** reveals more details than the compressed version.

The search field at the top of the page can be used to filter the list by stream name.

6.3.1 Media Window — Selected channel

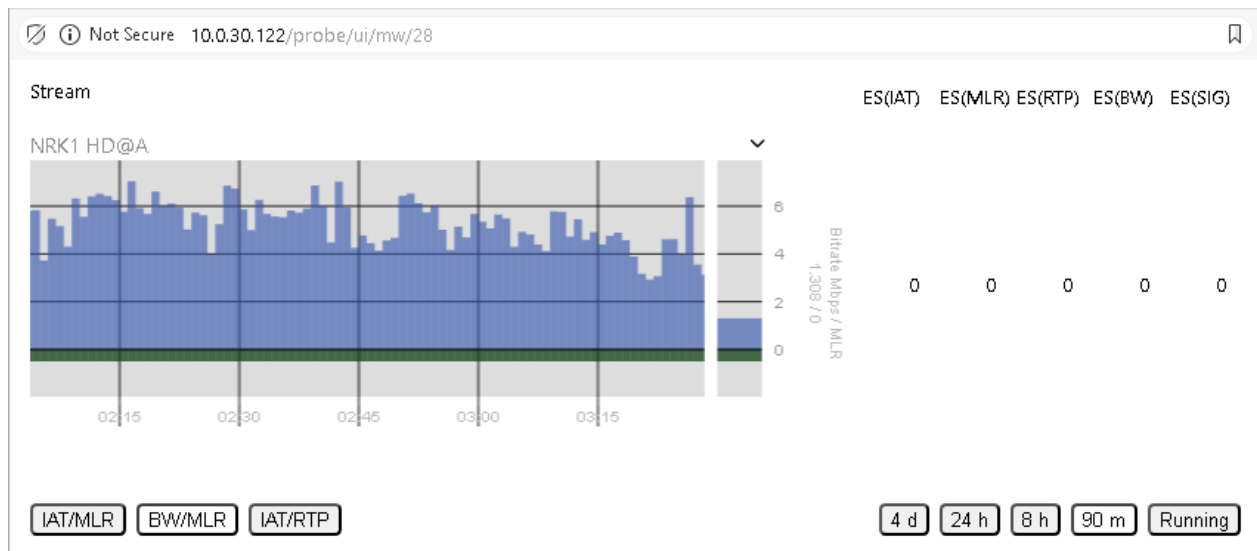


The **Media Window — Selected channel** view is activated by clicking the upward pointing arrow next to the graph. It will open a pop up that shows the **MW** for one stream only.

This separate window can be used to display the selected channel even when navigating away from the probe. This also provides the ability to monitor media windows for several streams without starting several browser sessions.

Clicking anywhere in the graph will shrink it. Clicking it again will expand it.

6.3.2 Media Window — Bandwidth graph

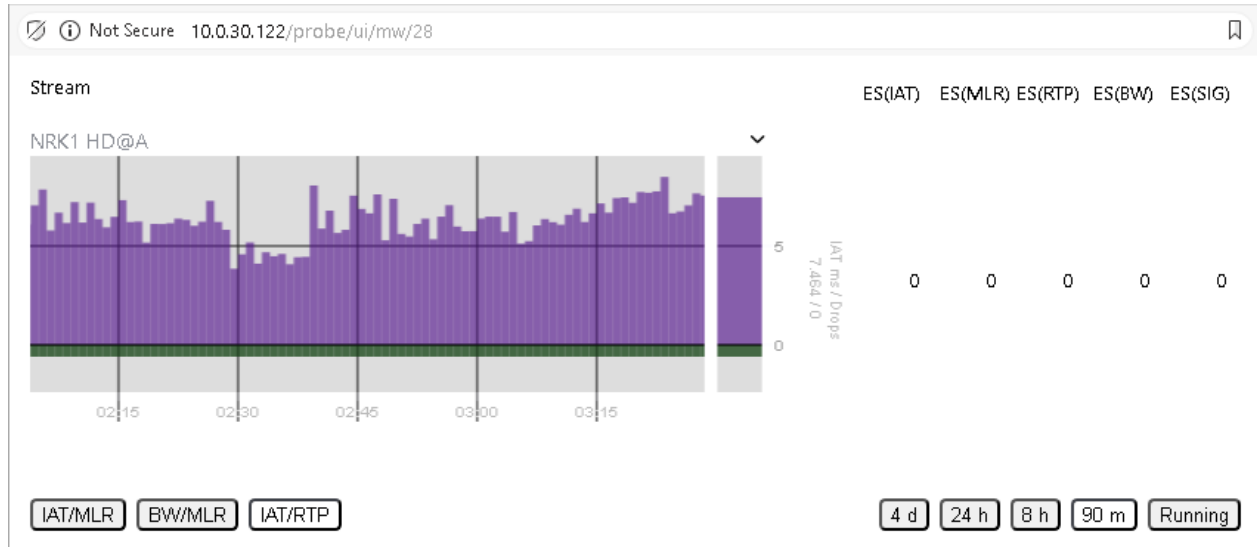


By clicking the **BW/MLR** button the graph displays the peak bandwidth as a function of time. The negative part of the composite graphs is still the packet loss (i.e. the MLR).

If the stream contains a transport stream (mapping TS/x) the bitrate corresponds to the **Multicasts** parameter **Net bitrate** (i.e. bitrate excluding null packets). Otherwise the bitrate is the UDP payload bitrate corresponding to the **Multicasts** parameter **Curr bitrate**.

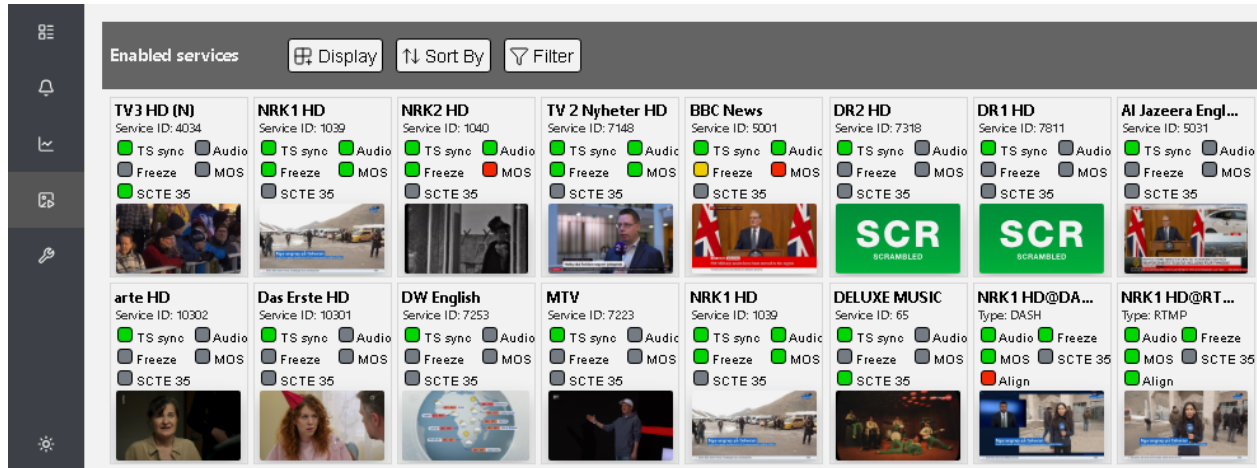
The bandwidth error threshold is configured in the **Multicasts — Ethernet thresh.** view.

6.3.3 Media Window — RTP drops



By clicking the **IAT/RTP** button the graph displays the packet jitter as a function of time. The composite graphs displays the RTP packet loss below the X-axis. If the monitored stream is not RTP encapsulated, IAT will be represented by grey color and there will never be any indication of packet loss in the graph.

6.4 Thumbnails



The **Thumbnails** view displays a mosaic of all decoded thumbnails. By default the *Normal* mode is used. Placeholder images will be displayed if thumbnail generation has not been enabled in the **Setup — Params** view or in the stream or channel configurations, indicating the type of service being received.

Use the **Display** button to switch between different display modes. If *Small* is selected, the **Thumbnails** view will display thumbnails and service names only, allowing more thumbnails to be displayed on the same page. In the *Compact* view, the service ID or OTT channel type is also displayed, as well as a row of bulbs indicating the content check status. Hover over the bulbs with your cursor for information on which bulb is which.

Selecting the *Normal* view, the bulbs are shown with an explanatory label. To display the name (as defined in the **Multicasts — Streams** and **OTT — Channels** views), select the **Stream info** view. Finally, the *Large* view displays the same information as the **Stream info** view, but with larger thumbnails.

Use the **Sort By** button to select the order in which to display the services. The *Default* sorting displays the thumbnail in the order they appear in the configuration, with multicasts being displayed first, followed by tunings and OTT channels last. Selecting *Name* sorts all services by name, mixing the stream types.

Sorting by *Alarm severity* shows the services with the highest number of active alarms (as indicated by red bulbs) first. Only the alarms shown in this view are considered for sorting purposes. Finally, if *Source* is selected, the services are sorted by the name of the streams they are part of.

Use the **Filter** button to limit the number of streams to display. The NOMAD makes it possible to filter by alarms (or lack thereof), to display only services that are producing thumbnails, or to display only services that are part of specific stream types. Additionally, you can also use the Search field at the top of the display to further limit the services being displayed.

If thumbnail extraction has not been enabled, or if the thumbnail extraction fails, an informational icon will be displayed instead, see **Thumbnail generation** below for details on the different icons.

The following information is displayed for each stream:

<i>Thumbnails</i>	
Stream name:	The configured name of the stream, tuning or channel is displayed here. Shown in the <i>Stream info</i> and <i>Large</i> views.
Service name:	For TS services, this displays the name defined for the service in the SI service descriptor. If no SI is present in the stream the service ID will be shown. For OTT channels, the name of the channel is shown here.
Service ID:	For TS services, the ID of the selected service within a transport stream. Not shown in the <i>Compact</i> view.
Type:	For non-TS services, the service type is displayed. Not shown in the <i>Compact</i> view.
TS sync status:	For TS services, status bulbs are displayed indicating the current Transport stream sync status. The different bulb colors are: Green: the stream has TS sync. Red: the stream does not have TS sync.
Freeze status:	Status bulbs are displayed indicating the current freeze-frame and color-freeze status for the streams. The freeze-frame error timeout values are set as part of the content threshold template associated with each multicast or OTT channel (refer to the Content – Content thresh. view). The different bulb colors are: White: Unknown (typically due to the NOMAD being unable to decode video) Grey: freeze-frame detection is disabled. Green: freeze-frame detection is enabled, no freeze-frame is detected. Yellow: freeze-frame detection is enabled. Two consecutive equal frames have been detected, but the freeze-frame error timeout value has not been exceeded. Red: freeze-frame is enabled. Freeze-frame has been detected and the freeze-frame error timeout value has been exceeded, thus resulting in an alarm.

SCTE 35 status: If the probe has been licensed with the SCTE 35 Signaling Analysis and Logging option, status bulbs are displayed indicating the current SCTE 35 alarm status for the streams.

The SCTE 35 alarming threshold values are set as part of the content threshold template associated with each multicast or OTT channel (refer to the **Content – Content thresh.** view). The different bulb colors are:

Grey: SCTE 35 alarming thresholds are disabled.

Green: SCTE 35 alarming thresholds are enabled, and no SCTE 35 alarms are active.

Red: SCTE 35 alarming thresholds are enabled, and one or more SCTE 35 alarms are active.

Additionally, if the service is currently in SCTE 35 cue out mode, the words “CUE OUT” are displayed under the thumbnail.

The **Thumbs Details** pop-up view is accessed by clicking a thumb in the **Thumbnails** view. These pop-up views are described in detail below. Note that thumbnails are only decoded automatically if the **Extract thumbnails** option has been enabled in the associated tuning, OTT or multicast setup, or if freeze-frame or color-freeze alarming (Content Extraction and Alarming option) has been enabled in the Content threshold template.

Clicking the **Close** button will close the view.

6.4.1 Service details view



Stream: Al Jazeera English HD

Transport stream ID	12
Name	Al Jazeera English HD
Type	multicast
Multicast address	239.255.2.39
Multicast port	5500
Bitrate	7.85 Mbps

Service: 5031

Service ID	5031
PSI/SI name	Al Jazeera English HD
Number of PIDs	4
Bitrate	7.72 Mbps

Status **Video** **Audio** **All PIDs** **SCTE35**

Name	Status description
 Audio silence	Threshold: -50 LUFS
 Audio too loud	Threshold: -5 LUFS
 Audio phase	Threshold: -0.2
 Freeze-frame	Consecutive frozen frames: 0
 Color-freeze	Consecutive frozen frames: 0
 MOS average	Running average: 3.3. Threshold: 3.2. Window: 10 min
 SCTE 35 Gap	Test disabled
 SCTE 35 placement	Test disabled
 SCTE 35 placement gap	Test disabled

[Close](#)

This view presents a large thumbnail for the selected service of a a tuning, or multicast setup, as well as video and audio metadata. The same pop-up can also be opened from the **Multicasts — Parameters** and **ETR 290 — Services** views. Clicking the **Close** button will close the pop-up view.

The pop-up consists of two parts, one shared part at the top displaying a the thumbnail and some details for the selected service, and a specific part at the bottom which differs depending on the selected tab. Which tabs are displayed depends on the contents of the stream and what monitoring thresholds are applied to it.

6.4.1.1 Service information

The top part of the dialog always show the thumbnail, if enabled, and stream and service metadata.

<i>Stream</i>	
Transport stream ID:	The ID of the selected stream as shown in the list of tunings and multicasts; non-TS services display <i>I</i> here.
Name:	The name of the tuning or multicast containing the selected service, as defined by the user.
Type:	The type of the stream containing the selected service; fpga (for ASI and RF streams), multicast, unicast or SRT Stream (a type of unicast).
Multicast address:	The multicast address of the stream containing the selected service. Multicasts only; not displayed for tuning setups and SRT streams.
Multicast port:	The port number of the multicast containing the selected service. Multicasts only; not displayed for tuning setups and SRT streams.
Input:	The physical input that the stream is being received on.
SRT Mode:	The SRT mode of operation selected to receive an SRT stream. SRT streams only; not displayed for multicasts.
SRT Latency:	The configured latency for the SRT connection. SRT streams only; not displayed for multicasts.
SRT Host:	The host address of the SRT stream source. SRT streams only; not displayed for multicasts. Not displayed in case of SRT mode 'Listener'.
SRT Port:	The port used to receive from the SRT stream source. SRT streams only; not displayed for multicasts.
Bitrate:	The total stream bitrate of the multicast containing the selected service (bits/s).
<i>Service</i>	
Service ID:	The service ID of the selected service; non-TS services display <i>I</i> here

PSI/SI Name:	The name of the selected service, as derived from PSI/SI; non-TS services display the multicast name here instead
Number of PIDs:	The number of PIDs or components associated with the selected service
Bitrate:	The total bitrate of the PIDs making up the selected service (bits/s)

6.4.1.2 Status

The **Status** tab displays the following service status information (bulbs will be green for status OK, red to indicate an active alarm and grey if the associated check has been disabled):

<i>Status description</i>	
Freeze-frame:	A bulb indicating the freeze-frame detection status. The freeze-frame error timeout value is set as part of the content threshold group associated with each multicast (refer to the Content — Content thresh. and Multicasts — Streams — Edit views). Consecutive frozen frames: The number of consecutive equal frames that have been detected.
Color-freeze:	A bulb indicating the color-freeze detection status. The freeze-frame error timeout value is set as part of the content threshold group associated with each multicast (refer to the Content — Content thresh. and Multicasts — Streams — Edit views). Consecutive frozen frames: The number of consecutive single color frames that have been detected.
SCTE 35 Gap:	If the probe has been licensed with the SCTE 35 Signaling Analysis and Logging option, this displays a status bulb indicating whether the SCTE 35 Command Gap alarm is active. The SCTE 35 alarming threshold values are set as part of the content threshold template associated with each multicast (refer to the Content — Content thresh. and Multicasts — Streams — Edit views). Time since last event: The number of seconds since the last received SCTE 35 event is displayed here. Threshold: The SCTE 35 Command gap threshold as defined in the content threshold template associated with the service.

SCTE 35 Placements: If the probe has been licensed with the SCTE 35 Signaling Analysis and Logging option, this displays a status bulb indicating whether the Too few SCTE 35 placement opportunities alarm is active. The SCTE 35 alarming threshold values are set as part of the content threshold template associated with each multicast (refer to the **Content — Content thresh.** and **Multicasts — Streams — Edit** views).

Placement opportunities last clock hour: The number of placement opportunities found during the previous clock hour, or N/A if the service was not monitored for the whole previous clock hour.

Threshold: The SCTE 35 Minimum number of placement opportunities per clock hour threshold as defined in the content threshold template associated with the service.

SCTE 35 Placement Gap: If the probe has been licensed with the SCTE 35 Signaling Analysis and Logging option, this displays a status bulb indicating whether the SCTE 35 placement gap alarm is active. The SCTE 35 alarming threshold values are set as part of the content threshold template associated with each multicast (refer to the **Content — Content thresh.** and **Multicasts — Streams — Edit** views).

Time since last opportunity: The number of seconds since the start of the last placement opportunity is displayed here.

Threshold: The SCTE 35 Maximum opportunity gap threshold as defined in the content threshold template associated with the service.

6.4.1.3 Video

Status	Video	Audio	All PIDs	SCTE35	
PID	Has PCR	Content	Last QoE information		
101	YES	SIZE	ASPECT RATIO	PIXEL ASPECT RATIO	CODEC
		3840x2160	16:9	1:1	hevc
		SAMPLING FORMAT	FRAME RATE	INTERLACED	RANGE
		YCbCr 4:2:0 (10 bit)	50 Hz	No	Narrow range
		COLOR PRIMARIES	TRANSFER CHARACTERISTICS	MATRIX COEFFICIENTS	MOS SCORE
		BT.2020	HLG (ARIB STD-B67)	BT.2020 non-constant lumin	4.0
					UPDATED
					Mar 5 15:54:01

Close

Close

The **Video** tab displays the following detailed metadata:

Video

PID: The video PID of the selected service for MPEG-TS services, or the video component number for non-TS services

Has PCR: Yes if the PID contains PCR, No if not

Size:	The video picture size of the selected service
Aspect ratio:	The video aspect ratio of the selected service, or “N/A” if no information is available
Pixel aspect ratio:	The video pixel aspect ratio of the selected service, or “N/A” if no information is available
Codec:	The video encoding format of the selected service
Sampling format:	The video sampling format of the selected service
Frame rate:	The video frame rate of the selected service (Hz)
Interlace:	Whether the video source is interlaced or not
Range:	Whether the range of visual content values in the video source are limited or not. <i>Possible ranges:</i> Full range, Narrow range
Color primaries:	The specific primary colors used to encode all colors in the video source. <i>Possible color primaries:</i> BT.709, BT.470 System M, BT.470 System B, G, ST 170, ST 240, Film, BT.2020, ST 428-1, ST 431-2, ST 432-1, EBU 3213
Transfer characteristics:	What transfer characteristics system the video source specifies to use to convert between RGB and Y’CbCr. <i>Possible transfer characteristics systems:</i> BT.709, Gamma 2.2, Gamma 2.8, ST 170, ST 240, Linear, Logarithmic, Logarithmic square root, xvYCC (IEC 61966-2-4), BT.2020 (10-bit), BT.2020 (12-bit), PQ, ST 428-1, HLG (ARIB-STD-B67)
Matrix coefficients:	What matrix coefficients the video source specifies to use to convert between RGB and Y’CbCr. <i>Possible matrix coefficients:</i> RGB, BT.709, FCC NTSC, BT.470 System B, G, ST 170, ST 240, YCgCo, BT.2020 non-constant luminance, BT.2020 constant luminance, ST 2085, Chromaticity-derived non-constant luminance, Chromaticity-derived constant luminance, ST ICtCp

6.4.1.4 Audio

Status	Video	Audio	All PIDs	SCTE35		
PID	Language	Channels	Codec	Rate	Audio level	Phase
5112	DEU	2 (stereo)	mp3	48.00 kHz		+0.9
5113	FRA	2 (stereo)	mp3	48.00 kHz		+0.2
5116	MUL	2 (stereo)	mp3	48.00 kHz		+0.3
5117	MIS	2 (stereo)	mp3	48.00 kHz		+0.3

Close

Close

The **Audio** tab displays the following detailed metadata:

<i>Audio</i>	
PID:	The audio PID of the selected service for MPEG-TS services, or the audio component number for non-TS services Note that there may be several audio PIDs or components associated with a service
Language:	The audio language, as derived from PSI/SI
Channels:	The number of audio channels represented by the audio PID or component
Codec:	The audio encoding format
Rate:	The audio sample rate (Hz)
Audio level:	If audio metadata extraction has been enabled for the channel, an audio level bar displaying the average audio level as a green bar referenced to the peak audio level, the peak level being indicated by a white line.
Phase:	If audio metadata extraction has been enabled for the channel, a momentary audio phase measurement will be displayed here for stereo sources. A value of -1 indicates audio that is completely out of phase, whereas a value of $+1$ indicates audio that is completely in phase.

Audio information is only displayed if audio metadata extraction has been enabled in the assigned content thresholds. Audio information is updated periodically, and the initial display can take several minutes. For more details on the content thresholds, please refer to the **Content — Content thresh.** view.

6.4.1.5 All PIDs

Status	Video	Audio	All PIDs	SCTE35
PID	Type	Has PCR	Language	Bitrate
5111	H264 Video	YES		6.95 Mbps
5112	MPEG1 Audio	NO	DEU	196.94 kbps
5113	MPEG1 Audio	NO	FRA	196.94 kbps
5116	MPEG1 Audio	NO	MUL	198.45 kbps
5117	MPEG1 Audio	NO	MIS	198.45 kbps
5114	Teletext	NO	DEU	195.44 kbps
1270	AIT	NO		10.52 kbps
1276	DSM-CC	NO		10.52 kbps
5115	Subtitling	NO	DEU	3.00 kbps
5118	Subtitling	NO	FRA	4.50 kbps
5119	Subtitling	NO	DEU	4.50 kbps
5198	Subtitling	NO	DAN	4.50 kbps

Close

The **All PIDs** tab contains an overview of all the PIDs that are associated with the selected service, including the PIDs displayed in other tabs. It displays the following metadata:

All PIDs

PID:	The PID number service for MPEG-TS services, or the component number for non-TS services associated with a service
Type:	The type description of the associated PID
Has PCR:	Yes if the PID contains PCR, No if not
Language:	The language for the content of the PID, as derived from PSI/SI, if specified
Bitrate:	The bitrate of this specific PID inside the service (bit/s)

6.4.1.6 SCTE 35

Status Video Audio All PIDs **SCTE35**

Time	Service	PID	Event ID	Command	Seg. type	Duration
2026-03-05 14:31:55	65 DELUXE MUSIC	60	1073745729	Splice insert		79.00
2026-03-05 14:33:09	65 DELUXE MUSIC	60	1073745729	Splice insert		NA
2026-03-05 14:33:11	65 DELUXE MUSIC	60	1073745729	Splice insert		NA
2026-03-05 14:33:13	65 DELUXE MUSIC	60	1073745729	Splice insert		NA
2026-03-05 14:50:37	65 DELUXE MUSIC	60	1073745741	Splice insert		175.00
2026-03-05 14:53:28	65 DELUXE MUSIC	60	1073745741	Splice insert		NA
2026-03-05 14:53:30	65 DELUXE MUSIC	60	1073745741	Splice insert		NA
2026-03-05 14:53:32	65 DELUXE MUSIC	60	1073745741	Splice insert		NA
2026-03-05 15:08:32	65 DELUXE MUSIC	60	1073745753	Splice insert		98.40
2026-03-05 15:10:06	65 DELUXE MUSIC	60	1073745753	Splice insert		NA
2026-03-05 15:10:08	65 DELUXE MUSIC	60	1073745753	Splice insert		NA
2026-03-05 15:10:10	65 DELUXE MUSIC	60	1073745753	Splice insert		NA
2026-03-05 15:27:30	65 DELUXE MUSIC	60	1073745765	Splice insert		202.00
2026-03-05 15:30:48	65 DELUXE MUSIC	60	1073745765	Splice insert		NA
2026-03-05 15:30:50	65 DELUXE MUSIC	60	1073745765	Splice insert		NA
2026-03-05 15:30:52	65 DELUXE MUSIC	60	1073745765	Splice insert		NA
2026-03-05 15:47:19	65 DELUXE MUSIC	60	1073745777	Splice insert		106.40
2026-03-05 15:49:01	65 DELUXE MUSIC	60	1073745777	Splice insert		NA
2026-03-05 15:49:03	65 DELUXE MUSIC	60	1073745777	Splice insert		NA
2026-03-05 15:49:05	65 DELUXE MUSIC	60	1073745777	Splice insert		NA

Close

If SCTE 35 monitoring has been enabled for the channel, and SCTE 35 events have been received, the **SCTE 35** tab displays the last 20 SCTE 35 events received on the selected service. The following information is displayed for the events.

SCTE 35

Time:	When the event occurred
Service:	The name of the service for which the event applies This is always the currently selected service
PID:	The PID carrying the SCTE 35 or SCTE 104 information. A service can have multiple SCTE 35 or SCTE 104 PIDs signaled in the PMT table(s)
Event ID:	ID of the specific event

Command: Specifies whether it is a splice in (switch to local content/ads) or splice out event (switch back to the audio/video in the service)

For messages with the splice command type ‘Time signal’ the Switch mode parameter will be empty and the Segment type parameter will contain the details

Seg. type: The segmentation type found in the segmentation descriptor (if found)

Duration: The time when a splice occurred to its end

Further SCTE 35 details can be found in the **Content — SCTE 35** view.

6.4.2 OTT details view

Profiles Manifest Alarms Thumbnails Alignment												
Channel		Health (120 min.)		Profiles		Profile status		Format				
NRK1 HD@DASH				10				DASH				
Profile	Type	Profile Health (120 min.)	Profile bps	Actual bps	Download bps	Duration	DL time	First byte	DL size	Encryption	HTTP header	
Video: avc1.4d40...	Live		7.0 Mbps	6.7 Mbps	1.8 Gbps	9.6 s	35.2 ms	5.2 ms	8.0 MB	No	File	
Video: avc1.4d40...	Live		5.0 Mbps	4.8 Mbps	1.9 Gbps	9.6 s	24.9 ms	5.0 ms	5.8 MB	No	File	
Video: avc1.4d40...	Live		4.0 Mbps	3.9 Mbps	1.7 Gbps	9.6 s	22.2 ms	4.8 ms	4.6 MB	No	File	
Video: avc1.4d40...	Live		3.0 Mbps	2.9 Mbps	1.5 Gbps	9.6 s	19.0 ms	4.4 ms	3.5 MB	No	File	
Video: avc1.4d40...	Live		2.0 Mbps	2.0 Mbps	1.4 Gbps	9.6 s	13.8 ms	4.5 ms	2.4 MB	No	File	
Video: avc1.4d40...	Live		1.0 Mbps	965.6 kbps	1.1 Gbps	9.6 s	8.7 ms	4.7 ms	1.2 MB	No	File	
Video: avc1.4d40...	Live		500.0 kbps	503.8 kbps	686.0 Mbps	9.6 s	7.0 ms	4.7 ms	604.6 kB	No	File	
Audio: mp4a.40...	Live		189.4 kbps	192.7 kbps	233.0 Mbps	9.6 s	7.9 ms	6.3 ms	231.2 kB	No	File	
Audio: mp4a.40...	Live		188.2 kbps	192.7 kbps	273.5 Mbps	9.6 s	6.8 ms	5.2 ms	231.2 kB	No	File	
Audio: mp4a.40...	Live		93.3 kbps	96.5 kbps	144.6 Mbps	9.6 s	6.4 ms	4.4 ms	115.8 kB	No	File	

This view presents profile and manifest metadata, as well as video and audio metadata and thumbnails for the selected channel. The same pop-up can also be opened from the **OTT — Active testing** view. Clicking the **Close** button will close the pop-up view.

6.4.2.1 Profiles

The **Profiles** view in this pop-up consists of two tables detailed below:

The following information relevant for the overall OTT channel is shown in the first part of the **Details — Profiles** pop-up window:

<i>Channel</i>	
Channel:	The channel name defined by the user and linked to a URL in the OTT — Channels view. A bulb indicates the current status of the channel, i.e. the most severe profile status.

Channel health:	A timeline graph display of a combined bitrate and alarm representation for the channel. This shows the most severe alarm or download speed for all monitored profiles. The individual profiles graphs are shown below. The timeline can display the last 120 minutes, 24 hours or four days, and the graph resolution is one minute for the two hour graph, twelve minutes for the 24 hour graph or 48 minutes for the four day graph.
Profiles:	The number of profiles associated with a channel.
Profile status:	The channel health bar displays the current status for individual channel profiles. Profiles are separated by vertical black lines. Colors indicate profile alarm status: • Green: OK • Yellow: Warning • Orange: Error • Red: Major • Black/Dark red: Fatal
Format:	The channel format is shown here (Apple HLS , Microsoft Smooth Streaming , Adobe HDS , MPEG DASH , SHOUTcast or RTMP).

In the same view below the table for the overall channel a more detailed view per **channel profile** is shown with the following information in it:

<i>Profiles</i>	
Profile:	The name of the OTT profile as flagged in the manifest files.
Type:	Live for live content or VoD for stored content. The distinction between the two is done based on whether the profile sequence numbers update or not.
Profile health:	A timeline graph display of a combined bitrate and alarm representation for individual profiles. Refer to Appendix C for a description of these graphs. The timeline can display the last 120 minutes, 24 hours or four days, and the graph resolution is one minute for the two hour graph, twelve minutes for the 24 hour graph or 48 minutes for the four day graph.
Profile bps:	The profile nominal bandwidth as flagged in the manifest files.
Actual bps:	The actual profile bitrate, i.e. the segment size (megabits) divided by the segment length (seconds). The actual profile bitrate should match the manifest bitrate specification within limits defined by the user in the OTT thresholds template associated with a channel. Otherwise an alarm will be raised.
Download bps:	The download bitrate, i.e. the segment size (megabits) divided by the download time (seconds).
Duration:	The profile segment duration (seconds) specified in the manifest file.

DL time:	The actual profile segment download time (seconds).
First byte:	The time (in seconds) before the first payload data byte was received.
DL size:	The actual profile segment size (bytes) as downloaded.
Encryption:	Yes or No depending on whether the content for that profile is encrypted or not.
HTTP header:	The current HTTP header of the last segment downloaded for that profile.

6.4.2.2 Manifest

Profiles

Manifest

Alarms

Thumbnails

Alignment

Channel	Profiles	Format	Manifest size	Manifest file	Manifest URL	HTTP Header	
 NRK1 HD@DASH	10	DASH	4.4 kB	File	Link	File	
Profile	Type	Profile bps	Seq. age	Manifest size	Manifest file	Manifest URL	HTTP Header
 Video: avc1.4d4020 1280...	Live	7.0 Mbps	9	N/A	N/A	N/A	N/A
 Video: avc1.4d401f 1280...	Live	5.0 Mbps	9	N/A	N/A	N/A	N/A
 Video: avc1.4d401f 1280...	Live	4.0 Mbps	9	N/A	N/A	N/A	N/A
 Video: avc1.4d401f 1024...	Live	3.0 Mbps	9	N/A	N/A	N/A	N/A
 Video: avc1.4d401f 768x...	Live	2.0 Mbps	9	N/A	N/A	N/A	N/A
 Video: avc1.4d4015 480x...	Live	1.0 Mbps	9	N/A	N/A	N/A	N/A
 Video: avc1.4d4015 480x...	Live	500.0 kbps	9	N/A	N/A	N/A	N/A
 Audio: mp4a.40.2 eng	Live	189.4 kbps	9	N/A	N/A	N/A	N/A
 Audio: mp4a.40.2 eng	Live	188.2 kbps	9	N/A	N/A	N/A	N/A
 Audio: mp4a.40.2 eng	Live	93.3 kbps	9	N/A	N/A	N/A	N/A

Close

The **Manifest** view shows health information on the overall manifest file for the channel as well as for the manifest files for the individual profiles for the formats were such are available.

Channel

Channel:	The channel name defined by the user and linked to a URL in the OTT — Channels view. A bulb indicates the current status of the channel, i.e. the most severe profile status.
Profiles:	The number of profiles associated with a channel.
Format:	The channel format is shown here (Apple HLS , Microsoft Smooth Streaming , Adobe HDS , MPEG DASH , SHOUTcast or RTMP).
Manifest size:	The size in bytes of the main/top manifest file for the overall channel.
Manifest file:	Clickable URL for displaying the manifest file as text for the overall channel.
Manifest URL:	A clickable link to the current main/top manifest file for the overall channel.
HTTP header:	The current HTTP header of the main/top manifest file for the overall channel.

Just below the channel manifest information in the same window is the detailed manifest information per profile. This view contains the following information:

Profiles

Profile:	The name of the OTT profile as flagged in the manifest files.
Type:	Live for live content or VoD for stored content. The distinction between the two is done based on the contents of the manifest file.

Profile bps:	The profile nominal bandwidth as flagged in the manifest files.
Seq.age:	The profile sequence shows how long it has been since the manifest was updated in whole seconds. The profile sequence age is only reported for Live profiles.
Manifest size:	The size in bytes of the manifest file for a particular profile, for formats where such a file is available.
Manifest file:	Clickable URL for displaying the manifest file as text for this particular profile, or “N/A” for formats where such a file is not available.
Manifest URL:	Clickable URL to the profile manifest file, for formats where such a file is available.
HTTP header:	URL to HTTP header in text form for a particular profile manifest file, or “N/A” for formats where such a file is not available.

6.4.2.3 Alarms

Profiles
Manifest
Alarms
Thumbnails
Alignment

Transport alarms

- Speed warning
- Speed error
- Timeout
- Resolve
- Connect
- Send
- Recv
- Profile stream type

HTTP alarms

- No body
- HTTP error
- HTTP 3XX
- HTTP 4XX
- HTTP 5XX

XML alarms

- Manifest size
- Actual bitrate
- Static
- Parse
- Segment missing
- Min. profiles
- Timesync
- Unknown

Content alarms

- Freeze-frame
- Color-freeze
- Profile alignment
- Audio silence
- Audio too loud
- Audio out of phase
- MOS below avg.
- Wrong DAR
- Wrong PAR

SCTE35 Alarms

- Event gap
- Too few placement opp.
- Opportunity gap
- Start event missing
- End event missing

Status	Color	Time	Type	Alarm id	Stream	Description
Active	Red	Mar 5 12:57:13	Content	4900	NRK1 HD@DASH	Wrong PAR, 4:3 (since Mar 5 12:56:08) (profile Video: avc1.4d4015 480x360)
Active	Red	Mar 5 12:57:13	Content	4900	NRK1 HD@DASH	Wrong PAR, 4:3 (since Mar 5 12:56:08) (profile Video: avc1.4d401f 768x576)
Active	Red	Mar 5 12:57:13	Content	4900	NRK1 HD@DASH	Wrong PAR, 4:3 (since Mar 5 12:56:08) (profile Video: avc1.4d4015 480x360)
Cleared	Green	Mar 6 10:29:19	Content	4950	NRK1 HD@DASH	MOS below threshold (profile Video: avc1.4d4020 1280x720) (Mar 6 10:13:...
Cleared	Green	Mar 6 10:23:19	Content	4950	NRK1 HD@DASH	MOS below threshold (profile Video: avc1.4d401f 768x576) (Mar 6 10:21:1...
Cleared	Green	Mar 6 10:21:39	Content	5100	NRK1 HD@DASH	One or more profiles are out of alignment (since Mar 6 10:21:18) (Mar 6 1...
Cleared	Green	Mar 6 10:17:19	Content	4950	NRK1 HD@DASH	MOS below threshold (profile Video: avc1.4d401f 768x576) (Mar 6 10:15:1...
Cleared	Green	Mar 6 10:14:49	Content	5100	NRK1 HD@DASH	One or more profiles are out of alignment (since Mar 6 10:14:10) (Mar 6 1...
Cleared	Green	Mar 6 10:04:10	Content	5100	NRK1 HD@DASH	One or more profiles are out of alignment (since Mar 6 10:03:58) (Mar 6 1...
Cleared	Green	Mar 6 10:03:29	Content	5100	NRK1 HD@DASH	One or more profiles are out of alignment (since Mar 6 10:03:10) (Mar 6 1...
Cleared	Green	Mar 6 10:02:49	Content	5100	NRK1 HD@DASH	One or more profiles are out of alignment (since Mar 6 10:02:39) (Mar 6 1...
Cleared	Green	Mar 6 10:02:19	Content	5100	NRK1 HD@DASH	One or more profiles are out of alignment (since Mar 6 10:02:09) (Mar 6 1...

The **Alarms** view gives an at-a-glance overview of any active OTT alarms for the selected channel. The alarms are divided into different columns, depending on their alarm type. This division, and the order of the alarms inside each column, is replicated in the **Micro** alarm overview shown in the **Streams** view. An alarm log for the selected channel is also provided here.

The alarms are the same ones as explained for the **Alarms — Alarm setup** view, see chapter 7.2.2 for more information.

6.4.2.4 Thumbnails

Profiles
Manifest
Alarms
Thumbnails
Alignment

Video: avc1.4d4020 1280x720



Profile to decode: Auto

Video information

Size	1280x720
Aspect ratio	16:9
Pixel aspect ratio	1:1
Codec	h264
Sampling format	YCbCr 4:2:0
Frame rate	50 Hz
Range	Narrow range
Color primaries	BT.709
Transfer characteristics	BT.709
Matrix coefficients	BT.709

Last QoE information

MOS algorithm	mos2
Updated	2026-03-06 10:39:00
MOS score	3.6
MOS running average	3.5
VMAF score	100%

Segment information

Engine ID	1
Profile name	Video: avc1.4d4020 1280x720
Bitrate	7.0 Mbps
Stream type	Live
Sequence number	19741577130

Close

The **Thumbnails** view will provide information about the current thumbnails in the channel.

The quality of the content in the selected profile can be viewed in the thumbnail section, and the user may alter the selected profile in the drop down list. *Auto* will select the profile with the highest bitrate and video data.

The section on the right hand side provides specific decoder and segment information.

Video information

Size:	The video picture size of the selected profile
Aspect ratio:	The video aspect ratio of the selected profile
Pixel aspect ratio:	The video pixel aspect ratio of the selected profile
Codec:	The video encoding format of the selected profile
Sampling format:	The video sampling format of the selected profile

Frame rate:	The video frame rate of the selected profile (Hz)
Range:	Whether the range of visual content values in the video source are limited or not. <i>Possible ranges:</i> Full range, Narrow range
Color primaries:	The specific primary colors used to encode all colors in the video source. <i>Possible color primaries:</i> BT.709, BT.470 System M, BT.470 System B, G, ST 170, ST 240, Film, BT.2020, ST 428-1, ST 431-2, ST 432-1, EBU 3213
Transfer characteristics:	What transfer characteristics system the video source specifies to use to convert between RGB and Y'CbCr. <i>Possible transfer characteristics systems:</i> BT.709, Gamma 2.2, Gamma 2.8, ST 170, ST 240, Linear, Logarithmic, Logarithmic square root, xvYCC (IEC 61966-2-4), BT.2020 (10-bit), BT.2020 (12-bit), PQ, ST 428-1, HLG (ARIB-STD-B67)
Matrix coefficients:	What matrix coefficients the video source specifies to use to convert between RGB and Y'CbCr. <i>Possible matrix coefficients:</i> RGB, BT.709, FCC NTSC, BT.470 System B, G, ST 170, ST 240, YCgCo, BT.2020 non-constant luminance, BT.2020 constant luminance, ST 2085, Chromaticity-derived non-constant luminance, Chromaticity-derived constant luminance, ST ICtCp

Audio Information

Codec:	The audio encoding format
Sample rate:	The audio sample rate
Channels:	The number of audio channels represented by the audio PID
Layout:	The audio channel layout

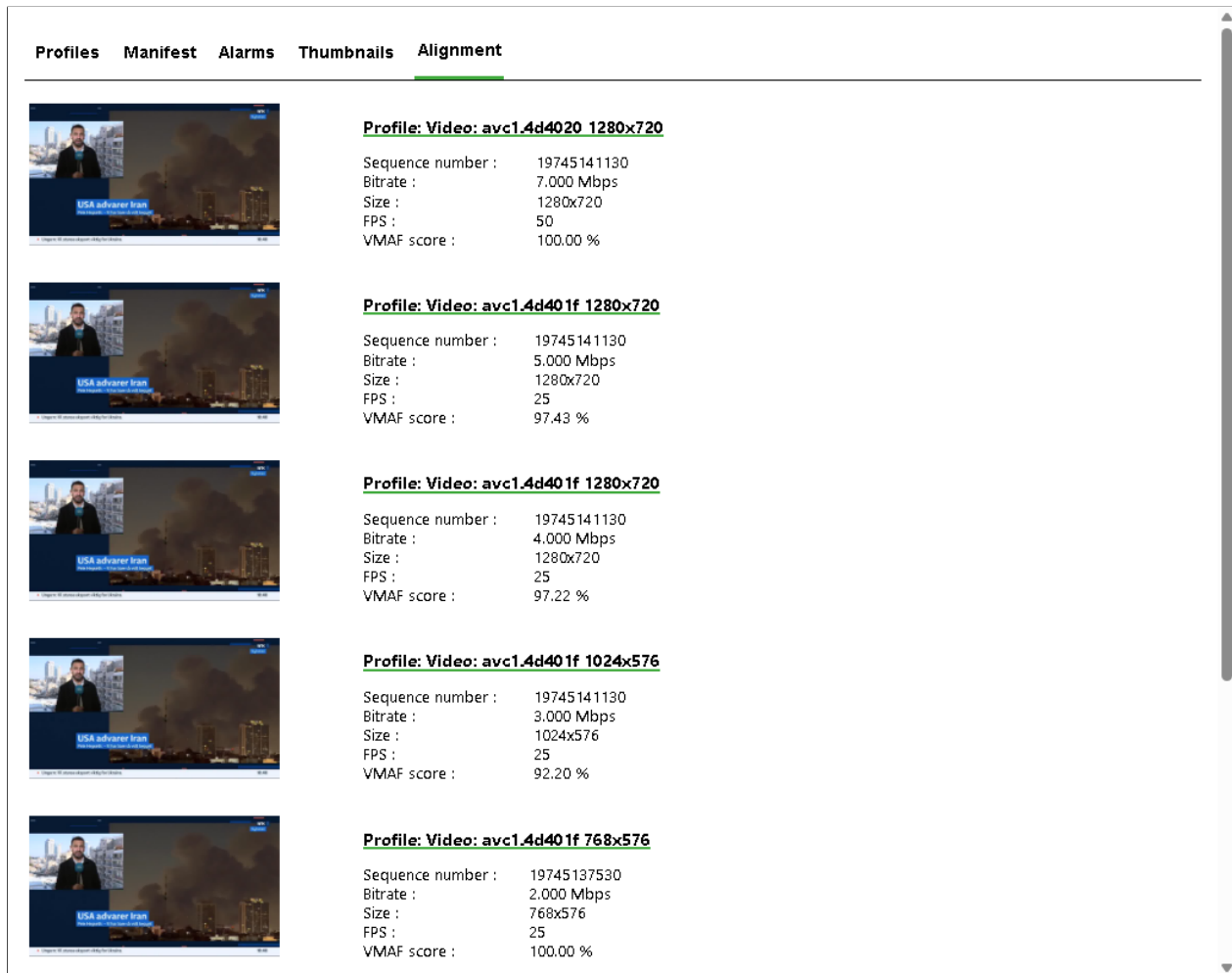
Audio information is only displayed if audio metadata extraction has been enabled in the content thresholds for the channel.

Segment Information

Engine ID:	The OTT engine monitoring the selected channel.
Profile name:	The name of the OTT profile as flagged in the manifest files.
Bitrate:	Bitrate rate of the a segment.
Streamtype:	The type of the stream detected; live or video on demand.

Sequence number: The current sequence number being analyzed. This is either signaled in the channel manifest (HLS, HDS, DASH, Smooth Streaming), or generated by the NOMAD(RTMP, SHOUTcast).

6.4.2.5 Alignment



Profile: Video: <u>avc1.4d4020 1280x720</u>
Sequence number : 19745141130
Bitrate : 7.000 Mbps
Size : 1280x720
FPS : 50
VMAF score : 100.00 %

Profile: Video: <u>avc1.4d401f 1280x720</u>
Sequence number : 19745141130
Bitrate : 5.000 Mbps
Size : 1280x720
FPS : 25
VMAF score : 97.43 %

Profile: Video: <u>avc1.4d401f 1280x720</u>
Sequence number : 19745141130
Bitrate : 4.000 Mbps
Size : 1280x720
FPS : 25
VMAF score : 97.22 %

Profile: Video: <u>avc1.4d401f 1024x576</u>
Sequence number : 19745141130
Bitrate : 3.000 Mbps
Size : 1024x576
FPS : 25
VMAF score : 92.20 %

Profile: Video: <u>avc1.4d401f 768x576</u>
Sequence number : 19745137530
Bitrate : 2.000 Mbps
Size : 768x576
FPS : 25
VMAF score : 100.00 %

The **Alignment** view shows the user all the profiles for a selected channel with thumbnails and corresponding data.

Profile Alignment Information

Profile: The name of the OTT profile as flagged in the manifest files. The first profile listed is always the one with the highest signaled bitrate.

Sequence number:	The segment or sequence number for the current thumbnail. This is either signaled in the channel manifest (HLS, HDS, DASH, Smooth Streaming), or generated by the NOMAD(RTMP, SHOUTcast). If the sequence differ between profiles, the thumbnails are not generated from the same segment for all profiles, and may therefor appear to be out of synchronization.
Bitrate:	The signaled bitrate for this profile (bits/s).
Size:	Indicates the original video size (pixels).
FPS:	The video frame rate (Hz).
Audio:	If loudness monitoring has been enabled for the channel, the audio channel layout will be shown here.

6.4.3 Thumbnail generation

The probe will try to generate thumbnail pictures for all streams. MPEG-2, H.264/MPEG-4, H.265/HEVC and JPEG 2000 video formats in standard definition, high definition or ultra-high definition are supported in MPEG-2 transport streams. Thumbnails are not generated for SMPTE ST 2022-7 combined streams.

For OTT channels, thumbnail decoding is available for **non-encrypted** HLS, HDS, DASH, Smooth Streaming and RTMP channels, as well as AES128 and SAMPLE-AES encrypted HLS channels, and fixed key CENC encrypted DASH.

The thumbnail update rate will depend on how the streams are coded and if they are standard definition, high definition or ultra-high definition.

If the probe is unable to generate a thumbnail from the signal, it will present one of the following icons:

	Shown if no data is received for the stream. There should be a match between presenting this icon and a No-signal alarm; however since the alarm and thumbnail mechanisms work independently of each other they have been given different names (loss of signal and no signal).
	Shown while the thumbnail engine is trying to decode a thumbnail picture and more precise status information has not yet been obtained. This icon is typically displayed after probe reboot or if new streams have recently been joined.
	Shown if the service does not carry a video PID — which is the case for radio services.
	The stream contains no service, as signaled in PSI/SI.

	The signal cannot be decoded due to excessive CC errors or RTP packet drops.
	The signal cannot be decoded because the Transport Error Indicator bit (TEI) is set.
	The signal cannot be decoded because the video bitstream contains errors. It might be possible to create thumbnails from this stream by enabling the “Ignore bitstream errors” checkbox in the content thresholds associated with the stream.
	The probe does not support thumbnail generation for this protocol mapping.
	The signal is recognized as being MPEG-2 encoded but the thumbnail extractor is unable to correctly decode a thumbnail picture.
	The signal is recognized as being MPEG-4/H.264 encoded but the thumbnail extractor is unable to correctly decode a thumbnail picture.
	The signal is recognized as being MPEG-H/H.265 encoded but the thumbnail extractor is unable to correctly decode a thumbnail picture.
	The signal is recognized as being JPEG 2000 encoded but the thumbnail extractor is unable to correctly decode a thumbnail picture.
	The signal is recognized as being JPEG XS encoded. The NOMAD does not currently support thumbnail generation for JPEG XS services.
	This icon is shown if the probe is unable to receive or analyze the PMT PID. Only streams with PSI information can have thumbnails decoded since the probe does not support a manual specification of the video PID.
	The probe can only generate a thumbnail picture if the video data is not scrambled.
	The stream is configured to be interpreted as MABR.

For OTT channels, an icon indicating the stream type will be displayed if thumbnail extraction has not been enabled, or if the thumbnail extraction fails.

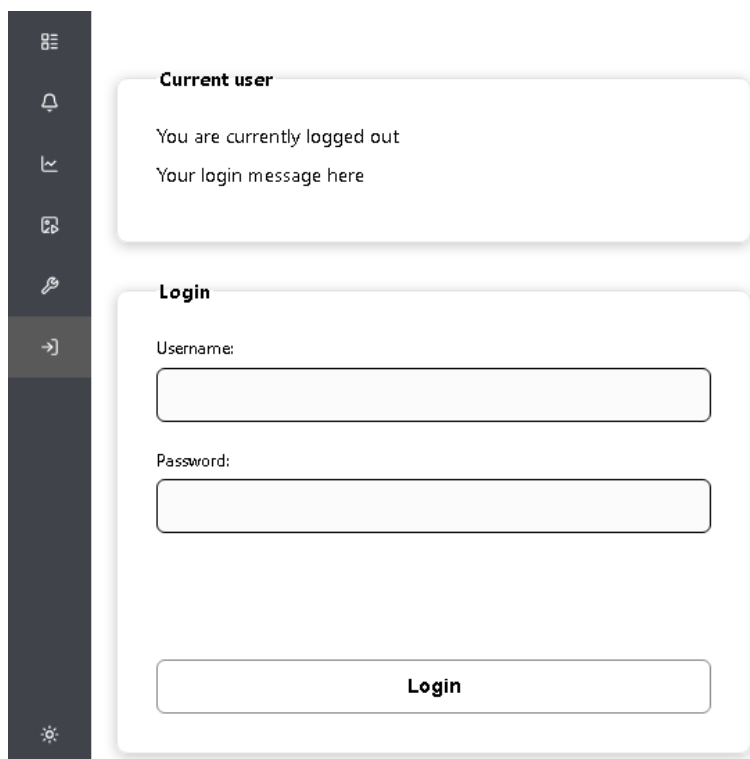
6.5 Expert



Selecting **Expert** in the main menu opens the Expert Graphical User Interface, which gives access to NOMAD configuration and additional features.

The contents of the Expert Graphical User Interface is described in detail in chapter 7.

6.6 Login



Current user

You are currently logged out

Your login message here

Login

Username:

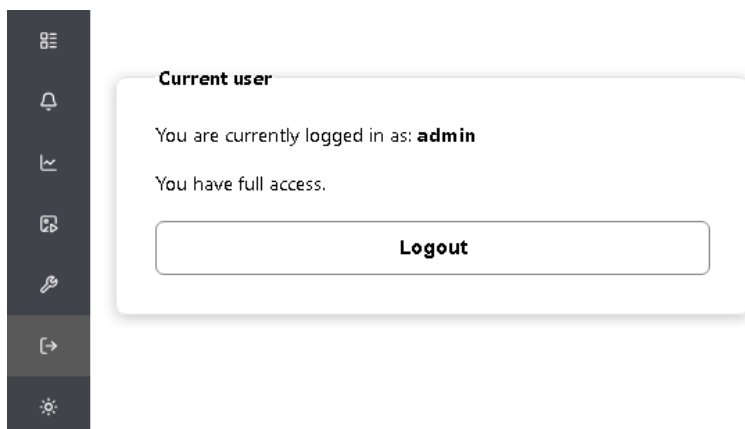
Password:

Login

The NOMAD is by default configured with access control disabled, allowing all users access to all features without having to log in. In this case, the **Login** view is not displayed.

When access control is activated, anyone with access to the NOMAD will first be presented with the **Login** view, requiring the user to log in before being able to access the user interface. Log-in is performed by providing the correct username and password.

Note: When logged in from the VBC, the VBC user's access rights apply, see chapter 7.15.14.2 for details.



Current user

You are currently logged in as: **admin**

You have full access.

Logout

Once logged in, the **Logout** view is available from the navigation menu. It will display the user name of the currently logged in user, and allows you to log out from the user interface. Once logged out, only the **Login** view is again available.

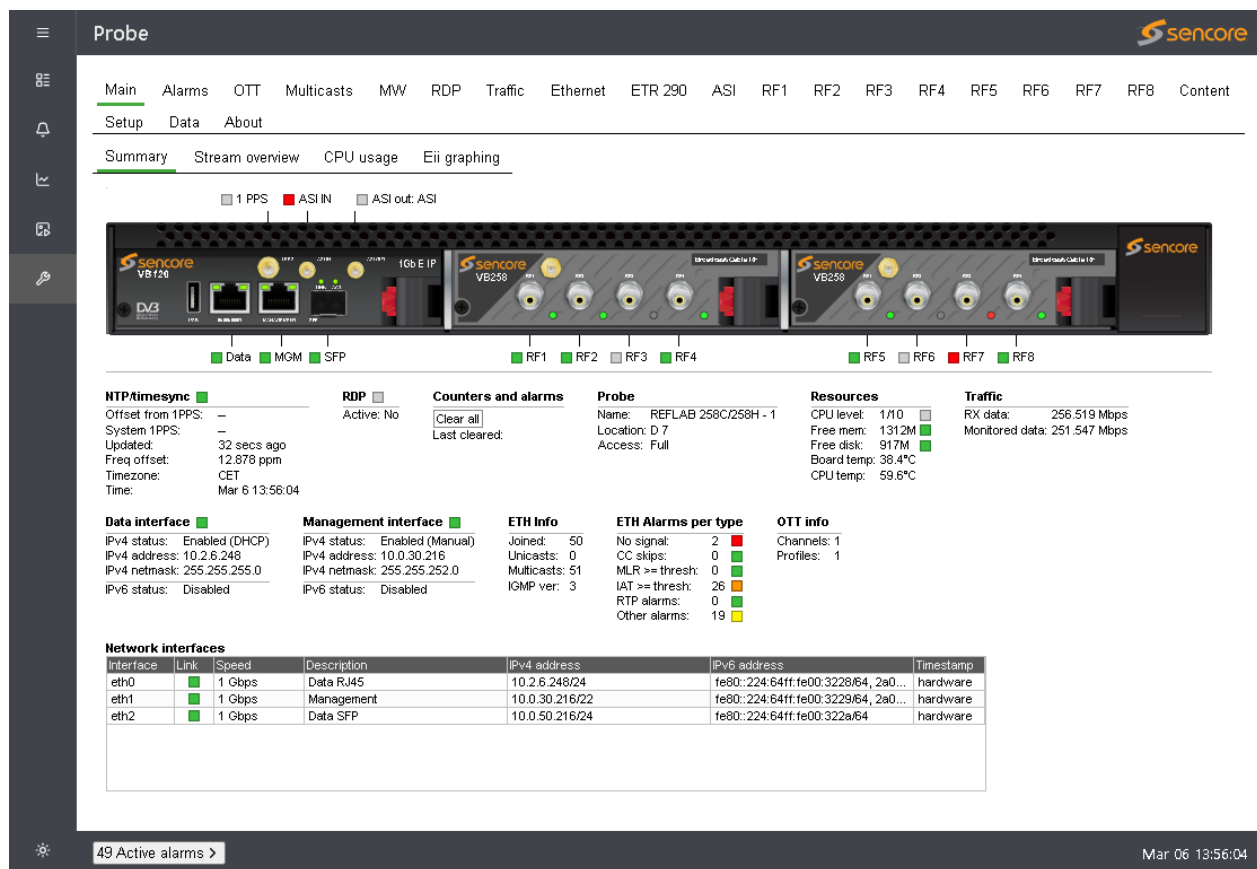
6.6.1 Configuring access control

No matter how the access control settings are configured, only the **admin** user can change the access control settings. These settings are available in the **Expert** view by navigating to **Setup — Security**. When access control is disabled, you first need to log in using the **Setup — Login** view before accessing any of these settings.

The default user name and password to is **admin** and **elvis**. The operator should define a new password for the “admin” user in the **Setup — Security — Password** view.

To restrict access, the **Setup — Security — Authentication** view can be used to set up log-in that restricts all access to the user interface. A firewall can be used to allow or deny certain addresses, please refer to the documentation for the **Setup — Security — Access control** view for more details on how to configure the firewall.

7 EXPERT PROBE GRAPHICAL USER INTERFACE



The screenshot displays the Sencore Expert Probe GUI. The top navigation bar includes tabs for Main, Alarms, OTT, Multicasts, MW, RDP, Traffic, Ethernet, ETR 290, ASI, RF1 through RF8, and Content. Below this, there are sub-tabs for Setup, Data, and About. The main content area is divided into several sections:

- Summary:** Shows a top-level overview with a 1 PPS indicator and ASI IN/OUT status.
- Hardware Overview:** A visual representation of the probe hardware, including the VB124 and VB258 units, with indicators for Data, MGM, SFP, and various RF ports (RF1-RF8).
- HTPtimesync:** Displays timing information such as Offset from 1PPS, System 1PPS, and Timezone.
- RDP:** Shows RDP status (Active: No).
- Counters and alarms:** Includes a 'Clear all' button and 'Last cleared' timestamp.
- Probe:** Provides details about the probe name (REFLAB 258C/258H - 1), location (D 7), and access status.
- Resources:** Lists system resources like CPU level, Free mem, Free disk, Board temp, and CPU temp.
- Traffic:** Shows RX data and Monitored data rates.
- Data interface:** Displays IPv4 and IPv6 status and addresses.
- Management interface:** Shows management interface status and addresses.
- ETH Info:** Provides Ethernet statistics like Joined, Unicasts, Multicasts, and IGMP ver.
- ETH Alarms per type:** A color-coded bar chart showing alarm counts for various Ethernet-related events.
- OTT info:** Displays OTT channels and profiles.
- Network interfaces:** A table listing network interfaces (eth0, eth1, eth2) with their link status, speed, description, and IP addresses.

At the bottom, a status bar shows '49 Active alarms' and the current date/time 'Mar 06 13:56:04'.

The **Expert** view provides access to more in-depth analysis and to the NOMAD configuration options. It can be reached by selecting the **Expert** option in the navigation menu in the top left corner of the screen.

The Expert UI can be navigated by using the tabs, which are always available just below the NOMAD title bar. Some of the pages have their own tabs for accessing nested pages. The bottom frame of the interface is always the **alarm list**. The alarm list is by default hidden, showing only the number of active alarms, and can be displayed and hidden again by clicking the **Active alarm** button.

Note: Some of the screenshots in this section are taken from a previous software release. While the look of these pages has changed, the information displayed and documentation is still valid for this release.

RDP

(Bulb): The RDP bulb indicates whether RDP is active or not. Green indicates RDP active whereas grey indicates that RDP is currently not active.

Active: The RDP active state is either *yes* or *no*, *yes* indicating that RDP relaying or alarm triggered recording mode has been selected by the operator in the **RDP** view.

Counters and alarms

Clear all: Click the **Clear all** button to reset all counters, graphs and alarms. All NOMAD measurement and alarm history is cleared. Note that it is not possible to undo this operation.

Last cleared: The time the **Clear all** button was last clicked. If no time is indicated the counters have not been cleared since NOMAD startup/reboot time.

Probe

Name: The NOMAD name as defined by the operator in the **Setup — Params** view.

Location: The NOMAD location as defined by the operator in the **Setup — Params** view.

Access: The access rights of the current user. Access rights are either full access or read only access, and are defined by the operator in the **Setup — Security** view.

Resources

CPU level: The CPU level indicates the workload of the probe, on a scale from 1 to 10 of total capacity.

Free mem: The available free memory.

Free disk: The available free probe disk space.

Board temp: The temperature of the probe motherboard.

CPU temp: The temperature of the probe CPU.

The probe employs a memory-based disk, which means that the amount of available free memory decreases as more files (such as recordings, thumbnails, PCAPs, etc.) are stored.

Traffic

RX data: The total bitrate of received data traffic

Monitored data: The total bitrate of multicasts and unicasts monitored (analyzed) by the probe

Data interface

(Bulb):	The bulb indicates whether the data interface is connected and active or not.
IPv4 status:	The IPv4 status as defined in the Setup — Ethernet view
IPv4 address:	The probe IPv4 Ethernet data/video interface IP address as defined by the user in the Setup — Ethernet view
IPv4 netmask:	The probe IPv4 Ethernet data/video interface IP address as defined by the user in the Setup — Ethernet view

Management interface

(Bulb):	The bulb indicates whether the management interface is connected and active or not.
IPv4 status:	The IPv4 status as defined in the Setup — Ethernet view
IPv4 address:	The probe IPv4 Ethernet data/video interface IP address as defined by the user in the Setup — Ethernet view
IPv4 netmask:	The probe IPv4 Ethernet data/video interface IP address as defined by the user in the Setup — Ethernet view

ETH info

Joined:	The number of joined streams (multicasts and unicasts)
Unicasts:	The number of unicasts currently being joined/monitored by the probe
Multicasts:	The number of multicasts currently being joined/monitored by the probe
IGMP ver:	The IGMP version currently used by the probe. IGMPv2 is used unless the operator has enabled IGMPv3 in the Setup — Params view.

ETH alarms per type

No signal:	The number of currently active Ethernet ‘No signal’ alarms
CC skips:	The number of currently active Ethernet ‘CC skips’ alarms
MLR>=thresh:	The number of currently active Ethernet MLR alarms, i.e. the total number of ‘MLR>= warning-threshold’ and ‘MLR>= alarm-threshold’ alarms
IAT>=thresh:	The number of currently active Ethernet IAT alarms, i.e. the total number of ‘IAT>= warning-threshold’ and ‘IAT>= alarm-threshold’ alarms
RTP alarms:	The number of currently active RTP alarms, i.e. the total number of ‘RTP packet drop’, ‘RTP duplicates’ and ‘RTP out of order’ alarms
Other alarms:	The total number of currently active Ethernet alarms not included in the alarm figures specified above

OTT info

Channels: The number of enabled OTT channels.

Profiles: The total number of profiles in the enabled OTT channels.

At the very bottom of the Summary page, an overview of the Ethernet network interfaces on the NOMAD are displayed.

Network interfaces

Interface: The ID of the selected network interface.

Link: Indicates whether the interface is connected.

Speed: Shows the current bitrate for the interface.

Description: Provides a human-readable description of the interface, if available.

IPv4 address: Lists the IPv4 address and netmask of the network interface, if set.

IPv6 address: Lists the IPv6 address and netmask of the network interface, if set.

Timestamp: Indicates whether the network interface supports hardware timestamping for precise measurements, or if kernel timestamping is used.

7.1.2 Main — Stream overview

Summary Stream overview CPU usage Eii graphing

Select stream Filter hits:195/195

Alarms for selected stream

Status	Col	Time	Type	Stream	Description
Recent items: 0					

Details for selected stream



Stream: Al Jazeera English HD@A

Transport stream ID	12
Name	Al Jazeera English HD@A
Type	multicast
Multicast address	239.255.2.39
Multicast port	5500
Bitrate	7.94 Mbps

Service: 5031

Service ID	5031
PSI/SI name	Al Jazeera English HD
Number of PIDs	4
Bitrate	7.72 Mbps

Status Video **Audio** **All PIDs** **SCTE35**

Name	Status description
☒ Freeze-frame	Consecutive frozen frames: 0
☐ Color-freeze	Test disabled

Menu links

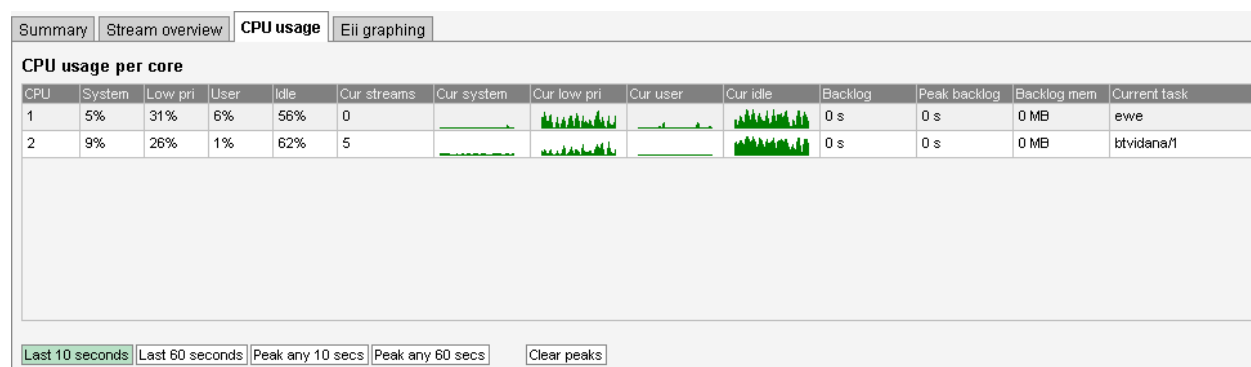
The **Stream overview** offers an easy way to get an overview of the status of a single channel by collecting the relevant information views from various parts of the probe and displaying them all in one place. This page is opened when clicking a channel alarm in any of the alarm list. When using the probe in conjunction with a the VideoBRIDGE Controller, this page is also displayed when clicking on a stream mentioned in the VBC user interface.

Use the **Select stream** drop-down to select a stream to display. By entering a stream name in the **Filter** box, only streams matching this filter will be show in the drop-down.

The list of active alarms for the selected channel is displayed on top, followed by different information depending on the kind of the stream selected. Please refer to the **Multicasts**, **ETR 290** and **OTT** chapters for detailed documentation on the various information views.

Use the **Menu links** buttons at the bottom of the page to open the thresholds assigned to the currently displayed stream.

7.1.3 Main — CPU usage



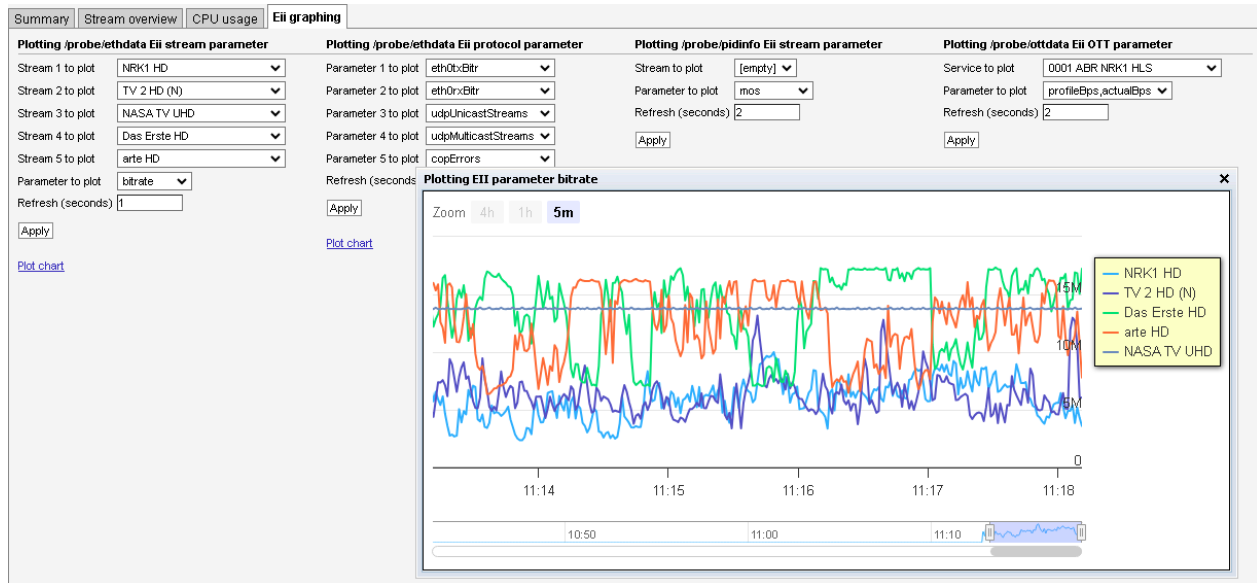
The **CPU usage** view is meant for troubleshooting performance issues in case of excessively high traffic load.

Three internal performance indicators (System, User and Idle) are displayed as percentage numbers and also graphed for the last minute. Issues can potentially arise if the System indicator becomes high (>80%).

The **CPU usage** view displays CPU usage of the NOMAD's two cores. To view the CPU usage averaged over the last 10 seconds click the **Current** button. To view the usage averaged over the last 60 seconds click the **Last 60 seconds** button. Clicking the **Peak any 10 secs** or **Peak any 60 seconds** button will display the historical maximum value for an averaging period of 10 s and 60 s respectively. To clear peak values click the **Clear peaks** button.

The length of the queues for multicast video analysis are displayed in the **Backlog** column, with the highest recorded value in the **Peak backlog** column. If these values keep growing, the probe is not able to keep up with the amount of data it has been set to monitor, and will eventually start dropping data to catch up again. Please refer to appendix B.5 for more details. Additionally, the currently running process (at the time of update) on each CPU core is displayed in the **Current task** column.

7.1.4 Main — Eii graphing



Eii is short for External Integration Interface and constitutes a set of XML files accessible through the NOMAD web server interface for machine access to measurement data.

Portions of the Eii interface are available in this view for simple trend graphing over arbitrary long time by the web browser.

The screenshot shows the bandwidth of two IP streams being graphed by sampling the Eii interface every 2 seconds. The graph is stored in the client web browser for as long as the graph window remains open. The graph starts again with zero history if the window is closed and then opened again.

Eii stream parameter

Using the **Eii stream parameter** plot, it is possible to plot parameters from up to five IP streams. Select the streams in the **Stream N to plot** (where N is 1 through to 5) drop-downs and the parameter in the **Parameter to plot** drop-down.

Eii stream parameters

bitrate:	Bitrate (bits per second)
rtp_drops:	Number of dropped IP frames due to network errors
iat_avg:	Average Inter-Arrival Time
cc_errs:	The number of discontinuities detected

Refresh (seconds) selects how often samples are read and plotted on the graph. Click **Apply** to store the parameters and then click the **Plot chart** link to open the chart.

Eii protocol parameter

Using the **Eii protocol parameter** plot, it is possible to plot up to five network interface parameters. Select the parameters in the **Parameter N to plot** (where N is 1 through to 5) drop-downs.

<i>Eii protocol parameters</i>	
vlanTaggedPerc:	Percentage of frames being VLAN tagged
ipFragPerc:	Percentage of frames being IP fragmented
eth0txBitr:	Total TX bitrate including units on first data interface
eth0rxBitr:	Total RX bitrate including units on first data interface
udpUnicastBitr:	Bitrate of the unicast traffic
udpMulticastBitr:	Bitrate of the multicast traffic
udpUnicastStreams:	Number of UDP unicast streams present
udpMulticastStreams:	Number of UDP multicast streams present
copPayloadBitr:	Bitrate of FEC protected payload
copFec1Bitr:	Bitrate of the FEC columns
copFec2Bitr:	Bitrate of the FEC rows
copCorrected:	IP packets correctable by the FEC
copUncorrected:	IP packets not correctable by the FEC
copErrors:	FEC packets with errors

Refresh (seconds) selects how often samples are read and plotted on the graph. Click **Apply** to store the parameters and then click the **Plot chart** link to open the chart.

Eii OTT parameter

Using the **Eii OTT parameter** plot, it is possible to plot analysis parameters from any of the monitored OTT channel. Select the channel in the **Service to plot** drop-down and the parameter in the **Parameter to plot** drop-down.

<i>Eii OTT parameters</i>	
profileBps,actualBps:	Plots both the profileBps and actualBps parameters
profileBps:	Bitrate of this profile as listed in meta-data (bits per second)
actualBps:	Bitrate of this profile calculated from downloaded segment (bits per second)
chunkDur:	Last segment length (seconds)
firstByte:	Time to first byte (milliseconds)
downloadDur:	Time to download segment (seconds)
chunkSize:	Size of downloaded segment (bytes)



Refresh (seconds) selects how often samples are read and plotted on the graph. Click **Apply** to store the parameters and then click the **Plot chart** link to open the chart.

Please refer to the separate Eii documentation for further details.

7.2 Alarms

7.2.1 Alarms — All Alarms

Main

Alarms

OTT

Multicasts

MW

RDP

Traffic

Ethernet

ETR 290

Content

Record

Setup

Data

About

All alarms

Ethernet alarms

FSM & MBR alarms

OTT alarms

Content alarms

ETR alarms

System alarms

Event log

Alarm setup

Flash alarms

#	Status	Col	Time	Type	Stream	Description
1	Active	■	Mar 25 11:23:07	ETR	PTV: arte HD	Pid 18 EIT: Event Information Table error
2	Active	■	Mar 25 11:22:23	ETR	PTV: arte HD	Service 10302 arte HD: Pid 5115 Subtitling: Presentation Time Stamp error
3	Active	■	Mar 25 11:22:06	ETR	PTV: arte HD	Service 10302 arte HD: Pid 5198 Subtitling: Presentation Time Stamp error
4	Active	■	Mar 25 11:22:06	ETR	PTV: arte HD	Service 10302 arte HD: Pid 5118 Subtitling: Presentation Time Stamp error
5	Active	■	Mar 25 11:22:00	ETR	PTV: ZDF HD	Service 11110 ZDF HD: Pid 6132 Private data: Presentation Time Stamp error
6	Active	■	Mar 25 11:21:22	ETR	PTV: MDR Sachsen HD	Service 10352 MDR Sachsen HD: Pid 5335 Subtitling: Presentation Time Stamp error
7	Active	■	Mar 25 11:19:57	ETR	PTV: ZDF HD	Service 11110 ZDF HD: Pid 6131 Subtitling: Presentation Time Stamp error
8	Active	■	Mar 25 11:18:22	ETR	PTV: BBC World News Europe HD	Pid 18 EIT: Event Information Table error
9	Active	■	Mar 25 11:12:44	ETR	PTV: Das Erste HD	Service 10301 Das Erste HD: Pid 5105 Subtitling: Presentation Time Stamp error
10	Active	■	Mar 25 11:11:49	ETR	PTV: DELUXE MUSIC	Service 65 DELUXE MUSIC: Pid 60 SCTE 35: Pid is missing
11	Active	■	Mar 25 11:08:13	ETR	PTV: Comedy Central Austria	Pid 18 EIT: Event Information Table error
12	Active	■	Mar 25 11:01:56	ETR	PTV: KiKA HD	Service 11160 KiKA HD: Pid 6631 Subtitling: Presentation Time Stamp error
13	Active	■	Mar 25 10:48:05	ETR	PTV: ZDF HD	Pid 18 EIT: Event Information Table error
14	Active	■	Mar 25 10:30:13	ETR	PTV: KiKA HD	Pid 18 EIT: Event Information Table error
15	Active	■	Mar 25 09:42:10	CNT	CamCam	Freeze-frame detected (since Mar 25 09:40:09)
16	Active	■	Mar 24 19:29:50	ETR	PTV: MDR Sachsen HD	Service 10352 MDR Sachsen HD: Pid 5331 H264 Video: Program Clock Reference accuracy error
17	Active	■	Mar 24 04:06:08	ETR	PTV: BBC Earth HD	Service 7190 HISTORY 2 HD: Pid 1317 H264 Video: Program Clock Reference accuracy error
18	Active	■	Mar 24 03:53:27	OTT	0036 ABR Disney_SS	Lagging behind (lost segments between 2911783718458666 and 2911783872058666) since last round
19	Active	■	Mar 24 00:00:50	SYS		Auto deletion of recordings imminent. Less than 4GB usable disk
20	Active	■	Mar 23 22:18:20	ETR	PTV: HyperDeck	Pid 16: Network Information Table error
21	Active	■	Mar 23 22:18:20	ETR	PTV: Cam	Pid 16: Network Information Table error
22	Active	■	Mar 23 22:18:20	ETR	PTV: TLC Sverige HD	Pid 16: Network Information Table error
23	Active	■	Mar 23 22:18:20	ETR	PTV: Animal Planet HD	Pid 16: Network Information Table error
24	Active	■	Mar 23 22:18:20	ETR	PTV: Eurosport 1 HD (N)	Pid 16: Network Information Table error
25	Active	■	Mar 23 22:18:20	ETR	PTV: TV 2 Sport 2 HD	Pid 16: Network Information Table error
26	Active	■	Mar 23 22:18:20	ETR	PTV: BBC Earth HD	Pid 16: Network Information Table error
27	Active	■	Mar 23 22:18:20	ETR	PTV: HISTORY HD	Pid 16: Network Information Table error
28	Active	■	Mar 23 22:18:20	ETR	PTV: Nat Geo HD (N)	Pid 16: Network Information Table error
29	Active	■	Mar 23 22:18:20	ETR	PTV: Discovery HD (N)	Pid 16: Network Information Table error
30	Active	■	Mar 23 22:18:20	ETR	PTV: TLC Norge HD	Pid 16: Network Information Table error

Recent items: 30

View list offline

Auto-refresh list

Flush alarms

Export...

The **Alarms** view gives the user the possibility of viewing alarms according to type or as one combined list. The individual alarm lists can hold the number alarms indicated below independently of each other, meaning that one may become full without affecting the other lists.

<i>Alarm list capacity</i>	
Ethernet alarms (ETH)	10000 alarms
Full Service Monitoring and Microbitrate (FSM)	100 alarms
Over The Top Television (OTT)	2500 alarms
ETSI TR 101 290 Analysis (ETR)	10000 alarms
Content (CNT)	2500 alarms
System alarms (SYS)	2500 alarms
Event log (LOG)	2500 events

If **Auto-refresh list** is selected, the alarm list will be continuously updated with new alarms. Active alarms are always located at the top of the list.

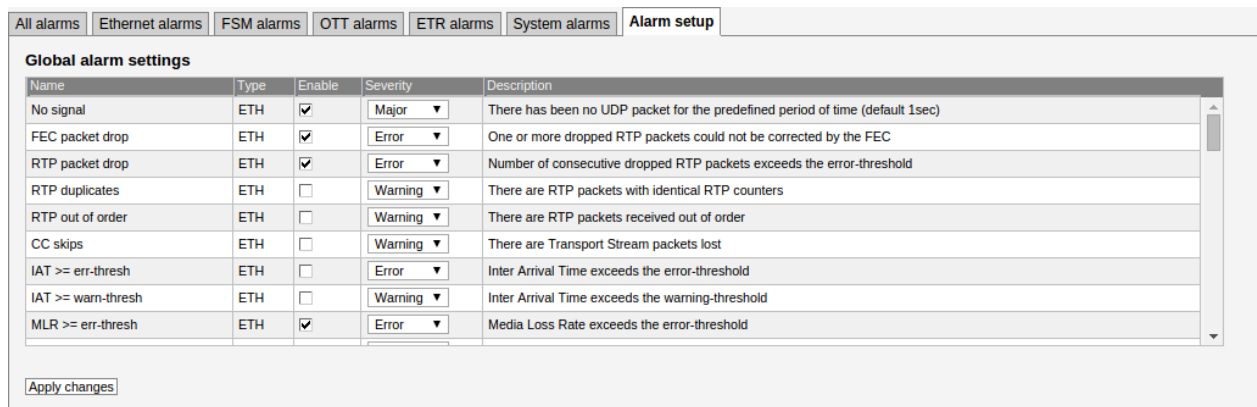
Clicking the **View list offline** button gives the user the opportunity to view the complete alarms and events list. By clicking one of the blue information icons leftmost in the offline list, a detailed alarm

description can be viewed. The search field in the upper right corner of the view allows the user to type a text string and the alarm list is updated to display only streams and alarms matching the specified text. To update the offline alarm list click the **Auto-refresh list** button and then go back to the offline mode.

Clicking the blue link text of any alarm in the alarm list opens the **Main — Stream overview** for the channel in the alarm. The alarm lists can be deleted by clicking the **Flush alarms** button. However it should be noted that this action will permanently clear the alarm lists — they cannot be restored.

The **Export** button enables export of the corresponding alarm list as an XML file. This file will open in a new window.

7.2.2 Alarms — Alarm setup



The screenshot shows the 'Alarm setup' tab in the interface. It contains a table titled 'Global alarm settings' with columns: Name, Type, Enable, Severity, and Description. The table lists various alarms with their respective settings. Below the table is an 'Apply changes' button.

Name	Type	Enable	Severity	Description
No signal	ETH	☒	Major	There has been no UDP packet for the predefined period of time (default 1sec)
FEC packet drop	ETH	☒	Error	One or more dropped RTP packets could not be corrected by the FEC
RTP packet drop	ETH	☒	Error	Number of consecutive dropped RTP packets exceeds the error-threshold
RTP duplicates	ETH	☐	Warning	There are RTP packets with identical RTP counters
RTP out of order	ETH	☐	Warning	There are RTP packets received out of order
CC skips	ETH	☐	Warning	There are Transport Stream packets lost
IAT >= err-thresh	ETH	☐	Error	Inter Arrival Time exceeds the error-threshold
IAT >= warn-thresh	ETH	☐	Warning	Inter Arrival Time exceeds the warning-threshold
MLR >= err-thresh	ETH	☒	Error	Media Loss Rate exceeds the error-threshold

Apply changes

The **Alarm setup** represents the final filtering stage for NOMAD alarms. The user selects whether an alarm should be enabled or ignored, and associates an error severity level with each alarm. When changes have been made to alarm settings click the **Apply changes** button for changes to take effect.

Figure 6.1 gives an overview of the total alarm handling of a NOMAD. The settings in the **Alarm setup** view are represented by the **Alarm Settings** box in this figure.

Note that the probe alarm handling will also depend on the threshold template settings defined by the user in the **Multicasts — Ethernet thresh.**, **ETR 290 — ETR thresh.**, **ETR 290 — PID thresh.**, **ETR 290 — Service thresh.**, the RF thresholds for the different interface cards, and **OTT — Thresholds** views.

Also note that only enabled alarms are shown in the alarm lists and forwarded as SNMP traps. Enabling or disabling NOMAD alarms does however not affect the alarms presented by the VBC. Refer to Appendix: NOMAD Versus VBC Alarms for a description of the NOMAD versus VBC alarm handling.

The following alarm severity levels may be selected:

OK: If enabled, the alarm will be present in the alarm list, color green

Warning:	If enabled, the alarm will be present in the alarm list, color yellow
Error:	If enabled, the alarm will be present in the alarm list, color orange
Major:	If enabled, the alarm will be present in the alarm list, color red
Fatal:	If enabled, the alarm will be present in the alarm list, color black

The following alarms and events are configured:

<i>ETH (Ethernet) alarms</i>		
No signal:	There has been no UDP packet for the predefined period of time (default 1sec)	Default: Enabled, severity Major
RTP packet drop:	Number of consecutive dropped RTP packets exceeds the error-thresholds – only available if RTP headers are present	Default: Enabled, severity Error
RTP duplicates:	Number of RTP packets with identical RTP counters – only available if RTP headers are present	Default: Disabled, severity Warning
RTP out of order:	There are RTP packets received out of order – only available if RTP headers are present	Default: Disabled, severity Warning
CC skips:	Number of transport stream discontinuities due to packet loss. Note that the CC skips number does not necessarily equal the number of lost packets, as several consecutive packets lost will be counted as one CC skip.	Default: Disabled, severity Warning
IAT >= err-thresh:	The Inter-packet Arrival Time exceeds the error threshold	Default: Disabled, severity Error
IAT >= warn-thresh:	The Inter-packet Arrival Time exceeds the warning threshold	Default: Disabled, severity Warning
MLR >= err-thresh:	The Media Loss Rate exceeds the error-threshold	Default: Enabled, severity Error
MLR >= warn-thresh:	The Media Loss Rate exceeds the warning-threshold	Default: Disabled, severity Warning
TTL changed:	The Time-To-Live field is changing	Default: Enabled, severity Error
TOS changed:	The Type-Of-Service field is changing	Default: Enabled, severity Error
Multiple mcast sources:	There are multiple multicast sources	Default: Enabled, severity Error

Mcast source changed:	The multicast source changed to one of the valid multicast sources specified by the operator	Default: Enabled, severity Error
Bitrate overflow:	The net stream bitrate exceeds the maximum bitrate Ethernet threshold value specified by the operator	Default: Enabled, severity Error
Bitrate underflow:	The net stream bitrate goes below the minimum bitrate Ethernet threshold value specified by the operator	Default: Enabled, severity Error
MSYNC data missing:	The MSYNC Data Loss Rate exceeds the error threshold	Default: Enabled, severity Error
MSYNC no mapping acquired:	The stream is configured as an MSYNC stream, but no MSYNC packets were received	Default: Enabled, severity Major
<i>FSM (Full service monitoring & Microbitrate) alarms</i>		
Full service monitoring:	No reply was obtained within timeout period for the configured FSM service	Default: Enabled, severity Major
Microbitrate bursting:	Raised if the bitrate of the user-interval exceeds the Burst threshold setting	Default: Enabled, severity Warning
Microbitrate excessive ES bursting:	Raised whenever the bitrate of the user-interval exceeds the Burst threshold for ES threshold number of seconds during the last ES Alarm window seconds	Default: Enabled, severity Error
Full service monitoring:	No reply was obtained within timeout period for the configured FSM service	Default: Enabled, severity Major
<i>LOG (Event log)</i>		
[Log config events]:	Log configuration related events, such as config uploads	Default: Enabled, severity OK
[Log startup events]:	Log startup related events (currently not used)	Default: Enabled, severity OK
[Log stream events]:	Log stream related events, such as manual resets of monitoring for ETR	Default: Enabled, severity OK
[Log other events]:	Log other events (currently not used)	Default: Enabled, severity OK

CNT (Content) alarms

Freeze-frame detected:	The service has frozen frames	Default: Enabled, severity Major
Color-freeze detected:	The service has frozen in one color	Default: Enabled, severity Major
SCTE 35 event gap:	The service has not received SCTE 35 or SCTE 104 data for longer than the threshold	Default: Enabled, severity Error
Too few SCTE 35 placement opportunities:	The service has not had enough placement opportunities signaled in SCTE 35 or SCTE 104 for the previous clock hour	Default: Enabled, severity Error
SCTE 35 placement gap:	The service has not had SCTE 35 or SCTE 104 placement opportunities for longer than the threshold	Default: Enabled, severity Error
SCTE 35 end event without start:	A SCTE 35 or SCTE 104 end segmentation descriptor message was received in a Time signal event, without the corresponding start segmentation descriptor message having been received.	Default: Enabled, severity Error
SCTE 35 start event without end:	A SCTE 35 or SCTE 104 start segmentation descriptor message was received in a Time signal event, without the corresponding end segmentation descriptor message being received within the defined timeout.	Default: Enabled, severity Error
SCTE 35 minimum pre-roll time:	A SCTE 35 event is received too close to the splice time.	Default: Enabled, severity Error
SCTE 35 maximum pre-roll time:	A SCTE 35 event is received too far from the splice time.	Default: Enabled, severity Error

ETR (ETR 290) alarms

TS Sync:	No TS Sync (no signal)	Default: Enabled, severity Major
Sync byte:	Sync byte error, sync byte not 0x47	Default: Enabled, severity Major
PAT:	Program Association Table error	Default: Enabled, severity Major
Continuity:	Continuity counter error	Default: Enabled, severity Major

PMT:	Program Map Table error	Default: Enabled, severity Major
Missing PID:	PID is missing	Default: Enabled, severity Major
Transport:	Transport stream error indicator is set	Default: Enabled, severity Major
CRC:	Table checksum error	Default: Enabled, severity Major
PCR:	Program Clock Reference error	Default: Enabled, severity Major
PCR Accuracy:	Program Clock Reference accuracy error (PCR jitter)	Default: Enabled, severity Major
PTS:	Presentation Time Stamp error	Default: Enabled, severity Major
CAT:	Conditional Access Table error	Default: Enabled, severity Major
NIT:	Network Information Table error	Default: Enabled, severity Major
SI Rep Rate:	Wrong repetition rate for SI tables	Default: Enabled, severity Major
Unref PID:	PID is unreferenced	Default: Enabled, severity Major
SDT:	Service Description Table error	Default: Enabled, severity Major
EIT:	Event Information Table error	Default: Enabled, severity Major
RST:	Running Status Table error	Default: Enabled, severity Major
TDT:	Time Date Table error	Default: Enabled, severity Major
MGT:	Master Guide Table error (ATSC mode)	Default: Enabled, severity Major
VCT:	Virtual Channel Table error (ATSC mode)	Default: Enabled, severity Major
PIM/PNM:	PIM/PNM error (ATSC mode)	Default: Enabled, severity Major
RRT:	Region Rating Table error (ATSC mode)	Default: Enabled, severity Major

ATSC EIT:	ATSC EIT Table error (ATSC mode)	Default: Enabled, severity Major
STT:	System Time Table error (ATSC mode)	Default: Enabled, severity Major
ETT:	Extended Text Table error (ATSC mode)	Default: Enabled, severity Major
CA System:	CA System error	Default: Enabled, severity Major
PID min. bitr.	PID minimum bitrate below threshold	Default: Enabled, severity Major
PID max. bitr.	PID maximum bitrate exceeds threshold	Default: Enabled, severity Major
PID checks:	PID check error	Default: Enabled, severity Major
Service min. bitr.	Service minimum bitrate below threshold	Default: Enabled, severity Major
Service max. bitr.	Service maximum bitrate exceeds threshold	Default: Enabled, severity Major
Service checks:	Service check error	Default: Enabled, severity Major
MIP:	Megaframe Insertion Packet error	Default: Enabled, severity Major
Reference:	Reference check error (comparing the stream with a Gold TS)	Default: Enabled, severity Major
Gold TS:	Error found while comparing the stream with the stored Gold TS snapshot	Default: Enabled, severity Major
Pre FEC BER:	Bit error rate prior to Viterbi FEC above specified threshold (Applicable for RF inputs)	Default: Enabled, severity Major
Post FEC BER:	Bit error rate after Viterbi FEC above specified threshold (Applicable for RF inputs)	Default: Enabled, severity Major
MER:	Modulation Error Ratio above specified threshold (Applicable for RF inputs)	Default: Enabled, severity Major
SNR:	Signal to Noise Ratio below specified threshold (Applicable for RF inputs)	Default: Enabled, severity Major
Signal strength:	Signal strength outside specified thresholds (Applicable for RF inputs)	Default: Enabled, severity Major
SFN meas:	Error with timing in DVB-T/T2 SFN networks (ASI and DVB-T/DVB-T2 inputs)	Default: Enabled, severity Major

Packet error count:	Detection of one or more packets with errors after demodulator FEC (satellite input)	Default: Enabled, severity Major
Center frequency:	Difference between received and configured RF frequency exceeds specified threshold (Applicable for RF inputs)	Default: Enabled, severity Major
Symbol rate:	Difference between received and configured symbol rate exceeds specified threshold (Applicable for RF inputs)	Default: Enabled, severity Major
Post BCH FER:	DVB-T/T2 BCH Frame Error Rate exceeds specified threshold (DVB-T mode)	Default: Enabled, severity Major
T2MI	Errors in DVB-T2 Modulator Interface protocol analysis	Default: Enabled, severity Major
LDPC	LDPC iteration count higher than threshold (DVB-T/DVB-T2)	Default: Enabled, severity Major
Eb/N0	Eb/N0 outside threshold (DVB-T/DVB-T2)	Default: Enabled, severity Major
EVM	Error vector magnitude outside threshold (DVB-T/DVB-T2)	Default: Enabled, severity Major
Link margin	Link margin threshold VB272 and VB278	Default: Enabled, severity Major
Interface overflow:	Input interface overflow error. Means that the probe is overloaded and can not properly analyze the signals.	Default: Enabled, severity Major
Modulation:	Unexpected modulation parameter:	Default: Enabled, severity Major

SYS (System) events

[Critical system errors]:	Critical system errors preventing the NO-MAD from operating correctly	Default: Enabled, severity Fatal
[System errors]:	Enable this to view all system errors	Default: Enabled, severity Major
[System warning]:	Enable this to view all system warnings	Default: Enabled, severity Error
[System info]:	Enable this to view system information messages such as time synchronization	Default: Enabled, severity OK

There is a multitude of system alarms which are reported under the above headings and the configuration applies to them as a group. See section 7.2.5 for a partial list of possible system alarms.

OTT Alarms

The number of profiles changed:	The number of profiles flagged in the manifest file changed	Default: Enabled, severity 'Warning'
Profile stream type changed:	The stream type of the profile changed in the manifest	Default: Enabled, severity 'Warning'
Minimum profiles	The channel has less profiles than specified in the threshold	Default: Enabled, severity Warning
Wrong profile type	The channel has profiles of a different type than specified in the threshold	Default: Enabled, severity Warning
Download bitrate low:	The download duration time exceeds the OTT bitrate threshold. The bitrate threshold is part of the OTT threshold template defined in the OTT — Thresholds view. A threshold template is assigned to a stream in the OTT — Channels view.	Default: Disabled, severity Warning
Download bitrate too low:	The download duration time exceeds the OTT segment duration time	Default: Enabled, severity Error
Manifest size:	The manifest file size exceeds the OTT manifest size threshold	Default: Enabled, severity Warning
Actual bitrate:	The actual measured bitrate does not match the profile bitrate specified in the manifest file	Default: Enabled, severity Warning
Download timeout:	The download time exceeds twice the segment duration time	Default: Enabled, severity Major
Address resolve error:	Unable to resolve address name	Default: Enabled, severity Error
Connection failed:	Connection failed	Default: Enabled, severity Error
Send error:	Could not send data to host	Default: Enabled, severity Error
Receive error:	Could not receive data from host	Default: Enabled, severity Major
Empty reply:	Response did not contain any data in body	Default: Enabled, severity Major
HTTP error:	Invalid HTTP response	Default: Enabled, severity Major

HTTP redirect error:	HTTP 3xx redirection error	Default: Enabled, severity Major
HTTP client error:	HTTP 4xx client error	Default: Enabled, severity Major
HTTP server error:	HTTP 5xx server error	Default: Enabled, severity Major
Static manifest:	Manifest file unchanged for longer than configured threshold	Default: Enabled, severity Major
Mis-alignment detected:	One or more profiles are out of visual alignment	Default: Enabled, severity Major
Manifest parse error:	Failed to parse manifest file. Invalid format	Default: Enabled, severity Major
Segment error:	Expected segment missing from manifest	Default: Enabled, severity Major
Unknown manifest:	Cannot recognize manifest XML format	Default: Enabled, severity Fatal

7.2.3 Alarms — Event log

All alarms	Ethernet alarms	FSM & MBR alarms	OTT alarms	Content alarms	ETR alarms	System alarms	Event log	Alarm setup	Flash alarms
#	Time	Type	Stream	Description					
1	Jan 21 15:22:54	LOG	SAT2: 1.2G_inp2	Measurement status cleared when tuning the stream					
2	Jan 21 15:22:19	LOG	SAT4: 1.1G_inp4	Monitoring reset from GUI by user admin					
3	Jan 21 15:22:15	LOG	SAT2: 1.1G_inp2	Measurement status cleared from GUI by user admin					
4	Jan 21 15:21:59	LOG	SAT4: 1.1G_inp4	Measurement status cleared when tuning the stream					
5	Jan 21 15:21:54	LOG	SAT3: 1.1G_inp3	Monitoring restarted due to config change					
6	Jan 21 15:21:44	LOG	SAT2: 1.1G_inp2	Measurement status cleared when tuning the stream					
7	Dec 27 14:11:03	LOG		Configuration uploaded from 192.168.50.14					

Recent items: 7

[View list offline](#)

[Auto-refresh list](#)

[Flush alarms](#)

[Export...](#)

The Event log displays the events logged by the probe. These are events that happen which are not errors in any way, such as configuration uploads or logging of monitoring resets for ETR streams.

When **View list offline** is enabled filter buttons will be shown on the top of list. These allows filtering of the events based on their type:

- Regular events
- Config events
- Startup events
- Stream events

All alarms

Ethernet alarms

FSM & MBR alarms

OTT alarms

Content alarms

ETR alarms

System alarms

Event log

Alarm setup

Flash alarms



☐ Regular events

☐ Config events

☐ Startup events

☐ Stream events

#	Time	Type	Stream	Description
1	Jan 21 15:25:14	LOG	SAT2: 1.2G inp2	Measurement status cleared when tuning the stream
2	Jan 21 15:24:39	LOG	SAT4: 1.1G inp4	Measurement status cleared when tuning the stream
3	Jan 21 15:24:04	LOG	SAT2: 1.1G inp2	Measurement status cleared when tuning the stream
4	Jan 21 15:23:29	LOG	SAT4: 1.2G inp4	Measurement status cleared when tuning the stream
5	Jan 21 15:22:54	LOG	SAT2: 1.2G inp2	Measurement status cleared when tuning the stream
6	Jan 21 15:22:19	LOG	SAT4: 1.1G inp4	Monitoring reset from GUI by user admin
7	Jan 21 15:22:15	LOG	SAT2: 1.1G inp2	Measurement status cleared from GUI by user admin
8	Jan 21 15:21:59	LOG	SAT4: 1.1G inp4	Measurement status cleared when tuning the stream
9	Jan 21 15:21:54	LOG	SAT3: 1.1G inp3	Monitoring restarted due to config change
10	Jan 21 15:21:44	LOG	SAT2: 1.1G inp2	Measurement status cleared when tuning the stream
11	Dec 27 14:11:03	LOG		Configuration uploaded from 192.168.50.14

Items found: 11

[View list offline](#)

[Auto-refresh list](#)

[Flush alarms](#)

[Export...](#)

To enable/disable logging of ETR stream events go to the **Setup — ETR** view.

7.2.4 Alarms — Flash Alarms (requires FLASH-OPT)

All alarms	Ethernet alarms	FSM alarms	OTT alarms	ETR alarms	System alarms	Alarm setup	Flash alarms
Status	Col	Time	Type	Stream	Description		
Event	☐	2015 Jan 27 14:36:20	ETH	10.0.81.121:1234	MLR >= error-threshold (9 >= 8)		
Active	☒	2015 Jan 27 14:36:20	ETH	10.0.81.121:1234	CC skips:10 discontinuities:3 - counting		
Event	☐	2015 Jan 27 14:35:31	ETH	10.0.81.121:1234	MLR >= error-threshold (15 >= 8)		
Event	☐	2015 Jan 27 14:35:31	ETH	10.0.81.121:1234	CC skips:15 discontinuities:2		
Event	☐	2015 Jan 27 14:35:15	ETH	10.0.81.121:1234	MLR >= error-threshold (15 >= 8)		
Event	☐	2015 Jan 27 14:35:15	ETH	10.0.81.121:1234	CC skips:15 discontinuities:2		
Event	☐	2015 Jan 27 14:35:08	ETH	10.0.81.121:1234	MLR >= error-threshold (16 >= 8)		
Event	☐	2015 Jan 27 14:35:08	ETH	10.0.81.121:1234	CC skips:16 discontinuities:3		
Event	☐	2015 Jan 27 14:35:03	ETH	10.0.81.121:1234	MLR >= error-threshold (16 >= 8)		
Event	☐	2015 Jan 27 14:35:03	ETH	10.0.81.121:1234	CC skips:16 discontinuities:3		
Event	☐	2015 Jan 27 14:34:46	ETH	10.0.81.121:1234	MLR >= error-threshold (16 >= 8)		
Event	☐	2015 Jan 27 14:34:46	ETH	10.0.81.121:1234	CC skips:16 discontinuities:3		
Cleared	☒	2015 Jan 27 14:34:28	ETH	10.0.81.121:1234	CC skips:444 discontinuities:88 (Jan 27 14:34:26 - Jan 27 14:34:28)		
Event	☐	2015 Jan 27 14:34:26	ETH	10.0.81.121:1234	MLR >= error-threshold (437 >= 8)		
Active	☒	2015 Jan 27 14:34:26	ETH	10.0.81.121:1234	CC skips:443 discontinuities:87 - counting		
Event	☐	2015 Jan 27 14:34:22	ETH	10.0.81.121:1234	MLR >= error-threshold (16 >= 8)		
Search Clear filter Older Newer Oldest Newest Export... Total flash alarms: 192 Position: 48% Displayed: 100							

The FLASH option enables the **Flash alarms** tab. This alarm list contains the last 20,000 alarms and keeps them in non-volatile memory so that they survive reboots and power-outages. This opens up a lot of possibilities for probes that cannot be reached while doing measurements and for probes that need to be powered down and consulted elsewhere. It also severely increases the size of the alarm list allowing browsing of older alarms.

7.2.5 System alarms

This section contains a partial list of system alarms that may be raised by the NOMAD.

System alarms

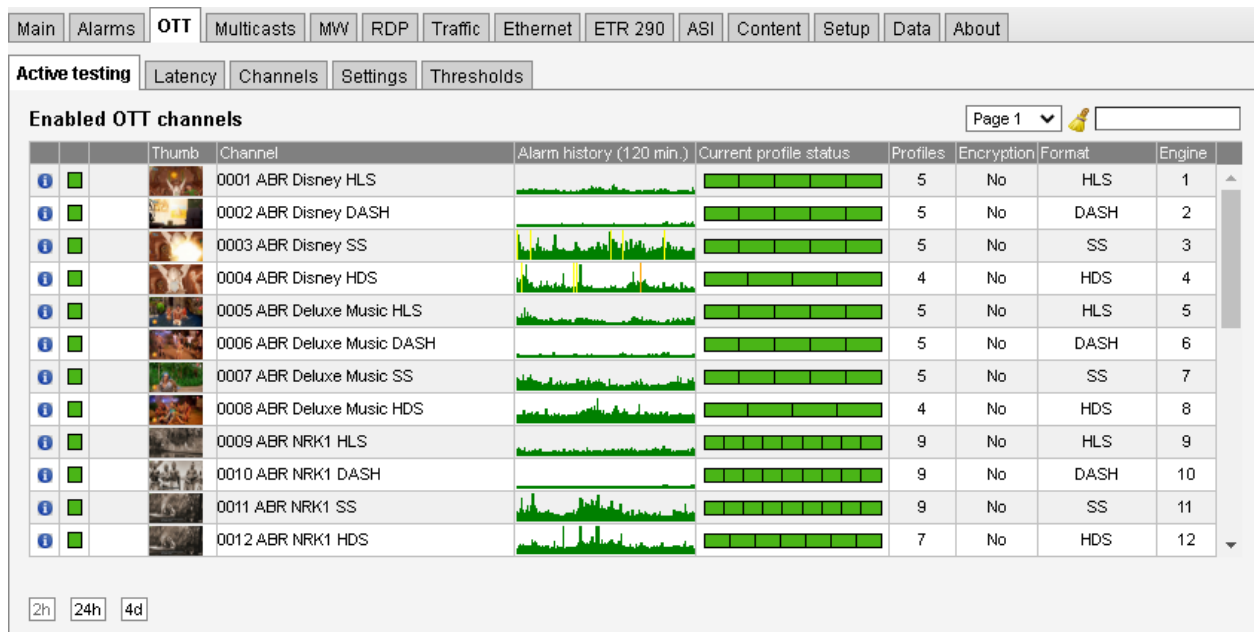
System time is wrong The system time does not agree with the time stamp of the license activation. Please refer to E Appendix: On-line License Activation for more details.

License expires in N hours	The current license activation is about to expire and the system is not able to connect to the internet to refresh it automatically. Please refer to E Appendix: On-line License Activation for more details.
Stopped processes	One or more of the required system processes have stopped. This can be due to an intermittent software failure (bug), in which case the alarm should go away after a little while. If the problem persists, this might indicate that the system is overloaded; try reducing load to see if the problem clears. This alarm is sometimes raised during system start-up if one of the processes is slow to start. As long as the alarm goes away in a few minutes, this is only an indication that the system might be running slow due to high load.
Process ewe restarted	A restart of the NOMAD main process has been detected. This can be due to an intermittent software failure (bug). If the problem persists, this might indicate that the system is overloaded; try reducing load to see if the problem clears.
Packet Errors on interface	The NOMAD has detected problems with the attached Ethernet connection. Verify cables and connectors.
High rate of unmonitored multicast packets on interface NN	The NOMAD has detected a high amount of multicast packets being delivered on the indicated network interface that it has not been configured to monitor. This can affect monitoring performance negatively.
SD card missing	No attached SD card could be found. Recordings and log files from the measurement logger will not be saved to flash. If the system is supposed to have an SD card attached, please try rebooting the NOMAD and contact technical support if the problem persists. The Flash Alarms functionality is not affected by this alarm.
SD storage full	The attached SD card is full. Recordings and log files from the measurement logger will not be saved to flash until some of the files are removed, using the Data — Storage view.
No disk free	The internal disk is full, please clear contents, for instance by disabling thumbnail generation, to ensure correct operation.
Disk free – Software upgrade may fail	The internal disk is nearly full and there is not enough space to store a software upgrade image. Please clear contents or reboot before trying to perform a system update.
Write error saving config file	The NOMAD configuration file could not be saved. If the problem persists, you should export a full configuration using the Data — Configuration to avoid loss of data.

Error copying IDProm to file	The NOMAD is unable to read from internal storage. If the problem persists, please contact technical support.
Trap queue is full	The NOMAD is creating so many simultaneous alarms that it is unable to forward them as traps over SNMP. If the problem persists, try to reduce the load or disable unimportant alarms, or use the Eii to fetch alarm information.
Content analysis overloaded	The content analysis engine is overloaded. Please refer to B.5 Content Thresholds for more details.
Data queue overflow	The named data queue is receiving more data than the NOMAD is able to process. This usually means that this part of the system is overloaded. Try reducing load to see if the problem goes away.

7.3 OTT

7.3.1 OTT — Active testing



The screenshot shows the 'Active testing' view for OTT channels. The table below represents the data shown in the interface:

Status	Thumb	Channel	Alarm history (120 min.)	Current profile status	Profiles	Encryption	Format	Engine
ⓘ		0001 ABR Disney HLS			5	No	HLS	1
ⓘ		0002 ABR Disney DASH			5	No	DASH	2
ⓘ		0003 ABR Disney SS			5	No	SS	3
ⓘ		0004 ABR Disney HDS			4	No	HDS	4
ⓘ		0005 ABR Deluxe Music HLS			5	No	HLS	5
ⓘ		0006 ABR Deluxe Music DASH			5	No	DASH	6
ⓘ		0007 ABR Deluxe Music SS			5	No	SS	7
ⓘ		0008 ABR Deluxe Music HDS			4	No	HDS	8
ⓘ		0009 ABR NRK1 HLS			9	No	HLS	9
ⓘ		0010 ABR NRK1 DASH			9	No	DASH	10
ⓘ		0011 ABR NRK1 SS			9	No	SS	11
ⓘ		0012 ABR NRK1 HDS			7	No	HDS	12

The OTT option enables monitoring of up to 50 OTT channels. Up to 5 OTT engines (depends on license) can operate in parallel, and each engine licensed allows any channels to be analyzed. Each engine analyses channels in series and can be configured with any number of channels up to the maximum allowed by the license. Make sure you have the necessary bandwidth available for the channels you are analyzing, see B.10 OTT Bandwidth requirements.

The NOMAD will parse a channel's manifest file, and for a live channel one of the latest segments in each OTT profile's segment sequence will be analyzed. The engine then moves on to the next OTT channel in the channel list defined by the user. For a VoD channel the OTT engine will analyze all segments in the VoD file, one in each round-robin loop.

If manifest file parsing or segment analysis reveals an error, an alarm will be raised. Note that some alarms depend on user-defined threshold values. Alarms must also be enabled in the **Alarm — Alarm setup** view.

The page to display can be selected from a drop-down menu.

The following OTT information is displayed in the Active testing view:

OTT channels

Status bulb: A bulb indicates the current status of the channel, i.e. the most severe profile status.

Thumb:	If thumbnail extraction has been enabled, a thumbnail is displayed for the channel if supported. Thumbnail decoding is a process asynchronous of the channel analysis and therefore should not be expected to be updated at the same time. The main purpose of the thumbnails is to provide brief information about the channel contents. If thumbnail extraction has not been enabled, or if the thumbnail extraction fails, an icon indicating the stream type will be displayed instead.
Channel:	The channel name defined by the user and linked to a URL in the OTT — Channels view.
Alarm history:	A timeline graph display of a combined bitrate and alarm representation for the channel. This shows the most severe alarm or download speed for all monitored profiles. The individual profiles graphs can be found in the OTT Profiles view. The timeline can display the last 120 minutes, 24 hours or four days. To switch between the graphs, press the “24h”, “2h” or “4d” button on the left under the channel list. Each bar color represents the alarm severity level as configured under Alarms — Alarm setup.
Current profile status:	The channel health bar displays the current status for individual channel profiles. Profiles are separated by vertical black lines. Colors indicate profile alarm status: • Green: OK • Yellow: Warning • Orange: Error • Red: Major • Black/Dark red: Fatal
Profiles:	The number of profiles associated with a channel.
Encryption:	Scrambling information is resolved from the profile manifest. If the profile is scrambled the encryption field will read <i>Yes</i> . If the profile is transmitted in clear the encryption field will read <i>No</i> .
Format:	The channel format is resolved from the manifest files, and is shown here (Apple HLS , Microsoft Smooth Streaming , Adobe HDS , MPEG DASH , SHOUTcast or RTMP).
Engine:	Indicates which OTT engine is assigned to what channel. The NO-MAD can be licensed with anywhere from 1 up to 5 OTT engines. Each engine is capable of handling any number of channels.

Click the blue information button on a channel to open the details window. This window provides detailed information about the status and alarms on all the profiles for the selected channel. The

pop-up window is identical to the one displayed in the **Thumbnails** view. For more details, see chapter 6.4.2.

7.3.2 OTT — Engine usage

Active testing Engine usage Channels Settings Thresholds

OTT engine usage overview

This shows an overview of the amount of channels assigned per engine. Channels that are spending close to 100% in network transfers may need to skip over segments to keep up with the channel. For more details, see the User's Manual.

Engine	Channels	Profiles	HLS	DASH	SS	HDS	SHOUTcast	RTMP	QTT	Cur network	Input
1	4	44	4	0	0	0	0	0	0		Data SFP
2	0	0	0	0	0	0	0	0	0		Data SFP
3	1	3	1	0	0	0	0	0	0		Data SFP
4	0	0	0	0	0	0	0	0	0		Data SFP
5	0	0	0	0	0	0	0	0	0		Data SFP
6	0	0	0	0	0	0	0	0	0		Data SFP
7	0	0	0	0	0	0	0	0	0		Data SFP
8	0	0	0	0	0	0	0	0	0		Data SFP
9	0	0	0	0	0	0	0	0	0		Data SFP
10	0	0	0	0	0	0	0	0	0		Data SFP
11	4	12	3	0	1	0	0	0	0		Data SFP
12	1	0	0	1	0	0	0	0	0		Data SFP
13	1	0	0	0	1	0	0	0	0		Data SFP
14	1	0	0	0	0	0	0	0	0		Data SFP
15	1	1	0	0	0	0	0	1	0		Data SFP
16	1	1	0	0	0	0	1	0	0		Data SFP
17	0	0	0	0	0	0	0	0	0		Data SFP
18	0	0	0	0	0	0	0	0	0		Data SFP
19	2	4	1	1	0	0	0	0	0		Data SFP
20	1	1	1	0	0	0	0	0	0		Data SFP
21	1	1	1	0	0	0	0	0	0		Data SFP
22	0	0	0	0	0	0	0	0	0		Data SFP
23	1	1	1	0	0	0	0	0	0		Data SFP
24	2	2	1	0	0	0	0	0	0		Data SFP

The **Engine usage** view is meant for troubleshooting performance issues in case of OTT engine overload. An overview of the number of channels and their associated number of profiles and stream types are displayed per OTT engine.

In addition, a graph indicating the amount of time each engine is spending doing network traffic is displayed. The Y axis of the network graph is percent, with a full bar indicating that the engine is spending all its time performing network requests. When this happens, it is likely that the engines will not be able to monitor all segments of the monitored channels.

When an overloaded engine is unable to keep up with the channel it may raise *Lagging behind N segments since last round* (for formats using sequential segment numbering) or *Lagging behind (lost segments between M and N) since last round* (for formats using, for instance, time-based segment numbering) alarm, indicating that a number of segments have rolled out of the playlist of segments specified in the manifest while the engine was busy downloading data.

Please refer to the OTT section of B Appendix: Monitoring Practices for suggestions on how to configure the OTT engines.

7.3.3 OTT — Channels

Active testing	Latency	Channels	Settings	Thresholds
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OTT channel configuration 

Name	URL	Threshold	Engine	Mode	Enabled	Edit
WaterfallCam@cache	http://10.0.30.8/abr/0/0/hls/WaterfallCam/playlist.m3u8	Default	1	Normal	✓	Edit
Bip bop	http://10.0.30.37/bipbop/bipbopall.m3u8	Default	2	Normal	✓	Edit
Silent Black	http://10.0.30.37/silent_black_stream/manifest.m3u8	Default	3	Normal	✓	Edit
Silent Green	http://10.0.30.37/silent_green_stream/manifest.m3u8	Default	4	Normal	✓	Edit
Silent Both	http://10.0.30.37/silent_alternating_stream/manifest.m3u8	Default	5	Normal	✓	Edit
Silent Complexity	http://10.0.30.37/silent_btech_stream/manifest.m3u8	Default	6	Normal	✓	Edit

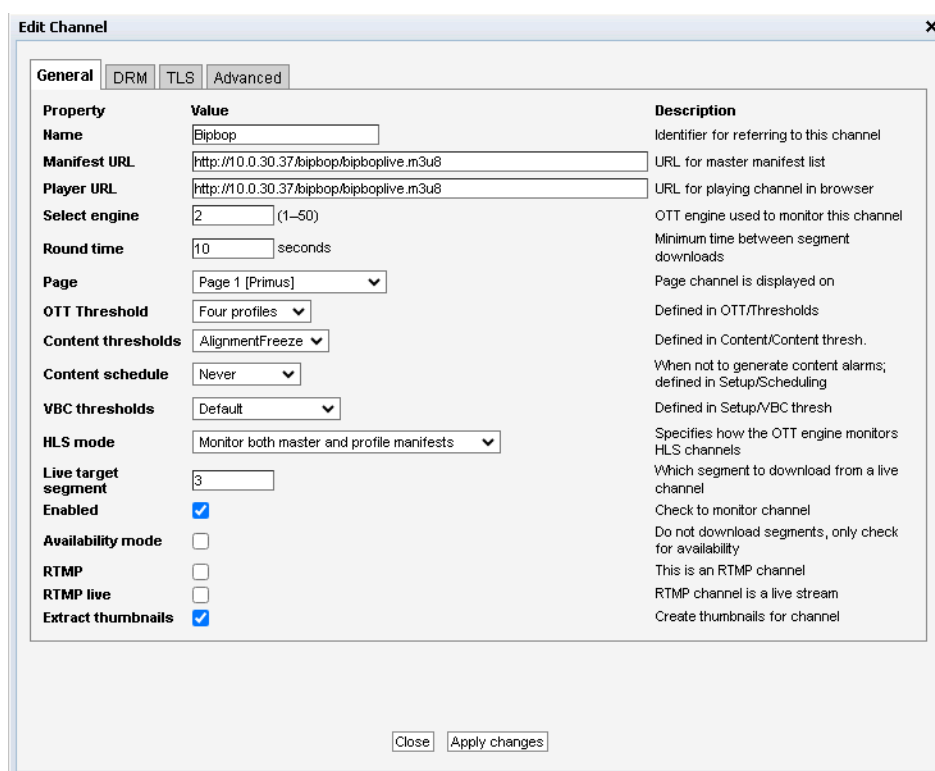
Channels: 6

[Add new channel](#)
[Duplicate selected](#)
[Delete selected](#)
[Distribute selected](#)
[Edit selected](#)

The OTT Channel Configuration list shows OTT channels configured by the user.

To add a channel to the list click the **Add new channel** button. This will open the **Edit channel** pop-up view, allowing the user to define channel parameters. A channel entry can be selected by clicking the channel; the list entry will be highlighted. Several list entries can be selected by using regular *Ctrl + click* functionality. Clicking the **Duplicate selected** button will open the **Edit channel** pop-up view with all channel parameters duplicated, except the channel name. Clicking **Delete selected** will delete the highlighted list entry. Clicking **Distribute selected** will distribute the selected channels across the licensed OTT engines (the NOMAD can be licensed with up to 5 OTT engines). Clicking **Edit selected** will open the **Edit channel** pop-up view associated with the highlighted channel. Batch editing is supported; this is convenient if a new threshold template should be assigned to a number of channels or if monitoring of several channels should be enabled or disabled. Select the channels and click the **Edit selected** button. Parameters differing between channels will be indicated in the **Edit selected** pop-up view by an asterisk wildcard symbol.

The search field in the upper right corner of the view allows the user to type a text string, and the OTT channel list is updated to display only channels matching the specified text.



Property	Value	Description
Name	Bipbop	Identifier for referring to this channel
Manifest URL	http://10.0.30.37/bipbop/bipboplive.m3u8	URL for master manifest list
Player URL	http://10.0.30.37/bipbop/bipboplive.m3u8	URL for playing channel in browser
Select engine	2 (1-50)	OTT engine used to monitor this channel
Round time	10 seconds	Minimum time between segment downloads
Page	Page 1 [Primus]	Page channel is displayed on
OTT Threshold	Four profiles	Defined in OTT/Thresholds
Content thresholds	AlignmentFreeze	Defined in Content/Content thresh.
Content schedule	Never	When not to generate content alarms; defined in Setup/Scheduling
VBC thresholds	Default	Defined in Setup/VBC thresh
HLS mode	Monitor both master and profile manifests	Specifies how the OTT engine monitors HLS channels
Live target segment	3	Which segment to download from a live channel
Enabled	☒	Check to monitor channel
Availability mode	☐	Do not download segments, only check for availability
RTMP	☐	This is an RTMP channel
RTMP live	☐	RTMP channel is a live stream
Extract thumbnails	☒	Create thumbnails for channel

General

Name: A name should be assigned to each OTT channel. The name will be used throughout the NOMAD's user interface when referring to this channel.

Manifest URL: The URL of the OTT channel.

Player URL: In this field you can enter the URL to a web page which will open the OTT channel in your browser. If entered, a 'play' button will be displayed in the **Active testing** view, which will open the selected URL in a new browser tab.

Select engine: A number between 1 and 5, depending on license activated, indicating which OTT engine the channel uses.

Round time: Sets the minimum round time of this OTT channel, in seconds (default: 15 seconds). If processing all the profiles of a single channel takes less time than this, it waits until this amount of seconds has passed since it started the round before starting to process through its channels again. The round time setting does not apply to channels for which real-time audio analysis have been enabled.
Note: The round time may not be set to a value less than 2 seconds.

Page: Choose which Active Testing page this channel should be displayed on. Having too many channels on the same page can cause the page reloading to stutter.

OTT Threshold:	The OTT threshold that should be assigned to the OTT channel. OTT thresholds that have been defined in the OTT — Thresholds view are available for selection from the drop-down menu.
Content thresholds:	The Content thresholds specify content alarming options. Selectable Content thresholds templates are defined in the Content — Content thresh. view.
Content schedule:	The scheduling scheme that should be assigned to the content monitoring for the OTT channel. Scheduling schemes that have been defined in the Setup — Scheduling view are available for selection from the drop-down menu. Scheduling allows masking content alarms at predefined time periods.
VBC thresholds:	The alarm threshold template used to configure when alarms are generated towards the VBC server.
Live target segment:	This specifies which segment, counted from the bottom of the list, the NOMAD should download when doing active testing on a live channel.
Enabled:	Check the 'Enabled' check box to start monitoring the OTT service.
Availability mode:	If this option is enabled, the engine will only check for segment presence but not download the entire file. This also disables thumbnail generation.
RTMP:	Check this check box if the channel is an RTMP channel.
RTMP live:	Check this check box if the RTMP channel is a live service.

HLS mode: This setting determines how the OTT engine monitors the manifests and URLs. The HLS mode applies only to HLS channels and is ignored by all other channels. The following options are available:

- **Monitor both master and profile manifests**

This option monitors both the master and profile manifests. It uses the playlist URLs to identify the different profiles. This is the default option.

- **Monitor profile manifests only**

This option makes the OTT engine only download the master manifest once. After the initial download, it will only re-download it if one of the profiles gets an error or the connection reset timeout occurs.

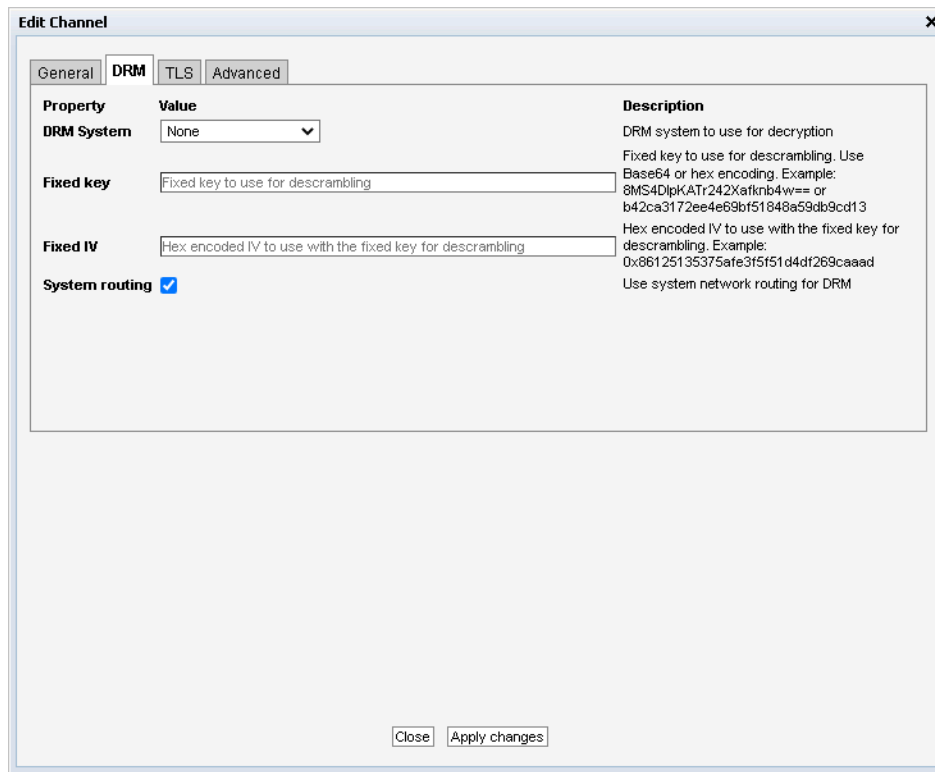
This option can be used if the server hosting the manifest is generating a unique session for each download of the master manifest, for instance by changing the profile playlist URLs between each download.

- **Monitor both, but allow unstable URLs**

This option also monitors both the master and profile manifests, but it doesn't use the playlist URLs to identify profiles. This option can also be used in cases where an OTT channel has unstable URLs.

Extract thumbnails: If the thumbnail option is enabled thumbnails will be available for the selected channels in the Active testing and Thumbnails sections.

Alignment: If the alignment option is enabled the alignment section will be available. If the Content Extraction and Alarming option is licensed, alignment checking is enabled in the Content threshold and this setting is not visible.



Property	Value	Description
DRM System	None	DRM system to use for decryption
Fixed key	Fixed key to use for descrambling	Fixed key to use for descrambling. Use Base64 or hex encoding. Example: 8MS4DlpKATr242Xafknb4w== or b42ca3172ee4e69bf51848a59db9cd13
Fixed IV	Hex encoded IV to use with the fixed key for descrambling	Hex encoded IV to use with the fixed key for descrambling. Example: 0x86125135375afe3f5f51d4df269caaad
System routing	☒	Use system network routing for DRM

DRM

DRM system: If this channel is encrypted using a Verimatrix VCAS server, selecting the **Verimatrix VCAS 3.7** or **Verimatrix VCAS 4.3** option and entering the IP address or hostname of the VCAS server's encoder interface in the **DRM hostname** field will allow descrambling of the encrypted segments. See **OTT descrambling with Verimatrix** for more info.

If this channel is encrypted using an Irdeto server, select the **Irdeto** option and configuring access to the Irdeto server will allow descrambling of the encrypted segments.

Select **None** option for streams that are not encrypted, or where you have a fixed key or IV available.

Fixed key: The key that will be used to descramble the segments for this channel. Using this field will override any key found during manifest parsing.

For HLS, use a Base64 encoded string, like this:

8MS4DlpKATr242Xafknb4w==

For DASH, use a hex encoded string, like this:

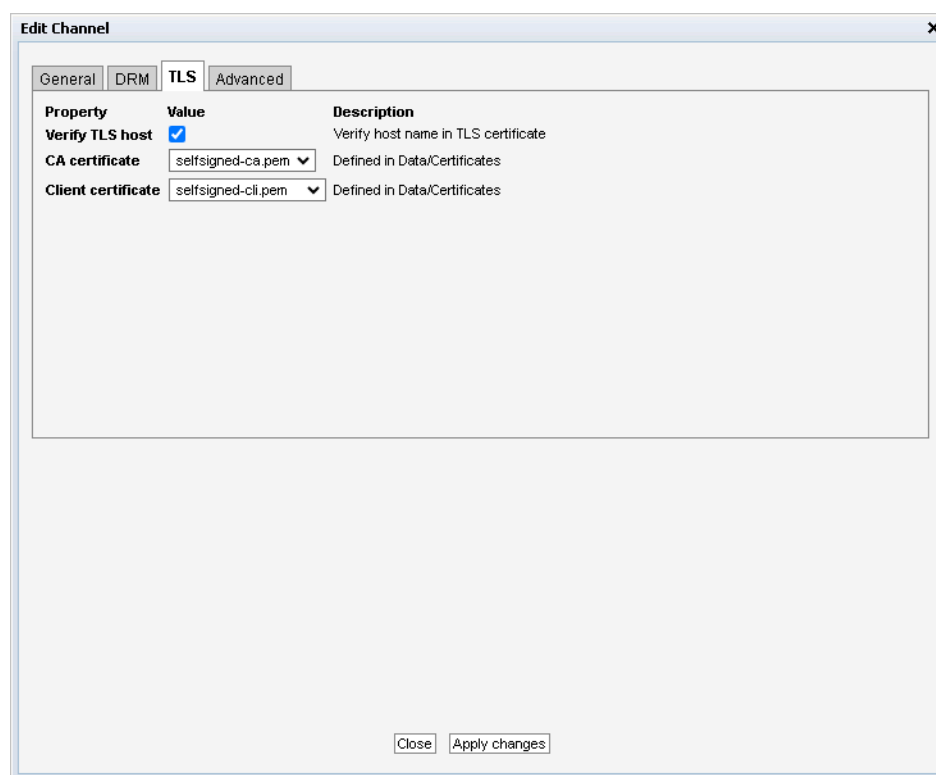
b42ca3172ee4e69bf51848a59db9cd13

Fixed IV: The IV to be used during descrambling of the HLS segments. Using this field will override any IV found or calculated during manifest parsing.

Use a 0x-prefixed hex encoded string, like this:

0x86125135375afe3f5f51d4df269caaad

DRM hostname:	If used with a DRM system, configure enter the IP address or hostname of the DRM server here.
DRM username:	When using the Irdeto DRM system, add the username used to log in to the Irdeto server here.
DRM password:	When using the Irdeto DRM system, add the password used to log in to the Irdeto server here.
Account ID:	When using the Irdeto DRM system, this should be set to the ID of the account that this channel is configured to. Please refer to the Irdeto User Manual for more details.
Content ID:	When using the Irdeto DRM system, this should be set to the ID of the channel on the Irdeto server. Please refer to the Irdeto User Manual for more details.
Crypto Period:	When using the Irdeto DRM system, this should be set to match the configuration on the Irdeto server. Please refer to the Irdeto User Manual for more details.
System routing:	If enabled, the request for the DRM system or linked key uses the system routing table. If disabled, the request uses the routing configured for the associated OTT engine.

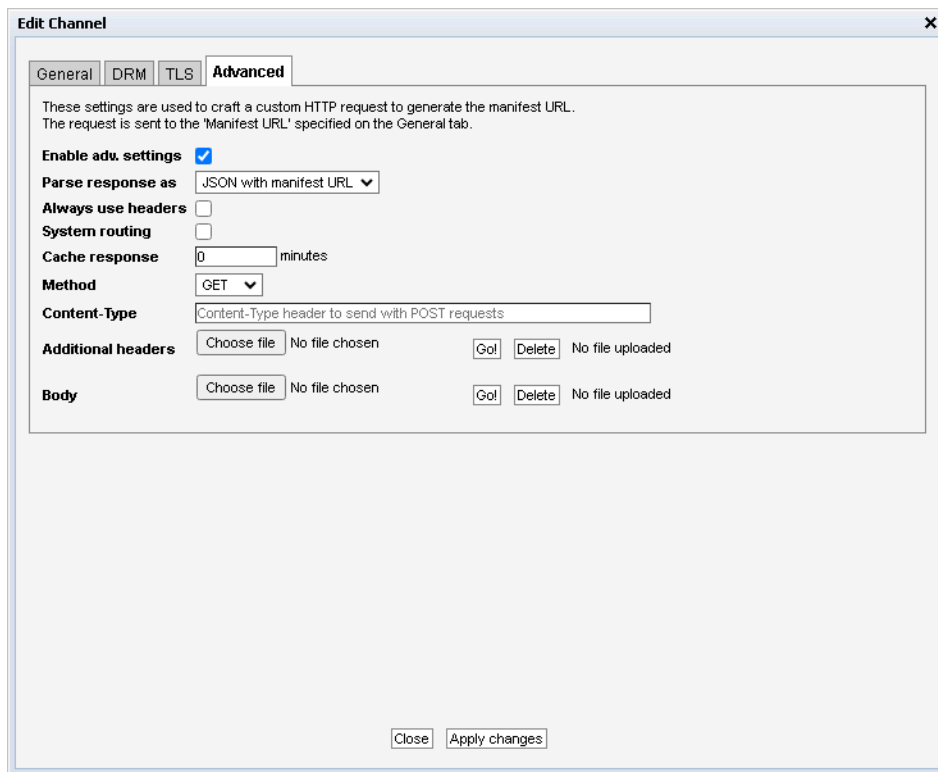


Property	Value	Description
Verify TLS host	☒	Verify host name in TLS certificate
CA certificate	selfsigned-ca.pem	Defined in Data/Certificates
Client certificate	selfsigned-cli.pem	Defined in Data/Certificates

Close Apply changes

TLS

Verify TLS host	If the channel is requested over a TLS connection, enabling this option verifies that the presented server certificate is valid for the host name used for the request. This setting can be enabled without having the CA certificate available.
CA certificate	If the channel is requested over a TLS connection, selecting a CA certificate here verifies that the presented server certificate is trusted by it. Certificates are uploaded in the Data — Certificates view.
Client certificate	If a client certificate is selected here, and the channel is requested over a TLS connection, the NOMAD will present this certificate in outgoing network requests. Enable this setting for mTLS (mutual TLS). Certificates are uploaded in the Data — Certificates view.



Advanced

Enable adv. settings:	Check this box to enable the advanced manifest settings. If unchecked, all settings on this page are ignored.
Parse response as:	Determines how to parse the response returned when requesting the Manifest URL . See below for an explanation of the settings.
Always use headers:	If enabled, any headers specified in Additional headers configured below will be sent with all requests. If disabled, the additional headers will only be sent in the advanced manifest request.

System routing:	If enabled, the request for the advanced manifest URL uses the system routing table. If disabled, the request uses the routing configured for the associated OTT engine.
Cache response:	Defines for how long the advanced manifest response should be cached. If set to a non-zero value, the server is not queried again for the same URL until at least the configured number of minutes has passed. If the value for <i>Reset connection after</i> under OTT — Settings is lower, that value takes precedence.
Method:	Determines which HTTP method to use when requesting the top-level manifest file. Supported methods are GET and POST .
Content-Type:	When requesting the manifest using the HTTP POST , use this Content-Type for the submitted request body.
Additional headers:	To provide additional custom request headers or overwrite the default headers when requesting the top-level manifest file, create a text file containing the headers and upload them here.
Body:	When requesting the manifest using the HTTP POST , upload the file to submit here.

The advanced manifest options can be used in instances where the master manifest file is not directly available to download, or if additional parameters or an alternative HTTP method is required to access it.

If your channel needs several steps of authentication or other web service calls before supplying clients with an URL to the master manifest, you can make an “in-between” web service which the NOMAD sends all required info to do the authentication and/or channel look-ups through this interface. Set **Parse response as** to *JSON with manifest URL* and have the in-between service return a JSON file with an “url” parameter containing the URL to the master manifest file.

If your channel just needs additional headers and/or an alternative HTTP method to return the master manifest, set **Parse response as** to *Normal manifest*. Enable **Always use headers** if the additional headers are to be supplied in all requests, and not only the request for the top-level manifest.

7.3.4 OTT — Settings

Active testing Engine usage Channels **Settings** Thresholds

OTT engine settings

Reset connection after: minutes

Routing interface		Routing interface	
Engine 1	Default OTT interface ▼	Engine 2	Default OTT interface ▼
Engine 3	Default OTT interface ▼	Engine 4	Default OTT interface ▼
Engine 5	Default OTT interface ▼	Engine 6	Default OTT interface ▼
Engine 7	Default OTT interface ▼	Engine 8	Default OTT interface ▼
Engine 9	Default OTT interface ▼	Engine 10	Default OTT interface ▼
Engine 11	Default OTT interface ▼	Engine 12	Default OTT interface ▼
Engine 13	Default OTT interface ▼	Engine 14	Default OTT interface ▼
Engine 15	Default OTT interface ▼	Engine 16	Default OTT interface ▼
Engine 17	Default OTT interface ▼	Engine 18	Default OTT interface ▼
Engine 19	eth2 - Data SFP ▼	Engine 20	Default OTT interface ▼
Engine 21	Default OTT interface ▼	Engine 22	Default OTT interface ▼
Engine 23	Default OTT interface ▼	Engine 24	Default OTT interface ▼

Page name	Page name	Page name
Page 1 Primus	Page 2 Secundus	Page 3 Set the name for page 3
Page 4 Set the name for page 4	Page 5 Set the name for page 5	Page 6 Set the name for page 6
Page 7 Set the name for page 7	Page 8 Set the name for page 8	Page 9 Set the name for page 9
Page 10 Set the name for page 10	Page 11 Set the name for page 11	Page 12 Set the name for page 12
Page 13 Set the name for page 13	Page 14 Set the name for page 14	Page 15 Set the name for page 15
Page 16 Set the name for page 16	Page 17 Set the name for page 17	Page 18 Set the name for page 18
Page 19 Set the name for page 19	Page 20 Set the name for page 20	Page 21 Set the name for page 21
Page 22 Set the name for page 22	Page 23 Set the name for page 23	Page 24 Set the name for page 24

The **Settings** view makes it possible to change global and per-engine OTT monitoring parameters. Press **Apply** to confirm changes made.

Settings

Reset connection after: Configures the NOMAD OTT engines to reset the connections after the specified number of minutes. This is useful for cases where the server has a limit for how long a session can live. By resetting before that limit a new session is created and the problem is avoided.

Routing interface: Selects the interface on which to connect to the OTT server. This defaults to the interface selected in the **Setup — Routing** view, but can be overridden for each engine. The routing applies to all channels monitored by this engine.

Page name: This setting allows names to be associated with different pages. Individual channels can be assigned to different pages in the **OTT — Channels** view, to facilitate easier navigation in the different OTT views.

7.3.5 OTT — Thresholds

Active testing
Latency
Channels
Settings
Thresholds

Threshold presets

Name	Refs	Type	Bitrate error	Bitrate warn	Min. actual	Max. actual	Manifest ad	Manifest size	Min. profiles	Edit
Default	0	Any	100	80	50	200	60	500.000 kB	0	Edit
Strict	0	Any	100	80	80	200	60	500.000 kB	2	Edit
Live	7	Live	100	80	-1	-1	60	500.000 kB	0	Edit
VoD	0	VoD	100	80	-1	-1	60	500.000 kB	0	Edit

Thresholds: 4

Add new threshold
Duplicate selected
Delete selected
Edit selected

The OTT **Threshold presets** list shows OTT threshold templates configured by the user.

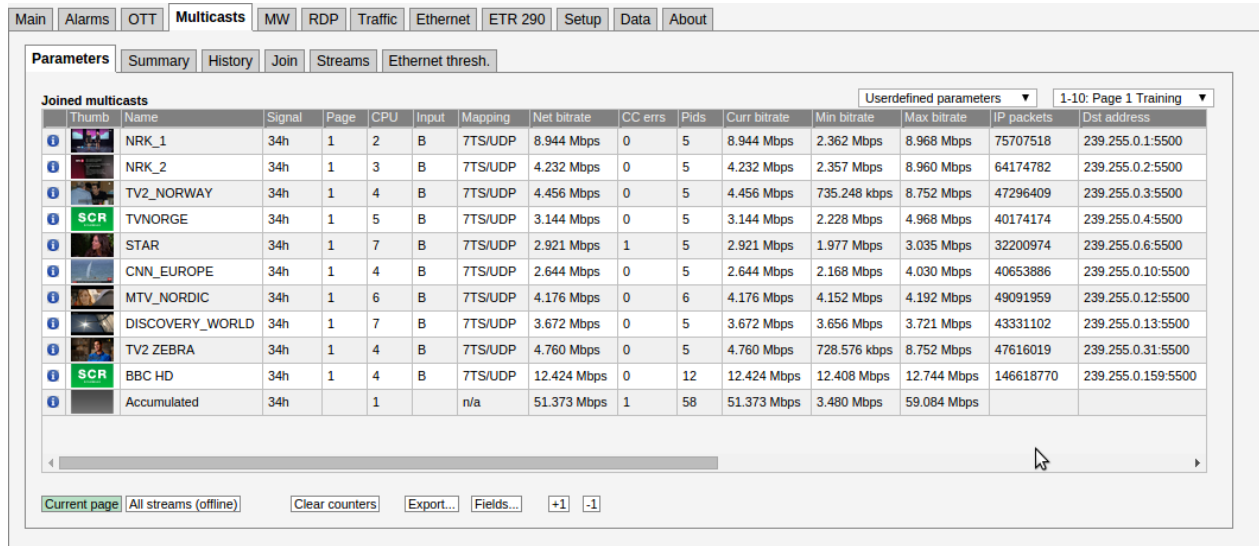
To add a threshold template to the list click the **Add new threshold** button. This will open the **Edit threshold** pop-up view, allowing the user to define threshold parameters. A threshold template entry can be selected by clicking the threshold template; the list entry will be highlighted. Several list entries can be selected by using regular *Ctrl + click* functionality. Clicking the **Duplicate selected** button will open the **Edit threshold** pop-up view with all threshold template parameters duplicated, except the threshold template name. Clicking **Delete selected** will delete the highlighted list entry. Clicking **Edit selected** will open the **Edit threshold** pop-up view associated with the highlighted threshold template. Batch editing is supported. Select the threshold templates and click the **Edit selected** button. Parameters differing between templates will be indicated in the **Edit selected** pop-up view by an asterisk wildcard symbol.

The search field in the upper right corner of the view allows the user to type a text string, and the threshold list is updated to display only thresholds matching the specified text.

Actual bitrate media type:	The profile types that the actual bitrate alarm applies to. If set to <i>Any</i> , the actual bitrate is checked for all profiles.
Sequence age:	The maximum time a manifest can remain unchanged before a manifest age alarm is raised.
Manifest size:	The maximum detected size of the manifest before a manifest size alarm is raised. Manifests larger than this will not be analyzed. Also applies to profile manifests, where applicable.
Min. profiles:	Minimum number of profiles in the selected channel before an alarm is raised.
Ignore X profiles:	When any of these are checked, all alarms are disabled for profiles of the corresponding media types.
Download ignored profiles:	If this is unchecked, no segments will be downloaded for profiles which are ignored above.

7.4 Multicasts

7.4.1 Multicasts — Parameters

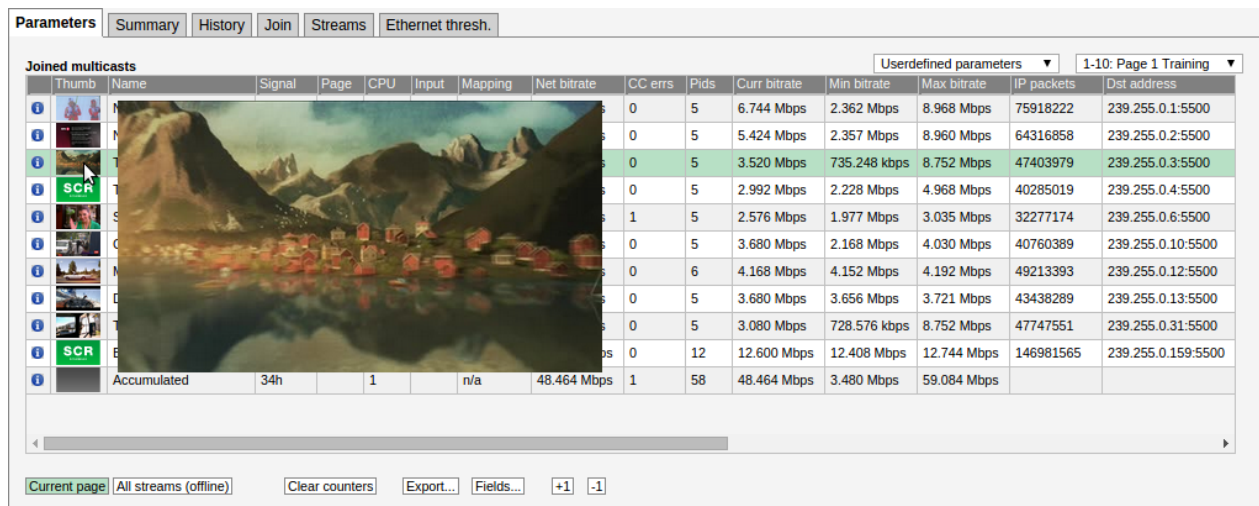


Thumb	Name	Signal	Page	CPU	Input	Mapping	Net bitrate	CC errs	Pids	Curr bitrate	Min bitrate	Max bitrate	IP packets	Dst address
	NRK_1	34h	1	2	B	7TS/UDP	8.944 Mbps	0	5	8.944 Mbps	2.362 Mbps	8.968 Mbps	75707518	239.255.0.1:5500
	NRK_2	34h	1	3	B	7TS/UDP	4.232 Mbps	0	5	4.232 Mbps	2.357 Mbps	8.960 Mbps	64174782	239.255.0.2:5500
	TV2_NORWAY	34h	1	4	B	7TS/UDP	4.456 Mbps	0	5	4.456 Mbps	735.248 kbps	8.752 Mbps	47296409	239.255.0.3:5500
	TVNORGE	34h	1	5	B	7TS/UDP	3.144 Mbps	0	5	3.144 Mbps	2.228 Mbps	4.968 Mbps	40174174	239.255.0.4:5500
	STAR	34h	1	7	B	7TS/UDP	2.921 Mbps	1	5	2.921 Mbps	1.977 Mbps	3.035 Mbps	32200974	239.255.0.6:5500
	CNN_EUROPE	34h	1	4	B	7TS/UDP	2.644 Mbps	0	5	2.644 Mbps	2.168 Mbps	4.030 Mbps	40653886	239.255.0.10:5500
	MTV_NORDIC	34h	1	6	B	7TS/UDP	4.176 Mbps	0	6	4.176 Mbps	4.152 Mbps	4.192 Mbps	49091959	239.255.0.12:5500
	DISCOVERY_WORLD	34h	1	7	B	7TS/UDP	3.672 Mbps	0	5	3.672 Mbps	3.656 Mbps	3.721 Mbps	43331102	239.255.0.13:5500
	TV2 ZEBRA	34h	1	4	B	7TS/UDP	4.760 Mbps	0	5	4.760 Mbps	728.576 kbps	8.752 Mbps	47616019	239.255.0.31:5500
	BBC HD	34h	1	4	B	7TS/UDP	12.424 Mbps	0	12	12.424 Mbps	12.408 Mbps	12.744 Mbps	146618770	239.255.0.159:5500
	Accumulated	34h		1	n/a		51.373 Mbps	1	58	51.373 Mbps	3.480 Mbps	59.084 Mbps		

The **Multicasts — Parameters** view displays detailed information about each stream.

The user selects which group of measurements should be displayed. Selections are *IP parameters*, *TS parameters*, *Ethernet parameters*, *RTP and FEC parameters*, *MSYNC parameters*, *SRT parameters*, *User-defined parameters* and *Statistical parameters*. If *User-defined parameters* is selected, the **Multicasts** view displays parameters selected by the user in the **Multicasts — Parameters — Fields** view.

For each page the *Accumulated* row at the bottom of the multicast list displays accumulated values for all streams associated with the page. The accumulated *Min bitrate* and *Max bitrate* is the minimum and maximum value of the *Accumulated* current bitrate.



Thumb	Name	Signal	Page	CPU	Input	Mapping	Net bitrate	CC errs	Pids	Curr bitrate	Min bitrate	Max bitrate	IP packets	Dst address
	NRK_1	34h	1	2	B	7TS/UDP	6.744 Mbps	0	5	6.744 Mbps	2.362 Mbps	8.968 Mbps	75918222	239.255.0.1:5500
	NRK_2	34h	1	3	B	7TS/UDP	5.424 Mbps	0	5	5.424 Mbps	2.357 Mbps	8.960 Mbps	64316858	239.255.0.2:5500
	TV2_NORWAY	34h	1	4	B	7TS/UDP	3.520 Mbps	0	5	3.520 Mbps	735.248 kbps	8.752 Mbps	47403979	239.255.0.3:5500
	TVNORGE	34h	1	5	B	7TS/UDP	2.992 Mbps	0	5	2.992 Mbps	2.228 Mbps	4.968 Mbps	40285019	239.255.0.4:5500
	STAR	34h	1	7	B	7TS/UDP	2.576 Mbps	1	5	2.576 Mbps	1.977 Mbps	3.035 Mbps	32277174	239.255.0.6:5500
	CNN_EUROPE	34h	1	4	B	7TS/UDP	3.680 Mbps	0	5	3.680 Mbps	2.168 Mbps	4.030 Mbps	40760389	239.255.0.10:5500
	MTV_NORDIC	34h	1	6	B	7TS/UDP	4.168 Mbps	0	6	4.168 Mbps	4.152 Mbps	4.192 Mbps	49213393	239.255.0.12:5500
	DISCOVERY_WORLD	34h	1	7	B	7TS/UDP	3.680 Mbps	0	5	3.680 Mbps	3.656 Mbps	3.721 Mbps	43438289	239.255.0.13:5500
	TV2 ZEBRA	34h	1	4	B	7TS/UDP	3.080 Mbps	0	5	3.080 Mbps	728.576 kbps	8.752 Mbps	47747551	239.255.0.31:5500
	BBC HD	34h	1	4	B	7TS/UDP	12.600 Mbps	0	12	12.600 Mbps	12.408 Mbps	12.744 Mbps	146981565	239.255.0.159:5500
	Accumulated	34h		1	n/a		48.464 Mbps	1	58	48.464 Mbps	3.480 Mbps	59.084 Mbps		

When the **Current page** button is clicked it is possible to select the page from a drop-down menu. The associated thumbnails are shown in the leftmost column of the list of measurements. Click one of the small thumbnails to view a larger thumbnail that is updated more frequently. Note that it is possible to disable probe thumbnail extraction in the **Setup — Params** view.

When **All streams (offline)** is clicked a complete list of measurements for all joined streams is displayed. A search field allows the user to type a text string and the multicast list is updated to display only multicasts matching the specified text. Note that monitoring parameters and thumbs will not be updated in **All streams (offline)** mode.

Peak and aggregate measurements are cleared when the **Clear counters** or **Clear counters all pages** button is clicked. Clicking this button also restarts the ETR monitoring for the streams have this enabled.

Clicking the **Export** button will allow export of the measurement data as an XML file that is opened in a new window.

Parameters									
Summary History Join Streams Ethernet thresh.									
Joined multicasts									
Last 4d Last 24h Last 8h Last 20m Last 1m Statistical parameters 1-10: Page 1 Training									
Name	ES(IAT)-24h	ES(MLR)-24h	ES(RTP)-24h	ES(overfl)-24h	ES(nosig)-24h	Peak(IAT)-24h	Sum(MLR)-24h	Peak(bitr)-24h	
NRK_1	0	0	0	0	0	5.3 ms	0	8.900 Mbps	
NRK_2	0	0	0	0	0	5.6 ms	0	8.900 Mbps	
TV2_NORWAY	0	0	0	0	0	36.1 ms	0	8.700 Mbps	
TVNORGE	0	0	0	0	0	10.3 ms	0	4.900 Mbps	
STAR	0	0	0	0	0	9.4 ms	0	3.000 Mbps	
CNN_EUROPE	0	0	0	0	0	25 ms	0	4.000 Mbps	
MTV_NORDIC	0	0	0	0	0	4.3 ms	0	4.100 Mbps	
DISCOVERY_WORLD	0	0	0	0	0	5.6 ms	0	3.700 Mbps	
TV2 ZEBRA	0	0	0	0	0	33.7 ms	0	8.500 Mbps	
BBC HD	0	0	0	0	0	1.5 ms	0	12.700 Mbps	
Accumulated									

Clicking a stream brings up the **Detailed monitoring** pop-up described later in this section.

In **All streams (offline)** mode a search field allows the user to type a text string and the multicast list is updated to display only multicasts matching the specified text.

Parameters									
Setup									
Joined multicasts									
Last 4d Last 24h Last 8h Last 20m Last 1m Statistical parameters									
Name	ES(IAT)-24h	ES(MLR)-24h	ES(RTP)-24h	ES(overfl)-24h	ES(nosig)-24h	Peak(IAT)-24h	Sum(MLR)-24h	Peak(bitr)-24h	
NRK_1	0	2	0	0	0	7.1 ms	5	9.30 Mbps	
NRK_2	0	0	0	0	0	4.9 ms	0	9.30 Mbps	
TVNORGE	0	0	0	0	0	4.7 ms	0	5.20 Mbps	
STAR	8	9	0	0	0	433.9 ms	243	4.40 Mbps	
CNN_EUROPE	0	0	0	0	0	57.5 ms	0	4.20 Mbps	
TRAVEL_CHANNEL	0	0	0	0	0	6.6 ms	0	3.30 Mbps	
DISCOVERY_WORLD	0	0	0	0	0	7.7 ms	0	3.60 Mbps	
ANIMAL_PLANET	0	0	0	0	0	14.8 ms	0	5.40 Mbps	
BBC_LIFESTYLE	0	0	0	0	0	7.6 ms	0	4.20 Mbps	
BBC_ENTERTAINMEN	0	0	0	0	0	3.7 ms	0	4.20 Mbps	
BBC_WORLD	0	6	0	0	0	5.3 ms	75	3.90 Mbps	
BOOMERANG	0	0	0	0	0	22.9 ms	0	4.60 Mbps	
TCM_NORDIC	0	0	0	0	0	33.9 ms	0	4.40 Mbps	
CARTOON_NORDIC	0	0	0	0	0	22.6 ms	0	4.70 Mbps	
TV2 ZEBRA	0	0	0	0	0	10.6 ms	0	8.70 Mbps	
DISCOVERY_SCIENCE	0	0	0	0	0	8 ms	0	3.60 Mbps	
DISNEY_CHANNEL	0	1	0	0	0	4.4 ms	20	4.60 Mbps	
DISNEY_XD	0	1	0	0	0	4.4 ms	22	4.30 Mbps	
TV2 FILMKANALEN	0	0	0	0	0	10.6 ms	0	7.70 Mbps	

Click the **Trim ch-list** button to unjoin streams with current status ‘No signal’, thereby removing them from the list. The **Statistical parameters** view lists sum or peak values for parameters over the interval indicated by the selected time button (Last 4d, Last 24h, Last 8h, Last 20m, Last 1m).

7.4.1.1 Parameter columns

Following is a listing explaining the meaning of the columns which may be shown for the joined multicasts view at **Multicasts — Parameters**. The columns displayed may be selected in see **Multicasts — Parameters — Fields**.

<i>Common parameters</i>	
①:	Click the information icon to access the Detailed Monitoring pop-up view.
Thumb:	If thumbnail extraction has been enabled, a thumbnail is displayed for each unencrypted stream. Click the small thumbnail to view a larger image that is updated more frequently. If thumbnail extraction has not been enabled, or if the thumbnail extraction fails, an informational icon will be displayed instead, see chapter 6.4.3 for details on the different icons.
Name:	The stream name specified by the user in the Edit Multicast view
Signal:	Time since last signal loss
Mon start:	Time since monitoring started, either by joining a stream or by clicking the "Clear counters" button
Page:	The page associated with the multicast
CPU:	CPU core monitoring this multicast
Input:	Network interface used to receive this multicast
Mapping:	For MPEG-2 Transport streams, the number of MPEG-2 packets mapped into each RTP, UDP or SRT packet is displayed here. For SMPTE 2022-7 combined streams, “ST 2022-7” is displayed. For MABR streams, when MSYNC packets are detected, “MSYNC<version>/<protocol>” is displayed, where “<version>” is either 1 or 3 and “<protocol>” is either UDP or RTP. For other unsupported RTP streams, “RTP data” is displayed.
<i>IP parameters</i>	
Curr bitrate:	Instantaneous MPEG-2 Transport Stream bitrate including null packets (PID 8191). The instantaneous bitrate is measured over a time period of 1000 ms, and is calculated from the size of the RTP, L2TP or UDP payloads.
Min bitrate:	The minimum current bitrate measurement
Max bitrate:	The maximum current bitrate measurement
IP packets:	The number of IP packets received
Dst address:	Multicast/unicast destination address : port

TOS:	Type-Of-Service (also called Differentiated Services Field)
TTL:	Time-To-Live
VLAN ID:	Native VLAN ID of this stream
Src address:	Multicast/unicast source address : port
Joined src:	The source address of the originally joined multicast.
IAT avg:	Average Inter-Arrival Time. The average time between consecutive IP frames (in milliseconds). Recalculated each second. For SMPTE ST 2022-7 combined streams, the path differential (PD) is shown instead, with the sign indicating which of the paths is ahead of the other.
IAT min:	The Minimum Inter-Arrival Time is the minimum registered time between two consecutive IP frames carrying video. Units are in milliseconds. For SMPTE ST 2022-7 combined streams, the minimum path differential is shown instead.
IAT max:	The Maximum Inter-Arrival Time is the maximum registered time between two consecutive IP frames carrying video. Units are in milliseconds. The Max-IAT is a measure of the maximum amount of network-induced packet jitter present. IP packet jitter affects video quality and should be minimized. For SMPTE ST 2022-7 combined streams, the maximum path differential is shown instead.

TS parameters

Net bitrate:	Instantaneous MPEG-2 Transport Stream bitrate excluding null packets (PID 8191). The instantaneous bitrate is measured over a time period of 1000 ms. No bitrate is reported for SMPTE ST 2022-7 combined streams.
CC errs:	The number of times a discontinuity has been detected for all the MPEG-2 Transport Stream continuity counters. This value is the total number of discontinuities detected for all PIDs present. Note that this value does NOT represent the number of MPEG-2 TS packets lost because any continuity counter mismatch detected for an IP-frame will increase CC errs by one. CC errors are serious as they will in practice usually result in visual video artifacts ('blocking') if occurring on the video PIDs. CC errors can be due to an erroneous input signal to the streaming head-end (e.g. from satellite rain fading or changes in the uplink). Alternatively, CC errors can arise from IP packets being dropped in the network.
PIDs:	Number of PIDs in the MPEG2-TS
Synb errs:	Number of transport stream packets with wrong synbyte (0x47)
#Services:	The number of services found in the multicasts

Ethernet parameters

Src MAC:	Source MAC address
Dst MAC:	Destination MAC address

RTP Parameters

RTP drops:	Accumulated number of dropped IP-frames due to network errors. Only available for multicasts that carry RTP information, and for L2TP streams that carry sequence numbers. When running video inside an RTP wrapper it is possible to exactly deduce the number of dropped IP frames due to network issues. This is possible as a result of the 16-bit sequence counter inside the RTP header. The following sequence will generate an RTP drops of +3: ..., 10, 11, 12, 16, 17, 18, ...
RTP dups:	Accumulated number of duplicate IP-frames. Only available for multicasts that carry RTP information, and for L2TP streams that carry sequence numbers. Duplicate IP-frames in the network can occur under normal circumstances and does not necessarily indicate network problems. The following sequence will generate an RTP dups of +2: ..., 10, 11, 12, 12, 12, 13, 14, ...
RTP ooo:	Accumulated number of times a packet has been found to be out of order. Only available for multicasts that carry RTP information. An out-of-order situation is defined to have occurred when the current sequence number is lower than the previous one. The following sequence will generate an RTP ooo of +2 (since there are two occurrences): ..., 10, 11, 15, 12, 16, 17, 13, 14, 18, 19, ...
RTP lag:	The maximum number of packet positions an out-of-order packet has been moved relative to its correct position. So for example 1,2,3,5,6,7,8,4,9,10 will result in an RTP lag of 4. The RTP lag is a good measure of how big a packet re-ordering buffer is needed in the receiving equipment to re-order packets.
Min hole size:	Minimum number of consecutive dropped RTP packets. The sequence 1,2,3,10,11,12,15 gives a min hole size of 2.
Max hole size:	Maximum number of consecutive dropped RTP packets. The sequence 1,2,3,10,11,12,15 gives a max hole size of 6.
Min hole sep:	Minimum number of RTP packets separating any holes. The sequence 1,2,3,10,11,12,15 gives a min hole sep of 3.
Num holes:	Number of packet loss sequences. The sequence 1,2,3,10,11,12,15 gives a num holes of 2.
FEC mode:	The CoP3 FEC mode.
FEC drops:	Number of RTP packet drops in the main stream that the FEC could not correct.
C-FEC drops:	Number of IP packets in the column-FEC streams dropped.
R-FEC drops:	Number of IP packets in the row-FEC streams dropped.

Statistical parameters: MPEG-2 transport stream parameters

ES(IAT):	Number of seconds during selected period with Inter-packet Arrival Time higher than associated Ethernet IAT warning threshold.
ES(MLR):	Number of seconds during selected period with Media Loss (corresponding to number of seconds with CC-errors).
ES(RTP):	Number of seconds during selected period with RTP packet drops.
ES(overfl):	Number of seconds during selected period with bitrate overflow.
ES(nosig):	Number of seconds during selected period without signal.
Peak(IAT):	Peak Inter-packet Arrival Time during selected period.
Sum(MLR):	Sum of Media Loss during selected period (equals number of TS packets lost).
Peak(bitr):	Peak stream bitrate during selected period.

MSYNC parameters

MSYNC URI	URI of of the MSYNC object being decoded as given from the object URI field of the Object Info MSYNC packet.
------------------	--

Detailed Monitoring

The **Detailed Monitoring** pop-up is activated by clicking a stream line in the monitoring list.

The current parameters for the selected stream are displayed in the bottom of the dialog, as in the **Joined multicasts** list.

Clicking the **Clear** button will clear all information about the selected stream, including PSI/SI analysis data. Clicking the **MediaWindow** button will open the Media Window **Selected channel** view. This is described in section 7.5.

Detailed Monitoring — Services

Detailed Monitoring

Services Event log IAT

Service/Pid	Bitrate	Min bitr.	Max bitr.	CC errors	Thumb	Type	PCR	Scr
3 KELO TV	12.164 Mbps	8.206 Mbps	15.691 Mbps	0		ATSC service		
49 MPEG2 Video	11.568 Mbps	7.616 Mbps	15.085 Mbps	0		MPEG2 Video	✓	
52 AC-3 Audio	394.416 kbps	390.728 kbps	400.008 kbps	0		AC-3 Audio		
53 AC-3 Audio	197.208 kbps	195.360 kbps	200.000 kbps	0		AC-3 Audio		
48 PMT	4.512 kbps	4.096 kbps	6.016 kbps	0		PMT		
4 UTV	3.450 Mbps	1.076 Mbps	6.212 Mbps	0		ATSC service		
65 MPEG2 Video	3.249 Mbps	876.736 kbps	6.006 Mbps	0		MPEG2 Video	✓	
68 AC-3 Audio	197.208 kbps	195.320 kbps	200.000 kbps	0		AC-3 Audio		
64 PMT	4.512 kbps	4.096 kbps	6.016 kbps	0		PMT		
5 ION	2.404 Mbps	1.022 Mbps	6.150 Mbps	0		ATSC service		
Other PIDs	138.472 kbps	75.448 kbps	673.016 kbps	0		Other		

Name	Signal	Page	CPU	Input	Mapping	Net bitrate	CC errs	PIDs	Syncb errs	#Services	Curr bitrate	Min bitrate
KELO inp 1 stream 1	432s	5	17	enp...	7TS/RTP	18.121 Mbps	0	36	0	3	19.400 Mbps	19.376 Mbps

Close Clear MediaWindow

The NOMAD is continuously gathering detailed information for the selected multicast. The NOMAD will continue updating the detailed information for the selected multicast until another is selected.

The **Detailed Monitoring — Services** view lists detected MPEG-2 TS services (by analyzing the PSI/SI tables), providing the following aggregate information for each service:

Service/Pid:	For each service, the service-name or service-id is obtained from the PSI/SI tables. PIDs that do not belong to a service are denoted 'Other PIDs'. The service ID is presented in square brackets.
Bitrate:	Service bitrate in bits per second
Min bitr.:	Minimum service bitrate in bits per second
Max bitr.:	Maximum service bitrate in bits per second
CC errors:	Number of Continuity Counter occurrences
Thumb:	Click the icon to access the Thumb pop-up view, explained below
Type:	The list entry service type or PID type
PCR:	This field will be checked if the corresponding PID carries PCR
Scr:	This field will be checked if the corresponding PID is scrambled

Detailed Monitoring — Event Log

Detailed Monitoring

Services **Event log** IAT

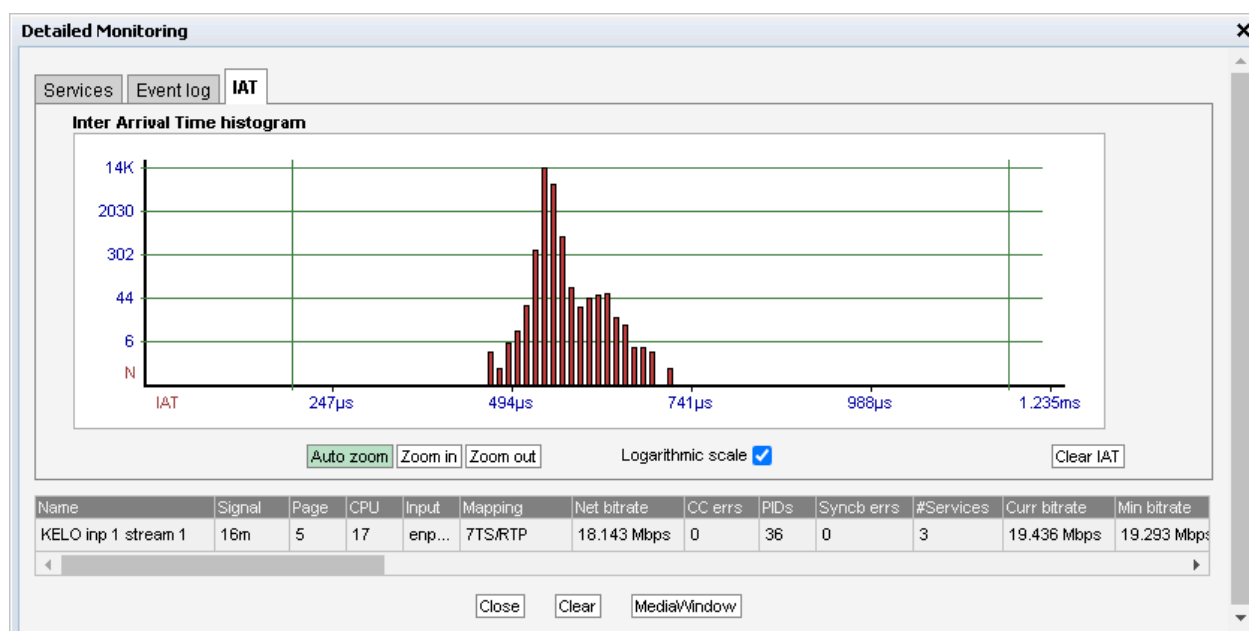
Time	Type	Description	Count
2020-11-04 13:45:41	SIGNAL	First packet received	2
2020-11-03 16:30:49	SIGNAL	First packet received	2
2020-10-30 07:55:41	SIGNAL	First packet received	2
2020-10-29 10:10:38	SIGNAL	First packet received	2
2020-10-29 09:45:38	SIGNAL	First packet received	2
2020-10-28 22:55:41	SIGNAL	First packet received	2
2020-10-28 21:50:41	SIGNAL	First packet received	2
2020-10-28 07:30:45	SIGNAL	First packet received	2
2020-10-28 05:25:47	SIGNAL	First packet received	2
2020-10-27 20:50:44	SIGNAL	First packet received	2
2020-10-27 08:49:46	SIGNAL	First packet received	2

Name	Signal	Page	CPU	Input	Mapping	Net bitrate	CC errs	PIDs	Syncb errs	#Services	Curr bitrate	Min bitrate
KELO inp 1 stream 1	505s	5	17	enp...	7TS/RTP	18.122 Mbps	0	24	0	3	19.417 Mbps	19.358 Mbps

Close Clear MediaWindow

The event log contains informative text that may prove helpful for diagnosing transport and bitstream level errors.

Detailed Monitoring — IAT



In the **Detailed Monitoring — IAT** view, the **Inter Arrival Time** histogram shows the accumulated number of IAT measurements within each presented interval. Vertical green lines indicate the maximum and minimum IAT values. By clicking the IAT range buttons it is possible to change the zooming of the graph. If the **Auto zoom** button is pressed the diagram will auto-scale to always include the minimum and maximum IAT readings.

The IAT histogram is a very useful and intuitive measure of how well the network is performing in terms of forwarding real-time traffic. A predictable and tightly bunched graph indicates small levels of network jitter. An unbound graph indicates network jitter issues typically brought forward by traffic congestion or misconfigured routers. Clicking the **Clear IAT** button will clear the IAT graph.

Note that for variable bitrate streams the IAT histogram will show a very different IAT distribution compared to the histogram for a constant bitrate stream. The histogram in the screenshot above displays the IAT distribution for a CBR stream.

For SMPTE ST 2022-7 combined streams, the path differential (PD) is shown instead.

Detailed Monitoring — MSYNC

Detailed Monitoring												
Services		Event log	IAT	MSYNC								
#	Object URI	Size	Received	Age	Object ID							
12	test_object_2959	656.01 k	463 / 463	33 s	0xb8f							
11	test_object_2960	434.79 k	307 / 307	28 s	0xb90							
10	test_object_2961	151.39 k	107 / 107	24 s	0xb91							
9	test_object_2962	696.74 k	492 / 492	23 s	0xb92							
8	test_object_2963	66.07 k	47 / 47	17 s	0xb93							
7	test_object_2964	612.08 k	432 / 432	17 s	0xb94							
6	test_object_2965	250.47 k	177 / 177	12 s	0xb95							
5	test_object_2966	36.01 k	26 / 26	10 s	0xb96							
4	test_object_2967	38.90 k	28 / 28	9 s	0xb97							
3	test_object_2968	202.47 k	143 / 143	9 s	0xb98							
2	test_object_2969	68.48 k	49 / 49	7 s	0xb99							
1	test_object_2970	90.04 k	64 / 64	7 s	0xb9a							
*	test_object_2971	457.19 k	323 / 323	6 s	0xb9b							
14	test_object_2957	122.04 k	87 / 87	40 s	0xb8d							
13	test_object_2958	639.71 k	452 / 452	39 s	0xb8e							

Name	Signal	Page	CPU	Input	Mapping	Net bitrate	CC errs	PIDs	Syncb errs	#Services	Curr bitrate	Min bitrate
NC_233.26.74.1	76s	1	8	enp...	MSYNC3/RTP	991.704 kbps	0	0	0	0	991.704 kbps	991.544 kbps

Close Clear MediaWindow

When MSYNC monitoring is enabled for a stream, this view displays a list of the objects received. To enable MSYNC monitoring, the stream may be configured as *MSYNC* in **Multicasts — Streams — Edit**.

The probe retains a list of the last 15 objects received for each stream configured as *MSYNC*. As new objects are received, they are appended to the bottom of the list. When the probe has filled up the list, it starts writing new objects from the first row again, thereby overwriting the oldest objects. This facilitates viewing the objects which have been received within the last update. In addition it makes reading the lines easier as only the minimum amount of rows are changed between each view update.

The following columns are defined:

Object receive order. The most recently received object is indicated with an asterisk (*). The oldest object received is 14.

Object URI	The URI of the object as given from the object URI field of the Object Info MSYNC packet. If the file contains control information, i.e. the object type field of the Object Info MSYNC packet is equal to control or Media manifest, the URI is displayed as a link and the content of the object may be downloaded. The size of the file which the probe keeps is limited to 1 MiB. If the file was not received in its entirety, there will be gaps in the file.
Size	The size of the object as specified by the object size field of the Object Info MSYNC packet.
Received	Number of packets received / Number of packets in the object. Any difference between these two numbers indicates packet loss. The number of packets in the object is given by the number of MSYNC packets field of the Object Info MSYNC packet.
Age	The age of the object. This is calculated as the difference between the current time and the reception time of the Object Info MSYNC packet.
Object ID	The id of the object as given from the object identifier field of every MSYNC packet.

The **Thumb View** pop-up is accessed by clicking an information icon in the **Detailed Monitoring — Services** view. The pop-up window is identical to the one displayed in the **Thumbnails** view. For more details, see chapter 6.4.1.

7.4.2 Multicasts — Parameters — Fields

Parameters
Summary
History
Detect
Join
Streams
Ethernet thresh.

Custom monitoring parameter selection

Common	Display in list	Description
Thumb	☒	Thumbnail
Name	☒	Name of stream (i.e. channel)
Signal	☒	Time since last signal loss
Page	☐	Which page a multicast is assigned to
CPU	☐	Which CPU core stream is processed on
Input	☒	Ethernet input of stream
Mapping	☒	How MPEG packets are mapped into RTP or UDP packets
IP		
	Display in list	Description
Curr bitrate	☒	Instant bitrate (last 1000 ms) of UDP payload
Min bitrate	☒	Min Curr bitrate
Max bitrate	☒	Max Curr bitrate
IP packets	☐	Number of IP packets
Dst address	☒	Multicast/unicast destination address : port
...	☐	

Apply

Select parameters that are to be displayed in list. List will load faster if fewer parameters are selected.

The **Multicasts — Parameters — Fields** view enables selection of the parameters to be displayed in the **Multicasts — Parameters** view. They are only in effect when *User-defined parameters* is selected as shown in **Multicasts — Parameters**. Note that thumbnails must also be enabled in the **Setup — Params** view for thumbnail availability.

7.4.3 Multicasts — Summary

Parameters
Summary
History
Detect
Join
Streams
Ethernet thresh.

Overall eth stream status Probe

 Eth streams with active alarms:3

Interface bitrate:29.447 Mbps

Monitoring:7 / 29.397 Mbps

 Enabled/OK: 2 / 2

Summary for each page

	OK	ES(MLR)	ES(RTP)	ES(overfl)	ES(nosig)		OK	ES(MLR)	ES(RTP)	ES(overfl)	ES(nosig)
 P1	3 / 3	11m	497s	0	0	Major	 P11	0 / 0	0	0	0
 P2	1 / 4	0	0	0	150s	Minor	 P12	0 / 0	0	0	0
 P3	0 / 0	0	0	0	0	 P13	0 / 0	0	0	0	0
 P4	0 / 0	0	0	0	0	 P14	0 / 0	0	0	0	0
 P5	0 / 0	0	0	0	0	 P15	0 / 0	0	0	0	0
 P6	0 / 0	0	0	0	0	 P16	0 / 0	0	0	0	0
 P7	0 / 0	0	0	0	0	 P17	0 / 0	0	0	0	0
 P8	0 / 0	0	0	0	0	 P18	0 / 0	0	0	0	0
 P9	0 / 0	0	0	0	0	 P19	0 / 0	0	0	0	0
 P10	0 / 0	0	0	0	0	 P20	0 / 0	0	0	0	0

ES-4d
ES-24h
ES-8h
ES-20m
ES-1m

The intention of this page, together with the **alarm list**, is to provide enough information for the operator to immediately see if there is anything seriously wrong with one or more Ethernet input streams. The overall status for the Full Service Monitoring (FSM) is also shown.

Throughout this view the bulb colors indicate the most severe active alarm. They may be green (no alarm), yellow (warning), orange (error) or red (major). The bulb color is based on user-defined alarm severity settings for each alarm. A grey bulb indicates that monitoring is disabled.

The following Ethernet parameters are shown:

Eth streams with active alarms:	Shows the number of streams that are presently in an alarm state (0–50). Note that the number of alarms counted refers to default settings, and alarms disabled by the user will still be counted.
Interface bitrate:	This is the total bitrate sensed on the data/video interface(s). It should be greater than or equal to the Monitoring bitrate.
Monitoring:	This is the total number of Ethernet streams monitored (0–50) and the total bitrate for these streams.
Full Service Monitoring status:	The number of enabled FSM services / number of OK FSM services

The probe is capable of monitoring up to 50 streams simultaneously. The probe splits streams into pages for easy handling. Each of the 20 predefined pages can be given a name and have a user-defined number of streams associated.

Part of the page-status is error-second statistics for the fundamental parameters **MLR**, **RTP**, **overfl** and **nosig** summed across all streams belonging to that page.

The error-second statistics interval is selected by clicking the buttons. For example, clicking the **ES-8h** button will present error-seconds for the last 8 hours. If 10 streams for a page have been without signal for the last 8 hours, the **nosig** will show as 80hours.

The following parameters are presented (note that the error second values are accumulated from probe boot time, and they will only be cleared by reboot or by clicking the **Clear all** counters button in the **Main** view):

‘Bulb’: The bulb indicates the most severe active alarm for any of the streams on the page. Active alarms are located on top of the alarm list. The alarm severity is reflected by the color of the associated icon.
Next to the bulb is a link that will lead to the **Monitoring page** if pressed. The Monitoring page will present error-second statistics for each stream individually.

OK: Shows how many of the streams monitored on this page are without active alarms

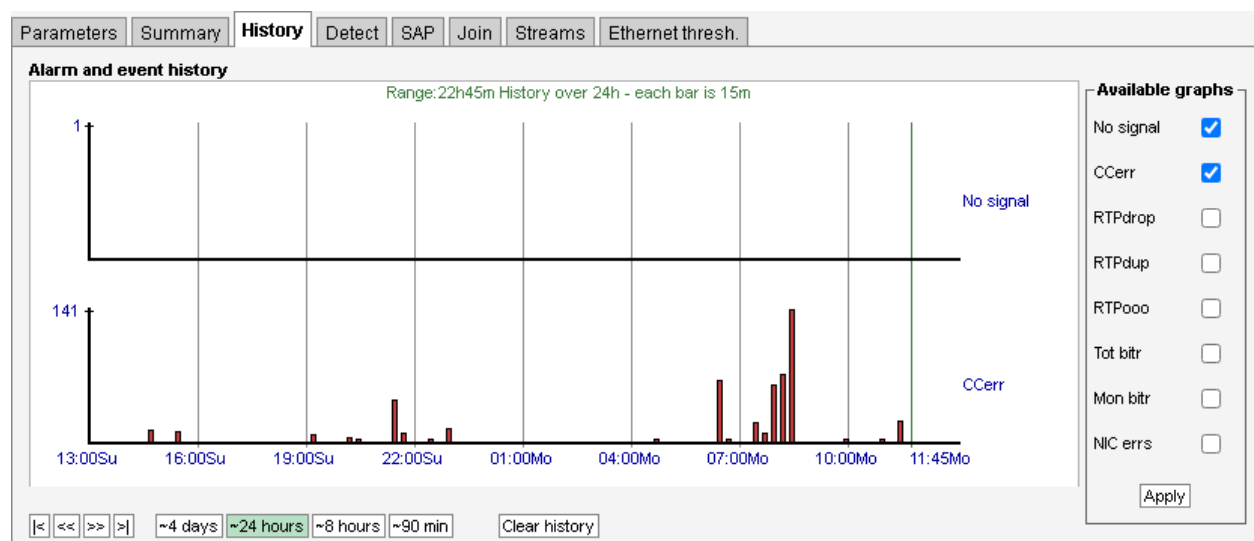
ES(MLR): Number of seconds in selected period with continuity counter errors in the MPEG2 transport stream (which corresponds to the number of seconds with non-zero Media Loss Rate).

ES(RTP): Number of seconds in selected period with RTP packet-drop

ES(overfl): Number of seconds in selected period with bitrate overflow

ES(nosig): Number of seconds in selected period where no signal (i.e. no data) was received

7.4.4 Multicasts — History



The probe keeps statistical Ethernet information for the last 4 days for visual inspection in the **history timeline view**.

Each bar in the histogram corresponds to a number of events that occurred within a certain time interval. The interval that each bar represents depends on the scale, from 1 minute (when 90 min is selected) to 1 hour (when 4 days is selected).

Clicking the **Clear history** button will reset all history graphs.

Tool-tip information is available for each bar and shows the time-interval for the bar and its exact value. For example, the tool-tip information ‘13:15-13:30:2’ means that within the time interval 13:15–13:30 there were 2 occurrences.

The histogram is updated every minute.

Any subset of the following parameters can be selected, click the **Apply** button for changes to take effect:

No signal:	The number of streams that reported the ‘No signal’ alarm during the interval represented by the bar.
CCerr:	The number of times a discontinuity has been detected for all the MPEG-2 Transport Stream continuity counters in the interval represented by the bar. This parameter corresponds to the sum of CC errs reported by all streams.
RTPdrop:	Accumulated number of dropped IP-frames due to network errors in the interval represented by the bar. This parameter corresponds to the sum of RTP drops reported by all streams.
RTPdup:	Accumulated number of duplicate IP-frames in the interval represented by the bar. This parameter corresponds to the sum of RTP dups reported by all streams.
RTPooo:	Accumulated number of times a packet has been found to be out of order in the interval represented by the bar. This parameter corresponds to the sum of RTP ooo reported by all streams.
Tot bitr:	Bitrate sensed on the data/video interface(s).
Mon bitr:	Bitrate on the data/video interface(s) corresponding to joined multicasts.
NIC errs:	Detected NIC errors. NIC errors are most likely caused by a bad cable or a misconfigured router. A NIC error may impact packet loss measurements such as CC errors and RTP errors.

Note that the history graphs show the sum for all streams being analyzed across all pages. So for example, if two streams experience **No signal** at the same time the **No signal** graph will increase by 2.

7.4.5 Multicasts — Detect

Please see chapter 7.7.2 on page 143.

7.4.6 Multicasts — SAP

Parameters	Summary	History	Detect	SAP	Join	Streams	Ethernet thresh.
Dst address	Src address	Name	Interface	Joined	User	Mapping	
239.255.0.2	10.0.81.13	FEM HD	eth0	no	SAP	TS/RTP	
239.255.0.3	10.0.81.13	VOX HD	eth0	no	SAP	TS/RTP	
239.255.0.4	10.0.81.13	TVNorge HD	eth0	yes	SAP	TS/RTP	
239.255.0.5	10.0.81.13	TV 2 News HD	eth0	no	SAP	TS/RTP	
239.255.0.6	10.0.81.13	C More Golf HD	eth0	no	SAP	TS/RTP	
239.255.0.8	10.0.81.13	Nat Geo HD (N)	eth0	no	SAP	TS/RTP	
239.255.0.10	10.0.81.13	239.255.0.10:5500 Not Present(7:B (TP C13):7007)	eth0	no	SAP	TS/RTP	
239.255.0.12	10.0.81.16	4Music	eth0	no	SAP	TS/RTP	
239.255.0.20	10.0.81.16	CNBC Europe	eth0	no	SAP	TS/RTP	
239.255.0.23	10.0.81.13	TLC Sverige HD	eth0	no	SAP	TS/RTP	
239.255.0.24	10.0.81.13	239.255.0.24:5500 Not Present(7:B (TP C13):7084)	eth0	no	SAP	TS/RTP	
239.255.0.26	10.0.81.13	239.255.0.26:5500 Not Present(7:B (TP C13):7006)	eth0	no	SAP	TS/RTP	
239.255.0.27	10.0.81.13	TLC Norge HD	eth0	no	SAP	TS/RTP	

[Live view](#)
[View list offline](#)
[Add selected to stream list](#)
[Add all to stream list](#)

The **SAP** view displays streams announced using the Session Announcement Protocol, detected by the NOMAD.

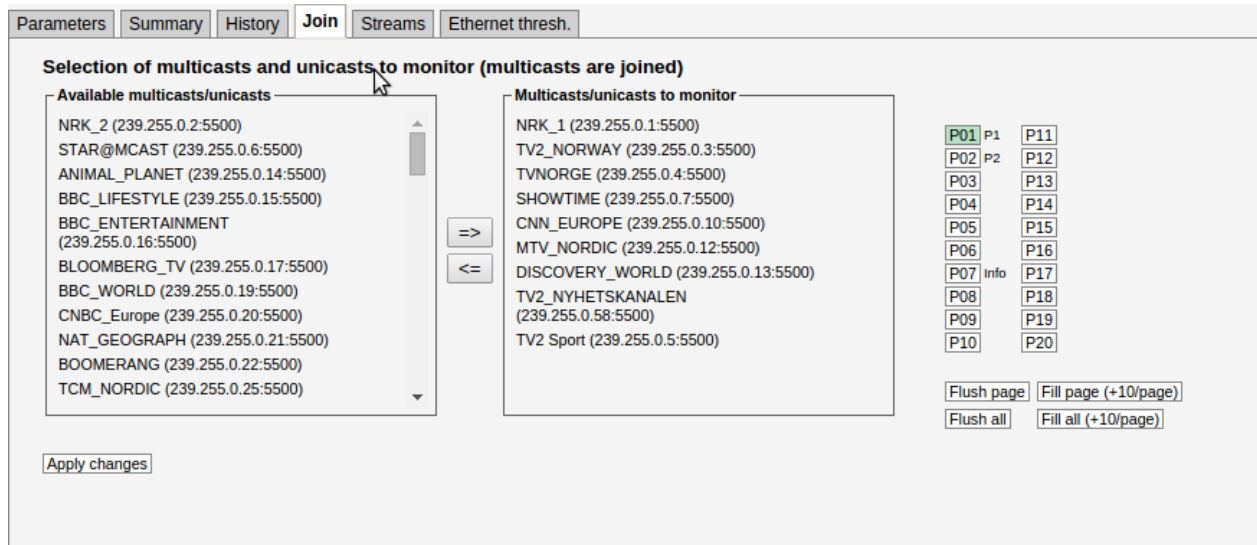
As long as **Enable SAP discovery** is enabled in the **Setup — Params** view, the NOMAD will continuously try to detect streams. Click the **View list offline** button to view the stream list in offline mode. Click the **Refresh** button to update the stream list in offline mode.

The source address makes it possible for the NOMAD to distinguish between multicasts with the same destination IP address and port, provided that **Source specific multicasts** has been enabled in the **Setup — Params** view.

If the stream is currently joined by the NOMAD (i.e. the NOMAD is currently monitoring the stream), the **Joined** field is set to yes.

Detected streams can be added to the NOMAD's stream list by selecting streams and clicking the **Add selected to stream list**. To add all detected streams the **Add all to stream list** button can be pressed.

7.4.7 Multicasts — Join



Parameters Summary History **Join** Streams Ethernet thresh.

Selection of multicasts and unicasts to monitor (multicasts are joined)

Available multicasts/unicasts

- NRK_2 (239.255.0.2:5500)
- STAR@MCAST (239.255.0.6:5500)
- ANIMAL_PLANET (239.255.0.14:5500)
- BBC_LIFESTYLE (239.255.0.15:5500)
- BBC_ENTERTAINMENT (239.255.0.16:5500)
- BLOOMBERG_TV (239.255.0.17:5500)
- BBC_WORLD (239.255.0.19:5500)
- CNBC_Europe (239.255.0.20:5500)
- NAT_GEOGRAPH (239.255.0.21:5500)
- BOOMERANG (239.255.0.22:5500)
- TCM_NORDIC (239.255.0.25:5500)

Multicasts/unicasts to monitor

- NRK_1 (239.255.0.1:5500)
- TV2_NORWAY (239.255.0.3:5500)
- TVNORGE (239.255.0.4:5500)
- SHOWTIME (239.255.0.7:5500)
- CNN_EUROPE (239.255.0.10:5500)
- MTV_NORDIC (239.255.0.12:5500)
- DISCOVERY_WORLD (239.255.0.13:5500)
- TV2_NYHETSKANALEN (239.255.0.58:5500)
- TV2 Sport (239.255.0.5:5500)

Probe Assignments:

P01	P1	P11
P02	P2	P12
P03		P13
P04		P14
P05		P15
P06		P16
P07	Info	P17
P08		P18
P09		P19
P10		P20

Apply changes

Flush page Fill page (+10/page)

Flush all Fill all (+10/page)

In order for the defined Ethernet multicasts to be monitored by the probe, they must be joined. The **Multicasts — Join** view and the **Multicasts — Streams** view allow the user to select which multicasts that are joined by the probe.

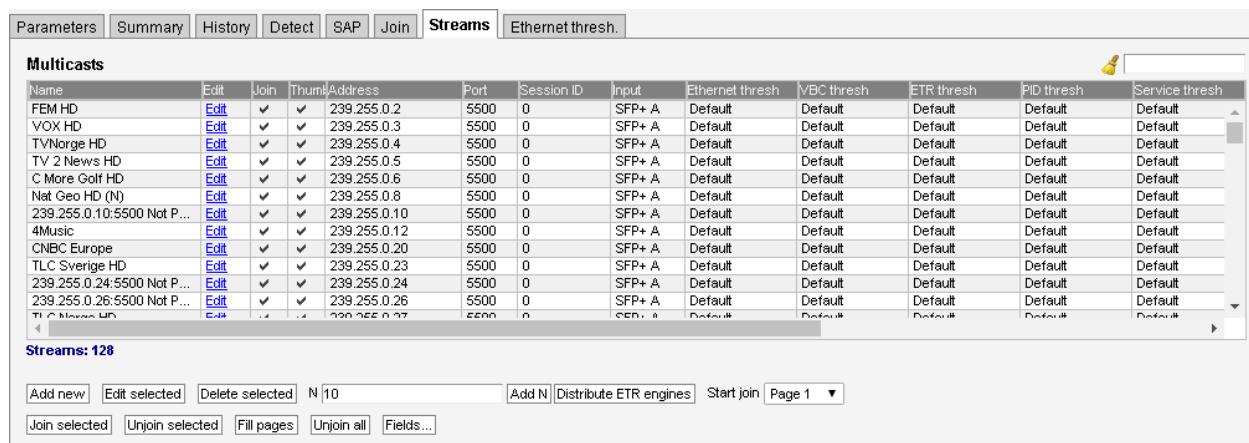
Streams defined in the **Multicasts — Streams** view will appear as available streams on the left hand side of the arrows in this view. Select streams to be monitored by clicking them and moving them to the right hand side of this view using the arrow. Changes should be confirmed by clicking the **Apply changes** button.

The probe can join a maximum of 50 uni/multicasts, these may be freely associated with the 20 probe pages.

The streams will be presented in the Joined multicasts list in the **Multicasts — Parameters** view.

It is possible to flush or fill the multicasts/unicasts to monitor list by clicking the corresponding button. Note that these operations will take effect immediately; it is not necessary to click **Apply changes** for multicasts to be joined or unjoined.

7.4.8 Multicasts — Streams



Name	Edit	Join	Thumb	Address	Port	Session ID	Input	Ethernet thresh	VBC thresh	ETR thresh	PID thresh	Service thresh
FEM HD	Edit	☒		239.255.0.2	5500	0	SFP+ A	Default	Default	Default	Default	Default
VOX HD	Edit	☒		239.255.0.3	5500	0	SFP+ A	Default	Default	Default	Default	Default
TVNorge HD	Edit	☒		239.255.0.4	5500	0	SFP+ A	Default	Default	Default	Default	Default
TV 2 News HD	Edit	☒		239.255.0.5	5500	0	SFP+ A	Default	Default	Default	Default	Default
C More Golf HD	Edit	☒		239.255.0.6	5500	0	SFP+ A	Default	Default	Default	Default	Default
Nat Geo HD (N)	Edit	☒		239.255.0.8	5500	0	SFP+ A	Default	Default	Default	Default	Default
239.255.0.10:5500 Not P...	Edit	☒		239.255.0.10	5500	0	SFP+ A	Default	Default	Default	Default	Default
4Music	Edit	☒		239.255.0.12	5500	0	SFP+ A	Default	Default	Default	Default	Default
CNBC Europe	Edit	☒		239.255.0.20	5500	0	SFP+ A	Default	Default	Default	Default	Default
TLC Sverige HD	Edit	☒		239.255.0.23	5500	0	SFP+ A	Default	Default	Default	Default	Default
239.255.0.24:5500 Not P...	Edit	☒		239.255.0.24	5500	0	SFP+ A	Default	Default	Default	Default	Default
239.255.0.26:5500 Not P...	Edit	☒		239.255.0.26	5500	0	SFP+ A	Default	Default	Default	Default	Default
TI C More HD	Edit	☒		239.255.0.27	5500	0	SFP+ A	Default	Default	Default	Default	Default

Streams: 128

[Add new](#)
[Edit selected](#)
[Delete selected](#)

[Add N](#)
[Distribute ETR engines](#)
[Start join](#)

[Join selected](#)
[Unjoin selected](#)
[Fill pages](#)
[Unjoin all](#)
[Fields...](#)

In this view the operator can define multicasts available to the probe and associate a name with each multicast address. This name will be used by the probe when referring to the multicast. If no name has been defined the probe will use the multicast address:port notation.

It is possible to add, delete or edit several entries simultaneously. Several entries are selected by using the regular *Ctrl + click* or *Shift + click* functionality. When adding new entries the current dialogue values will be used as the template with the values for Name and Address incremented for each.

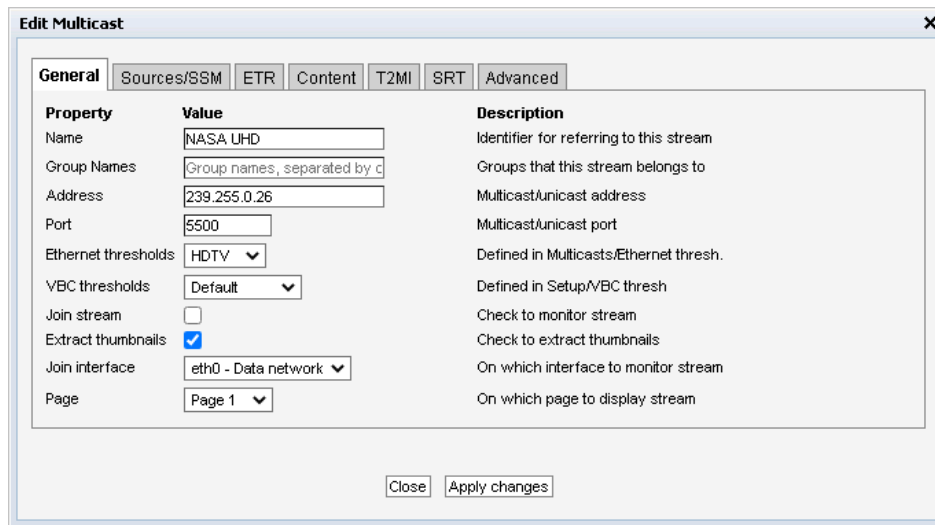
Note that both multicast and unicast addresses can be entered here.

The **Distribute ETR engines** button will distribute the selected streams, with ETR disabled, on the unused ETR engines. An ETR engine is considered unused if no stream with ETR enabled is assigned to it.

The search field in the upper right corner of the view allows the user to type a text string, and the multicast list is updated to display only streams matching the specified text.

Clicking **Add new** or selecting one or more multicasts and clicking **Edit selected** will open the **Multicast — Streams — Edit** pop-up view. When multicasts have been defined, clicking **Join selected** will join the selected multicasts and enable monitoring. The probe will only analyze joined multicasts. Clicking **Join all** will join all multicasts in the list (up to the licensed maximum number of channels). Unjoining one or more multicasts is done by selecting multicasts and clicking **Unjoin selected** or by clicking **Unjoin all**.

When the Edit button is clicked it is possible to define the following multicast parameters (note that some parameters are only relevant and selectable when the probe is equipped with the correct options):



Property	Value	Description
Name	NASA UHD	Identifier for referring to this stream
Group Names	Group names, separated by c	Groups that this stream belongs to
Address	239.255.0.26	Multicast/unicast address
Port	5500	Multicast/unicast port
Ethernet thresholds	HDTV	Defined in Multicasts/Ethernet thresh.
VBC thresholds	Default	Defined in Setup/VBC thresh
Join stream	☐	Check to monitor stream
Extract thumbnails	☒	Check to extract thumbnails
Join interface	eth0 - Data network	On which interface to monitor stream
Page	Page 1	On which page to display stream

General

Name: A name should be assigned to each unicast/multicast. The name will be used throughout the NOMAD user interface when referring to this stream. It may also be used by an external management system like the VideoBRIDGE Controller.

To enable SMPTE ST 2022-7 monitoring, create two streams with the same name, but with a different class name, for each of the paths, and enable **SMPTE ST 2022-7 monitoring** on the **Advanced** tab. The class name is everything added after @ in the name.

Group Names: A comma separated list of groups this stream belongs to.

Address: The IP address of the unicast or multicast. For a SRT, T2MI inner or SMPTE ST 2022-7 combined stream, enter a dummy address that falls within the range 224.0.0.0 to 239.255.255.255.

Port: The port number of the unicast or multicast. For a SRT, T2MI inner or SMPTE ST 2022-7 combined stream, enter a dummy port number.

Ethernet thresholds: The Ethernet thresholds specify various error limits. Selectable Ethernet thresholds templates are defined in the **Multicasts — Ethernet thresh.** view. For a T2MI stream select a dummy threshold template.

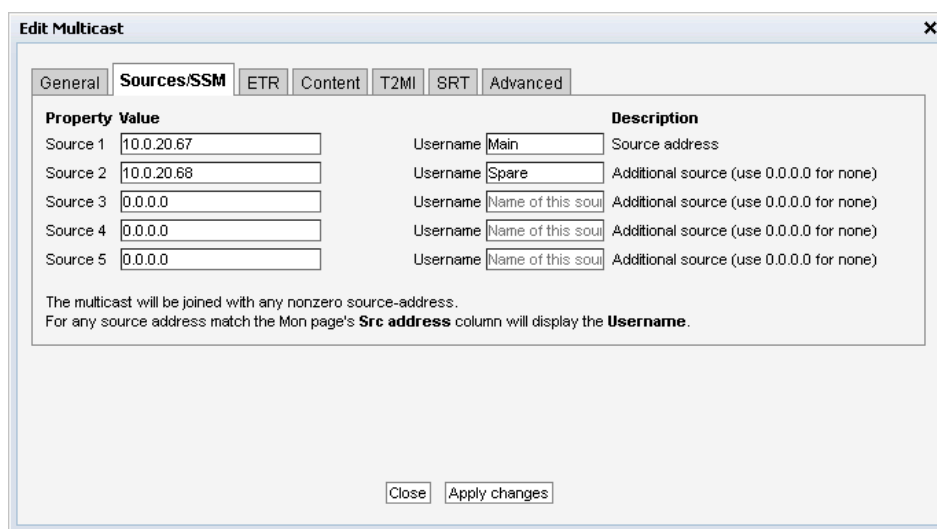
VBC thresholds: The VBC thresholds specify various error limits to be used by VideoBRIDGE Controller to generate alarms. These thresholds are only relevant if the VideoBRIDGE Controller is used. VBC threshold templates are defined in the **Setup — VBC thresh.** view.

Join stream: Check the 'Join stream' check box to join a multicast or unicast. Only joined streams are analyzed. A stream may also be joined from the **Multicasts — Join** or **Multicasts — Streams** views, and the status of this check box will be updated accordingly.

Extract thumbnails: When enabled, the probe will generate thumbnails for this multicast. In order to enable this option, *Extract thumbnails* also needs to be enabled in the **Setup — Params** view

Join interface: Select which interface to join the selected multicast. The data interface(s) are listed, as well as any enabled VLAN interface (defined in **Setup — VLANs**).

Page: For easy navigation, each stream can be assigned a specific page. The names of the pages are defined in **Setup — Pages**.



Property	Value	Description
Source 1	10.0.20.67	Source address
Source 2	10.0.20.68	Additional source (use 0.0.0.0 for none)
Source 3	0.0.0.0	Additional source (use 0.0.0.0 for none)
Source 4	0.0.0.0	Additional source (use 0.0.0.0 for none)
Source 5	0.0.0.0	Additional source (use 0.0.0.0 for none)

The multicast will be joined with any nonzero source-address.
For any source address match the Mon page's **Src address** column will display the **Username**.

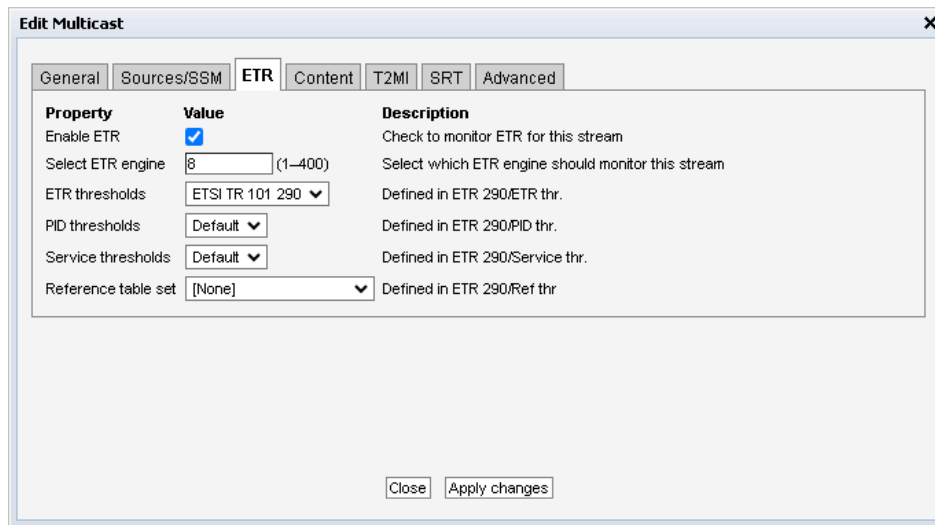
Close Apply changes

Sources/SSM

Source 1: If a zero source address is specified for a multicast it will be joined without a source. This allows both source specific multicasts and non-source specific multicasts to co-exist in the same network and be joined by the NOMAD.

Source 2–5: Additional SSM source addresses may be specified to enable back-up solutions. Note that it is the operator's responsibility to ensure that a multicast is only transmitted by one SSM source at any time.

Username: For each of the sources listed it is possible to specify a name for this source. In the **Multicasts — Parameters** view, this name will be displayed in the **Src address** column instead of the source IP address. This can be used to easier distinguish between the main and backup transmitters etc.



Property	Value	Description
Enable ETR	☒	Check to monitor ETR for this stream
Select ETR engine	8 (1-400)	Select which ETR engine should monitor this stream
ETR thresholds	ETSI TR 101 290	Defined in ETR 290/ETR thr.
PID thresholds	Default	Defined in ETR 290/PID thr.
Service thresholds	Default	Defined in ETR 290/Service thr.
Reference table set	[None]	Defined in ETR 290/Ref thr

ETR (ETR290 Option)

Enable ETR: ETR monitoring of a stream will not take place unless it is enabled by this setting. This parameter is only relevant if the probe is ETR enabled. ETR monitoring is not supported for SMPTE ST 2022-7 combined streams.

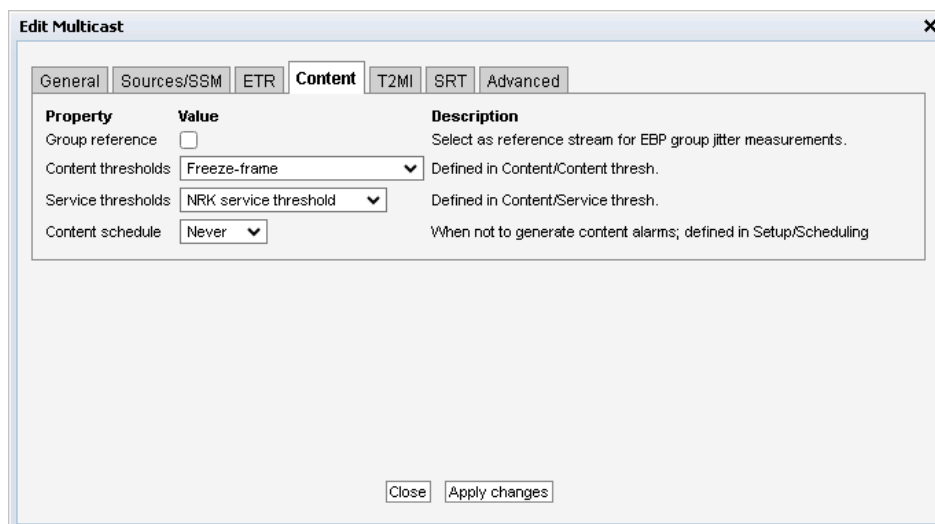
Select ETR engine: If the probe is licensed for several Ethernet ETR engines the user may select which engine should be used to analyze the stream. The default ETR engine selection is IPTV1. It is also possible to use the **Distribute ETR engines** button described above to assign streams to engines.

ETR thresholds: The ETR thresholds specify various error limits and alarm conditions. Selectable ETR thresholds templates are defined in the **ETR 290 — ETR thresh.** view. The round-robin cycling time is also defined by this threshold template. This parameter is only relevant if the probe is ETR enabled.

PID thresholds: The PID thresholds specify various error limits and alarm conditions. Selectable PID thresholds templates are defined in the **ETR 290 — PID thresh.** view. This parameter is only relevant if the probe is ETR enabled.

Service thresholds: The Service thresholds selection defines various error limits and alarm conditions. Selectable service thresholds templates are defined in the **ETR 290 — Service thresh.** view. This parameter is only relevant if the probe is ETR enabled.

Reference table set: The Reference table set selection is used to compare the tables in the transport stream with a set of stored tables. These tables are defined in the **ETR 290 — Gold TS thresholds** view.



Edit Multicast

General Sources/SSM ETR **Content** T2MI SRT Advanced

Property	Value	Description
Group reference	☐	Select as reference stream for EBP group jitter measurements.
Content thresholds	Freeze-frame	Defined in Content/Content thresh.
Service thresholds	NRK service threshold	Defined in Content/Service thresh.
Content schedule	Never	When not to generate content alarms; defined in Setup/Scheduling

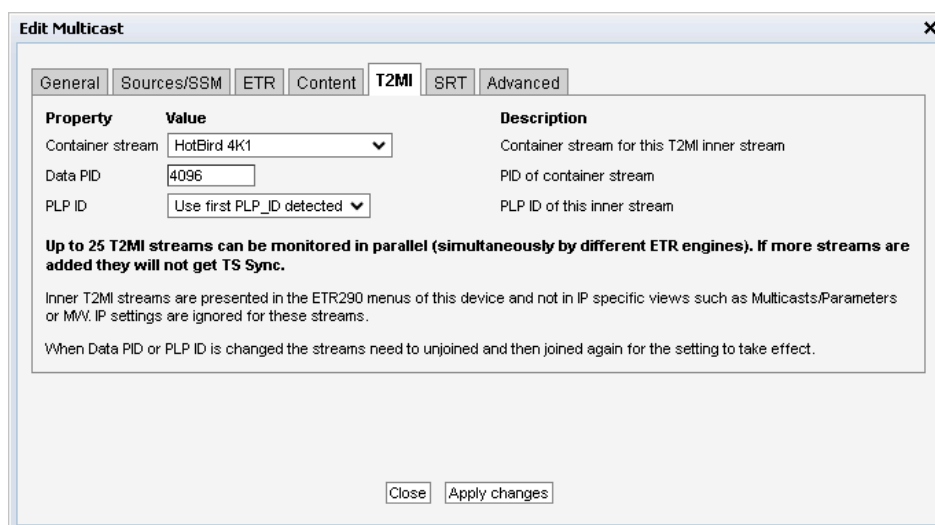
Close Apply changes

Content

Content thresholds: The Content thresholds specify content alarming options. Selectable Content thresholds templates are defined in the **Content — Content thresh.** view.

Service thresholds: The Content service threshold group that should be assigned to the multicast. Content service threshold groups that have been defined in the **Content — Service thresh.** view are available for selection from the drop-down menu.

Content schedule: The scheduling scheme that should be assigned to the content monitoring for the multicast. Scheduling schemes that have been defined in the **Setup — Scheduling** view are available for selection from the drop-down menu. Scheduling allows masking content alarms at predefined time periods. The schedules can be overridden for specific services using Content service thresholds.



Edit Multicast

General Sources/SSM ETR Content **T2MI** SRT Advanced

Property	Value	Description
Container stream	HotBird 4K1	Container stream for this T2MI inner stream
Data PID	4096	PID of container stream
PLP ID	Use first PLP_ID detected	PLP ID of this inner stream

Up to 25 T2MI streams can be monitored in parallel (simultaneously by different ETR engines). If more streams are added they will not get TS Sync.

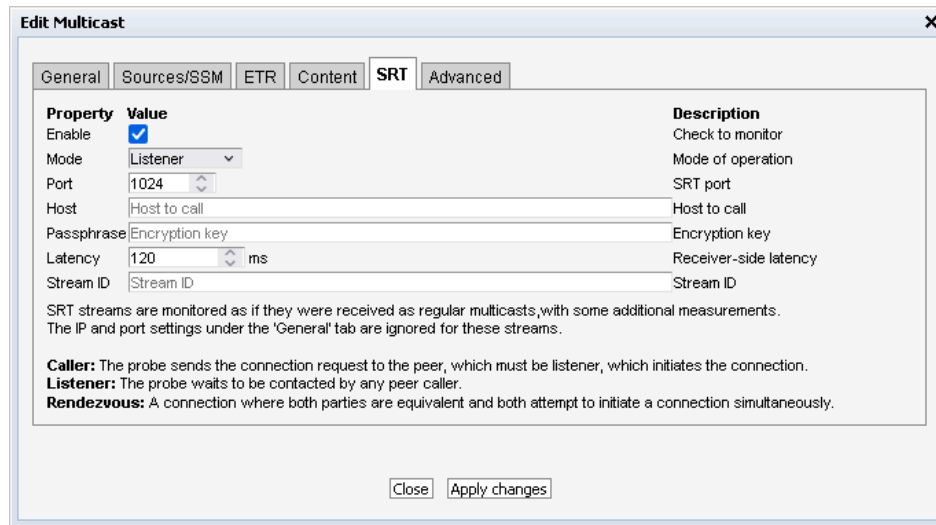
Inner T2MI streams are presented in the ETR290 menus of this device and not in IP specific views such as Multicasts/Parameters or MW. IP settings are ignored for these streams.

When Data PID or PLP ID is changed the streams need to unjoined and then joined again for the setting to take effect.

Close Apply changes

T2MI (T2MI Option)

Container stream:	For a T2MI inner stream the container stream (outer stream) must be specified. Select the container stream from the drop-down menu. For streams other than T2MI inner streams (none) should be selected.
Data PID:	The container stream PID carrying the inner stream
PLP ID:	The PLP ID for the inner stream. Select a fixed PLP ID value from the drop-down menu or specify that the first detected PLP ID should be used.

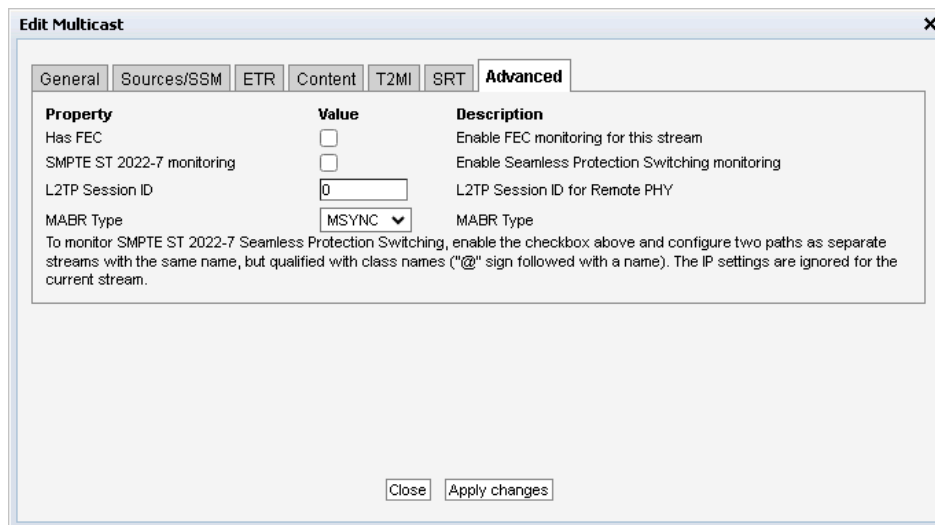


SRT

Enable:	Enable to monitor SRT stream
Mode:	The mode of operation the probe should use; either a <i>Listener</i> , a <i>Caller</i> or <i>Rendezvous</i> .
Port:	The port number to receive the SRT stream through.
Host:	The host address of the SRT stream source. (ignored for Listener mode)
Passphrase:	In case the SRT stream you want to receive is encrypted. If left blank the stream is assumed to be unencrypted.
Latency:	Defines the minimum receiver buffering delay before analyzing the video content in an SRT data packet. A larger value gives a larger window of time for the SRT protocol to retransmit lost packets, and vice versa.
Stream ID:	A free-form string sent by a caller to the opposing listener during connection initiation. Will have no effect if set on Rendezvous or Listener mode.

The probe currently supports up to 4 concurrent SRT receive sessions. When operating SRT in **Listener** mode the probe will await an external caller to connect to the specified UDP port before data reception occurs. Select the network interface to listen on under the **General** tab.

More information on SRT streams can be found in D Appendix: SRT Streams.



Property	Value	Description
Has FEC	☐	Enable FEC monitoring for this stream
SMPTE ST 2022-7 monitoring	☐	Enable Seamless Protection Switching monitoring
L2TP Session ID	0	L2TP Session ID for Remote PHY
MABR Type	MSYNC	MABR Type

To monitor SMPTE ST 2022-7 Seamless Protection Switching, enable the checkbox above and configure two paths as separate streams with the same name, but qualified with class names ("@" sign followed with a name). The IP settings are ignored for the current stream.

Close Apply changes

Advanced

Has FEC:	The stream carries COP3 (SMPTE ST 2022-5) Forward Error Correction. If enabled, statistics about FEC drops and correctible errors will be reported for the stream.
SMPTE ST 2022-7 monitoring:	This is a Seamless Protection Switching (SMPTE ST 2022-7) combined stream.
Session ID:	The session ID of the L2TP stream is specified here (or 0 if not used). It is used together with the multicast address to identify the L2TP stream.
MABR Type:	The MABR kind. Possible values are: <i>Disabled</i> and <i>MSYNC</i> . When the setting is <i>Disabled</i> , the stream is decoded normally. When set to <i>MSYNC</i> , the stream is interpreted as MSYNC. If the stream may be decoded as MSYNC, the MSYNC objects received are stored and listed in Detailed Monitoring — MSYNC .

Seamless Protection Switching (SMPTE ST 2022-7) monitors the same stream transmitted twice. The probe verifies that the two streams combined do not have packet loss and the jitter between the two streams. When two multicast/unicast streams are selected, the probe will report errors report errors if the same RTP packets are missing from both streams. Errors are also reported if the timing between the two stream exceeds the threshold settings.

To enable SMPTE ST 2022-7 monitoring, set up a combined stream with the **SMPTE ST 2022-7 monitoring** checkbox enabled. The IP settings are ignored for this stream. Then set up the two path streams, giving the same name, but with different class names. The class name is everything added after @ in the name.

The NOMAD supports monitoring as a receiver class C for SBR streams, as defined in SMPTE ST 2022-7:2019.

L2TP (remote PHY) streams are mapped into multicasts. In order to identify the correct stream the multicast address is entered in the **General** tab and the session ID of the L2TP stream is specified here. The port number is not used, and will be shown as 0.

To identify available L2TP session IDs, join the stream first and then use the **Multicasts — Detect** view to see the session IDs that are available. Both IPv4 and IPv6 is supported.

If the L2TP stream carries valid sequence numbers, dropped or duplicated frames will be analyzed by the NOMAD in a manner similar to RTP streams.

7.4.9 Multicasts — Ethernet thresh.

Parameters
Summary
History
Detect
SAP
Join
Streams
Ethernet thresh.

Threshold presets

Search...

These thresholds are used to scale graphs, generate probe alarms and to determine when an error-second has occurred

Name	Refs	IAT:MLR er...	IAT:MLR w...	Max bitrate	Min bitrate	No signal ms	RTP drops	SRT drops	Timeline	Edit
Default	0	50:8	45:1	30	0.1	1000	1	1		Edit
TV	27	50:8	45:1	30	0.1	1000	1	1	✓	Edit
Radio	8	150:8	130:1	1	0.1	1000	1	1	✓	Edit
HDTV	31	30:8	20:1	50	1	1000	1	1	✓	Edit

Thresholds: 4

Add new threshold
Duplicate selected
Delete selected
Edit selected

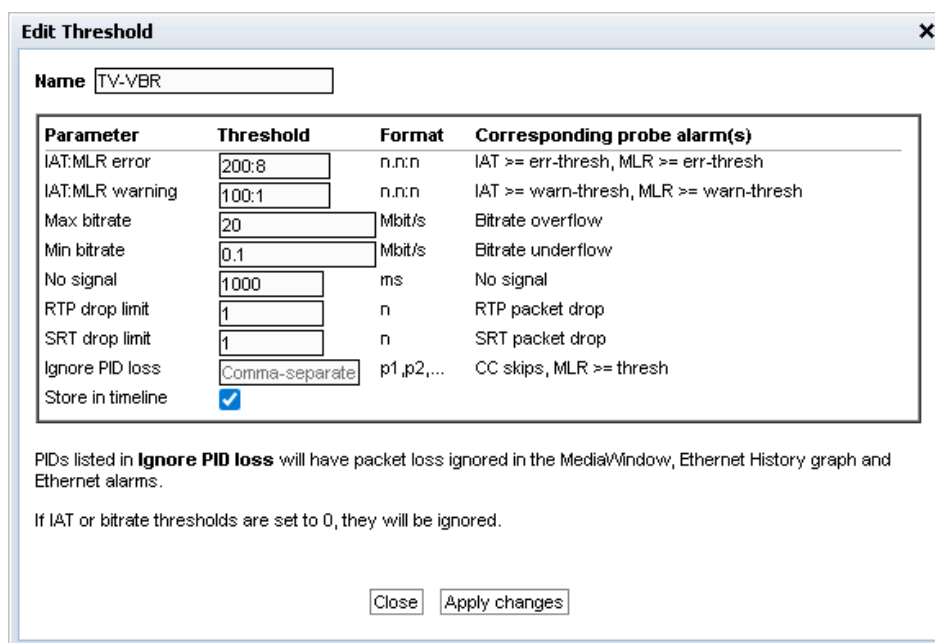
Thresholds are used to determine when to actually raise an alarm upon detection of an error. The Ethernet thresholds are used for generating Ethernet probe alarms as well as for calculating error-seconds. Error seconds and ETH probe alarms are issued whenever measurements exceed the defined threshold levels for a parameter. Ethernet thresholds are also used to scale some graphs like the MediaWindow graphs. The alarm level of each of these alarms is set in the **Alarms — Alarm setup** view. Note that it is also possible to disable alarms in the **Alarms — Alarm setup** view.

The **Multicasts — Ethernet thresh.** view makes it possible to define threshold values that operate at stream level. Thresholds are associated with each stream in the **Multicasts — Streams — Edit** view. There are two different ways of creating user-defined thresholds. To create a new threshold template from scratch the operator should click the **Add new threshold** button. A pop-up window will appear allowing the user to define alarm conditions. Another way of creating a user-defined threshold template is by highlighting one of the threshold templates already defined and then click the **Duplicate highlighted** button.

Deleting a threshold template is done by highlighting the threshold template that should be removed and clicking **Delete selected**. It is possible to delete or edit several entries simultaneously. Several entries are selected by using the regular *Ctrl + click* or *Shift + click* functionality. Click the **Edit**

button to edit one or more selected threshold templates. Note that the predefined ‘Default’ threshold template cannot be deleted or changed.

In the threshold presets list the ‘Refs’ column displays how many streams are associated with each stream threshold template.



Parameter	Threshold	Format	Corresponding probe alarm(s)
IAT:MLR error	200:8	n.n:n	IAT >= err-thresh, MLR >= err-thresh
IAT:MLR warning	100:1	n.n:n	IAT >= warn-thresh, MLR >= warn-thresh
Max bitrate	20	Mbit/s	Bitrate overflow
Min bitrate	0.1	Mbit/s	Bitrate underflow
No signal	1000	ms	No signal
RTP drop limit	1	n	RTP packet drop
SRT drop limit	1	n	SRT packet drop
Ignore PID loss	Comma-separate	p1,p2,...	CC skips, MLR >= thresh
Store in timeline	☒		

PIDs listed in **Ignore PID loss** will have packet loss ignored in the MediaWindow, Ethernet History graph and Ethernet alarms.

If IAT or bitrate thresholds are set to 0, they will be ignored.

Close Apply changes

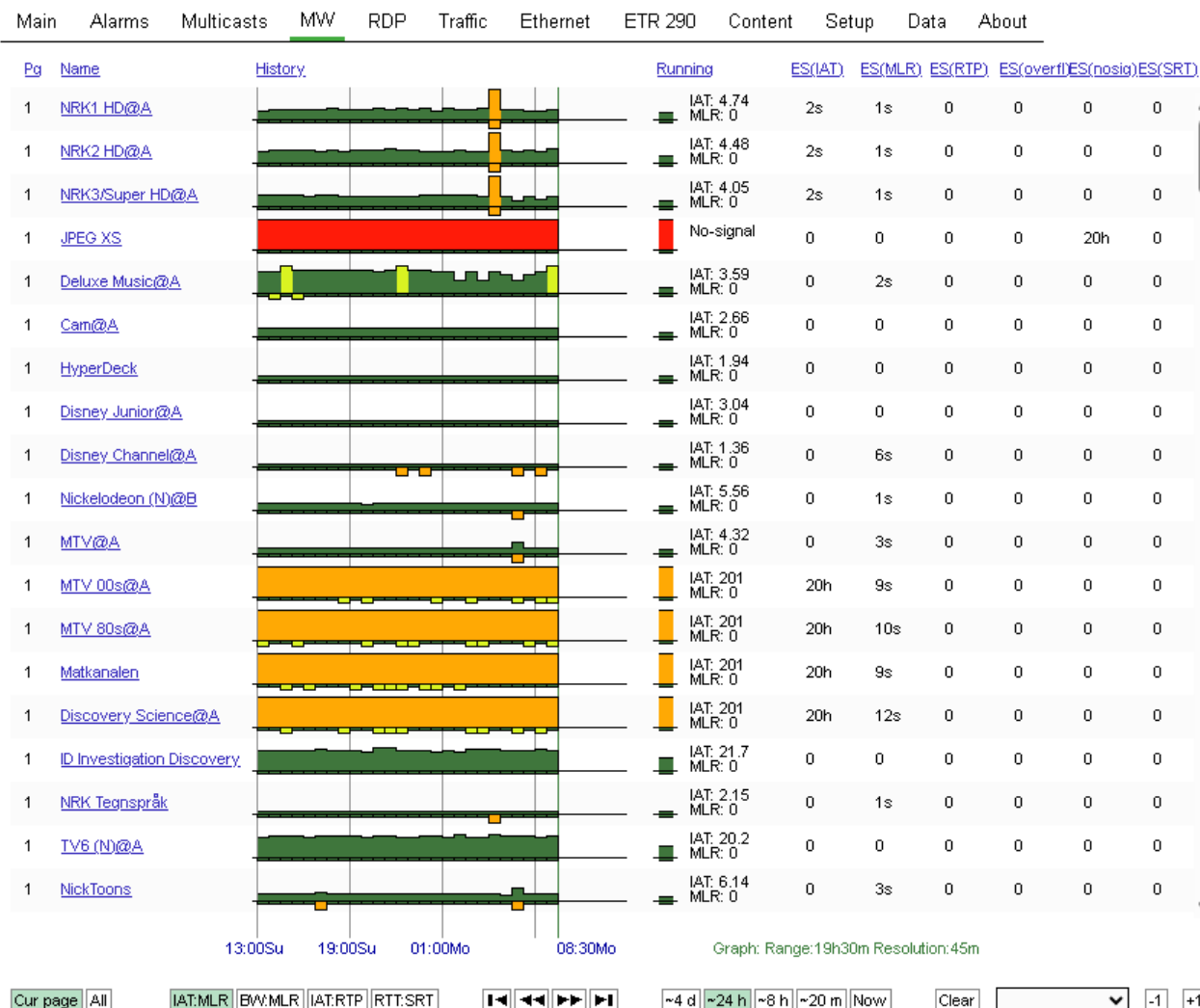
Ethernet thresholds

Name: A text string that identifies the Ethernet threshold

IAT:MLR error: This threshold contains error limits for IAT (Inter-packet Arrival Time) and MLR (Media Loss Rate).
The IAT limit, in milliseconds, is the first parameter (before the colon), the MLR limit, in number of TS packets, is the last parameter. If the IAT limit is exceeded the alarm ‘IAT >= err-thresh’ will be raised. If the MLR limit is exceeded the alarm ‘MLR >= err-thresh’ will be raised. The severity (and hence the color used in the MediaWindow view) for IAT:MLR errors depend on the severity assigned to these alarms in the **Alarms — Alarm setup** view.
Note that error seconds based on MLR are counted regardless of this threshold if one or more packets are missing.

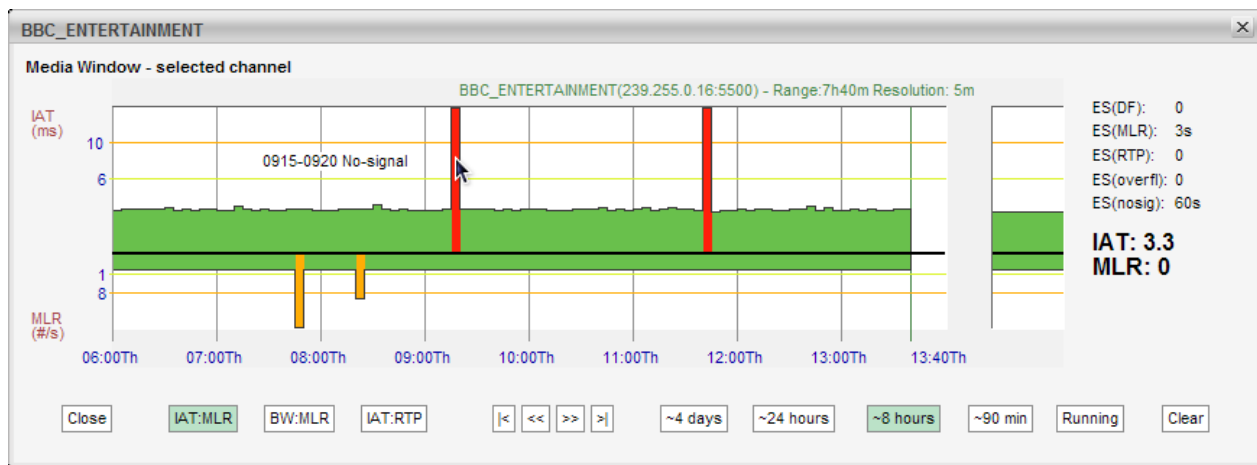
IAT:MLR warning:	This threshold contains warning limits for IAT (Inter-packet Arrival Time) and MLR (Media Loss Rate). The IAT limit, in milliseconds, is the first parameter (before the colon), the MLR limit, in number of TS packets, is the last parameter. If the IAT limit is exceeded the alarm ‘IAT >= warn-thresh’ will be raised. If the MLR limit is exceeded the alarm ‘MLR >= warn-thresh’ will be raised. The severity (and hence the color used in the MediaWindow view) for IAT:MLR errors depend on the severity assigned to these alarms in the Alarms — Alarm setup view.
Max bitrate:	The maximum bitrate in Mbit/s. An alarm will be raised if the stream bitrate exceeds the maximum bitrate.
Min bitrate:	The minimum bitrate in Mbit/s. A value of 0 will never generate an alarm. A value of 0.1 Mbit/s will generate an alarm if the minimum bitrate threshold is less than 0.1 Mbit/s.
No signal:	Number of milliseconds without receiving any signal before the ‘No signal’ alarm is raised
RTP drop limit:	If the number of lost RTP packets exceeds the RTP drop limit an alarm will be raised. Note that error seconds based on packet drops are counted regardless of this threshold. For RTP MSYNC streams this threshold is also used to raise the ‘MSYNC data missing’ alarm. If the MSYNC stream is not RTP encapsulated then the ‘MSYNC data missing’ alarm will be raised if the number of IP packets received for the MSYNC object is less then the number of packets signaled by the MSYNC protocol.
SRT drop limit:	If the number of lost SRT packets exceeds the SRT drop limit an alarm will be raised. Note that error seconds based on packet drops are counted regardless of this threshold. If the SRT stream is also using RTP signalling, SRT packet drops will also cause RTP drops.
Ignore PID loss:	A comma separated list of PIDs for which the probe should ignore packet loss. Packet loss that affects these PIDs will not result in an error-second count, and the ETR monitoring engine will not count these errors.

7.5 MW (Media Window)



The **Media Window** in **Expert view** is very similar to the one in the **MW view**. This view also contains support for **SRT** and the measurements can be cleared from this view. By clicking the clear button the measurements are cleared from this view only.

The user determines whether only multicasts associated with the currently selected page should be displayed (by clicking the **Cur page** button), or if all joined multicasts should be presented in one list (by clicking the **All** button). The time window buttons allow selection of x-axis resolution in the graphs, and by using the arrow buttons it is possible to move the timeline to view an error incident more accurately. Clicking **Clear** will clear all graphs. Note that clearing graphs cannot be undone. Clicking the **+1** button will display the next page. Clicking the **-1** button will display the previous page.

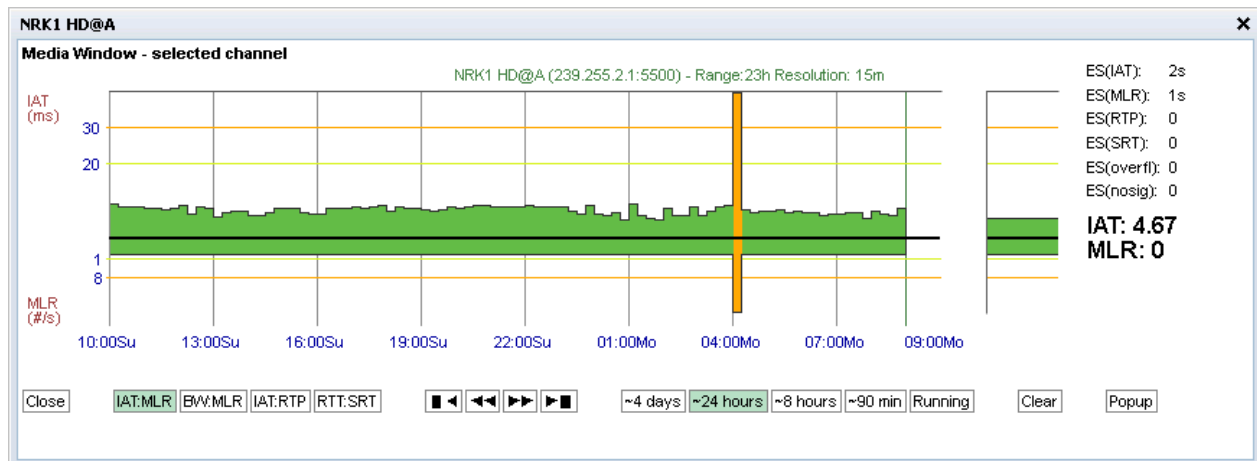


This view includes the following time-span options: **4 days**, **24 hours**, **8 hours**, **20 minutes**, and **Now**. When **Now** is selected, the view shows the most recent **96 seconds**.

Note that with **Now** active, the interval tooltip displays *minutes and seconds* (rather than hours and minutes). Consequently, a timestamp such as **0827 – 0830** refers to the current hour, specifically from **8 minutes 27 seconds** to **8 minutes 30 seconds** past the hour.

By zooming and panning the user can pinpoint more accurately when errors occurred. In the above diagram tool-tip reveals that ‘No signal’ occurred between 9:15 and 9:20.

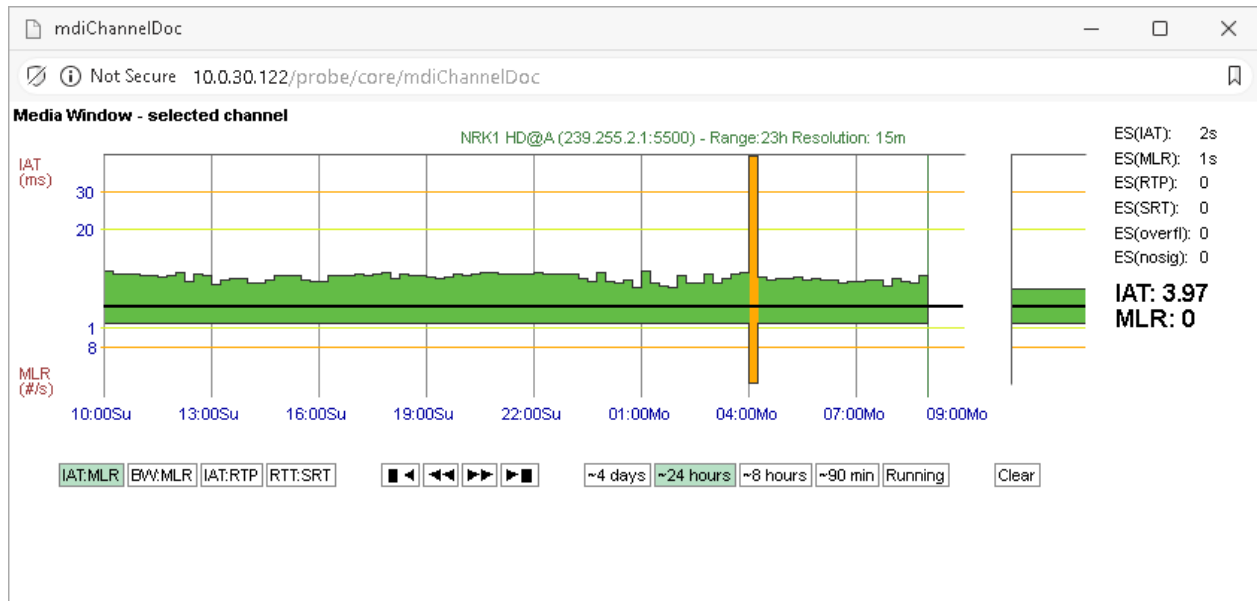
7.5.1 Media Window — Selected channel



The **Media Window — selected channel** view is activated by clicking a multicast label in the **MW** page. Clicking anywhere in the running graph will zoom in, unless you already are at the maximum zoom level.

This high-resolution version of the **Media Window** reveals more details than the compressed version. There are 3 times more samples along the X-axis, and the graph indicates visually the error and warning thresholds. Note that the time windows of the regular **Media Window** and **Media Window**

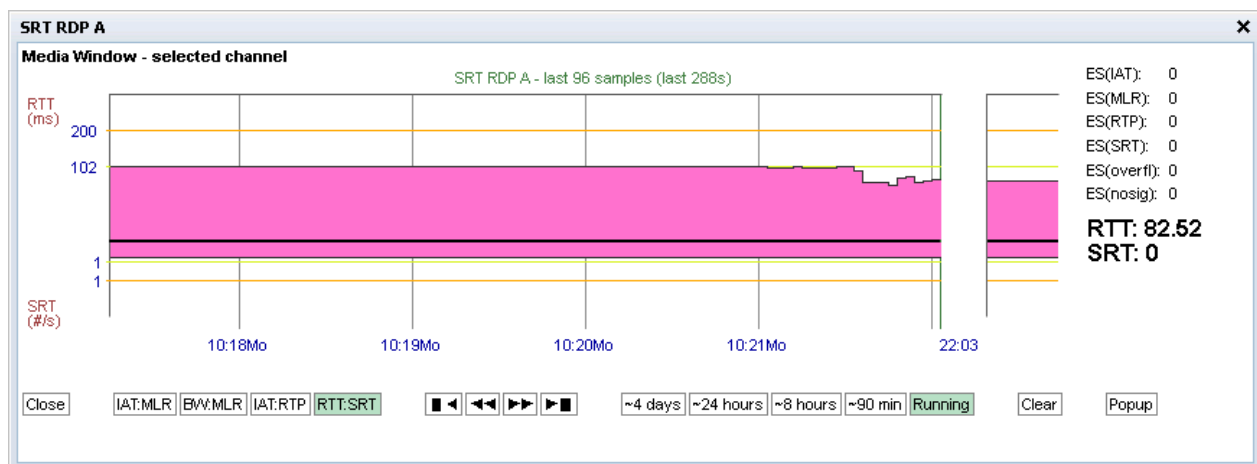
— **selected channel** are not exactly the same, even if the same time window has been selected for both views.



By clicking the **Popup** button will open a pop-up with similar features as the **MW view pop-up**.

The **BW:MLR** and **IAT:RTP** buttons will open a graph with the same information as **MW BW/MLR** and **MW IAT/MLR**, respectively.

7.5.2 Media Window — SRT Round-Trip Time Graph

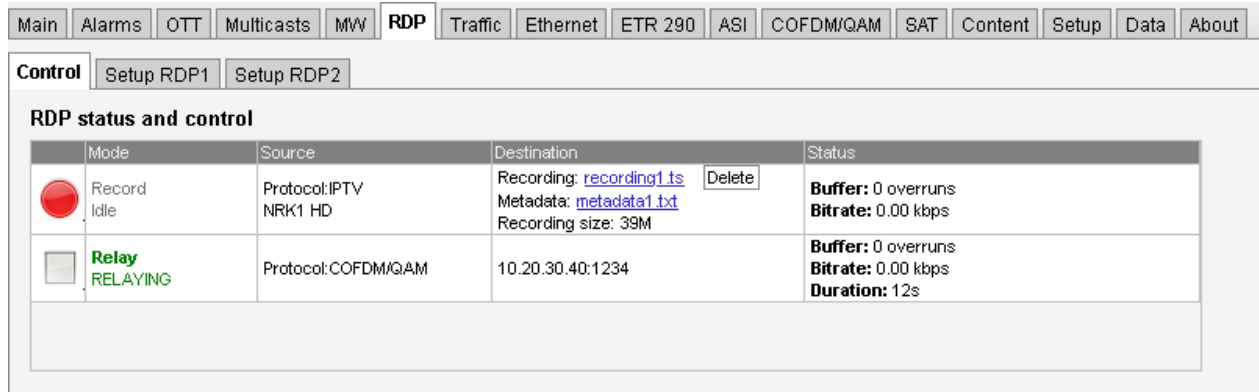


By clicking the **RTT:SRT** button the graph displays the SRT round-trip time as a function of time. The negative part of the composite graph displays unrecoverable SRT packets. If the monitored stream is not using an SRT encapsulation, both graphs are shown in grey and the text 'Not SRT' is shown for the live data.

7.6 RDP (Return Data Path)

The Return Data Path feature enables forwarding of streams from any probe interface to another destination IP address. Stream may also be recorded to file, either directly or triggered by alarms. The probe supports forwarding or recording of two streams in parallel.

7.6.1 RDP — Control

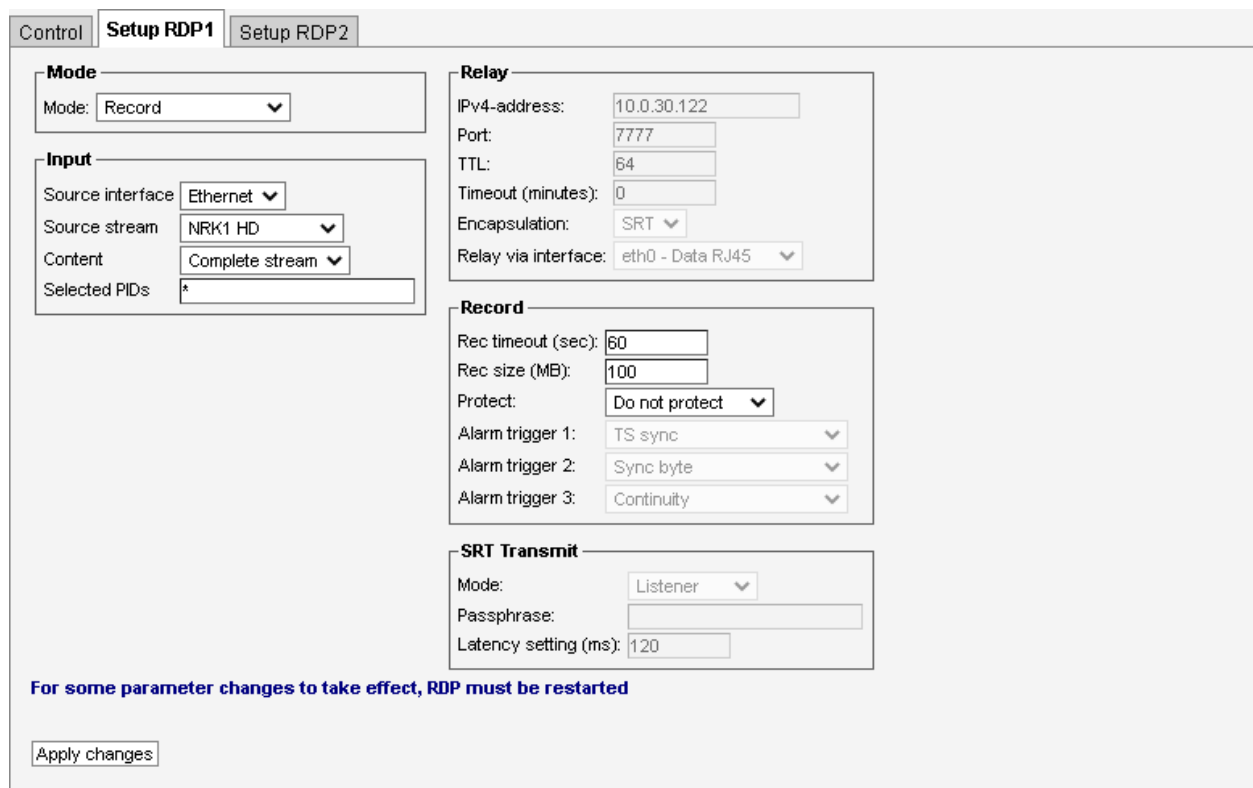


Mode	Source	Destination	Status
 Record Idle	Protocol: IPTV NRK1 HD	Recording: recording1.ts Metadata: metadata1.txt Recording size: 39M Delete	Buffer: 0 overruns Bitrate: 0.00 kbps
 Relay RELAYING	Protocol: COFDM/QAM	10.20.30.40:1234	Buffer: 0 overruns Bitrate: 0.00 kbps Duration: 12s

Click the icons in the **Control** view to activate or de-activate an RDP engine. There are different icons for controlling RDP engines depending on whether they are configured to relay or record. The state of each RDP engine is restored after a reboot.

For recordings and triggered recordings the last recording is made available in the Destination column along with the metadata file. The metadata file contains basic information about the recording such as the recording size, list of PIDs and CC-errors for each PID. In the case of triggered recording, the alarm causing the recording is also included. Pressing the Delete button deletes the recording. For triggered recordings the number of recordings is stated in the Status column. Pressing the Delete button resets this counter. The buffer utilization is stated as a percentage and should never approach 100% for correct relaying or recordings.

7.6.2 RDP — Setup



The screenshot shows the 'Setup RDP1' configuration window. It includes tabs for 'Control', 'Setup RDP1', and 'Setup RDP2'. The 'Setup RDP1' tab is selected. The interface is divided into several sections:

- Mode:** A dropdown menu set to 'Record'.
- Input:** A group of settings including 'Source interface' (Ethernet), 'Source stream' (NRK1 HD), 'Content' (Complete stream), and 'Selected PIDs' (a text field with an asterisk).
- Relay:** A group of settings including 'IPv4-address' (10.0.30.122), 'Port' (7777), 'TTL' (64), 'Timeout (minutes)' (0), 'Encapsulation' (SRT), and 'Relay via interface' (eth0 - Data RJ45).
- Record:** A group of settings including 'Rec timeout (sec)' (60), 'Rec size (MB)' (100), 'Protect' (Do not protect), and three alarm triggers (TS sync, Sync byte, Continuity).
- SRT Transmit:** A group of settings including 'Mode' (Listener), 'Passphrase' (empty), and 'Latency setting (ms)' (120).

At the bottom, there is a blue text warning: "For some parameter changes to take effect, RDP must be restarted" and an 'Apply changes' button.

Each of the RDP engines is configured separately. First the Mode is selected. Depending on the mode either the Relay or Record settings needs to be configured. The Input selects the stream or interface to relay or record.

These are the settings:

Mode and Input

Mode:	Select whether this RDP engine should relay, record or trigger-record.
Source interface:	The source interface drop-down menu allows selection of available input signals. Note that ETR290 analysis of a demodulated signal should be locked (round-robin looping disabled) to obtain a continuous stream for ASI and RF signals.
Source Stream:	When Ethernet input is selected the user selects the stream to forward or record. Ethernet streams being joined/monitored by the probe are available for selection.
Content:	The user selects the service to be relayed or recorded, or alternatively selects that the complete stream should be used. The PIDs associated with the service are automatically displayed in the 'Selected PIDs' field, and these may be edited if required.

Selected PIDs: The user can specify the PIDs to be selected, default is all PIDs. Typically PAT and PMT PIDs should be forwarded in addition to video and audio PIDs, however this depends on the equipment receiving the forwarded stream.

When mode **Relay over IP** has been selected, the RDP parameters are:

<i>Relay</i>	
IPv4-address:	The unicast address or multicast address to forward to. Multicast addresses are in the range 224.0.0.0 – 239.255.255.255.
Port:	The port to forward to. The combination of IP address and port fully describes the destination address.
TTL:	The Time-To-Live flagging of the relayed signal. The default value is 64.
Timeout:	The relaying period in minutes. If the value 0 is selected, no timeout applies, and relaying will continue until it is stopped manually.
Encapsulation:	The encapsulation format of the relayed stream. UDP , RTP or SRT may be selected.
Relay via interface:	The available interfaces for forwarding the stream are listed.

When mode **Record** or **Trigger recording** has been selected the options are:

<i>Record</i>	
Rec timeout:	The maximum recording time in seconds. This setting enables the user to limit recordings of low-bitrate streams.
Rec size:	The total file size of the recording. When in alarm trigger mode the resulting recording will consist of a fixed sized portion of data before the alarm is raised and the remaining recording from data after the trigger occurred.
Protect:	When in alarm trigger mode the user may select to protect a recording from being overwritten due to a new alarm occurrence. The user may select between ‘Never overwrite’, ‘Do not protect’, ‘30 seconds’, ‘60 seconds’ and ‘5 minutes’.
Alarm trigger 1–3:	Select a maximum of three different alarms that should trigger recording. Note that a recording will start upon a transition from status <i>OK</i> to status <i>alarm</i> . Alarms that have been disabled in the Alarm — Alarm setup view will be shown in brackets – these will never trigger a recording.

The maximum recording size depends on the amount of free disk on the probe, up to a maximum of 500 Mbyte.

When encapsulation **SRT** has been selected the SRT Transmit options are:

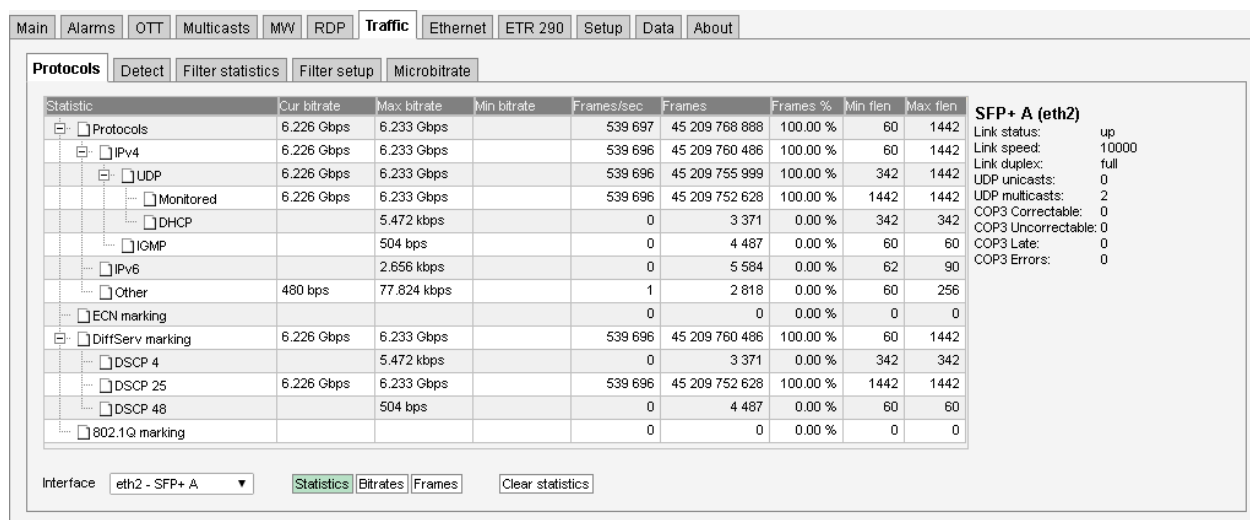
SRT configuration options

Mode:	SRT can be connected using one of three connection modes: Caller: the probe sends the connection request to the peer, which must be listener , to initiate the connection. Listener: the probe waits to be contacted by any peer caller . Rendezvous: the probe and the peer (which must be in rendezvous mode as well) both attempt to initiate a connection simultaneously.
Passphrase:	Specifies a passphrase to encrypt the forwarded stream.
Latency setting:	The latency value (milliseconds) insisted upon by the sender side as a minimum value for the receiver.

Please refer to appendix D for more details on SRT.

7.7 Traffic

7.7.1 Traffic — Protocols



The screenshot shows the 'Protocols' view in the Sencore software. The interface is 'eth2 - SFP+ A'. The table displays statistics for various protocols, including IPv4, UDP, DHCP, ICMP, IPv6, Other, ECN marking, DiffServ marking, DSCP 4, DSCP 25, DSCP 48, and 802.1Q marking. The statistics include Cur bitrate, Max bitrate, Min bitrate, Frames/sec, Frames, Frames %, Min flen, and Max flen. On the right, there is a summary for 'SFP+ A (eth2)' showing link status (up), link speed (10000), link duplex (full), and various error counts (0).

Statistic	Cur bitrate	Max bitrate	Min bitrate	Frames/sec	Frames	Frames %	Min flen	Max flen
Protocols	6.226 Gbps	6.233 Gbps		539 697	45 209 768 888	100.00 %	60	1442
IPv4	6.226 Gbps	6.233 Gbps		539 696	45 209 760 486	100.00 %	60	1442
UDP	6.226 Gbps	6.233 Gbps		539 696	45 209 755 999	100.00 %	342	1442
Monitored	6.226 Gbps	6.233 Gbps		539 696	45 209 752 628	100.00 %	1442	1442
DHCP		5.472 kbps		0	3 371	0.00 %	342	342
ICMP		504 bps		0	4 487	0.00 %	60	60
IPv6		2.656 kbps		0	5 584	0.00 %	62	90
Other	480 bps	77 824 kbps		1	2 818	0.00 %	60	256
ECN marking				0	0	0.00 %	0	0
DiffServ marking	6.226 Gbps	6.233 Gbps		539 696	45 209 760 486	100.00 %	60	1442
DSCP 4		5.472 kbps		0	3 371	0.00 %	342	342
DSCP 25	6.226 Gbps	6.233 Gbps		539 696	45 209 752 628	100.00 %	1442	1442
DSCP 48		504 bps		0	4 487	0.00 %	60	60
802.1Q marking				0	0	0.00 %	0	0

The **Protocols** view allows monitoring of IP traffic on the selected port in terms of the protocols used.

The interface can be selected using the drop-down at the bottom of the page. Clicking the **Clear statistics** button will reset displayed values.

The following measurements are presented, depending on which statistic is selected:

Statistics

Statistic:	The protocol for which the following measurements apply
Cur bitrate:	The current total bitrate for this protocol (measured over the last 1s period)

Max bitrate:	The maximum bitrate during any 1s period
Min bitrate:	The minimum non-zero bitrate during any 1s period
Frames/sec:	Traffic speed in number of IP packets per second
Frames:	Number of Ethernet frames
Frames %:	Percentage of total number of frames
Min flen:	Minimum Ethernet frame length
Max flen:	Maximum Ethernet frame length

Bitrates

Statistic:	As above
Cur bitrate:	As above
Bitrates:	A graph displaying the bitrate over time, displaying the last five minutes
Bitrate graph:	Click the bitrate graph button to display a detailed bitrate graph for the specified protocol

Frames

Statistic:	As above
Frames/sec:	Traffic speed for this protocol expressed in number of IP packets per second
Frames:	A graph displaying frames per second over time, displaying the last five minutes
Frames graph:	Click the frames graph button to display a detailed frames per second graph for the specified protocol

Interface statistics

Link status:	Displays whether the interface is up or down
Link speed:	Displays the interface speeds, as bits per second
Link duplex:	Indicates whether the interface is operating at full or half duplex
UDP unicasts:	The number of detected UDP unicasts
UDP multicasts:	The number of detected UDP multicasts
COP3 Correctable:	Total count of dropped payload IP packets that are correctable by the FEC
COP3 Uncorrectable:	Total count of dropped payload IP packets that cannot be corrected by the FEC
COP3 Late:	Payload or FEC packets are received slightly too late according to the buffer model and may result in errors in another implementation of the specifications. The number of packets with this error.

COP3 Errors: Either the L/D parameters are not consistent across the streams or payload/FEC packets are received too late or too early according to the buffer model. The number of packets with these errors.

7.7.2 Traffic — Detect

Protocols

Detect

Filter statistics

Filter setup

Microbitrate

Multicast scan

Detected UDP traffic

	Dst address	Src address	Name	Interface	Joined	Session ID	Mapping	Signal	RTP drops	CC errors	Bitrate	CPU
i	239.255.2.1:5500	10.0.76.119:5500	NRK1 HD	eth0	yes		7TS/RTP	44h	24025	39557	7.824 M...	2
	239.255.2.1:5502	10.0.76.119:5500		eth0	no		n/a	-	-	-	-	2
i	239.255.2.2:5500	10.0.76.119:5500	NRK2 HD	eth0	yes		7TS/RTP	44h	24509	40073	3.513 M...	2
	239.255.2.2:5502	10.0.76.119:5500		eth0	no		n/a	-	-	-	-	2
	239.255.2.2:5504	10.0.76.119:5500		eth0	no		n/a	-	-	-	-	2
i	239.255.2.3:5500	10.0.76.119:5500	NRK3/Super HD	eth0	yes		7TS/RTP	44h	22192	38353	7.042 M...	2
i	239.255.2.50:5500	10.0.76.119:5500	Hyperdeck_p1	eth0	yes		7TS/RTP	44h	25123	25684	6.388 M...	2
i	239.255.2.51:5500	10.0.76.119:5500	CamHD	eth0	yes		7TS/RTP	44h	24866	22958	6.291 M...	2

8 detected streams

Live view

View list offline

(All)

☐ Include source address

Add selected to stream list

Add all to stream list

Export...

The **Traffic Detect** view displays all UDP traffic sensed by the probe. Note that generally the upstream switch or router will not output streams that are not joined by downstream equipment, i.e. usually only joined streams will be available for monitoring.

If the unicast/multicast destination address is known to the probe (i.e. listed in the **Multicasts — Streams** view) the stream's **Name** is looked up, otherwise a generic name is used.

When the **Traffic — Detect** view is entered after probe booting, the probe will continuously try to detect streams. Click the **View list offline** button to view the stream list in offline mode. Click the **Refresh** button to update the stream list in offline mode.

The source address makes it possible for the probe to distinguish between multicasts with the same destination IP address and port, provided that **Source specific multicasts** has been enabled in the **Setup — Params** view.

If the stream is currently joined by the probe (i.e. the probe is currently monitoring the stream), the **Joined** field is set to yes.

Detected streams can be added to the probe's stream list by selecting streams and clicking the **Add selected to stream list**. If the checkbox **Include source address** is checked, the detected source address is added to the configuration, which will instruct the probe to request the stream as a source specific multicast; this setting can be configured globally in **Setup — Params**. To add all detected streams the **Add all to stream list** button can be pressed. Only streams not already in the probe's stream list are considered. Clicking the **Export** button will generate an XML-file that opens in a new window.

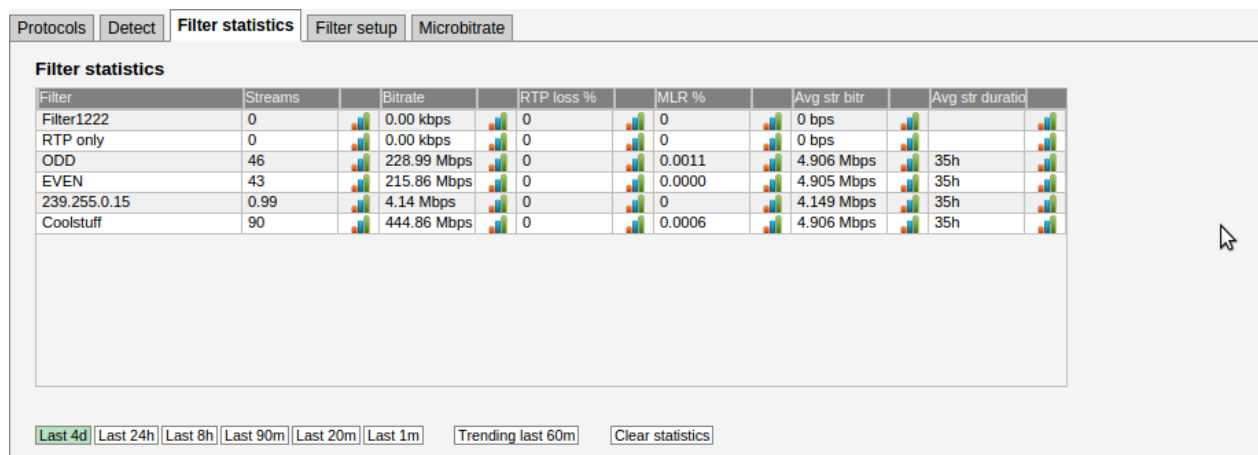
A drop down menu allows filtering of detected streams, making it possible to view streams of a specific type only. Stream types are defined in the **Traffic — Filter setup** view. If the AEO option is

enabled for the probe the Detect list will contain the following additional columns: Mapping, signal, RTP drops, CC errors and Bitrate. These parameters are the same as on the **Multicasts** page.

①:	Click the blue information icon to pop up the detailed stream info if the stream is already monitored.
Dst address:	The multi- or unicast address
Src address:	The stream source address
Name:	The stream name, as defined in the Multicasts — Streams view. A generic name will be used for multi- or unicasts not defined by the user.
Interface:	The stream source network interface (physical or VLAN)
Joined:	If the stream is joined by the probe this field will read 'Yes'.
Session ID:	The session ID of the L2TP stream is specified here (or 0 if not used). It is used together with the multicast address to identify the L2TP stream.
Mapping:	The transport stream to IP mapping. Typically seven transport stream packets are mapped into one IP packet.
Signal:	The duration of stream availability
RTP drops:	The number of detected RTP drops for the stream. This is only valid if the stream is RTP encapsulated.
CC errors:	The number of detected continuity counter errors for the stream.
Bitrate:	The stream bitrate
CPU:	The probe CPU used to analyze the stream (1-7)

Please note that the **Multicast scan** and the **Detect** features are mutually exclusive, so it is necessary to click the **Exit scan mode** in the **Multicast scan** view to resume population of the **Detect** list.

7.7.3 Traffic — Filter statistics

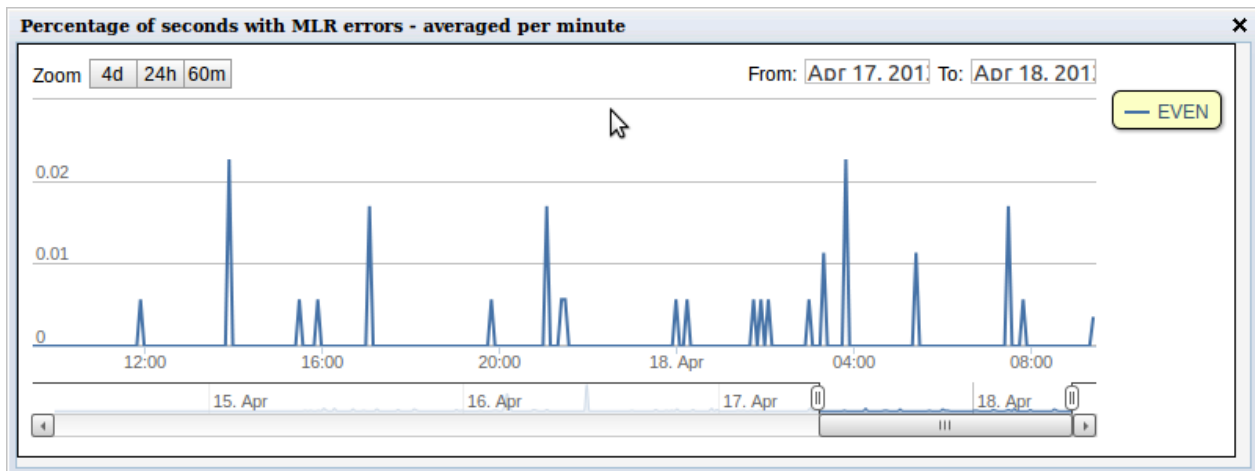


The **Traffic — Filter statistics** view makes it possible to view statistics for different stream types. Stream types are defined by the user in the **Traffic — Filter setup** view.

Statistics is displayed for a time period selected by clicking one of the time duration buttons.

<i>Filter statistics:</i>	
Filter:	The filter name, as defined by the user in the Traffic — Filter setup view.
Streams:	The number of streams matching the associated filter, averaged over the selected time duration.
Bitrate:	The total summed bitrate for streams matching the associated filter.
RTP loss %:	Percentage of time an average stream that matches the filter experiences RTP packet loss inside selected time period. Example: If the Last 1m period is selected and there are totally three streams caught by filter: • stream A: present for 60 seconds, 4 RTP error seconds • stream B: present for 30 seconds, 0 RTP error seconds • stream C: present for 30 seconds, 5 RTP error seconds $\text{RTP loss \%} = 9\text{ES} / 120\text{s}$ $\text{RTP loss \%} = 9\text{ES} / 3\text{streams} / 120\text{s} * 100\% = 7.5\%$
MLR %:	Percentage of time an average stream that matches the filter experiences MLR inside selected time period. The calculation is similar to that for RTP loss %.
Avg str bitr:	The average bitrate for streams matching the associated filter.
Avg str duration:	The stream duration is calculated for each stream by identifying the stream's average stream alive counter inside the selected time period, then multiply by 2. The stream alive counter is the number of seconds the stream has existed. This gives accurate results for streams that begin within the selected time period, but may give up to twice the real bitrate for streams that begin (long) before the selected period. Examples: a stream exists for 100 seconds, and begins within the selected period. The calculation becomes: Stream duration = $(1+2+\dots+100)/100*2 = 101$ If the same stream started 50 seconds before the selected period, the calculation becomes: Stream duration = $(51+52+\dots+100)/50*2 = 151$

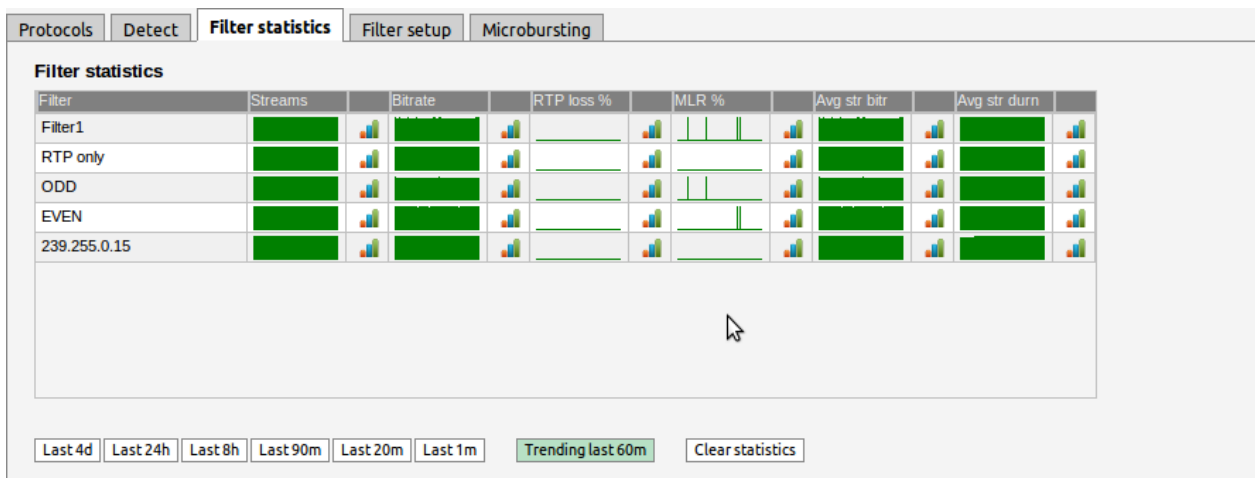
Clicking the icon next to each value brings up the detailed graph window.



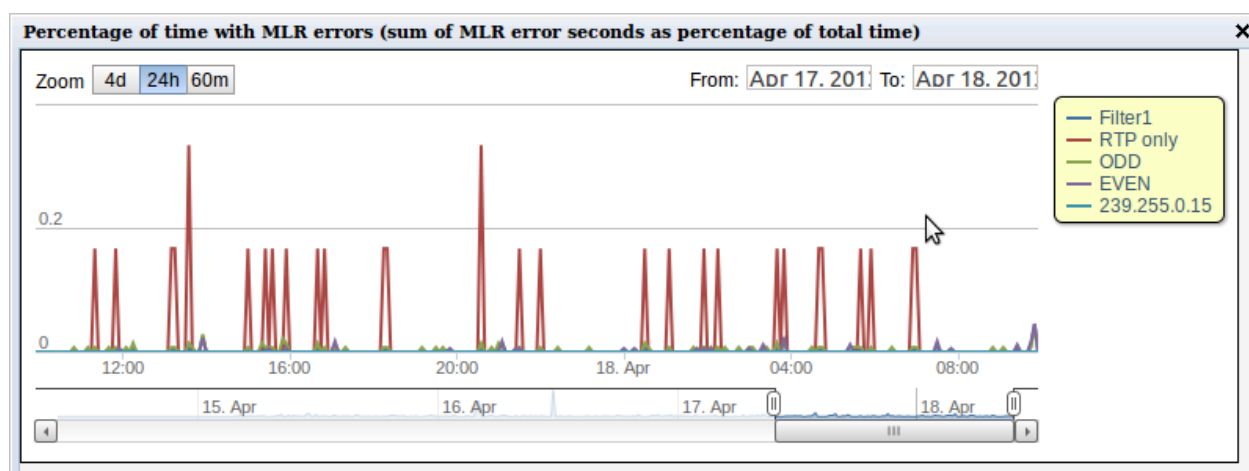
The detailed graph window displays up to 4 days of history.

Trending

Clicking the **Trending last 60m** button will present at-a-glance trending graphs for each parameter for the last 60 minutes.



Clicking a graph icon displays the corresponding detailed graph for the selected filter. Clicking the trend graphs itself will bring up the same detailed graph but will plot all the filters so that they can easily be compared.



The detailed trending graph above displays MLR errors for all filters.

7.7.4 Traffic — Filter setup

Protocols

Detect

Filter statistics

Filter setup

Microbitrate

Statfilter settings

Name	Enabled	Streams	Cast	RTP	VLAN	IP dst	IP src	UDP dst	UDP src	UDP payload	Edit
Filter1222	✓	0	Only unicasts	-	-	-	-	-	-	-	Edit
RTP only	✓	0	-	Only with RTP	-	-	-	-	-	-	Edit
ODD	✓	47	-	-	-	Require match	-	-	-	-	Edit
EVEN	✓	44	-	-	-	Require match	-	-	-	-	Edit
239.255.0.15	✓	1	-	-	-	Require match	-	-	-	-	Edit
Coolstuff	✓	91	-	-	-	Require match	-	-	-	-	Edit
Filter7		0	-	-	Only untagged	-	-	-	-	-	Edit
Filter8		0	-	-	-	-	-	-	-	-	Edit
Filter9		0	-	-	-	-	-	-	-	-	Edit
multicast_monitorin		0	Only multicast	-	-	-	-	-	-	N TS/UDP	Edit

Filters:10

Edit selected

The **Traffic — Filter setup** view makes it possible to define stream filter requirements affecting the **Traffic — Detect** and **Traffic — Filter statistics** views. Ten filters can be defined and enabled by the user.

Statfilter settings:

Name: A text string defining the filter

Enabled: Only enabled filters are in use

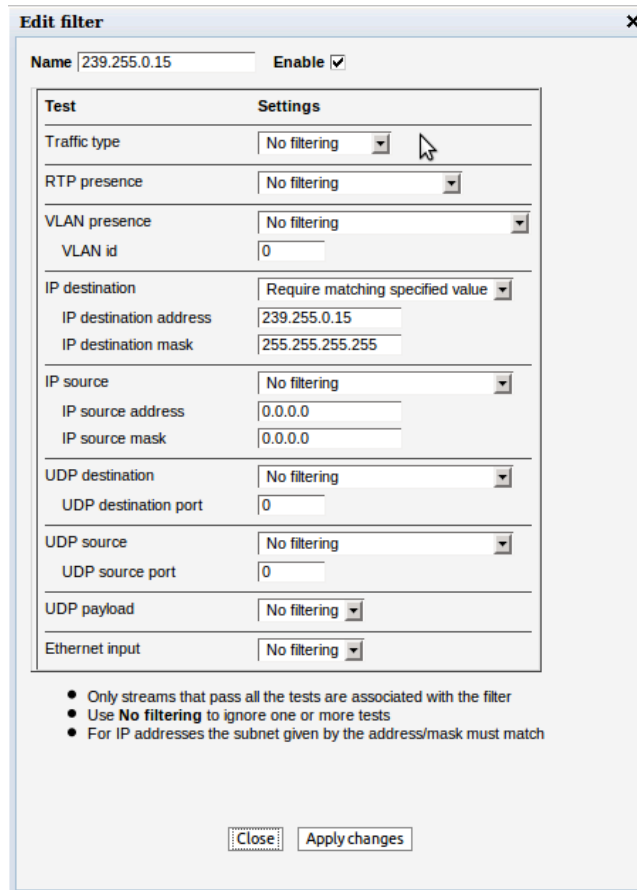
Streams: The number of streams matching filter requirements

Cast: The type of stream: *No filtering*, *Only unicasts* or *Only multicasts*

RTP: The RTP mode: *No filtering*, *Only with RTP header* or *Only without RTP header*

VLAN: VLAN selection mode: *No filtering*, *Only tagged traffic*, *Only untagged traffic* or *Require matching specified value* (a specific VLAN ID).

IP dst:	The IP destination address mode: <i>No filtering</i> or <i>Require matching specified value</i> (a specific IP address/netmask)
IP src:	The IP source address mode: <i>No filtering</i> or <i>Require matching specified value</i> (a specific IP address/netmask)
UDP dst:	The UDP destination mode: <i>No filtering</i> or <i>Require matching specified value</i> (a specific UDP port number)
UDP src:	The UDP source mode: <i>No filtering</i> or <i>Require matching specified value</i> (a specific UDP port number)
UDP payload:	The UDP payload mapping type: <i>No filtering</i> , <i>7 TS/UDP</i> or <i>N TS/UDP</i> (any integer number of TS to UDP mapping)
Edit:	Click the Edit link to edit filter settings.



Edit filter [X]

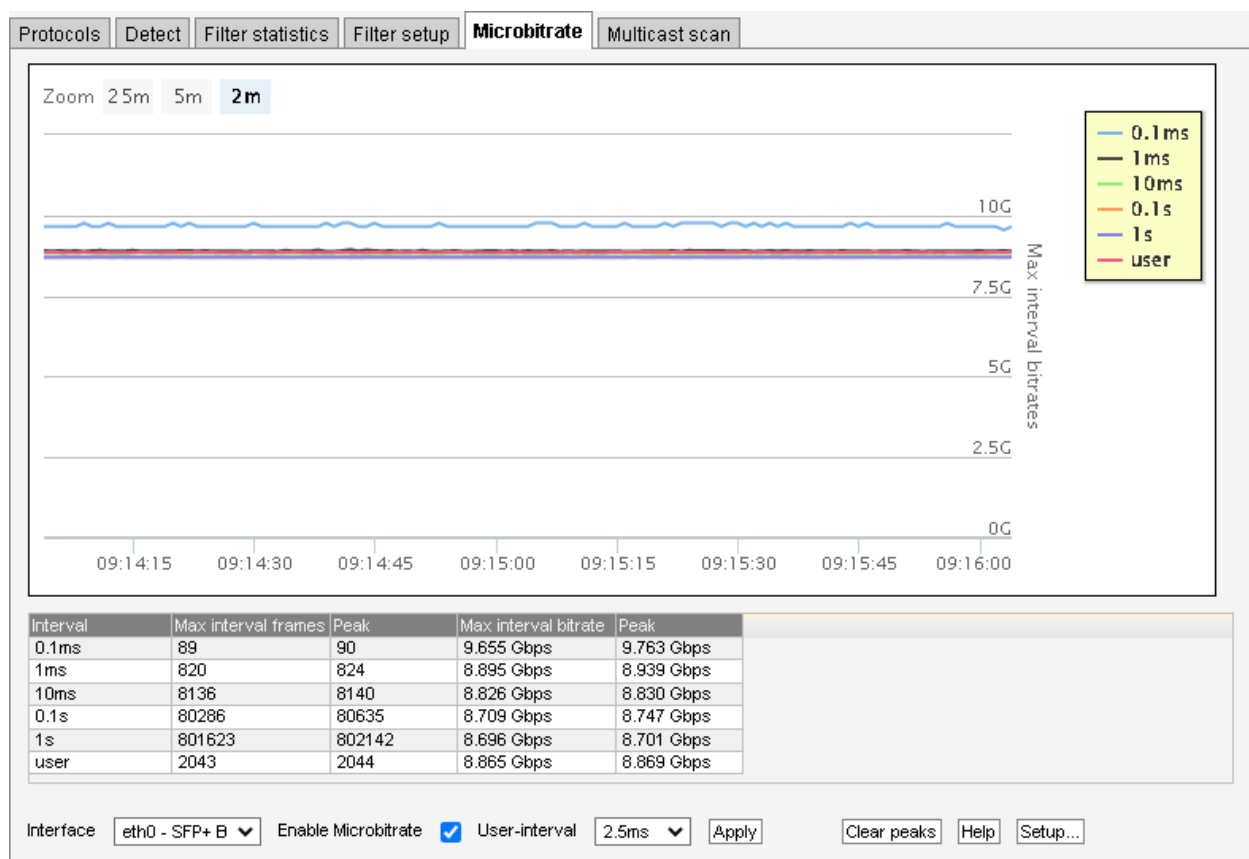
Name: 239.255.0.15 Enable: ☒

Test	Settings
Traffic type	No filtering
RTP presence	No filtering
VLAN presence	No filtering
VLAN id	0
IP destination	Require matching specified value
IP destination address	239.255.0.15
IP destination mask	255.255.255.255
IP source	No filtering
IP source address	0.0.0.0
IP source mask	0.0.0.0
UDP destination	No filtering
UDP destination port	0
UDP source	No filtering
UDP source port	0
UDP payload	No filtering
Ethernet input	No filtering

- Only streams that pass all the tests are associated with the filter
- Use **No filtering** to ignore one or more tests
- For IP addresses the subnet given by the address/mask must match

[Close] [Apply changes]

7.7.5 Traffic — Microbitrate



The Microbitrate feature allows sampling of bitrate at various sampling intervals. When enabling this feature, each Ethernet frame is timestamped in hardware on probe ingress. This timestamp is used to calculate bitrates at various sampling intervals. Due to quantisation error, the 0.1ms interval may show higher peak values than the theoretical maximum.

The **Interval** is the sampling interval of each bitrate calculation. There are six intervals tracked simultaneously, the five pre-defined intervals and the **user-interval**. The **User-interval** is a user-given sampling interval shown in the graph and used for microbitrate alarming.

The **Max interval frames** is the max number of frames within one interval last second. The **Max interval bitrate** is the max sum of Ethernet frame sizes inside one interval last second converted to bits per second. This number should always be bigger or equal for shorter intervals.

Click the legends in the graph to show or hide graphs.

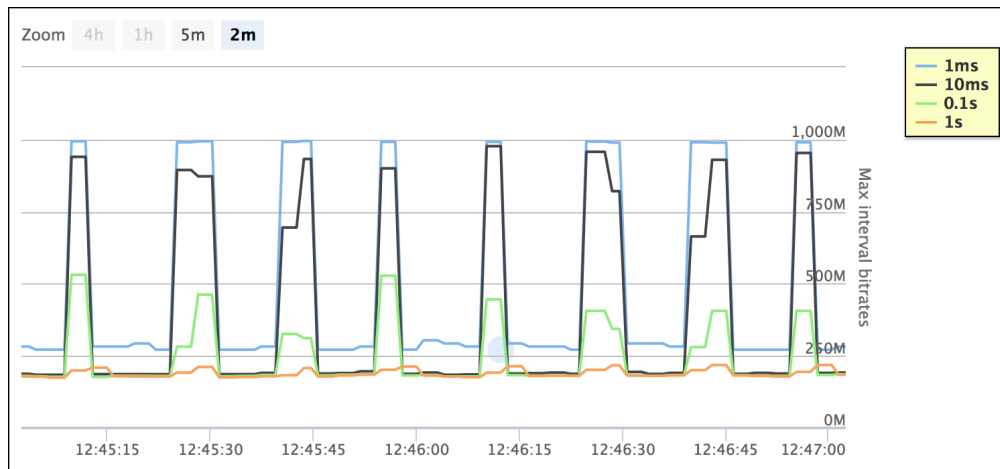


Figure 7.1: OTT traffic example

Figure 7.1 is a typical OTT traffic graph where the client periodically requests limited amounts of data at maximum speed resulting in traffic that is bursting near line-speed for short intervals while the average bitrate for larger intervals is only a fraction. This traffic shape is challenging for network equipment since it demands all remaining capacity up to line speed.

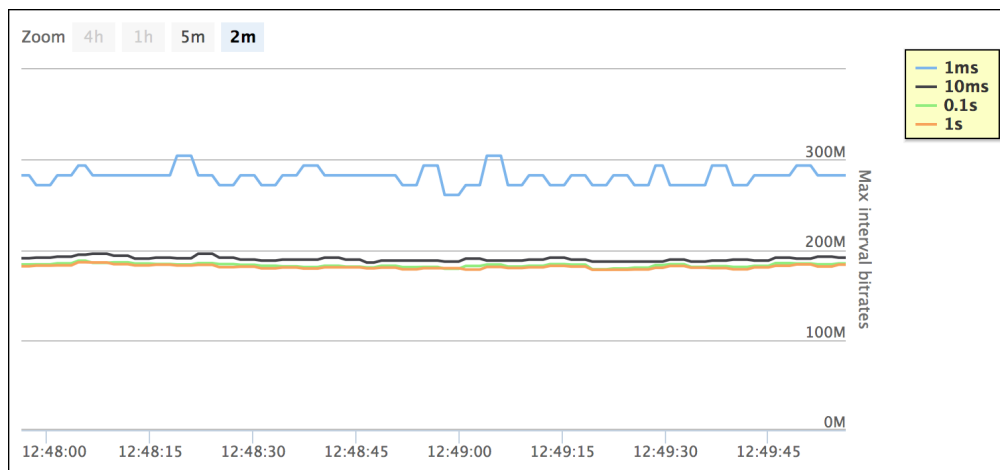


Figure 7.2: Multicast traffic example

For multicast type traffic the traffic pattern will look more like the graph in figure 7.2. Here the bitrate is much more steady even for short intervals. The network never experiences near line-speed bursting since each stream is bitrate controlled by the sender.

Microbitrate Setup

Protocols
Detect
Filter statistics
Filter setup
Microbitrate
Multicast scan

Microbitrate bursting alarm setting

Burst threshold
8000
Bitrate required (Mbps) to trigger alarm

Microbitrate excessive ES bursting alarm settings

ES Alarm window
3600
Error second window (seconds) to count burst errors

ES threshold
10
Number of ES required in window to trigger alarm

These alarms are based on the sampling interval specified for the user-graph.

Apply changes

There are two alarms defined for Microbitrate:

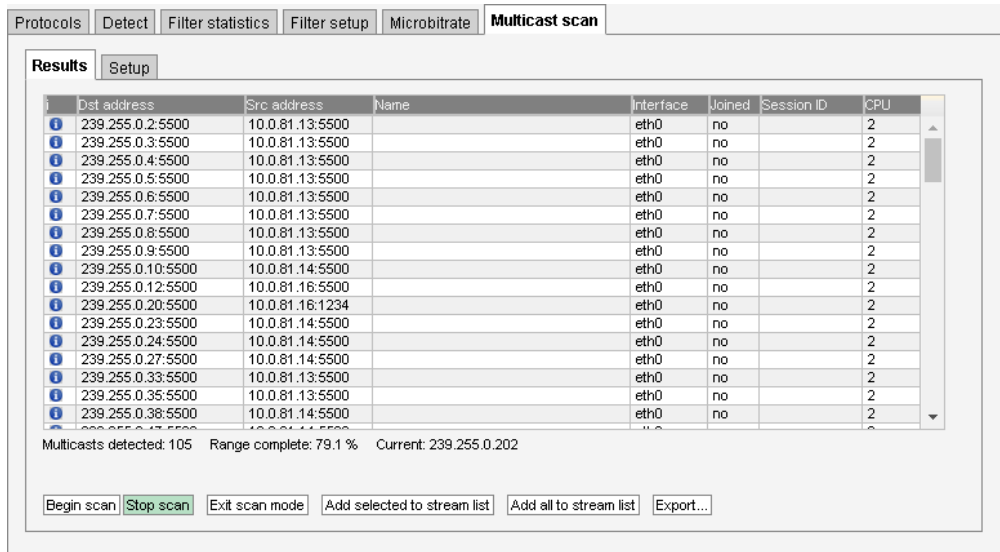
- Microbitrate bursting
- Microbitrate excessive ES bursting

These alarms are both associated with the user-interval, which is a user-specified graph sampling interval.

If the bitrate of the user-interval exceeds the **Burst threshold** setting, the **Microbitrate bursting** alarm will be raised.

Sometimes this will yield a lot of alarms, so a second alarm has been defined. Whenever the bitrate of the user-interval exceeds the **Burst threshold** for **ES threshold** number of seconds during the **last ES Alarm window** seconds, the **Microbitrate excessive ES bursting** alarm is raised.

7.7.6 Traffic — Multicast scan

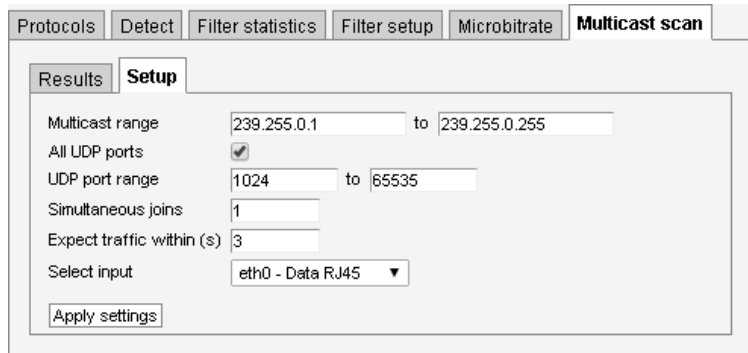


The screenshot shows the 'Multicast scan' window with the 'Results' tab selected. It displays a table of detected multicast addresses. Below the table, it shows 'Multicasts detected: 105', 'Range complete: 79.1 %', and 'Current: 239.255.0.202'. At the bottom, there are buttons for 'Begin scan', 'Stop scan', 'Exit scan mode', 'Add selected to stream list', 'Add all to stream list', and 'Export...'.

	Dst address	Src address	Name	Interface	Joined	Session ID	CPU
1	239.255.0.2:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.3:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.4:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.5:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.6:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.7:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.8:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.9:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.10:5500	10.0.81.14:5500		eth0	no		2
1	239.255.0.12:5500	10.0.81.16:5500		eth0	no		2
1	239.255.0.20:5500	10.0.81.16:1234		eth0	no		2
1	239.255.0.23:5500	10.0.81.14:5500		eth0	no		2
1	239.255.0.24:5500	10.0.81.14:5500		eth0	no		2
1	239.255.0.27:5500	10.0.81.14:5500		eth0	no		2
1	239.255.0.33:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.35:5500	10.0.81.13:5500		eth0	no		2
1	239.255.0.38:5500	10.0.81.14:5500		eth0	no		2

The **Multicast scan** feature is useful for scanning an IPv4 multicast interval to see which multicasts are available in the network. Detected multicasts can easily be added to the stream list. The parameters displayed are the same as in the **Traffic — Detect** view, please see chapter 7.7.2 for details.

Configure the scan interval and other scan parameters in the **Setup** view.



The screenshot shows the 'Multicast scan' window with the 'Setup' tab selected. It contains the following fields and controls:

- Multicast range:** 239.255.0.1 to 239.255.0.255
- All UDP ports:** ☒
- UDP port range:** 1024 to 65535
- Simultaneous joins:** 1
- Expect traffic within (s):** 3
- Select input:** eth0 - Data RJ45
- Apply settings** button

Setup

Multicast range: The multicast range to scan (IPv4 addresses).

All UDP ports: Check this to disable filtering on UDP port.

UDP port range: Filter to be used for UDP port unless **All UDP ports** is checked.

Simultaneous joins: Number of joins performed simultaneously.

Expect traffic within (s): The probe will wait this long to determine if the multicasts joined actually exist.

Select input: Input interface to scan.

In fast networks it is useful to increase the **Simultaneous joins** to a larger number.

Please note that the **Multicast scan** and the **Detect** features are mutually exclusive, so it is necessary to click the **Exit scan mode** to resume population of the **Detect** list.

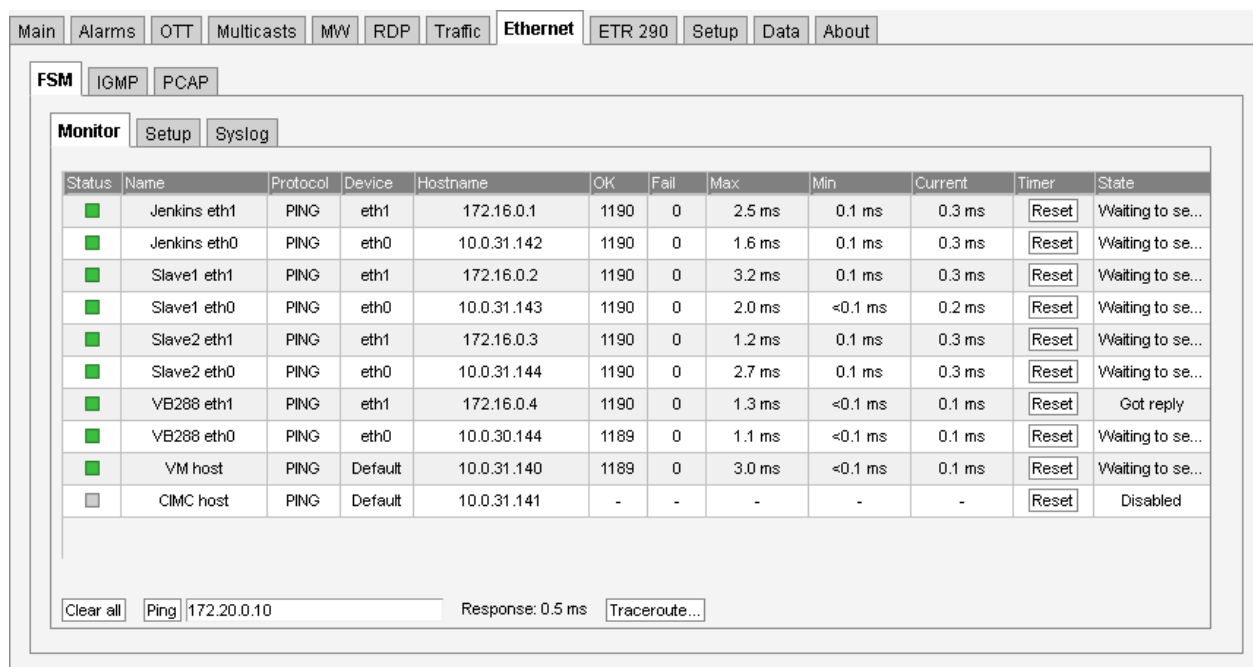
7.8 Ethernet

7.8.1 Ethernet — FSM

Full Service Monitoring (FSM) allows easy validation of any server reachable by the probe via Ethernet. The servers may be probed by either sending an ICMP Echo Request packet (also known as Ping) or performing an HTTP Get request.

Up to 10 services may be defined and each service will be checked at regular intervals. Any errors will be logged. An error is defined as no reply within 5 seconds for the Ping option or no, or incorrect, reply within 5 seconds for the HTTP option. If there are more consecutive errors than a fails threshold value an alarm will be raised.

7.8.1.1 Ethernet — FSM — Monitor



The screenshot shows the 'Ethernet' tab in the software interface. Under the 'FSM' section, the 'Monitor' sub-tab is active. It displays a table with the following data:

Status	Name	Protocol	Device	Hostname	OK	Fail	Max	Min	Current	Timer	State
Green	Jenkins eth1	PING	eth1	172.16.0.1	1190	0	2.5 ms	0.1 ms	0.3 ms	Reset	Waiting to se...
Green	Jenkins eth0	PING	eth0	10.0.31.142	1190	0	1.6 ms	0.1 ms	0.3 ms	Reset	Waiting to se...
Green	Slave1 eth1	PING	eth1	172.16.0.2	1190	0	3.2 ms	0.1 ms	0.3 ms	Reset	Waiting to se...
Green	Slave1 eth0	PING	eth0	10.0.31.143	1190	0	2.0 ms	<0.1 ms	0.2 ms	Reset	Waiting to se...
Green	Slave2 eth1	PING	eth1	172.16.0.3	1190	0	1.2 ms	0.1 ms	0.3 ms	Reset	Waiting to se...
Green	Slave2 eth0	PING	eth0	10.0.31.144	1190	0	2.7 ms	0.1 ms	0.3 ms	Reset	Waiting to se...
Green	VB288 eth1	PING	eth1	172.16.0.4	1190	0	1.3 ms	<0.1 ms	0.1 ms	Reset	Got reply
Green	VB288 eth0	PING	eth0	10.0.30.144	1189	0	1.1 ms	<0.1 ms	0.1 ms	Reset	Waiting to se...
Green	VM host	PING	Default	10.0.31.140	1189	0	3.0 ms	<0.1 ms	0.1 ms	Reset	Waiting to se...
Grey	CIMC host	PING	Default	10.0.31.141	-	-	-	-	-	Reset	Disabled

Below the table, there is a 'Clear all' button, a 'Ping' button with a text input field containing '172.20.0.10', a 'Response: 0.5 ms' label, and a 'Traceroute...' button.

The following parameters are continuously monitored for each service:

Status: Red = active alarm, Green = no alarm

Name: User defined service name

Protocol: Type of protocol. HTTP or Ping

IP address:	IP address. Must be numeric, host name is not accepted
OK:	Total number of valid checks
Fail:	Total number of invalid checks
Max:	Maximum response time recorded
Min:	Minimum response time recorded
Current:	The current (most recent) response time
Timer:	Button to reset and immediately restart the service
State:	Current state of the service. The states are: 'Disabled', 'Waiting to send', 'Waiting for reply', 'Got reply' and 'Reset'.

For convenience a manual ping field is located below the status table. By entering a valid IP address or host name and clicking the **Ping** button an arbitrary server may be pinged.

The **Clear all** button will clear accumulated data for all enabled FSM services, but active alarms will not be removed.

Clicking the **Traceroute** button will open a new window, allowing the user to trace the network route to a specified IP address.

FSM
IGMP
PCAP

Traceroute

Provide arguments (--help for help): 8.8.8.8 Execute

```

traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 38 byte packets
1 10.0.205.1 (10.0.205.1) 1.405 ms 1.379 ms 1.398 ms
2

```

7.8.1.2 Ethernet — FSM — Setup

Monitor

Setup

Syslog

Full Service Monitoring Setup

Name	Protocol	Hostname	Device	Enabled	Edit
Jenkins eth1	PING	172.16.0.1	eth1	✓	Edit
Jenkins eth0	PING	10.0.31.142	eth0	✓	Edit
Slave1 eth1	PING	172.16.0.2	eth1	✓	Edit
Slave1 eth0	PING	10.0.31.143	eth0	✓	Edit
Slave2 eth1	PING	172.16.0.3	eth1	✓	Edit
Slave2 eth0	PING	10.0.31.144	eth0	✓	Edit
VB288 eth1	PING	172.16.0.4	eth1	✓	Edit
VB288 eth0	PING	10.0.30.144	eth0	✓	Edit
VM host	PING	10.0.31.140	Default	✓	Edit
CIMC host	PING	10.0.31.141	Default		Edit

Each of the 10 FSM services may be defined or edited by clicking on the corresponding **Edit** button in the left hand table.

The probe supports ping and generic HTTP GET protocols for online status verification of arbitrary targets. After completing configuration of the selected service **Apply changes** must be pressed to save and apply the changes.

Edit Service

☒ Enable
 Name
 Protocol
 Device
 Probe cycle seconds
 Fails threshold successive failures
 Hostname
 Comment
Protocol specific parameters
 ICMP echo request: If reachable, the target service will respond

Edit Service

☒ Enable
 Name
 Protocol
 Device
 Probe cycle seconds
 Fails threshold successive failures
 Hostname
 Comment
Protocol specific parameters
 HTTP: Validate presence and content of HTTP server-based services.
 Http://10.0.30.10
 Expect word reply
 Last reply [Show content](#)
 Port
 Support cookies ☐

These fields are common for both the ping and the HTTP GET protocols:

Enable: Enable by checking toggle button.

Name:	User-defined name of service
Protocol:	Select between ping and HTTP.
Device:	Ethernet interface to use for this service.
Probe cycle:	Time interval in seconds to wait between each activation. A value below 30 is not recommended.
Fails threshold:	The number of consecutive errors needed to raise an alarm
Hostname:	The IP address for the target. Host names are supported for HTTP.
Comment:	Optional comment field – maximum 100 characters

These fields are specific for the HTTP GET protocol:

http://<IP address>:	The request to send to the target, for example index.html
Expect word reply:	A case sensitive word or sentence to be expected in the reply. To find a suitable string, use the Show content link. Leave this field empty to let the probe ignore the contents of the reply.
Last reply:	The last reply Show content link points to the last HTML file that was generated by this service.
Port:	The port used by the target server, often 80 for HTTP requests
Support cookies:	If enabled, the HTTP GET request will remember cookies returned by the target and provide them in subsequent requests.

7.8.1.3 Ethernet — FSM — Syslog

Monitor Setup Syslog					
Facility	Severity	Timestamp	Hostname	Agent	Message
system	info	2016-01-29 15:52:55	localhost	NetworkManager[1985]	<info> domain name 'localdomain'
system	info	2016-01-29 15:52:55	localhost	NetworkManager[1985]	<info> nameserver '172.16.217.2'
system	info	2016-01-29 15:52:55	localhost	NetworkManager[1985]	<info> gateway 172.16.217.2
system	info	2016-01-29 15:52:55	localhost	NetworkManager[1985]	<info> prefix 24 (255.255.255.0)
system	info	2016-01-29 15:52:55	localhost	NetworkManager[1985]	<info> address 172.16.217.154
system	info	2016-01-29 15:52:55	localhost	NetworkManager[1985]	<info> (eth0): DHCPv4 state changed renew -> renew
system	info	2016-01-29 15:52:55	localhost	dhclient[5699]	bound to 172.16.217.154 -- renewal in 712 seconds.
system	info	2016-01-29 15:52:55	localhost	dhclient[5699]	DHCPACK from 172.16.217.254 (xid=0x6e8707a5)
system	info	2016-01-29 15:52:55	localhost	dhclient[5699]	DHCPREQUEST on eth0 to 172.16.217.254 port 67 (xid=0x6e8...
clock	info	2016-01-29 15:50:01	localhost	CROND[60342]	(root) CMD (/usr/lib64/sa/sa1 1 1)
system	info	2016-01-29 15:40:08	localhost	NetworkManager[1985]	<info> domain name 'localdomain'
system	info	2016-01-29 15:40:08	localhost	NetworkManager[1985]	<info> nameserver '172.16.217.2'
system	info	2016-01-29 15:40:08	localhost	NetworkManager[1985]	<info> gateway 172.16.217.2
system	info	2016-01-29 15:40:08	localhost	NetworkManager[1985]	<info> prefix 24 (255.255.255.0)

[Newest](#)
[Much newer](#)
[Newer](#)
[Older](#)
[Much older](#)
[Oldest](#)
[Export...](#)
 Total messages: 1920 Position: 0% Displayed: 100

The NOMAD has a built-in syslog server which captures all incoming messages (UDP, port 514). Messages are displayed in a pageable grid with the following columns: Facility, Severity, Timestamp, Hostname, Agent and Message. Currently displayed page can be exported as an XML-document.

Since the syslog server typically stores about 100 pages of messages there is a group of buttons for a fast navigation:

Newest	Move to the first page
Much newer	Move 10 pages backwards
Newer	Move 1 page backwards
Older	Move 1 page forwards
Much older	Move 10 pages forwards
Oldest	Move to the last page

Syslog server has a limited capacity which is usually enough to store the latest 10,000 messages depending on the size of the syslog messages. When a new message arrives and no storage space remains the oldest messages are removed.

Note that the syslog server is very sensible to time settings, so it is strongly recommended to have a time synchronization enabled.

7.8.2 Ethernet — IGMP

FSM

IGMP

PCAP

i	No	Time	Source	Destination	Code	Message	Group
1	4833	Feb 01 09:22:32.872	10.0.31.145 (local)	239.255.0.152	0	IGMPV2 host membership report (0x16)	239.255.0.152
1	4834	Feb 01 09:23:24.646	10.0.30.1	224.0.0.1	100	IGMP host membership query (0x11)	
1	4835	Feb 01 09:23:25.844	10.0.31.145 (local)	239.255.0.151	0	IGMPV2 host membership report (0x16)	239.255.0.151
1	4836	Feb 01 09:23:29.576	10.0.31.145 (local)	239.255.0.152	0	IGMPV2 host membership report (0x16)	239.255.0.152
1	4837	Feb 01 09:23:31.192	10.0.31.145 (local)	239.255.0.150	0	IGMPV2 host membership report (0x16)	239.255.0.150
1	4838	Feb 01 09:24:24.689	10.0.30.1	224.0.0.1	100	IGMP host membership query (0x11)	
1	4839	Feb 01 09:24:27.808	10.0.31.145 (local)	239.255.0.152	0	IGMPV2 host membership report (0x16)	239.255.0.152
1	4840	Feb 01 09:24:28.016	10.0.31.145 (local)	239.255.0.151	0	IGMPV2 host membership report (0x16)	239.255.0.151
1	4841	Feb 01 09:24:32.360	10.0.31.145 (local)	239.255.0.150	0	IGMPV2 host membership report (0x16)	239.255.0.150
1	4842	Feb 01 09:25:24.752	10.0.30.1	224.0.0.1	100	IGMP host membership query (0x11)	
1	4843	Feb 01 09:25:27.400	10.0.31.145 (local)	239.255.0.152	0	IGMPV2 host membership report (0x16)	239.255.0.152
1	4844	Feb 01 09:25:30.536	10.0.31.145 (local)	239.255.0.150	0	IGMPV2 host membership report (0x16)	239.255.0.150
1	4845	Feb 01 09:25:31.592	10.0.31.145 (local)	239.255.0.151	0	IGMPV2 host membership report (0x16)	239.255.0.151
1	4846	Feb 01 09:26:24.807	10.0.30.1	224.0.0.1	100	IGMP host membership query (0x11)	
1	4847	Feb 01 09:26:29.608	10.0.31.145 (local)	239.255.0.152	0	IGMPV2 host membership report (0x16)	239.255.0.152
1	4848	Feb 01 09:26:30.120	10.0.31.145 (local)	239.255.0.150	0	IGMPV2 host membership report (0x16)	239.255.0.150
1	4849	Feb 01 09:26:31.304	10.0.31.145 (local)	239.255.0.151	0	IGMPV2 host membership report (0x16)	239.255.0.151

Live view

View list offline

Clear list

Export...

The IGMP view shows all IGMP (version 2 or 3) messages detected by the probe. This includes IGMP query messages sent by routers, IGMP reply messages sent by the probe itself and IGMP reply messages sent by other probes and devices on the same subnet.

The live IGMP page can be paused by clicking the **View list offline** button. The IGMP messages can be exported as XML by clicking the **Export...** button, and the list is cleared by clicking the **Clear list** button.

①: Click the blue information icon to open the IGMP record pop-up view

No:	The message number since the list was cleared
Time:	The probe time when the message occurred
Millisec:	The milliseconds timestamp
Source:	The source IP address
Destination:	The destination IP address
Code:	The timeout code
Message:	The interpreted IGMP message
Group:	The IGMP group address

7.8.3 Ethernet — PCAP

FSMIGMP**PCAP**

Filter settings: (packet captured if it matches any enabled filter)

Capture only headers (first 64 bytes) ☐
Capture non TCP/UDP traffic ☐
Capture TCP traffic ☒
Capture UDP traffic ☒
Capture if IP DST and IP SRC ☐
Capture if IP DST and IP SRC ☐
Capture if IP DST and IP SRC ☐
Capture if IP DST and IP SRC ☐
Capture if IP DST and IP SRC ☐
Capture if IP DST and IP SRC ☐

Select input

Status:

Status In Progress
Size 78M
Packets 32750
Time (seconds) 4
Dropped packets 0
Disk free 834M
Capture [rec.pcap](#)

The NOMAD can make PCAP recordings on the data interface of up to approximately 1 Gbyte (depending on the amount of free disk) based on simple user configurable filters. If the FLASH option is available, the recorded PCAP files can be moved to a 32 Gbyte flash card using the **Data — Storage** view. The PCAP format supports microsecond timing accuracy.

Incoming traffic is recorded if it matches one or more of the enabled filters while outgoing traffic is always recorded. So for instance, to record all OTT traffic on the data interface it is sufficient to enable the “Capture all TCP traffic” filter (since OTT uses the HTTP protocol which is always TCP).

In order to be able to create a PCAP recording, the NOMAD must temporarily enable extended analysis of all incoming data. Under some circumstances, this might cause packet drops due to the system becoming overloaded. If this happens, please try to reduce the load by temporarily unjoining multicasts and then try again.

Filter settings

Capture only header (first 64 bytes):	If enabled, only 64 first bytes of Ethernet frame is captured. This allows higher bitrate traffic to be recorded and over longer time
Capture all non TCP/UDP traffic:	Check to record non-IPv4 traffic such as ARP, PIM or IPv6
Capture all TCP traffic:	Check to capture all IPv4 TCP traffic
Capture all UDP traffic:	Check to capture all IPv4 UDP traffic
IP DST and IP SRC filters:	Check to activate test. Will capture stream if IP destination address matches. If SRC is specified it has to match too
Select input:	Chooses the network interface to capture traffic on
<i>Status</i>	
Status:	Show the current recording status
Size:	Size of current recording
Packets:	Number of packets in the recording
Time (seconds):	Duration of the current recording
Dropped packets:	Number of dropped packets due, usually caused by running temporarily out of buffer due to too high traffic. To allow higher bitrate recordings Capture only headers may be enabled.
Disk free:	Remaining disk size
Capture:	Link to download the recorded capture. May be invalid if recording is still in progress.
Start recording:	Click to start a new recording. This will clear the current rec.pcap file.
Stop recording:	Click to stop the current recording.
Sort recorded frames on packet time:	At high bitrates, some Ethernet frames may be recorded out of order as a result of the multi-core architecture. Click to sort frames in recording according to time-stamp.

7.9 ETR 290

The ETR 290 tab and all sub-views will only be present in the user interface provided that the probe is licensed with the ETR 290 option. A basic ETR 290 license is included as standard for the NOMAD.

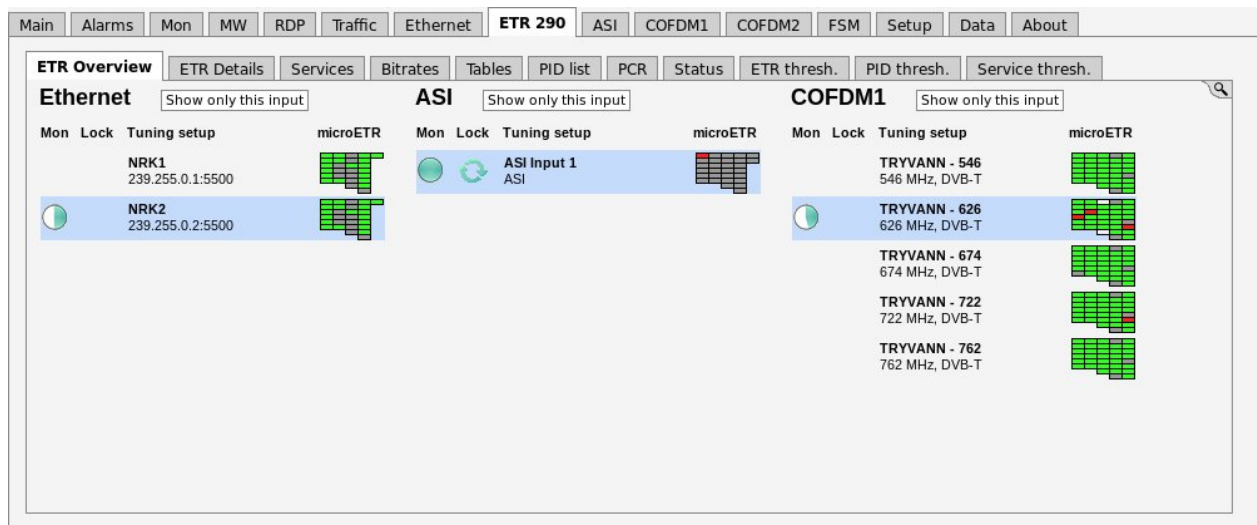
The ETR 290 views show information as reported by the ETSI TR 101 290 monitoring engines.

If ETR 290 analysis has been configured for multiple Ethernet streams to be monitored by a particular Ethernet ETR engine (refer to **Multicasts — Streams — Edit**), they will be analyzed in a round-robin fashion by the engine. A maximum of 50 Ethernet streams may be analyzed in total.

If demodulated streams from a demodulator interface are present, these will also be analyzed in succession. A basic ETR 290 license includes one ETR analysis engine for each enabled input: Ethernet, ASI and demodulators. Additional ETR 290 analysis engines for Ethernet are available, making it possible to reduce the analysis round-trip time or allowing simultaneous full-time ETR analysis of several multicasts. The ETR 290 analysis engines operate in parallel. Up to 50 ETR engines are currently supported in parallel on the NOMAD probes.

It is possible to hide disabled inputs from being displayed in the various **ETR 290** sub-views. This setting is found in the **Setup — ETR** view.

7.9.1 ETR 290 — Overview



The **ETR 290 — Overview** view will show ETR 290 status for ETR 290 monitored streams. ETR 290 monitoring may be enabled for Ethernet streams in the **Multicasts — Streams — Edit** view. The ASI input is always ETR 290 monitored unless the input is disabled, and streams received over RF are also ETR 290 monitored.

The streams currently being analyzed are highlighted and a circular progress icon shows the monitoring progress.

The analysis time for each stream is set as part of the **ETR thresholds** parameters list in the **ETR 290 — ETR thr. — Edit** view.

The result of the different ETR 290 tests are shown as table entries in a condensed view called MicroETR, a scaled down version of the regular ETR display, one icon representing one stream. Green color indicates status OK whereas red color indicates an active alarm for that particular test. A white field shows that a check has not yet been performed, usually due to lack of measurement

data, and grey indicates that a check is disabled. Tool-tip functionality allows the user to view the name of an individual check in the MicroETR display. Let your cursor hover over the field for a moment to view the tool-tip.

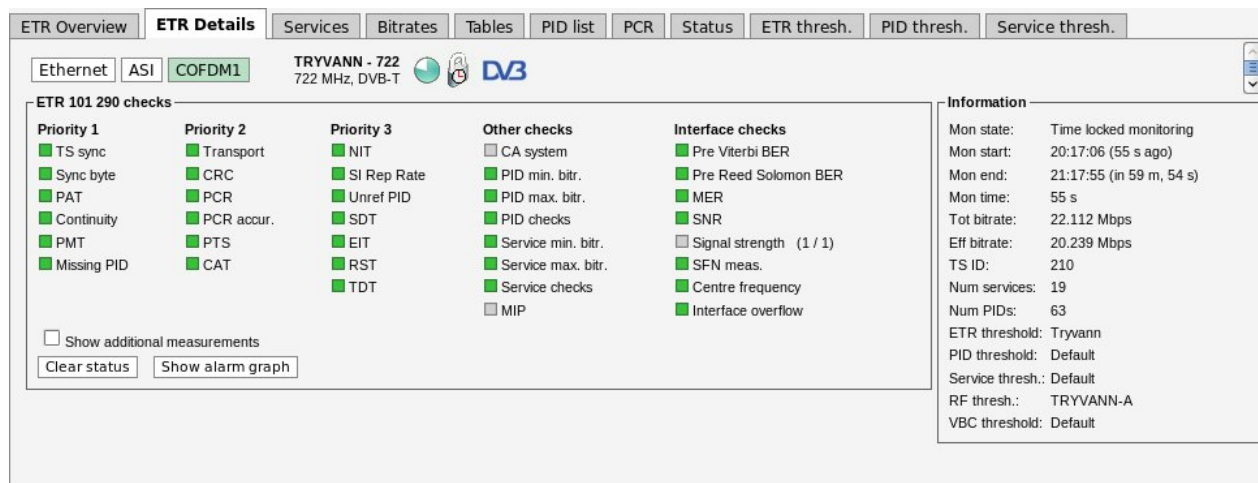
When clicking one of the MicroETR icons the detailed ETR 290 status for that stream is displayed in the **ETR 290 — ETR Details** view. By entering this view through the MicroETR, the view will remain static irrespective of the round-robin looping, thus making it easy to examine one stream in detail without interruptions. The round-robin looping and associated alarm handling will continue in the background. Click the magnifying glass icon to open a search field, making it possible to filter the list of monitored streams.

Note that it is possible to deactivate individual ETR 290 alarms by defining appropriate **ETR thresholds**.

To examine one particular Ethernet or demodulator stream in more detail, lock the ETR 290 analysis to that stream by clicking the lock field at that stream. The round-robin operation of the ETR 290 engine will then be stopped and a lock icon will appear as an indication that the monitoring is locked to that stream. If a time limit has been set for the time lock (**Setup — ETR** view), a clock icon will be superimposed on the lock icon. To re-activate the round-robin cycling the lock icon should be clicked. Note that locking the ETR 290 processing to one stream will affect alarm handling and all ETR 290 views. Active alarms for streams that are not currently being analyzed will freeze (remain active) until the processing lock is deselected and ETR 290 analysis eventually shows that the error state is cleared.

The user can select one input to be displayed exclusively by clicking the corresponding **Show only this input** button. This does not affect ETR 290 processing or alarming. Click **Show all inputs** to again display information about all inputs.

7.9.2 ETR 290 — ETR Details



The **ETR Details** view shows the ETR 290 status for the current stream of the user-selected input. The name of the current stream is displayed in addition to the two round-robin indicator icons when

relevant: the time cycle icon and the lock icon. By clicking the lock icon the round-robin tuning process is stopped (locked to the current frequency) or resumed. A DVB, ATSC or ISDB icon indicates the analysis mode. The analysis mode is defined as part of the ETR threshold template.

The information displayed here is the same as in the **ETR** tab of the **Streams details** pop-up from the **Streams** view.

The **ETR threshold**, **PID threshold** and **Service threshold** can be edited from this view by clicking the blue gear. This makes it possible to adjust the threshold settings while at the same time viewing the detailed measurement results. When the gear is clicked, three new options become available:

- **Drop-down list** — select another threshold from the list in **ETR thresholds**
- **Edit** — a pencil icon that opens the editor for the selected threshold
- **Duplicate** — a “+” icon that creates a copy of the threshold, which can be edited

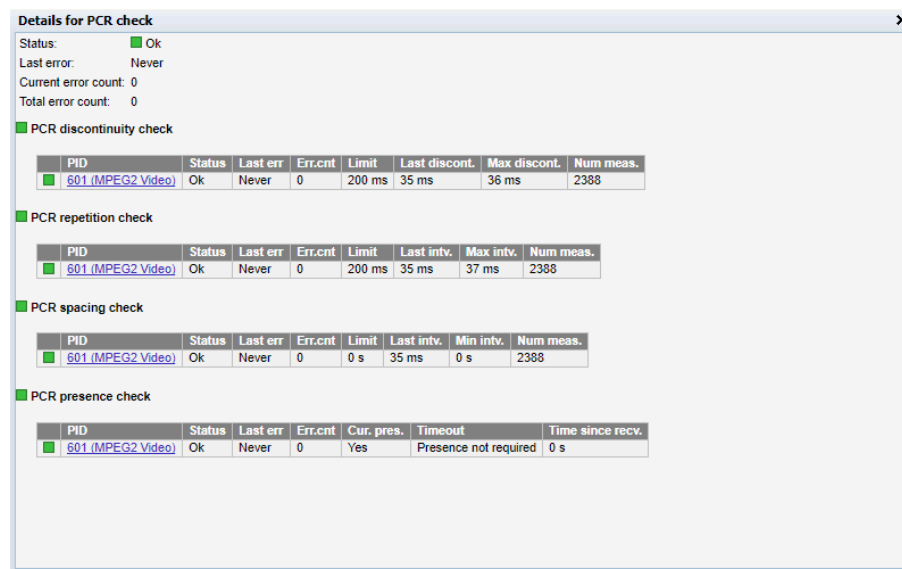
All thresholds can be edited, except for built-in defaults:

ETR thresholds: *ETSI TR 101 290, ATSC Default, Optimised, IP-SPTS, CMTS downlink, Analog carrier and Default*

PID and Service thresholds: *Default*

To modify a default threshold, use the + icon. The new duplicate is given a default name that appends a numeric suffix to the original name. The name can then be changed, as well as the threshold parameters.

When clicking one of the ETR 290 parameters, details about the current status can be viewed for that item.



Details for PCR check							
Status:	Ok						
Last error:	Never						
Current error count:	0						
Total error count:	0						
PCR discontinuity check							
PID	Status	Last err	Err.cnt	Limit	Last discont.	Max discont.	Num meas.
601 (MPEG2 Video)	Ok	Never	0	200 ms	35 ms	36 ms	2388
PCR repetition check							
PID	Status	Last err	Err.cnt	Limit	Last intv.	Max intv.	Num meas.
601 (MPEG2 Video)	Ok	Never	0	200 ms	35 ms	37 ms	2388
PCR spacing check							
PID	Status	Last err	Err.cnt	Limit	Last intv.	Min intv.	Num meas.
601 (MPEG2 Video)	Ok	Never	0	0 s	35 ms	0 s	2388
PCR presence check							
PID	Status	Last err	Err.cnt	Cur. pres.	Timeout	Time since recv.	
601 (MPEG2 Video)	Ok	Never	0	Yes	Presence not required	0 s	

Enable the **Show additional measurements** checkbox to view additional measurements that are performed but which are ignored when determining the alarm status. These will appear with a ‘half-bulb’ icon indicating that the check is disabled whilst also showing the status of this element. As an example this can be used to view the BAT section repetition interval and section gap, or

to view a list of PIDs with CC errors including the PIDs for which this check has been manually disabled.

Click a PID in a PID list to view PID details. Similarly you can click on a service to view service details.

If the **Clear status** button is clicked the error counts are reset and the ETR 290 analysis restarts.

The details of the individual ETR 290 measurements are described in a separate document called **Sencore VideoBRIDGE ETR 290 Details — Extended ETSI TR 101 290 Testing**.

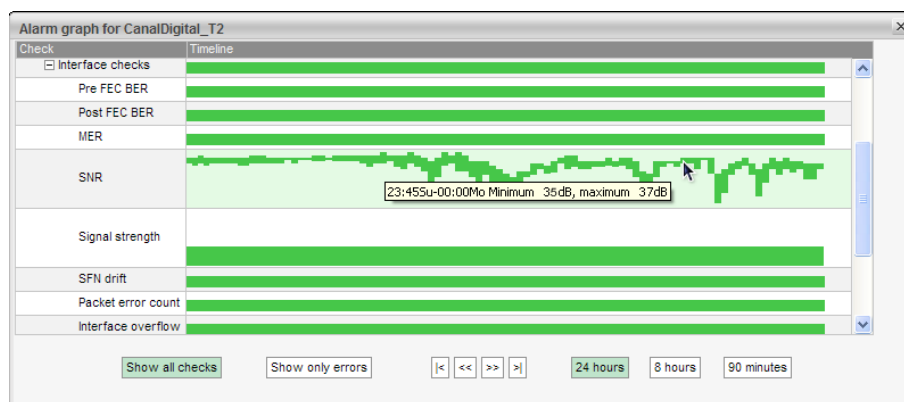
Clicking the **Show alarm graph** button opens the Alarm graph pop-up view.



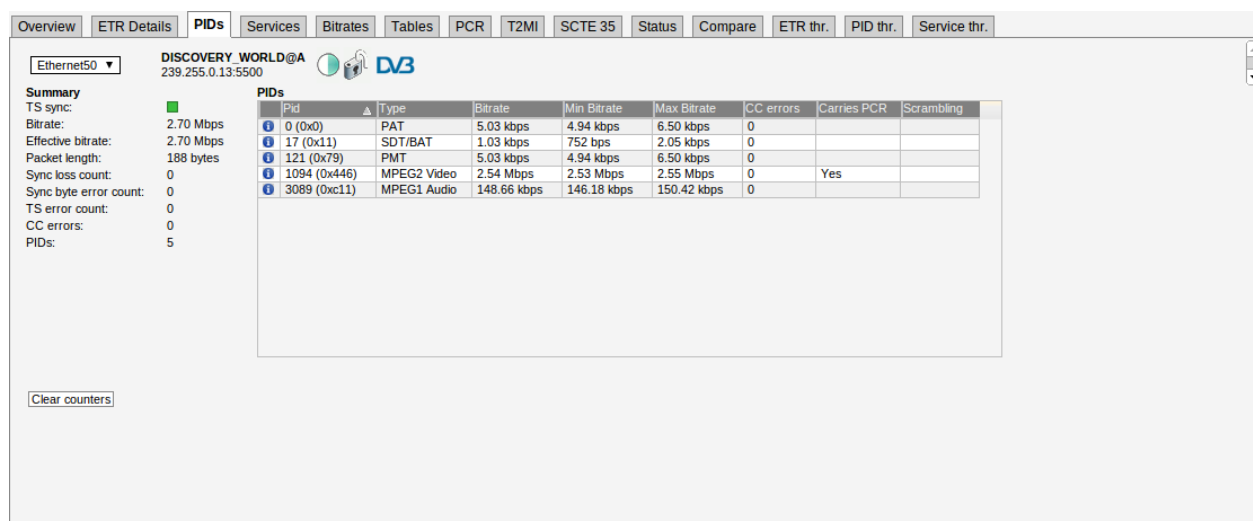
The alarm graph shows the ETR alarm status over time in the form of a status timeline. The timeline bar shows the stream status for a time span of 90 minutes, 8 hours or 24 hours as selected by clicking the time selection buttons below the timelines. The stream bar reveals any alarm that has been present during the selected time period. The bar color is either green for OK or colored in accordance with the alarm severity if an alarm has occurred. Refer to **section 7.2.2** for a description of the alarm color representation. Periods of time when the stream has not been ETR monitored due to round-robin operation are represented by grey. By using the arrow buttons it is possible to view alarm occurrences up to 24 hours back in time even if the highest graph time resolution is selected.

If alarms have occurred during the selected time period, the status timeline will not be all green. In this case it is possible to expand the timeline tree by clicking the plus sign at the timeline. Individual timelines for different ETR priorities and for different alarms may be viewed as the tree is expanded into several levels. Tool-tips reveals details about an error incident such as which PIDs have had CC errors.

By default the 'Show only errors' mode is selected, and only timelines that are not all green will be displayed. By clicking the **Show all checks** button it is possible to access demodulator measurement graphs, if relevant. Note that graphs representing MER, SNR and Signal strength are always present, irrespective of probe hardware configuration. These graphs show the maximum and minimum values of the parameter during the period.



7.9.3 ETR 290 — PIDs

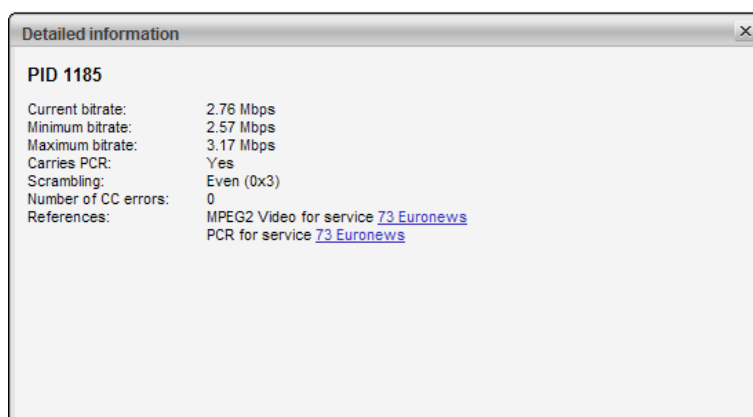


This view lists the PIDs of the currently active stream of the selected input. The PID list can be sorted by clicking a table column header.

The name of the current stream is displayed in addition to the two round-robin indicator icons when relevant: the time cycle icon and the lock icon. By clicking the lock icon the round-robin cycling is stopped or resumed. A DVB, ATSC or ISDB icon indicates the analysis mode. The analysis mode is defined as part of the ETR thresholds.

By clicking the button **Clear counters** the minimum and maximum bitrates and the CC error counters will be reset. Note that this cannot be undone.

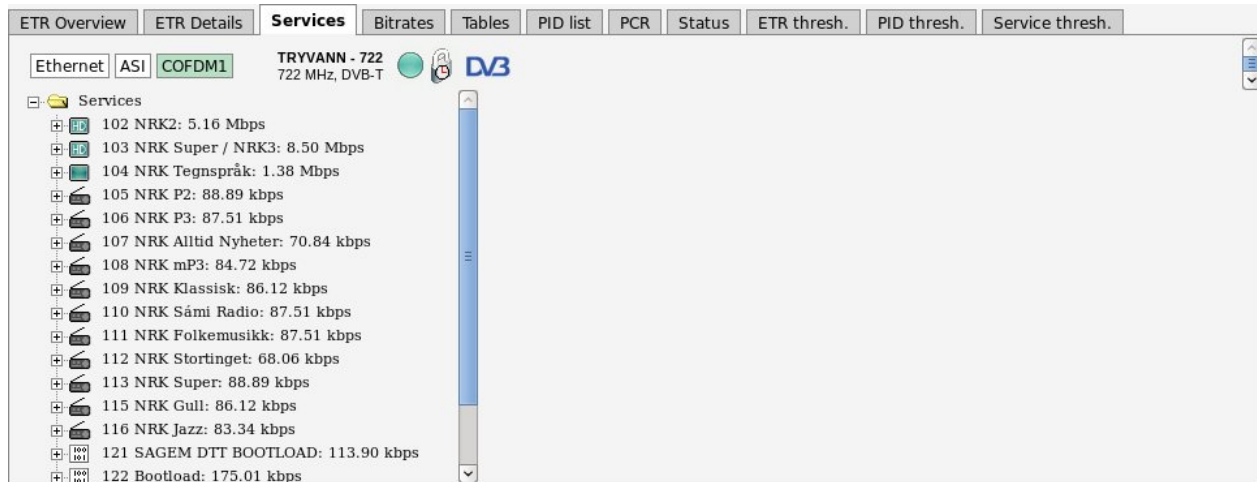
When clicking the blue information icon associated with a PID details concerning that PID will be displayed. All services referring to the PID are listed, and scrambling information is shown.



The following PID details are displayed:

<i>PID Details:</i>	
PID:	The PID for which the following parameters apply
Current bitrate:	The current bitrate measurement for this PID. The bitrate is averaged over 1 second.
Minimum bitrate:	The minimum bitrate measurement for this PID since the start of the monitoring period. (I.e. when the probe tuned to the frequency or when the monitoring of this frequency was restarted by the user clicking on Clear status in the ETR 290 — ETR Details view.)
Maximum bitrate:	The maximum bitrate measurement for this PID since the start of the monitoring period.
Carries PCR:	If the PID carries Program Clock Reference information, this field will be set to Yes. If PCR analysis is enabled in the ETR threshold template a link will be shown to bring up the PCR histogram data for this PID.
Scrambling:	If the PID is scrambled, this field will show if it is scrambled with Odd or Even control word.
Number of CC errors:	The number of CC errors for the specified PID. For the Ethernet interface the number of CC errors is measured from when the probe started to monitor the multicast or when the user clicked Clear counters in the Multicasts — Parameters view.
References:	All the references for this PID in the PSI/SI/PSIP tables. This will show the reference type and the service that refers the PID (if applicable). The service can be clicked to show the detailed service information.

7.9.4 ETR 290 — Services

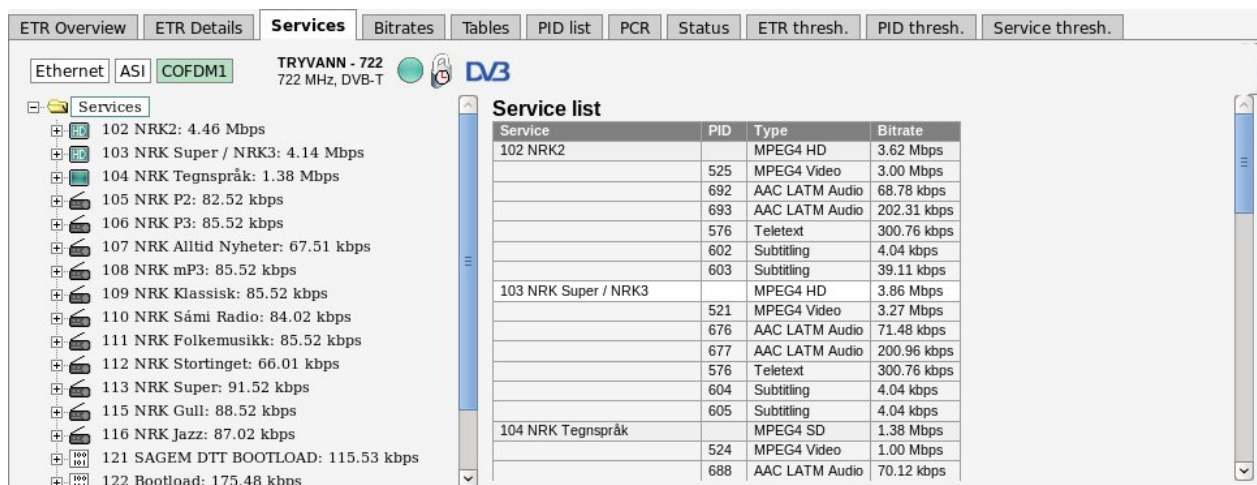


The **ETR290 — Services** view lists the services and service components of the current stream of the selected input.

The name of the current stream is displayed in addition to the two round-robin indicator icons when relevant: the time cycle icon and the lock icon. By clicking the lock icon, the round-robin cycling is stopped or resumed. A DVB, ATSC or ISDB icon indicates the analysis mode. The analysis mode is defined as part of the ETR thresholds.

When tree nodes are selected, detailed information will be displayed on the right hand side of the view.

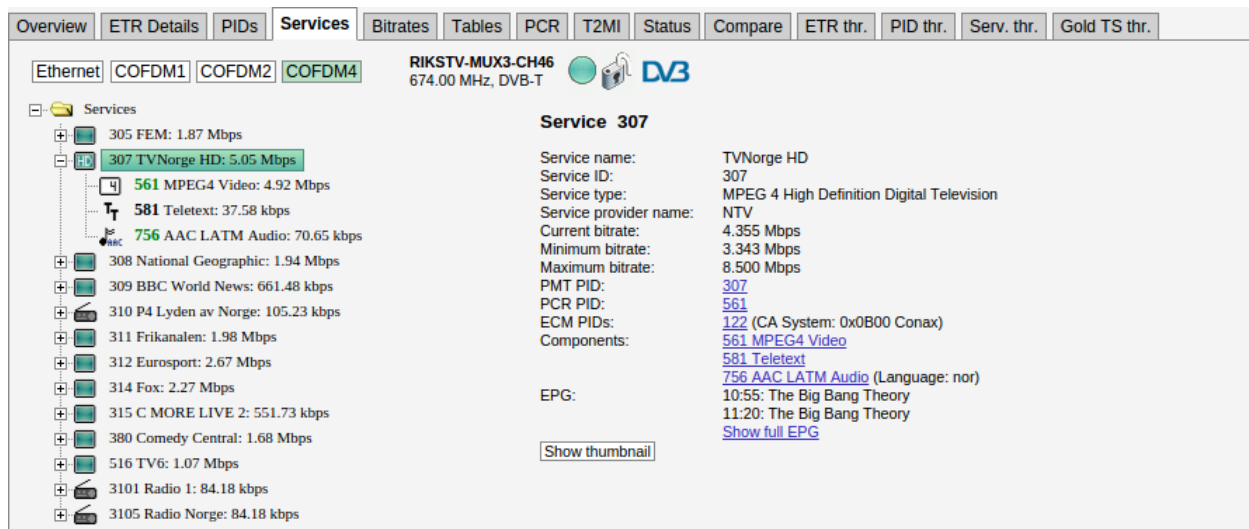
If the service tree 'Services' top node is clicked, a summary list of stream services and PIDs is displayed. Each service's service ID and each component's PID value and bitrate are displayed together with individual PID and service bitrates.



Services top node

Service:	Service name and service ID
PID:	Service component PID value
Type:	Service and component encoding format
Bitrate:	Individual current bitrate of services and components

When clicking a service, details about the service and service components will be displayed.



If a PID is scrambled this is indicated in the service tree by the color green or blue (for even and odd scrambling respectively). A missing PID is indicated by the color red. Click on the PID to show more details.

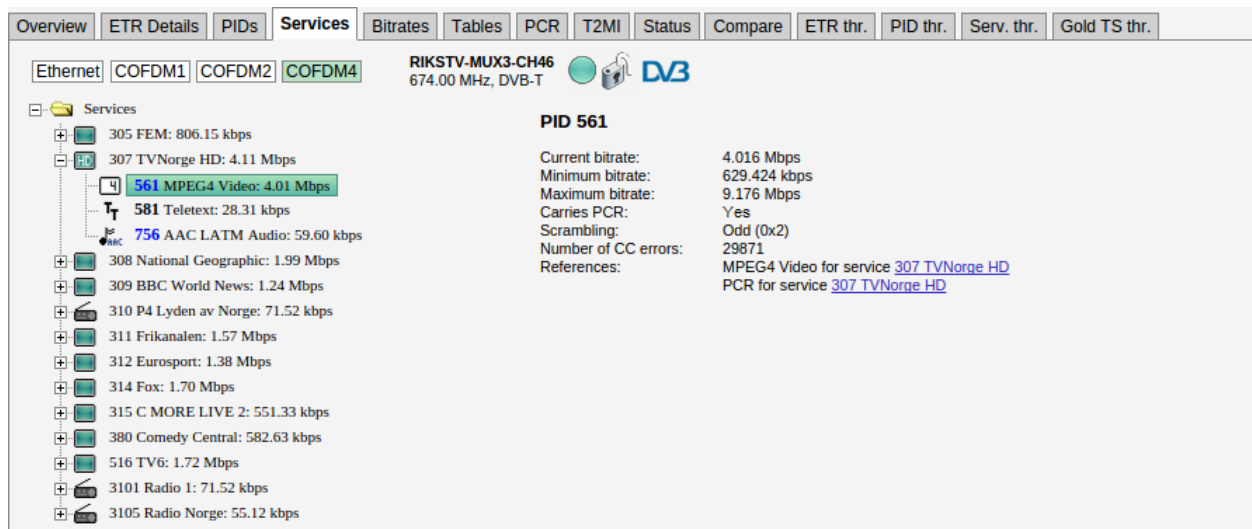
Click the Show thumbnail button to view a thumbnail of the selected service. Thumbnails can only be shown for services that are not scrambled. The pop-up window is identical to the one displayed in the **Thumbnails** view. For more details, see chapter 6.4.1.

Service node

Service name:	Name of the highlighted service, as signaled in SDT or VCT
Service ID:	Service ID number
Service type:	Service type as signaled in SDT
Service provider name:	The name of the service provider as signaled in SDT. Not applicable for ATSC streams.
Current bitrate:	The current bitrate measurement for this service. The bitrate is averaged over 1 second.
Minimum bitrate:	The minimum bitrate measurement for this service since the start of the monitoring period. (I.e. when the probe tuned to the frequency or when the monitoring of this frequency was restarted by the user clicking Clear status in the ETR 290 — ETR Details view.)

Maximum bitrate:	The maximum bitrate measurement for this service since the start of the monitoring period.
PMT PID:	The service's PMT PID
PCR PID:	The service's PCR PID
ECM PIDs:	The service's ECM PID(s) and name of CA system(s). This information will only be displayed if ECM PIDs are signaled in the PMT table, usually only done when one or more service components are scrambled.
Components:	A list of the component PIDs and reference types. For PIDs which have a language descriptor (typically audio PIDs) the language code is also shown.
EPG:	If DVB EIT is present in the stream, the EIT check is enabled in the ETR template used by the stream and EIT table IDs are configured in the Setup — ETR view, EIT present/following is displayed. For ATSC streams, EIT present/following is displayed if there are EITs present in the stream. If EIT schedule is present in the stream, a blue 'Show full EPG' link is displayed. By clicking the link it is possible to view the EIT schedule information.
Show thumbnail	Opens the Thumbnail view for this service. Thumbnails are only decoded automatically if the Extract thumbnails option has been enabled in the associated tuning or multicast setup. Please note initial extraction of thumbnails can take around one minute when decoding the thumbnail manually by opening this pop-up. The same pop-up details are displayed as when opened from the Content — Thumbnails view.

When clicking a service component, associated key parameters and references will be displayed.



Overview | **ETR Details** | **PIDs** | **Services** | Bitrates | Tables | PCR | T2MI | Status | Compare | ETR thr. | PID thr. | Serv. thr. | Gold TS thr.

RIKSTV-MUX3-CH46
674.00 MHz, DVB-T

Services

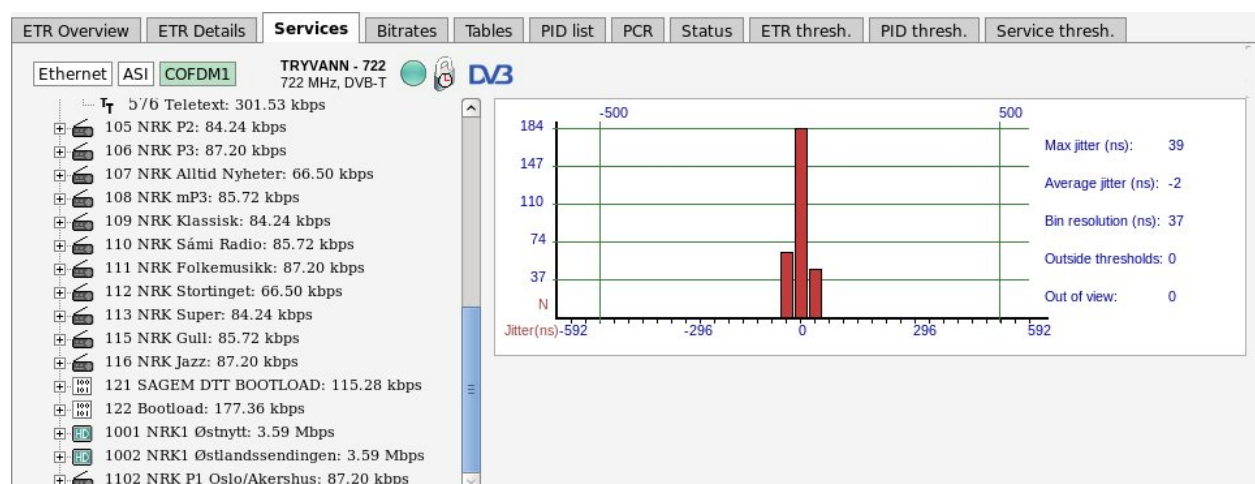
- 305 FEM: 806.15 kbps
- 307 TVNorge HD: 4.11 Mbps
- 561 MPEG4 Video: 4.01 Mbps**
- 581 Teletext: 28.31 kbps
- 756 AAC LATM Audio: 59.60 kbps
- 308 National Geographic: 1.99 Mbps
- 309 BBC World News: 1.24 Mbps
- 310 P4 Lyden av Norge: 71.52 kbps
- 311 Frikanalen: 1.57 Mbps
- 312 Eurosport: 1.38 Mbps
- 314 Fox: 1.70 Mbps
- 315 C. MORE LIVE 2: 551.33 kbps
- 380 Comedy Central: 582.63 kbps
- 516 TV6: 1.72 Mbps
- 3101 Radio 1: 71.52 kbps
- 3105 Radio Norge: 55.12 kbps

PID 561

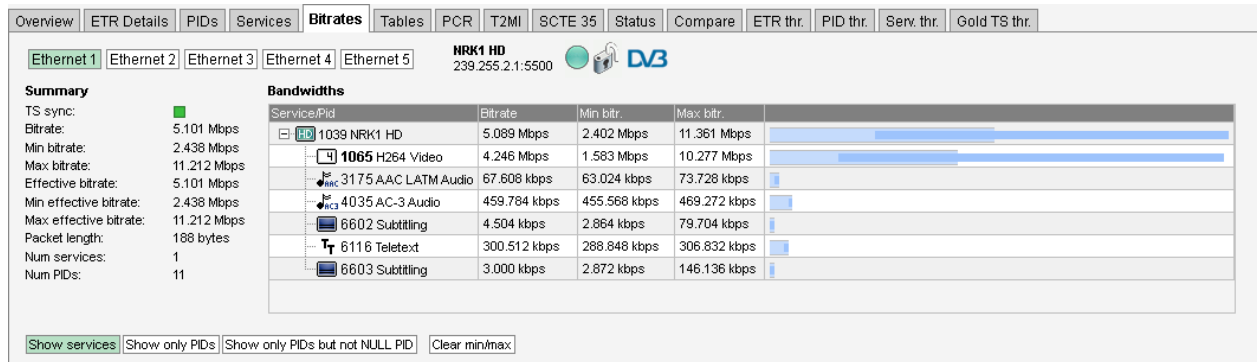
Current bitrate: 4.016 Mbps
 Minimum bitrate: 629.424 kbps
 Maximum bitrate: 9.176 Mbps
 Carries PCR: Yes
 Scrambling: Odd (0x2)
 Number of CC errors: 29871
 References: MPEG4 Video for service [307 TVNorge HD](#)
 PCR for service [307 TVNorge HD](#)

For PIDs carrying PCR it is possible to view a PCR jitter histogram by clicking the blue ‘show histogram’ link. If one of the blue service links is clicked, service details are shown.

<i>Service component node</i>	
Current bitrate:	The current bitrate measurement for this PID. The bitrate is averaged over 1 second.
Minimum bitrate:	The minimum bitrate measurement for this PID since the start of the monitoring period. (I.e. when the probe tuned to the frequency or when the monitoring of this frequency was restarted by the user clicking Clear status in the ETR 290 — ETR Details view.)
Maximum bitrate:	The maximum bitrate measurement for this PID since the start of the monitoring period.
Carries PCR:	An indication of whether the PID carries PCR or not. The value may be ‘Yes’ or ‘No’. If PCR is carried by the PID, a blue ‘show histogram’ link is displayed. By clicking this link it is possible to view the PCR jitter histogram.
Scrambling:	An indication of whether the PID is scrambled or not. If the PID is not scrambled, the value will be ‘No’. If the PID is scrambled, information about the current control word is displayed: ‘Even 0x3’ or ‘Odd 0x2’.
Number of CC errors:	The number of CC errors detected during the monitoring period
References:	A list of PSI/SI references to the component PID. When one of the blue service links is clicked, detailed service information is displayed.



7.9.5 ETR 290 — Bitrates



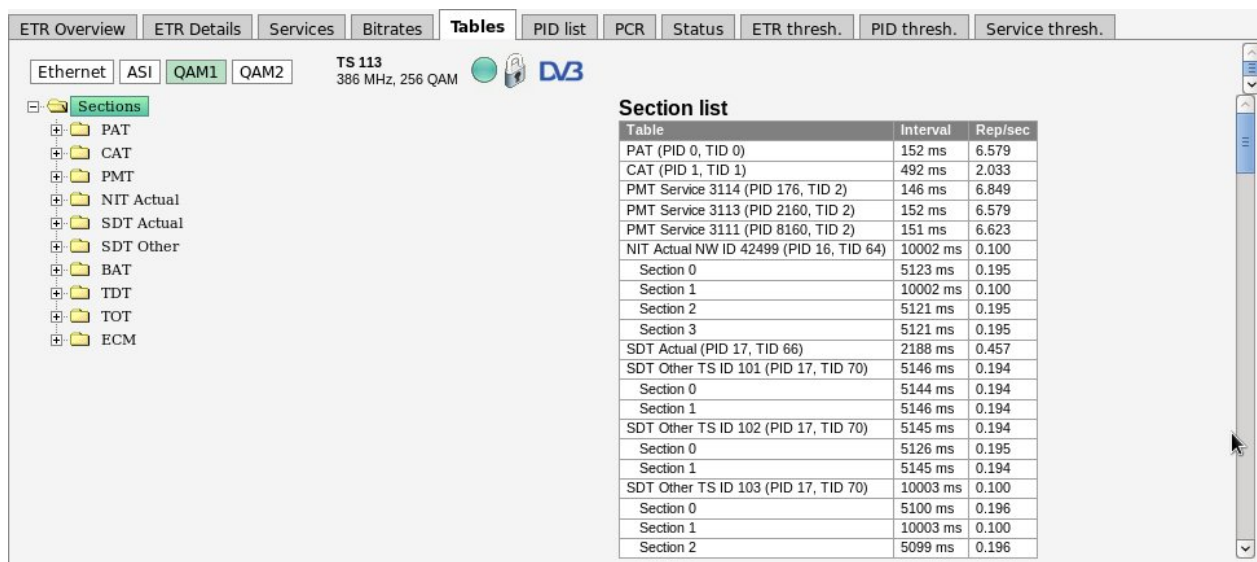
This view shows a graphical representation of service and PID bitrates. The current bitrate is shown as the length of the light blue bar whereas the dark blue bar represents bitrate variation, spanning from minimum to maximum measured bitrate.

The name of the current stream is displayed in addition to the two round-robin indicator icons when relevant: the time cycle icon and the lock icon. By clicking the lock icon the round-robin tuning process is stopped (locked to the current frequency) or resumed. A DVB, ATSC or ISDB icon indicates the analysis mode. The analysis mode is defined as part of the ETR thresholds.

The user may select to view a list of services and component PIDs, to view PIDs only or to view PIDs without the null PID. This is selected by clicking the **Show Services**, **Show only PIDs** or **Show only PIDs but not NULL PID** button respectively.

Click **Clear min/max** to reset the minimum and maximum bitrate measurements.

7.9.6 ETR 290 — Tables

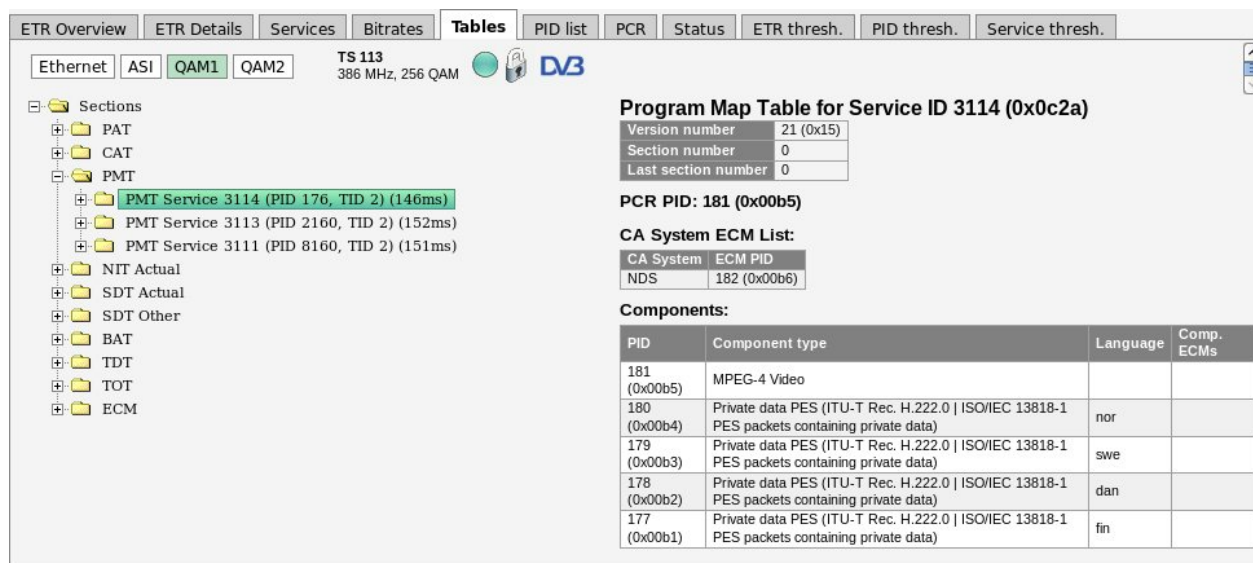


This view lists the PSI and SI or ATSC tables and table contents of the currently active stream of the selected input.

The name of the current stream is displayed in addition to the two round-robin indicator icons when relevant: the time cycle icon and the lock icon. By clicking the lock icon the round-robin cycling is stopped or resumed. A DVB, ATSC or ISDB icon indicates the analysis mode. The analysis mode is defined as part of the ETR thresholds.

Clicking the ‘Sections’ node displays detected tables and associated repetition rates.

Clicking a table enables viewing the table contents in a readily readable format.



Program Map Table for Service ID 3114 (0x0c2a)

Version number	21 (0x15)
Section number	0
Last section number	0

PCR PID: 181 (0x00b5)

CA System ECM List:

CA System	ECM PID
NDS	182 (0x00b6)

Components:

PID	Component type	Language	Comp. ECMs
181 (0x00b5)	MPEG-4 Video		
180 (0x00b4)	Private data PES (ITU-T Rec. H.222.0 ISO/IEC 13818-1 PES packets containing private data)	nor	
179 (0x00b3)	Private data PES (ITU-T Rec. H.222.0 ISO/IEC 13818-1 PES packets containing private data)	swe	
178 (0x00b2)	Private data PES (ITU-T Rec. H.222.0 ISO/IEC 13818-1 PES packets containing private data)	dan	
177 (0x00b1)	Private data PES (ITU-T Rec. H.222.0 ISO/IEC 13818-1 PES packets containing private data)	fin	

By clicking the plus-icon at a table the table contents is displayed in detail.

Clicking one of the table entries will allow viewing the table contents as a hexadecimal dump for detailed inspection.

Overview	ETR Details	PIDs	Services	Bitrates	Tables	PCR	T2MI	Status	Compare	ETR thr.	PID thr.	Serv. thr.	Gold TS thr.
ASI1 ASI PLP: Auto DVB Sections PAT CAT PMT NIT Actual NIT Actual NW ID 1337 (PID 16, TID 64) (2007ms) table_id: 64 (0x40) section_syntax_indicator: 1 b reserved_future_use: 1 b reserved: 11 b section_length: 461 (0x1cd) network_id: 1337 (0x0539) reserved: 11 b version_number: 17 (0x11) current_next_indicator: 1 b section_number: 0 (0x00) last_section_number: 0 (0x00) reserved_future_use: 1111 b network_descriptors_length: 4 network_descriptors reserved_future_use: 1111 b transport_streams_data_length: 444 transport_streams CRC32: 0x17b73515 0000: 40 F1 CD 05 39 E3 00 00 F0 04 FE 02 03 00 F1 BC @...9..... 0010: 00 01 05 39 00 1A 7F 0D 04 00 00 7B 00 56 00 2A ...9.....{.V.* 0020: 01 39 91 70 00 41 09 04 10 19 1E BA 16 1C 39 16 .9.p.A.....9. 0030: 00 02 05 39 00 05 41 03 1C 37 16 00 03 05 39 00 ...9.A.7.....9. 0040: 05 41 03 1C 39 16 00 04 05 39 00 05 41 03 1C 7F .A.9.....A.. 0050: 01 00 05 05 39 00 05 41 03 10 07 19 00 06 05 39 ...9.A.....9 0060: 00 05 41 03 1B A1 19 00 07 05 39 00 05 41 03 1C .A.....9.A.. 0070: 7F 01 00 08 05 39 00 05 41 03 1C 7F 01 00 09 05 ...9.A..... 0080: 39 00 05 41 03 1C 39 16 00 0A 05 39 00 05 41 03 9 .A.9.....9.A. 0090: 1C 39 16 00 0C 05 39 00 05 41 03 00 41 01 00 0D .9.....A.A.. 00A0: 05 39 00 05 41 03 04 0F 19 00 0E 05 39 00 05 41 .9.A.....9.A 00B0: 03 04 10 19 00 0F 05 39 00 05 41 03 04 11 19 00 ...9.A..... 00C0: 10 05 39 00 05 41 03 1B A1 19 00 11 05 39 00 05 .9.A.....9.. 00D0: 41 03 18 99 19 00 12 05 39 00 05 41 03 18 EC 19 A.....9.A.. 00E0: 00 13 05 39 00 05 41 03 04 25 19 00 16 05 39 00 .9.A.%.9.. 00F0: 05 41 03 1C 43 19 00 1A 05 39 00 05 41 03 1C 4F .A.C.9.....0 0100: 19 00 37 05 39 00 14 7F 0D 04 00 00 00 00 D6 00 ..7.9..... 0110: 00 00 4D D1 E0 00 41 03 1C 39 16 00 38 05 39 00 ..M...A.9..8.9. 0120: 0E FA 04 00 02 01 4A 41 06 1C 39 16 1C 33 16 00 ...JA..9..3.. 0130: 39 05 39 00 0B FA 04 00 02 01 74 41 03 1C 37 16 9.9.....tA..7. 0140: 00 3A 05 39 00 0B FA 04 00 02 01 BA 41 03 1C 7F .:9.....A.. 0150: 01 00 38 05 39 00 0B FA 04 00 02 01 E4 41 03 1C .:9.....A.. 0160: 5E 16 00 3C 05 39 00 0B FA 04 00 02 02 2A 41 03 ^.<.9.....*A. 0170: 1C 39 16 00 3D 05 39 00 0B FA 04 00 02 02 54 41 .9...=.9.....TA 0180: 03 1C 48 01 00 3E 05 39 00 0B FA 04 00 02 02 7E .H...>.9.....~ 0190: 41 03 1C 7F 01 00 3F 05 39 00 0B FA 04 00 02 02 A.....?9..... 01A0: A8 41 03 03 84 01 00 40 05 39 00 0D 43 08 01 10 A.....e.9..C.. 01B0: 00 00 01 92 01 02 50 00 03 00 41 05 39 00 0D 43 P..A.9..C 01C0: 0B 01 10 00 00 01 92 01 02 50 00 03 17 B7 35 15 P.....5.													

The selected table entry is highlighted in the table dump. Note that values shown in the table list may not correspond directly to the highlighted hex dump byte(s), because some of the table entries do not add up to whole bytes.

By hovering the cursor over the items in the tree a tool-tip is displayed showing the start position of the data in the hexadecimal dump and the length of data. Press the save icon to download and save the raw table data on your computer.

A description of each PSI/SI table is beyond the scope of this manual, please refer to the specifications for more information about PSI/SI.

If you get “Unknown descriptor” in the table parsing it could be that the stream contains additional descriptors that can be enabled. Make a note of the descriptor_tag and go to **Setup — ETR** to enable the parsing of the descriptor.

Overview

ETR Details

PIDs

Services

Bitrates

Tables

PCR

T2MI

Status

Compare

ETR thr.

PID thr.

Serv. thr.

Gold TS thr.

Ethernet

COFDM1

COFDM2

COFDM4

RIKSTV-MUX3-CH46

674.00 MHz, DVB-T





EIT Present/Following

TS ID 231 original network ID 8770

Sections

PAT

PMT

NIT Actual

SDT Actual

SDT Other

EPG

TDT

TOT

ECM

MIP

CAT

Service	Current event	Next event	Full EPG
201 TV 2	13:00 (01:00:00) Tid for hjem Norsk livsstilsserie, (4:8/s10). Denne gangen tar "Tid for hjem" turen bort fra Bergen, til vakre Voss. Med seg har de en helt ny designer, norske Kirsten Visdal. (Event type: Leisure hobbies-general) 	14:00 (01:00:00) Bolighjelpen UK Britisk livsstilsserie fra 2018, (8:8/s3). Det nygifte paret Nikki og Andy har bodd sammen noen år før de giftet seg. Nikki har begynt å hate den treroms terrasseboligen deres og vil flytte. (Event type: Leisure hobbies-general) 	Show EIT schedule
204 TV 2 Nyhetskanalen	13:45 (00:15:00) Sportsnyhetene De siste nyhetene innen sport. (Event type: Sports-sports magazines) 	14:00 (00:30:00) Nyhetene Siste nytt fra TV2s nyhetsredaksjon. (Event type: News/Current affairs-news/weather report) 	Show EIT schedule
210 TV 2 Sport 1	13:00 (02:00:00) Premier League: Cardiff - Bournemouth Britisk fotball. Fra Cardiff City Stadium og kampen mellom Cardiff og Bournemouth i 25. runde i Premier League. Kommentator: Espen Ween. (Event type: Sports-football/soccer) 	15:00 (02:00:00) Tippekampen: Chelsea - Huddersfield Britisk fotball. Fra Stamford Bridge og kampen mellom Chelsea og Huddersfield i 25. runde i Premier League. Kommentator: Peder Mørtevd. (Event type: Sports-football/soccer) 	Show EIT schedule

For streams which have electronic program guide (EPG) information in the EIT table and the extraction of this information is enabled (in **ETR thresholds** and in **Setup — ETR**) the tree will show the text **EPG** (for ATSC streams EPG will be displayed regardless if EITs are present in the stream). Clicking on this will bring up the list of present/following events (the current program and the next program to be broadcast) for the current stream will be displayed. If the stream has EIT p/f other information (and this table is enabled in **Setup — ETR**) then the list will also contain EPG present/following for other streams (not available for ATSC). If the stream has EIT schedule information for the actual and/or other streams (and these tables are enabled in **Setup — ETR**) then the list will also contain the link **Show EIT schedule**. Clicking this will show the full schedule for the selected service. The amount of data shown depends on the signal. A common practice is to send EPG for 7 days ahead.

Overview

ETR Details

PIDs

Services

Bitrates

Tables

PCR

T2MI

Status

Compare

ETR thr.

PID thr.

Serv. thr.

Gold TS thr.

Ethernet

COFDM1

COFDM2

COFDM4

RIKSTV-MUX3-CH46

674.00 MHz, DVB-T

EIT Schedule for service 307 TVNorge HD in stream with TS ID 231 original network ID 8770

Go back to EIT Present/Following for all streams

2019.02.04

Start time	Duration	Event
00:10	01:45:00	Hot Pursuit Amerikansk actionkomedie fra 2015. Reese Witherspoon, Sofia Vergara. (Event type: Movie/Drama-adventure/western/war)
01:55	01:00:00	Første date Norsk realityserie fra 2018. (2:12/s2). På Første date-restauranten møtes single fra hele landet på blind date. (Event type: Show/Game show-general)
02:55	00:30:00	Hundepatruljen NZ Vet Clinic - Jonti. Newzealandsk dokumentarserie fra 2016. (13:13/s5). (Event type: Show/Game show-general)
03:25	00:25:00	Hundepatruljen NZ Episode 4. Newzealandsk dokumentarserie. (4:10/s7). Whanganui Delta-teamet Jason og Farris trekker en innbruddstyv fram fra skjulestedet sitt, og narkotikahunden Oscar varsler hundepasser Bill om problemer ved Mt Eden fengs. (Event type: Show/Game show-general)
03:50	00:30:00	Hundepatruljen NZ Episode 5. Newzealandsk dokumentarserie. (5:10/s7). Politihunden Hades gir ikke opp jakten på en innbruddstyv. Biosikkerhetslabradoren Ebony sniffer seg fram til noe som kravler på postbåndet. (Event type: Show/Game show-general)

To get detailed information about one event, click the binary symbol . This will open a popup window with parsing of the underlying EIT table. The information can be displayed either in detailed hex mode:

Table parsing

Show summary

Show hex

event

event_id: 10503 (0x2907)

start_time: 2019.02.04 14:02:19

duration: 00:29:06

running_status: running (0x4)

free_CA_mode: 0 (0 b) (0x0)

descriptors_loop_length: 233 (000011101001 b) (0x0c9)

descriptors

short event descriptor

descriptor_tag: 77 (0x4d)

descriptor_length: 181

ISO_639_language_code: nor

event_name_length: 29

event_name: Et år på tur med Lars Monsen

short_descr_length: 147

short_descr: Norsk opplevelsesserie fra 2007. Lars Monsen har vært på langtur og har tilbrakt et år på tur med Lars Monsen.

content descriptor

parental rating descriptor

Unknown descriptor

CRC32: 0x18f2650c

```

0000: 4F F1 04 03 EA ED 00 01 00 D2 22 42 01 4F 29 07 0....."B.0).
0010: E4 96 14 02 19 00 29 06 80 E9 4D B5 6E 6F 72 1D .....).M.nor.
0020: 05 45 74 20 E5 72 20 70 E5 20 74 75 72 20 6D 65 .Et .r p. tur me
0030: 64 20 4C 61 72 73 20 4D 6F 6E 73 65 6E 93 05 4E d Lars Monsen..N
0040: 6F 72 73 68 20 6F 70 70 6C 65 76 65 6C 73 65 73 orsk opplevelses
0050: 73 65 72 69 65 20 66 72 61 20 32 30 30 37 2E 20 serie fra 2007.
0060: 4C 61 72 73 20 4D 6F 6E 73 65 6E 20 68 61 72 20 Lars Monsen har
0070: 76 E6 72 74 20 70 E5 20 6C 61 6E 67 74 75 72 20 v.r.t p. langtur
0080: 6F 67 20 68 61 72 20 74 69 6C 62 72 61 68 74 20 og har tilbrakt
0090: 65 74 20 E5 72 20 6E 6F 72 64 20 66 6F 72 20 70 et .r nord for p
00A0: 6F 6C 61 72 73 69 72 6B 65 6C 65 6E 20 69 20 4E olarsirkelen i N
00B0: 6F 72 67 65 2C 20 53 76 65 72 69 67 65 20 6F 67 orge, Sverige og
00C0: 20 46 69 6E 6C 61 6E 64 2E 28 31 3A 38 29 28 52 Finland.(1:8)(R
00D0: 70 54 A7 A1 AA 55 A4 6E 6E 77 A1 76 76 A4 11 2E 1T 11 nor v. /

```

Or in summary mode:

Table parsing	
Show summary	Show hex
Event Information Table Present/Following Other	
Version number	22 (0x16)
Section number	0
Last section number	1
Service ID	1002 (0x03ea)
Transport Stream ID	210 (0x00d2)
Original Network ID	8770 (0x2242)
Event list:	
Event ID	10503 (0x2907)
Start time	2019.02.04 14:02:19
Duration	00:29:06
Content type	Leisure hobbies-tourism/travel
Event name	Language Value
	nor Et år på tur med Lars Monsen
Short description	Language Value
	nor Norsk opplevelsesserie fra 2007. Lars Monsen har vært på langtur og har tilbrakt et år nord for polarsirkelen i Norge, Sverige og Finland.(1:8)(R)

ETR 290 — Digital Radio Mondiale

Digital Radio Mondiale streams will show up in the tree with the label **Digital Radio Mondiale**, if they have been configured properly in the **ETR thresholds**.

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IPTV 1 **Digital Radio Mondiale**
239.0.0.1:5503

Sections

- PAT
- PMT
- NIT Actual
- SDT Actual
- Digital Radio Mondiale**

Digital Radio Mondiale PID 3000

General	
Available streams:	239.103.150.1:5000
Protocol version:	00.00
Seconds OK:	24
Robustness mode:	B
Selected IP:	239.103.150.1
Selected port:	5000

FAC - Fast Access Channel	
Sync:	OK
Bandwidth occupancy:	10 kHz
Interleaver:	2s
Service configuration:	1 audio service
Service identifier:	0xe1c238
Language:	English
Program type:	News

SDC - Service Description Channel	
Sync:	OK
Service label:	BBC WS
SDC mode:	16-QAM CR 0.5
Audio coding:	xHE-AAC
Audio mode:	mono
Audio sampling rate:	38.4 kHz
Language code:	eng
Country code:	gb

MSC - Media Service Channel	
Sync:	OK
MSC mode:	16-QAM
Stream 0 bitrate:	10.7250 kbps
Stream 1 bitrate:	0.9200 kbps
Stream 2 bitrate:	0.0000 kbps
Stream 3 bitrate:	0.0000 kbps

General

Available streams: A list of IP addresses and ports available in this PID. If both the selected IP and port match one of the available streams, it will be highlighted in green.
Note: Only the available streams can be decoded and will contain information.

Protocol version: What protocol is being used in the stream.

Seconds ok: Seconds without error.

Robustness mode: The robustness mode used for this program. Labelled A to E.

Selected IP: The IP address selected in ETR thresholds. If it doesn't match any of the IP addresses in available streams, no data will be accessible.

Selected port: The port selected in ETR thresholds. If it does not match the port associated with the selected IP address in the available streams, no data will be accessible.

FAC — Fast Access Channel

Sync: *OK* if stream has sync. *No sync* otherwise.

Bandwidth occupancy: The bandwidth occupancy of this stream.

Interleaver: '2s', '400ms', '600ms'

Service configuration:	Configuration of the program.
Service identifier:	A hexadecimal value that uniquely identifies the program.
Language:	Specifies the language of the program.
Program type:	Specifies the genre of the program.

SDC — Service Description Channel

Sync:	<i>OK</i> if stream has sync. <i>No sync</i> otherwise.
Service label:	The primary identification of the program for the listener.
SDC mode:	The SDC mode used by the program.
Audio coding:	The audio coding in use by the program.
Audio mode:	The audio mode used. Either mono or stereo.
Audio sampling rate:	The audio bitrate in kHz.
Language code:	The language code of the language of the program.
Country code:	Country code for the country of origin.

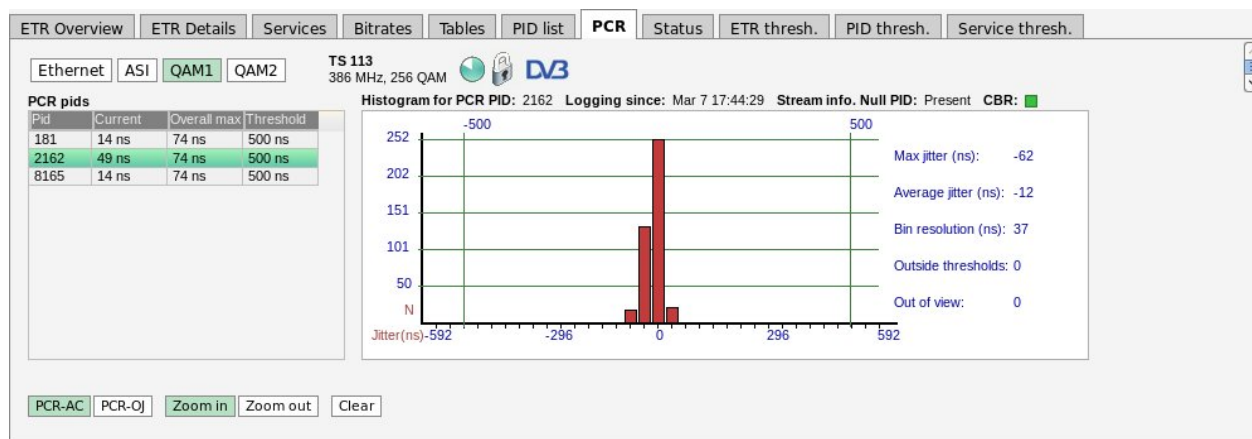
MSC — Media Service Channel

Sync:	<i>OK</i> if stream has sync. <i>No sync</i> otherwise.
MSC mode:	The MSC mode used by the program.
Stream 0 bitrate:	The bitrate of stream 0 in kilobits/s (kbps).
Stream 1 bitrate:	The bitrate of stream 1 in kilobits/s (kbps).
Stream 2 bitrate:	The bitrate of stream 2 in kilobits/s (kbps).
Stream 3 bitrate:	The bitrate of stream 3 in kilobits/s (kbps).

Developed according to the standards for DRM-MDI:

- ETSI TS 102 820, ‘Multiplex Distribution Interface (MDI)’
- ETSI ES 201 980, ‘System Specification’
- ETSI EN 301 192, ‘DVB specifications for Data Broadcasting’

7.9.7 ETR 290 — PCR



The PCR jitter histogram displays PCR jitter as measured by the probe. A list of detected PCR PIDs in the selected stream is shown together with their current and maximum PCR jitter values. A PCR PID is selected for histogram presentation by clicking the associated table entry. The histogram shows the number of received PCR values versus jitter. PCR jitter is by default measured as PCR-AC for all interfaces. By creating an ETR threshold template that enables PCR-OJ and assigning this template to a stream it is possible to select PCR-OJ measurement mode by clicking the **PCR_OJ** button. The PCR_OJ measurement is not relevant for Ethernet streams.

Please note PCR analysis will be disabled if none of the PCR-AC, PCR-OJ, PCR Accuracy or PCR Jitter checks are enabled in the **ETR thresholds**. So to use the **ETR 290 — PCR** functionality this needs to be enabled.

The name of the current stream is displayed in addition to the two round-robin indicator icons when relevant: the time cycle icon and the lock icon. By clicking the lock icon the round-robin cycling is stopped or resumed. The push-buttons **Zoom in** and **Zoom out** enables rescaling of the graph. This makes it possible to view PCR jitter values that are outside the range defined by the auto-scaling. Clicking the **Clear** button will clear historical data from the histogram.

Tool-tip functionality provides information about each histogram bar: the number of samples, the percentage of total number of samples and the jitter interval represented by the bar. For PCR measurements to be valid it is essential that the signal be stuffed with null packets (PID 8191) to obtain an absolutely constant bitrate. The stream info above the histogram shows if the analyzed stream contains null packets or not. A color indicator above the PCR jitter histogram indicates whether the signal is of constant bitrate or not, as perceived by the PCR filter in the processing engine. Green indicates OK, red indicates that the PCR jitter measurements are not valid due to the bitrate not being constant.

Note that PCR jitter measurements for Ethernet streams are very sensitive to packet loss, and packet loss results in a large jitter values – often for all PCR PIDs of an MPTS.

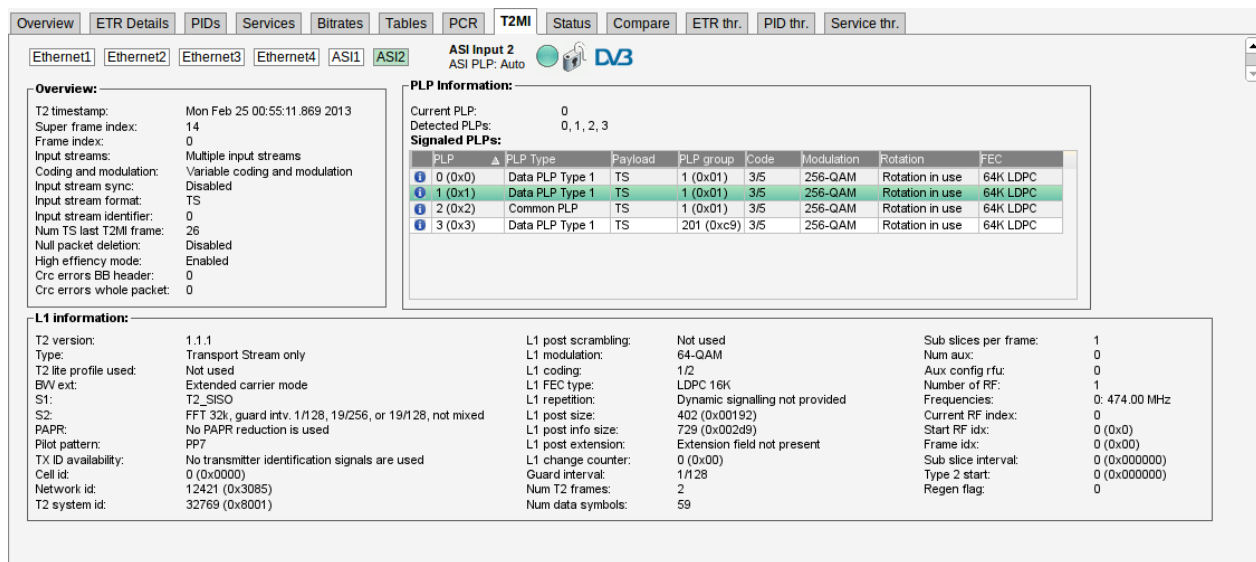
The PCR PID list displays the following parameters:

PID:	The PID for which the following parameters apply.
Current:	The last PCR jitter value measured.
Overall max:	The maximum PCR jitter value measured since transport stream sync was obtained. Note that this may not correspond to the maximum value for PCR jitter in the histogram, as the histogram displays values measured from the time when a PCR PID was selected.
Threshold:	The PCR jitter threshold currently valid for the stream, as defined in the associated ETR threshold template.

In addition to the histogram itself, the following parameters are displayed:

Max jitter (ns):	The maximum jitter value measured from the time the PID was selected.
Average jitter (ns):	The average jitter in nanoseconds.
Bin resolution (ns):	The width of the jitter interval spanned by each histogram bar.
Outside thresholds:	The number of PCR values that are outside the PCR jitter thresholds (defined by the user as part of the ETR threshold template).
Out of view:	The number of PCR values that are out of the currently displayed view.

7.9.8 ETR 290 — T2MI (requires T2MI-OPT)



The screenshot displays the T2MI monitoring interface with the following sections:

- Overview:**
 - T2 timestamp: Mon Feb 25 00:55:11.869 2013
 - Super frame index: 14
 - Frame index: 0
 - Input streams: Multiple input streams
 - Coding and modulation: Variable coding and modulation
 - Input stream sync: Disabled
 - Input stream format: TS
 - Input stream identifier: 0
 - Num TS last T2MI frame: 26
 - Null packet deletion: Disabled
 - High efficiency mode: Enabled
 - Crc errors BB header: 0
 - Crc errors whole packet: 0
- PLP Information:**
 - Current PLP: 0
 - Detected PLPs: 0, 1, 2, 3
 - Signed PLPs:**

PLP	PLP Type	Payload	PLP group	Code	Modulation	Rotation	FEC
0 (0x0)	Data PLP Type 1	TS	1 (0x01)	3/5	256-QAM	Rotation in use	64K LDPC
1 (0x1)	Data PLP Type 1	TS	1 (0x01)	3/5	256-QAM	Rotation in use	64K LDPC
2 (0x2)	Common PLP	TS	1 (0x01)	3/5	256-QAM	Rotation in use	64K LDPC
3 (0x3)	Data PLP Type 1	TS	201 (0xc9)	3/5	256-QAM	Rotation in use	64K LDPC
- L1 information:**

T2 version: 1.1.1	L1 post scrambling: Not used	Sub slices per frame: 1
Type: Transport Stream only	L1 modulation: 64-QAM	Num aux: 0
T2 lite profile used: Not used	L1 coding: 1/2	Aux config rfu: 0
BW ext: Extended carrier mode	L1 FEC type: LDPC 16K	Number of RF: 1
S1: T2_SISO	L1 repetition: Dynamic signalling not provided	Frequencies: 0: 474.00 MHz
S2: FFT 32k, guard intv. 1/128, 19/256, or 19/128, not mixed	L1 post size: 402 (0x00192)	Current RF index: 0
PAPR: No PAPR reduction is used	L1 post info size: 729 (0x002a9)	Start RF idx: 0 (0x0)
Pilot pattern: PP7	L1 post extension: Extension field not present	Frame idx: 0 (0x00)
TX ID availability: No transmitter identification signals are used	L1 change counter: 0 (0x00)	Sub slice interval: 0 (0x000000)
Cell id: 0 (0x0000)	Guard interval: 1/128	Type 2 start: 0 (0x000000)
Network id: 12421 (0x3085)	Num T2 frames: 2	Regen flag: 0
T2 system id: 32769 (0x8001)	Num data symbols: 59	

T2MI monitoring is a licensed option available for transport streams over ASI, satellite and Ethernet. T2MI is enabled on a per stream basis, most of the information is found in this GUI extracted from the L1 current packets in the T2MI streams. The full parsing of this information table is found in the ‘Tables’ section.

Please note that the T2MI stream needs to have either a relative or an absolute T2 Timestamp to be received properly. Signals without timing information can not be received.

Overview:

T2 timestamp:	The last received T2 timestamp. The probe supports both relative and absolute timestamps.
Super frame index:	The last received superframe index.
Frame index:	The index of the last received frame.
Input streams:	Indicates whether Single or Multiple Input Streams are used.
Coding and modulation:	Whether the stream uses Constant Coding and Modulation or Adaptive Coding and Modulation.
Input stream sync:	The Input Stream Synchronizer (ISSY) value.
Input stream format:	The format of the input stream. Will normally be 'TS'.
Input stream identifier:	The input stream identifier for the current stream.
Num TS pkt. last T2MI frame:	The number of transport stream packets that was in the last T2MI frame.
Null packet deletion:	Whether null packet deletion is in use or not.
High efficiency mode:	Whether high efficiency mode is active or not.
Crc Errors BB header:	The number of CRC errors on the BB header detected since the monitoring of the stream started.
Crc Errors whole packet:	The number of CRC errors calculated over the whole T2MI packet since the monitoring of the stream started.

L1 information:

T2 version:	The version of the T2 spec used. Up to version 1.3.1 is supported including T2 lite.
Type:	The type of data carried in the Transport stream.
T2 lite profile used:	Set to true if the T2 lite profile is used for sending power efficient broadcasts to portable clients.
BW ext:	The carrier mode (normal or extended).
S1:	T2-SISO, T2-MISO or Non-T2.
S2:	FFT mode and guard interval.
PAPR:	The PAPR reduction mode (if any).
Pilot pattern:	Pilot pattern PP1 to PP8.
TX ID availability:	Should always be set to 'No transmitter identification signals are used'.
Cell id:	The cell ID for the transmitter.
Network id:	The network id for this DVB-T2 network.

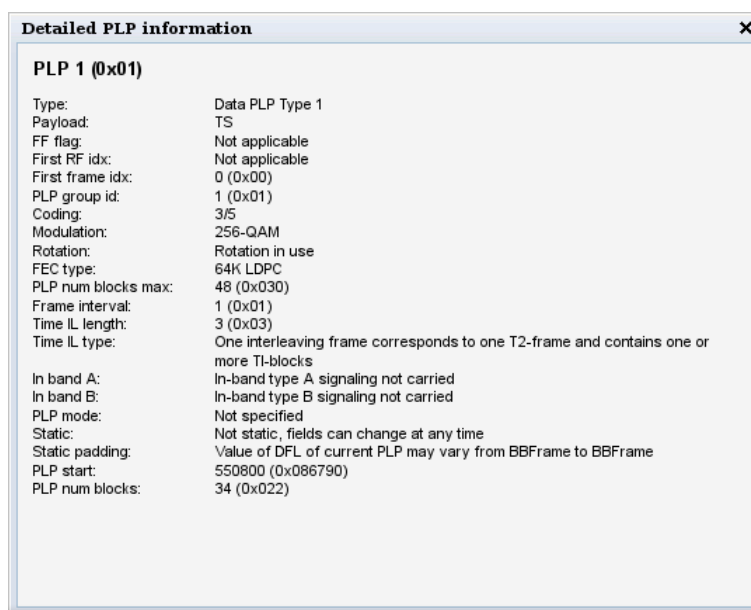
T2 system id:	The T2 system id.
L1 post scrambling:	Says whether post scrambling is used or not.
L1 modulation:	The L1 modulation type used. BPSK, QPSK, 16-QAM or 64-QAM.
L1 FEC type:	The L1 fec type in use. Only 'LDPC 16K' is currently supported in DVB-T2.
L1 repetition:	Shows if dynamic signaling is provided.
L1 post size:	The L1 post size.
L1 post info size:	The L1 post info size.
L1 post extension:	Shows if extension field is provided.
L1 change counter:	The value of the L1 change counter.
Guard interval:	The guard interval used for the transmission. 1/32, 1/16, 1/8 or 1/4.
Num T2 frames:	The number of T2 frames signaled.
Num data symbols:	The number of data symbols signaled.
Sub slices per frame:	How many sub slices are used per T2 frame.
Num aux:	The number of auxiliary channels transmitted.
Aux config rfu:	The aux config rfu number.
Number of RF:	The number of RF frequencies used to transmit the signal.
Frequencies:	The list of frequencies used to transmit the signal. Normally only one frequency will be used.
Current RF index:	The index of the frequency currently being used for the transmission.
Start RF idx:	The starting RF index.
Frame idx:	The frame index.
Sub slice interval:	The interval between sub slices.
Type 2 start:	The value of the type 2 start parameter.
Regen flag:	The value of the regen flag.

PLP (Physical Layer Pipes) information:

Current PLP:	The PLP currently being received. If a specific PLP was configured the interface settings T2MI extraction (ASI — Setup or Multicasts — Streams), this will be used. If auto mode is used the first PLP detected will be used.
Detected PLPs:	The detected PLP ids in the T2MI stream. In some error situations this may differ from the list of Signaled PLPs show below.
Signaled PLPs:	Lists the PLPs signaled in the stream.
PLP type:	The signaled type of the PLP. Data PLP Type 1 is the most common, some signals can have a common PLP as well as well as other PLP types.

Payload:	Payload type of this PLP. Will typically be the Transport Stream format
PLP Group:	The group signaled for this PLP. The PLPs in a group shares one common PLP and when analyzing a PLP both the data in the specified PLP and the common PLP in the same group (if present) are extracted. The PLP contains PIDs which are shared such as PAT, SDT, NIT, CAT and EMMs. In the example above , analyzing PLP 0 will also analyze PLP 2.
Code:	The FEC coding scheme used for this PLP.
Modulation:	Modulation for the PLP.
Rotation:	Specifies if IQ rotation is enabled.
FEC:	Specifies the FEC coding type for this PLP.

Clicking the blue information symbol in the PLP list will bring up more detailed information for that PLP.

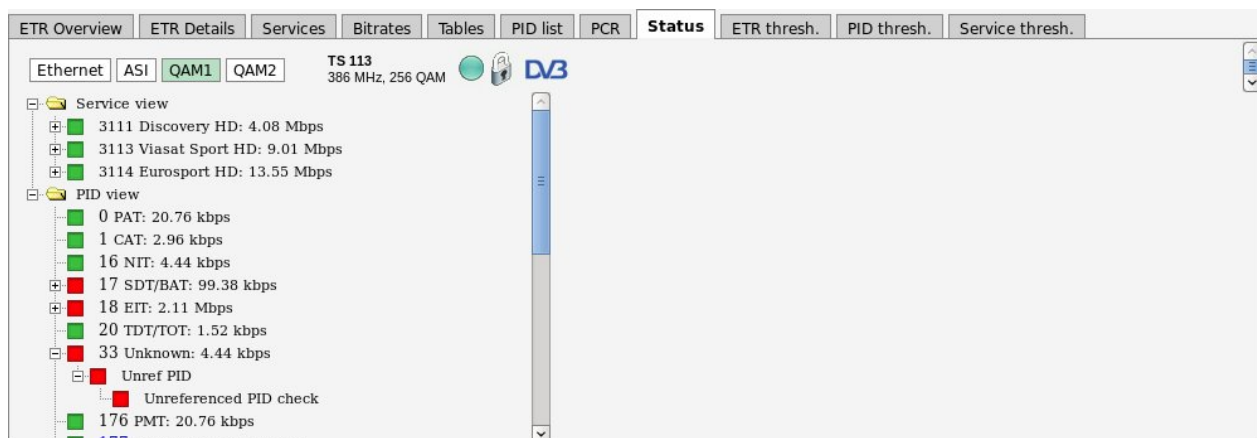


Detailed PLP information:

PLP:	The ID of the signaled PLP.
Type:	The signaled type of the PLP. Data PLP Type 1 is the most common, some signals can have a common PLP as well as well as other PLP types.
Payload:	Payload type of this PLP. Will typically be the Transport Stream format
FF flag:	The FF flag value.
First RF idx:	The first RF index used for transmitting this PLP.
First frame idx:	The first frame index used to transmit this PLP.

PLP group id:	The group signaled for this PLP. The PLPs in a group shares one common PLP and when analyzing a PLP both the data in the specified PLP and the common PLP in the same group (if present) are extracted. The PLP contains PID which are shared such as PAT, SDT, NIT, CAT and EMMs.
Coding:	The FEC coding scheme used for this PLP.
Modulation:	Modulation used for transmitting this PLP.
Rotation:	Specifies if IQ rotation is enabled for this PLP.
FEC type:	Specifies the FEC coding type for this PLP.
PLP num blocks max:	The maximum number of blocks which can be used by this PLP.
Frame interval:	The frame interval for this PLP.
Time IL length:	The length of the time interleaver.
Time IL type:	The time interleaving type in use.
In band A:	Says if in-band type A signaling is used for this PLP.
In band B:	Says if in-band type B signaling is used for this PLP.
PLP mode:	The PLP mode for this PLP.
Static:	Says whether the PLP bandwidth is static or not static.
Static padding:	Says whether the padding is static or can change between each BB frame.
PLP start:	The start value for the PLP in the stream.
PLP num blocks:	The number of blocks used for this PLP.

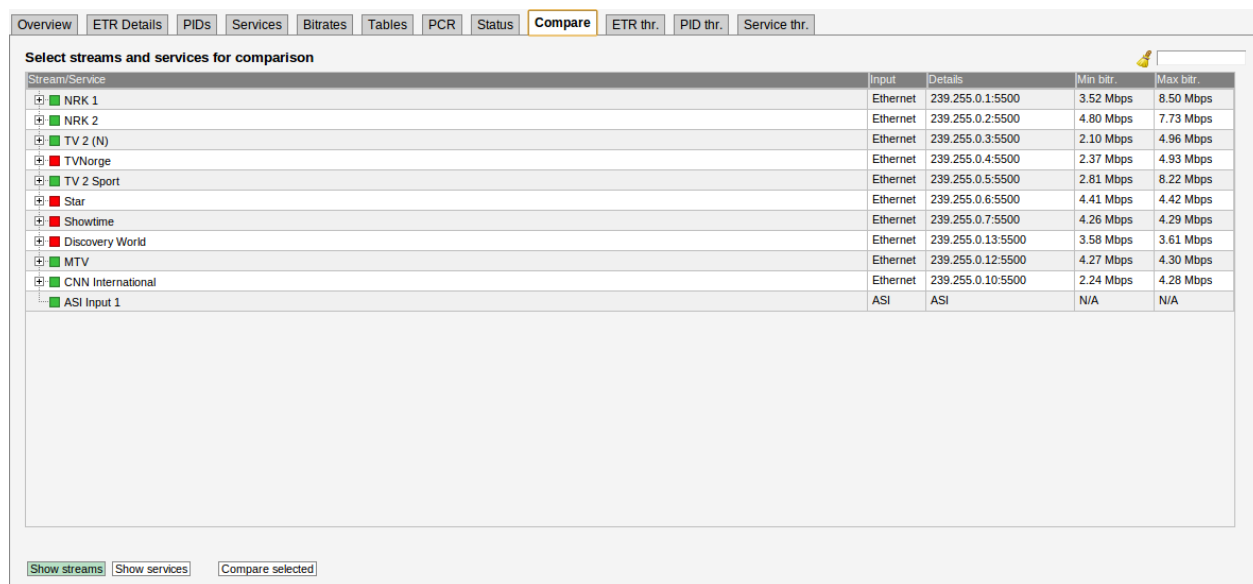
7.9.9 ETR 290 — Status



The **ETR 290 — Status** view shows a stream content overview linked to current alarms, making it easy to view what services and PIDs are currently affected by errors.

By clicking any of the ‘view’, service or PID nodes, more information will be displayed on the right hand side of the table. This information is described in **ETR 290 — Services**.

7.9.10 ETR 290 — Compare



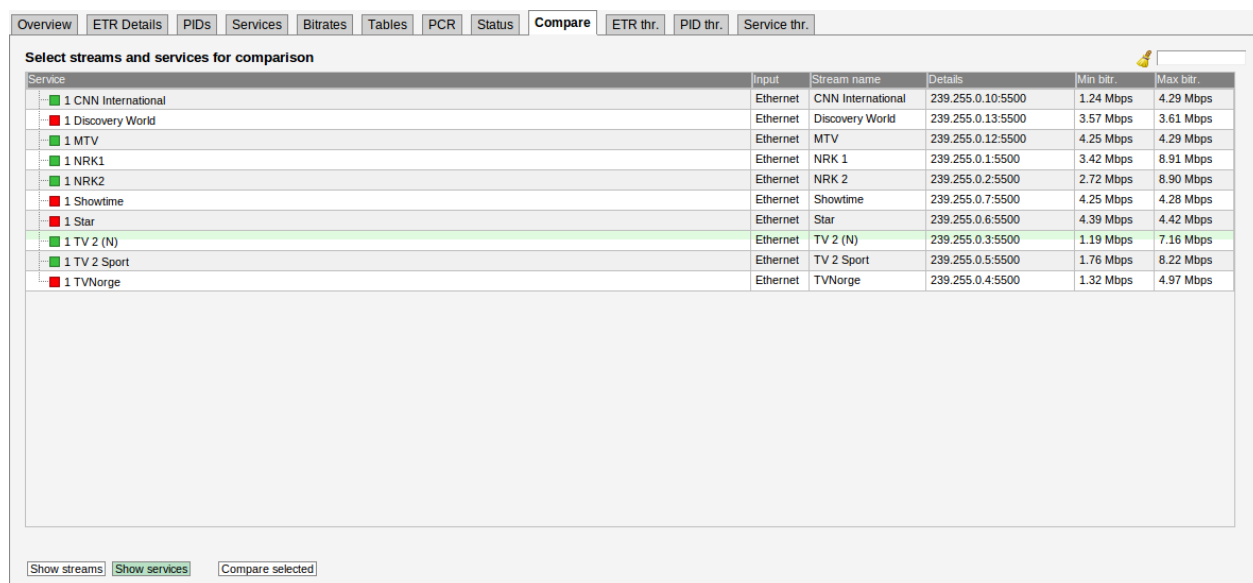
The screenshot shows the 'Compare' tab selected in the ETR 290 interface. The table displays the following data:

Stream/Service	Input	Details	Min bitr	Max bitr
NRK 1	Ethernet	239.255.0.1:5500	3.52 Mbps	8.50 Mbps
NRK 2	Ethernet	239.255.0.2:5500	4.80 Mbps	7.73 Mbps
TV 2 (N)	Ethernet	239.255.0.3:5500	2.10 Mbps	4.96 Mbps
TVNorge	Ethernet	239.255.0.4:5500	2.37 Mbps	4.93 Mbps
TV 2 Sport	Ethernet	239.255.0.5:5500	2.81 Mbps	8.22 Mbps
Star	Ethernet	239.255.0.6:5500	4.41 Mbps	4.42 Mbps
Showtime	Ethernet	239.255.0.7:5500	4.26 Mbps	4.29 Mbps
Discovery World	Ethernet	239.255.0.13:5500	3.58 Mbps	3.61 Mbps
MTV	Ethernet	239.255.0.12:5500	4.27 Mbps	4.30 Mbps
CNN International	Ethernet	239.255.0.10:5500	2.24 Mbps	4.28 Mbps
ASI Input 1	ASI	ASI	N/A	N/A

Buttons at the bottom: **Show streams**, **Show services**, **Compare selected**.

The **Compare** view is based on analysis performed by the ETSI TR 101 290 engine and only the streams monitored by ETR will be listed.

The **Compare** view allows comparison of services or transport streams across different probe interfaces. Clicking **Show streams** results in a list of selectable transport streams and services, and clicking **Show services** results in a list of selectable services. Note that the screen is not auto-refreshed, click the **Compare** tab to perform an active refresh.

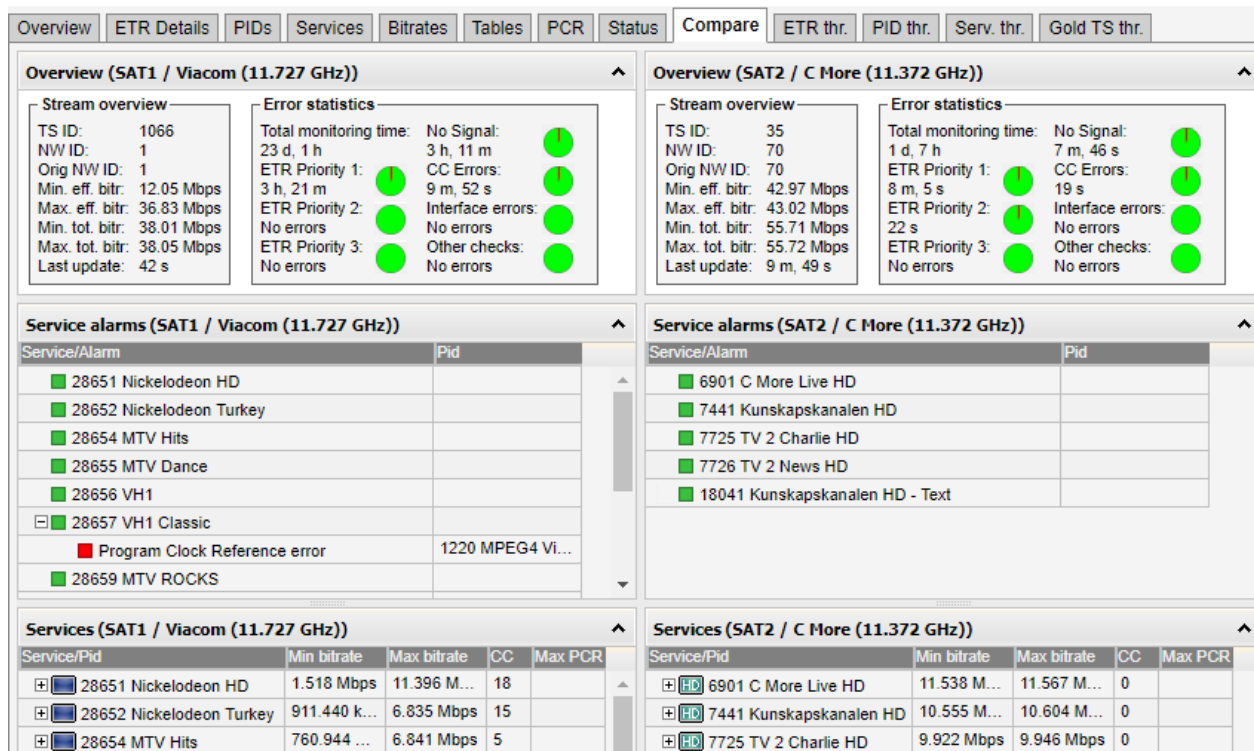


The screenshot shows the 'Compare' tab selected in the ETR 290 interface. The table displays the following data:

Service	Input	Stream name	Details	Min bitr	Max bitr
1 CNN International	Ethernet	CNN International	239.255.0.10:5500	1.24 Mbps	4.29 Mbps
1 Discovery World	Ethernet	Discovery World	239.255.0.13:5500	3.57 Mbps	3.61 Mbps
1 MTV	Ethernet	MTV	239.255.0.12:5500	4.25 Mbps	4.29 Mbps
1 NRK1	Ethernet	NRK 1	239.255.0.1:5500	3.42 Mbps	8.91 Mbps
1 NRK2	Ethernet	NRK 2	239.255.0.2:5500	2.72 Mbps	8.90 Mbps
1 Showtime	Ethernet	Showtime	239.255.0.7:5500	4.25 Mbps	4.28 Mbps
1 Star	Ethernet	Star	239.255.0.6:5500	4.39 Mbps	4.42 Mbps
1 TV 2 (N)	Ethernet	TV 2 (N)	239.255.0.3:5500	1.19 Mbps	7.16 Mbps
1 TV 2 Sport	Ethernet	TV 2 Sport	239.255.0.5:5500	1.76 Mbps	8.22 Mbps
1 TVNorge	Ethernet	TVNorge	239.255.0.4:5500	1.32 Mbps	4.97 Mbps

Buttons at the bottom: **Show streams**, **Show services**, **Compare selected**.

One or more services or transport streams are selected by clicking and later *Ctrl* + clicking items from the list. Clicking the **Compare selected** button will launch a condensed overview page that allows status parameters for services or streams to be viewed side by side. Key parameters are presented in one column for each service/stream, and it is easy to recognize differences in signal contents or alarm status. The number of streams that can be compared depends on screen size.



Overview (SAT1 / Viacom (11.727 GHz))

Stream overview

TS ID:	1066
NW ID:	1
Orig NW ID:	1
Min. eff. bitr:	12.05 Mbps
Max. eff. bitr:	36.83 Mbps
Min. tot. bitr:	38.01 Mbps
Max. tot. bitr:	38.05 Mbps
Last update:	42 s

Error statistics

Total monitoring time:	No Signal:	
23 d, 1 h	3 h, 11 m	
ETR Priority 1:	CC Errors:	
3 h, 21 m	9 m, 52 s	
ETR Priority 2:	Interface errors:	
No errors	No errors	
ETR Priority 3:	Other checks:	
No errors	No errors	

Service alarms (SAT1 / Viacom (11.727 GHz))

Service/Alarm	Pid
28651 Nickelodeon HD	
28652 Nickelodeon Turkey	
28654 MTV Hits	
28655 MTV Dance	
28656 VH1	
28657 VH1 Classic	
Program Clock Reference error	1220 MPEG4 Vi...
28659 MTV ROCKS	

Services (SAT1 / Viacom (11.727 GHz))

Service/Pid	Min bitrate	Max bitrate	CC	Max PCR
28651 Nickelodeon HD	1.518 Mbps	11.396 M...	18	
28652 Nickelodeon Turkey	911.440 k...	6.835 Mbps	15	
28654 MTV Hits	760.944 ...	6.841 Mbps	5	

Overview (SAT2 / C More (11.372 GHz))

Stream overview

TS ID:	35
NW ID:	70
Orig NW ID:	70
Min. eff. bitr:	42.97 Mbps
Max. eff. bitr:	43.02 Mbps
Min. tot. bitr:	55.71 Mbps
Max. tot. bitr:	55.72 Mbps
Last update:	9 m, 49 s

Error statistics

Total monitoring time:	No Signal:	
1 d, 7 h	7 m, 46 s	
ETR Priority 1:	CC Errors:	
8 m, 5 s	19 s	
ETR Priority 2:	Interface errors:	
22 s	No errors	
ETR Priority 3:	Other checks:	
No errors	No errors	

Service alarms (SAT2 / C More (11.372 GHz))

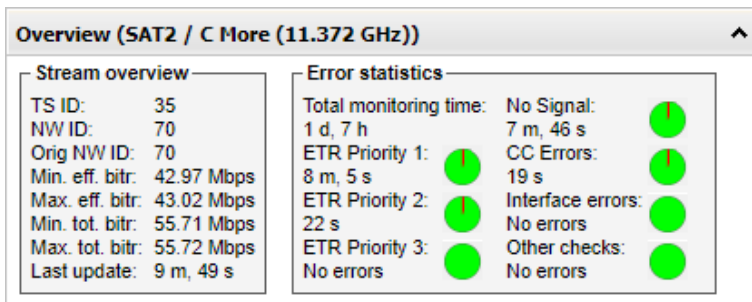
Service/Alarm	Pid
6901 C More Live HD	
7441 Kunskapskanalen HD	
7725 TV 2 Charlie HD	
7726 TV 2 News HD	
18041 Kunskapskanalen HD - Text	

Services (SAT2 / C More (11.372 GHz))

Service/Pid	Min bitrate	Max bitrate	CC	Max PCR
6901 C More Live HD	11.538 M...	11.567 M...	0	
7441 Kunskapskanalen HD	10.555 M...	10.604 M...	0	
7725 TV 2 Charlie HD	9.922 Mbps	9.946 Mbps	0	

The compare column consists of several sub-views:

Stream overview



Overview (SAT2 / C More (11.372 GHz))

Stream overview

TS ID:	35
NW ID:	70
Orig NW ID:	70
Min. eff. bitr:	42.97 Mbps
Max. eff. bitr:	43.02 Mbps
Min. tot. bitr:	55.71 Mbps
Max. tot. bitr:	55.72 Mbps
Last update:	9 m, 49 s

Error statistics

Total monitoring time:	No Signal:	
1 d, 7 h	7 m, 46 s	
ETR Priority 1:	CC Errors:	
8 m, 5 s	19 s	
ETR Priority 2:	Interface errors:	
22 s	No errors	
ETR Priority 3:	Other checks:	
No errors	No errors	

Stream overview shows a number of key parameters for the selected stream/service.

Stream overview

TS ID: The transport stream ID of the selected stream or the stream containing the selected service

NW ID:	The network ID of the selected stream or the stream containing the selected service
Orig NW ID:	The original network ID of the selected stream or the stream containing the selected service
Min. eff. bitr:	The minimum effective bitrate (null packets removed) measured for the selected stream or the stream containing the selected service
Max. eff. bitr:	The maximum effective bitrate (null packets removed) measured for the selected stream or the stream containing the selected service
Min. tot. bitr:	The minimum total bitrate (including null packets) measured for the selected stream or the stream containing the selected service
Max. tot. bitr:	The maximum total bitrate (including null packets) measured for the selected stream or the stream containing the selected service
Last update:	The time since the last update. The information will be updated when the round robin ETR engine stops monitoring a stream or once every minute for streams which are permanently monitored.

Error statistics

Total monitoring time:	The total time the stream has been monitored by the ETR engine
ETR Priority 1:	The time the stream has been affected by ETSI TR 101 290 Priority 1 errors
ETR Priority 2:	The time the stream has been affected by ETSI TR 101 290 Priority 2 errors
ETR Priority 3:	The time the stream has been affected by ETSI TR 101 290 Priority 3 errors
No signal:	The time the stream has been affected by 'No signal' alarm
CC errors:	The time the stream has been affected by 'CC error' alarm
Interface errors:	The time the stream has been affected by 'Interface error' alarm
Other checks:	The time the stream has been affected by miscellaneous 'Other' alarms

Pie charts indicate for how long the stream has been affected by errors compared to the total monitoring time, green color representing 'OK' and red color 'Error'.

Service alarm

Service alarms (SAT1 / Viacom (11.727 GHz))	
Service/Alarm	Pid
 28651 Nickelodeon HD	
 28652 Nickelodeon Turkey	
 28654 MTV Hits	
 28655 MTV Dance	
 28656 VH1	
 28657 VH1 Classic	
 Program Clock Reference error	1220 MPEG4 Vi...
 28659 MTV ROCKS	

If a transport stream is selected for comparison the **Service alarms** sub-view displays a list of services present in the stream. If there is one or more active alarms for a service this will be indicated by a red ‘bulb’ whereas a green ‘bulb’ indicates no active alarms. If a service is affected by one or more active alarms these alarms may be viewed by expanding the service tree. If relevant the PIDs affected by alarms are also displayed. Note that only alarms detected during the last monitoring period are displayed.

If a service is selected for comparison this sub-view simply shows the selected service and any active alarms affecting the service.

Services

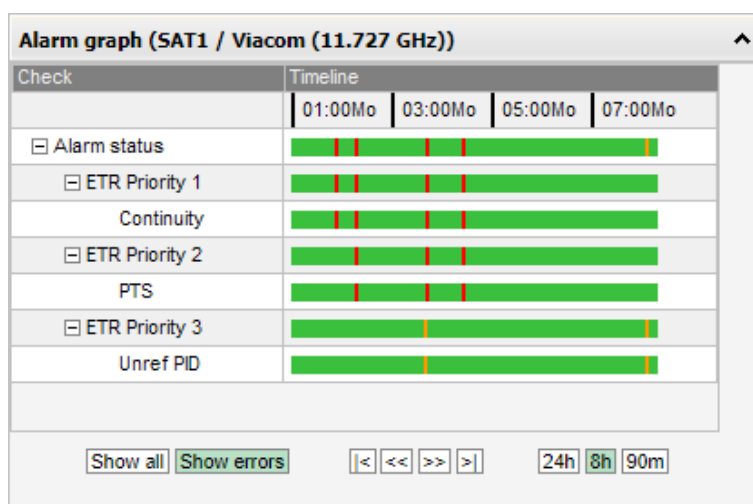
Services (SAT2 / C More (11.372 GHz))				
Service/Pid	Min bitrate	Max bitrate	CC	Max PCR
  6901 C More Live HD	11.538 M...	11.575 M...	0	
 404 PMT	7.440 kbps	7.576 kbps	0	
 4214 MPEG1 Audio	261.128 ...	263.856 ...	0	
 3325 MPEG1 Audio	261.128 ...	263.856 ...	0	
 7116 ECM	14.880 k...	16.608 k...	0	
 1278 MPEG4 Video	11.008 M...	11.040 M...	0	N/A
  7441 Kunskapskanalen HD	10.552 M...	10.599 M...	0	
  7725 TV 2 Charlie HD	9.922 Mbps	9.955 Mbps	0	

If a transport stream is selected for comparison the **Services** sub-view displays a list of services present in the stream. Clicking the plus icon at a service will expand the service tree, displaying the service’s individual components. The minimum and maximum effective bitrates of a service/-component are also shown, in addition to the number of continuity counter errors and the maximum measured PCR jitter (if relevant).

Colored PIDs indicate scrambling; blue and green representing odd and even scrambling respectively.

Note that all references to a PID will result in a PID entry, i.e. one PID may be displayed several times in the list.

Alarm graph



The Alarm graph sub-view shows similar alarm graphs as the **ETR 290 — ETR Details — Alarm graph popup** view. Please refer to the **ETR 290 — ETR Details** section of this User's Manual for a comprehensive description of this view.

ETR Details

ETR Details (SAT1 / Viacom (11.727 GHz))				
Pri 1	Pri 2	Pri 3	Other	Interface
☒ TS sync	☒ Transport	☒ NIT	☒ CA syst.	☒ Post LDPC-BCH
☒ Sync byte	☒ CRC	☒ SI Rep	☒ PID minbr.	☒ MER
☒ PAT	☒ PCR	☒ Unref PID	☒ PID maxbr.	☒ SNR
☒ Continuity	☒ PCR accr.	☒ SDT	☒ PID ch.	☒ Sig. str.
☒ PMT	☒ PTS	☒ EIT	☒ Serv. minbr.	☒ Pkt. err.
☒ Miss.PID	☒ CAT	☒ RST	☒ Serv. maxbr.	☒ Centre frequency
		☒ TDT	☒ Serv. ch.	☒ Symbol rate
			☐ MIP	☐ T2MI
			☐ Gold TS	☒ Eb/N0
			☐ Time	☒ EVM
				☒ Intf. ovfl.

The ETR details sub-view shows the same alarm overview as the **ETR 290 — ETR Details** view. Clicking a check will open a pop-up view displaying alarm details. Please refer to the **ETR 290 — ETR Details** section of this user's manual for a comprehensive description of this view.

Tables

Tables (IPTV / Eurosport 1 HD (N) (239.255.2.20:5500))			
PID	Table	CRC	Compare
0	PAT (PID 0, TID 0)	0xDDF22CE1	Reference
1	CAT (PID 1, TID 1)	0xD5DCFB4C	Reference
482	PMT Service 7273 (PID 482, TI...	0xB720DAD6	Reference
17	SDT Actual TS ID 39 Orig NW I...	0x31BECFE3	Reference
20	TDT (PID 20, TID 112)	0x0	Reference

Tables (IPTV / DELUXE MUSIC (239.255.1.20:5500))			
PID	Table	CRC	Compare
0	PAT (PID 0, TID 0)	0x5F020F81	Compare
1	CAT (PID 1, TID 1)	0xD5DCFB4C	Compare
99	PMT Service 65 (PID 99, TID 2)	0xC48A6F	No match
16	NIT Actual NW ID 65280 (PID 1...	0xA8CD098F	No match
17	SDT Actual TS ID 15 Orig NW I...	0xB5B3EEAE	Compare
20	TDT (PID 20, TID 112)	0x0	Compare
20	TOT (PID 20, TID 115)	0x0	No match
3333	AIT (PID 3333, TID 116)	0x63D1E66A	No match
482	PMT Service 7273 (PID 482, TI...	N/A	Not found

The Tables sub-view provides a comparison of all PSI/SI tables present in the selected streams. The first transport stream selected will serve as a reference stream for the other(s). Each entry will display the PID, table name, and the CRC for the table. If a table exists in both the reference stream and the current stream and has a different CRC, it is marked in red and a 'Compare'-link will show for a more detailed view of the differences between the two. Likewise if the table are present in both streams, but has equal CRC, it will be displayed with normal text color and a 'Compare'-link will be shown. If either a table is only found in the reference stream or the current stream, it will be marked in pink with 'Not found' or grey with 'No match', respectively. Note that this feature only applies for comparing streams, not services within the same stream.

7.9.11 ETR 290 — ETR threshold

Overview
ETR Details
PIDs
Services
Bitrates
Tables
PCR
Status
Compare
ETR thr.
PID thr.
Serv. thr.
Gold TS thr.

ETR Thresholds

These thresholds are used to define detailed conditions for ETR 290 alarm triggering on a per-stream basis.

Name	Refs	Description	Tuning duration	Mode	Edit
ETSI TR 101 290	0	Settings according to TR 101 290. Some advanced features are disabled	70	DVB	Edit
Full ETR 290	131	Settings according to TR 101 290. Some advanced features are disabled	70	DVB	Edit
ATSC Default	0	ATSC template based on TR 101 290. Some advanced features are disabled	70	ATSC	Edit
Optimised	0	Optimised settings with additional checks enabled	70	DVB	Edit
IP-SPTS	0	Settings adapted to IP streaming of Single Program Transport Streams	20	DVB	Edit
CMTS downlink	0	Used to verify CMTS downlink traffic	20	DVB	Edit
Analog carrier	0	For monitoring analog frequencies	15	DVB	Edit
Default	4	Default template used for new streams. Only important alarms are raised.	70	DVB	Edit
PCR testing	3		70	DVB	Edit
ASI	1		70	DVB	Edit
DVB-T2	1		70	DVB	Edit
DVB-T1	1		70	DVB	Edit
SAT 1.2 GHz	1		70	DVB	Edit

ETR thresholds: 13

Add new threshold
Duplicate selected
Delete selected
Edit selected

The **ETR thresholds** make it possible to define detailed conditions for ETR 290 alarm triggering on a per-stream basis. There are seven predefined ETR threshold templates that are write-protected and cannot be edited by the operator:

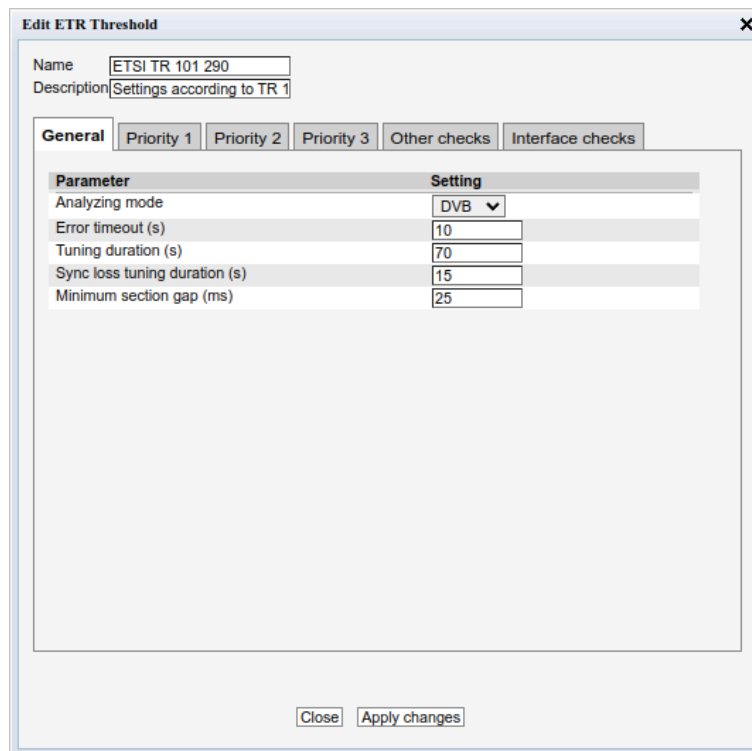
- Default
- ETSI TR 101 290
- ATSC Default
- Optimised
- IP-SPTS
- CMTS downlink
- Analog carrier

These predefined thresholds may be used when defining a monitoring configuration, but it is a good idea to create editable copies of these threshold templates and use these copies rather than the originals. Doing so will allow fine-tuning of parameters later on.

There are two different ways of creating user-defined thresholds. To create a new threshold template from scratch the operator should click the **Add new threshold** button. A pop-up window will appear allowing the user to define alarm conditions and set the round-robin cycling time. The default values of the different parameters settings are in accordance with the template **Default**. Another way of creating a user-defined threshold template is by highlighting one of the threshold templates already defined and then click the **Duplicate highlighted** button. The copy created this way may be edited during the fine-tuning phase of system configuration.

Deleting an ETR threshold template is done by highlighting the threshold template that should be removed and clicking **Delete highlighted**. Note that if the deleted threshold template is assigned to a stream currently being monitored, the new threshold for that stream will default to the predefined **Default** threshold template.

It is possible to perform multi-editing of existing threshold templates by selecting several threshold templates (using the regular *Ctrl + click* or *Shift + click* functionality) and clicking **Edit selected**. Parameters that differ between the threshold templates will be represented by an asterisk in the **Edit ETR threshold** view. Changes made will affect all selected threshold templates.



Parameter	Setting
Analyzing mode	DVB
Error timeout (s)	10
Tuning duration (s)	70
Sync loss tuning duration (s)	15
Minimum section gap (ms)	25

The ETR threshold dialog is divided into tabs for easier access to the relevant settings and has the following settings:

ETR Thresholds — Parameters:

Name: A text field with the name of the ETR threshold template

Description: Text field that should contain a meaningful description of the threshold

ETR Thresholds — General:

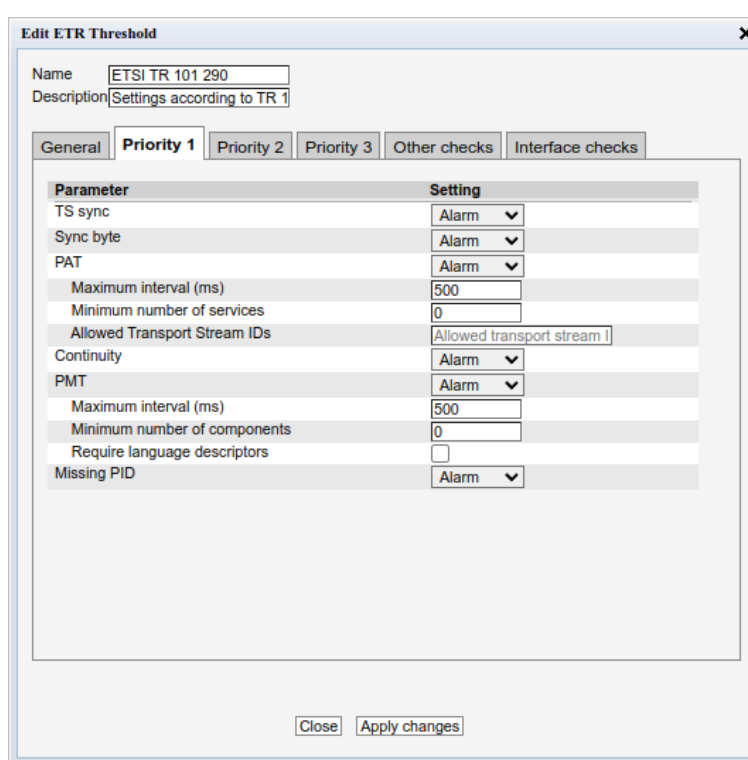
Analyzing mode: The mode of table analysis. DVB, ATSC or ISDB may be selected.

Error timeout (s): The number of seconds an alarm stays active before it is cleared, if no new alarms are generated. For all table related alarms the actual alarm timeout used is the sum of the Error timeout parameter and the maximum table repetition period. E.g. the TDT (Time Date Table) with table repetition set to 30 seconds will have an effective error timeout of 40 seconds. This avoids toggling of alarms for tables that are sent infrequently. Default value: 10 s

Tuning duration (s): The time (in seconds) the probe will stay tuned to a frequency/multicast during the round-robin loop. For setting the tuning duration, use the following expression: $\text{max_table_rep} * 2 + 10$
 Use the maximum table repetition, multiply it by 2 and then add 10 seconds.
 E.g. with TDT repetition set to 30 seconds, use $30 * 2 + 10 = 70$ seconds tuning duration.
 In order to speed up the tuning process tables should be transmitted more frequently. For instance if TDT, which is usually the least frequently transmitted table, is sent every 10 seconds, a tuning duration of 30 seconds may be used. For signals without TDT (common in SPTS) the TDT check can be disabled and the tuning duration may be reduced. If only RF measurements are performed, the minimum recommended tuning duration is 30 seconds. If the tuning duration is set too low the checks for tables with long table repetition periods will still be in an unknown state as the probe does not have enough measurements to determine the state for these. Tuning duration should never be set to less than 10 seconds for Ethernet streams and 15 seconds for all other streams (the minimum for RF streams depends on the setup). Default value: 70 s

Sync loss tuning duration (s): The time (in seconds) the probe will stay tuned to a frequency/multicast with TS Sync loss during the round-robin tuning process. Usually there is no need to stay tuned to a frequency/multicast once the probe has established that there is no signal on the tuning setup. When monitoring a tuning setup with signal loss, the probe will use the lowest value of 'Tuning duration' and 'Sync loss tuning duration', e.g. if the former is set to 60 seconds and the latter to 1000 seconds, 60 seconds will be used. Default value: 15 s

Minimum section gap (ms): The minimum allowed gap between transmission of two consecutive sections with the same table ID. If the sections are transmitted too rapidly the STB may not be able to process the data in time and various problems can occur. However newer STBs can normally handle lower section gaps than the default value of 25ms. The section gap time is measured as the time between reception of the last TS packet of two consecutive (complete) sections. This section gap setting is used for PAT, PMT, CAT, NIT, RST, TDT, MGT, VCT, PIM/PNM, RRT, ATSC EIT, ETT and STT. There are separate gap settings for SDT and EIT. Default value: 25 ms



Parameter	Setting
TS sync	Alarm
Sync byte	Alarm
PAT	Alarm
Maximum interval (ms)	500
Minimum number of services	0
Allowed Transport Stream IDs	Allowed transport stream I
Continuity	Alarm
PMT	Alarm
Maximum interval (ms)	500
Minimum number of components	0
Require language descriptors	☐
Missing PID	Alarm

ETR Thresholds — Priority 1:

TS sync: Enable or disable alarming of no signal error (TS sync loss)

Sync byte: Enable or disable alarming of sync byte errors

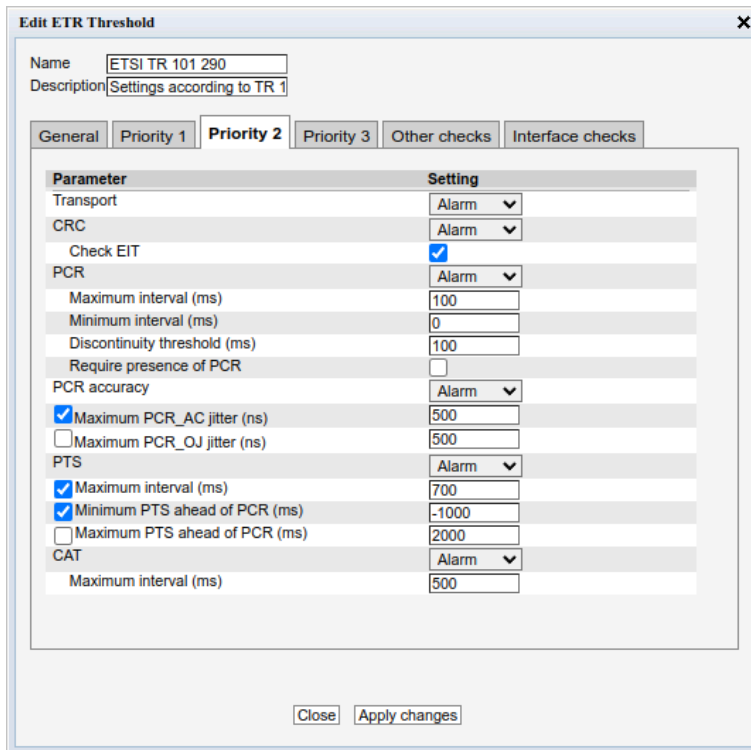
PAT: Enable or disable alarming of Program Association Table errors

PAT – Maximum interval (ms): The maximum allowed section repetition interval for the PAT table. Default according to ETSI TR 101 290: 500 ms

PAT – Minimum number of services: The minimum number of services that must be present in the PAT. Set to 0 to disable this check. Default: 0

PAT – Allowed Transport Stream IDs:	When this field is left blank all TS IDs are considered valid. If one or more TS IDs are specified (separated by commas or as a range) only these IDs are considered valid, and any other TS ID will trigger an alarm. Example of a valid field: ‘100-120, 300,320’
Continuity:	Enable or disable alarming of Continuity Counter errors
PMT:	Enable or disable alarming of Program Map Table errors
PMT – Maximum interval (ms):	The maximum allowed section repetition interval for the PMT tables. Default according to ETSI TR 101 290: 500 ms
PMT – Minimum number of components:	The minimum number of components that must be present in all services. Set to 0 to disable this check. Default: 0
PMT – Require language descriptors:	If enabled it requires a language descriptor to be present for all audio components signaled in the PMT. Default: Disabled
Missing PID:	Enable or disable alarming of missing PID errors

Note that errors affecting individual PIDs may be effectively masked by creating suitable PID threshold templates that are associated with these PIDs. This is particularly useful for PIDs affected by continuity counter errors, missing PID errors and unreferenced PID errors.



Edit ETR Threshold

Name: ETSI TR 101 290
Description: Settings according to TR 1

General | Priority 1 | **Priority 2** | Priority 3 | Other checks | Interface checks

Parameter	Setting
Transport	Alarm
CRC	Alarm
Check EIT	☒
PCR	Alarm
Maximum interval (ms)	100
Minimum interval (ms)	0
Discontinuity threshold (ms)	100
Require presence of PCR	☐
PCR accuracy	Alarm
☒ Maximum PCR_AC jitter (ns)	500
☐ Maximum PCR_OJ jitter (ns)	500
PTS	Alarm
☒ Maximum interval (ms)	700
☒ Minimum PTS ahead of PCR (ms)	-1000
☐ Maximum PTS ahead of PCR (ms)	2000
CAT	Alarm
Maximum interval (ms)	500

Close Apply changes

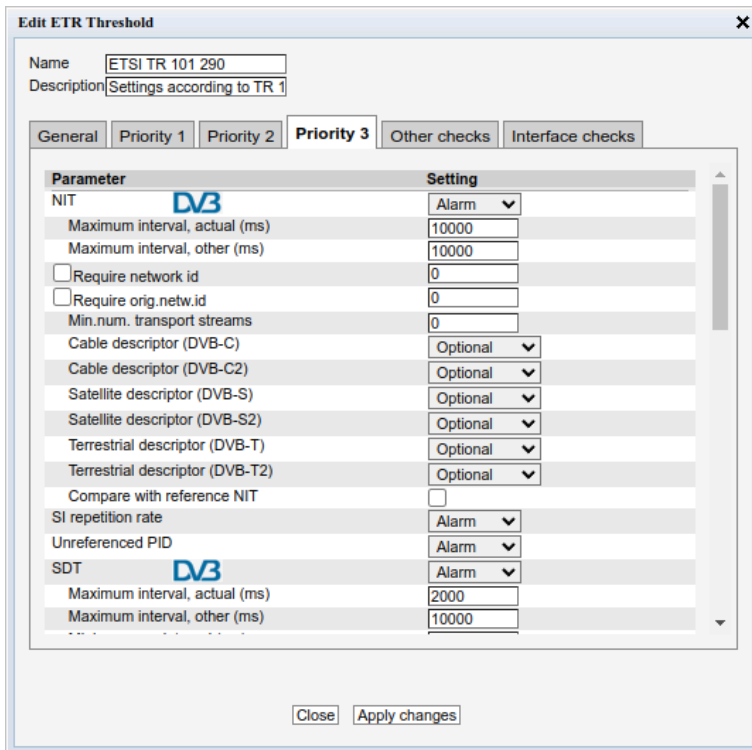
<i>ETR Thresholds — Priority 2:</i>	
Transport:	Enable or disable alarming of Transport error indicator errors
CRC:	Enable or disable alarming of checksum errors for tables
CRC – Check EIT:	When enabled alarming of CRC errors in the EIT tables will be performed. Default: Enabled
CRC – Check AIT:	When enabled alarming of CRC errors in the AIT tables will be performed. Default: Enabled
PCR:	Enable or disable alarming of Program Clock Reference errors
PCR – Maximum interval (ms):	The maximum interval between reception of PCR values. Default according to ETSI TR 101 290: 40 ms
PCR – Minimum interval (ms):	The minimum interval between reception of PCR values. Normally this setting should be 0. Default: 0 ms
PCR – Discontinuity threshold (ms):	The maximum change in the PCR value between two adjoining PCR values (where the discontinuity indicator flag has not been set). Default according to ETSI TR 101 290: 100 ms
PCR – Require presence of PCR:	When enabled an alarm will be raised if a PID signaled as PCR in the PMT does not carry PCR information
PCR Accuracy:	Enable or disable alarming of PCR Accuracy (PCR Jitter) errors for OCR_AJ and PCR_OJ. PCR_OJ is not relevant for Ethernet streams.
PCR Accuracy – Maximum PCR_AC jitter (ns):	The maximum allowed PCR jitter for PCR_AC measurements. Checking of this value will be performed if the checkbox is enabled. Default according to ETSI TR 101 290: 500 ns
PCR Accuracy – Maximum PCR_OJ jitter (ns):	The maximum allowed PCR jitter for PCR_OJ measurements. PCR_OJ measurement does not apply to IP streams. Checking of this value will be performed if the checkbox is enabled and the stream is received on an ASI or RF interface. Default according to ETSI TR 101 290: 500 ns
PTS:	Enable or disable alarming of Presentation Time Stamp errors
PTS – Maximum interval (ms):	The maximum allowed interval between the reception of two PTS values. Checking of this measurement will be performed for all PTS PIDs if the checkbox is enabled in the ETR Thresholds template. When the checkbox is disabled the measurement will only be checked for the PIDs that have this measurement enabled in the PID threshold template . Default threshold according to ETSI TR 101 290: 700 ms

PTS – Minimum PTS ahead of PCR (ms): The minimum allowed value for the measurement of the signaled PTS versus the current PCR clock. If the PTS value sent refers to a PCR clock time that have already passed the measurement will be negative. Checking of this measurement will be performed for all PTS PIDs if the checkbox is enabled in the ETR Thresholds template. When the checkbox is disabled the measurement will only be checked for the PIDs that have this measurement enabled in the **PID threshold template**. Default: -1000 ms

PTS – Maximum PTS ahead of PCR (ms): The maximum allowed value for the measurement of the signaled PTS versus the current PCR clock. Checking of this measurement will be performed for all PTS PIDs if the checkbox is enabled in the ETR Thresholds template. When the checkbox is disabled the measurement will only be checked for the PIDs that have this measurement enabled in the **PID threshold template**. Default: 2000 ms

CAT: Enable or disable alarming of Conditional Access Table errors

CAT – Maximum interval (ms): The maximum allowed section repetition interval for the CAT table. Default according to ETSI TR 101 290: 500 ms



Parameter	Setting
NIT	Alarm
Maximum interval, actual (ms)	10000
Maximum interval, other (ms)	10000
☐ Require network id	0
☐ Require orig.netw.id	0
Min.num. transport streams	0
Cable descriptor (DVB-C)	Optional
Cable descriptor (DVB-C2)	Optional
Satellite descriptor (DVB-S)	Optional
Satellite descriptor (DVB-S2)	Optional
Terrestrial descriptor (DVB-T)	Optional
Terrestrial descriptor (DVB-T2)	Optional
Compare with reference NIT	☐
SI repetition rate	Alarm
Unreferenced PID	Alarm
SDT	Alarm
Maximum interval, actual (ms)	2000
Maximum interval, other (ms)	10000

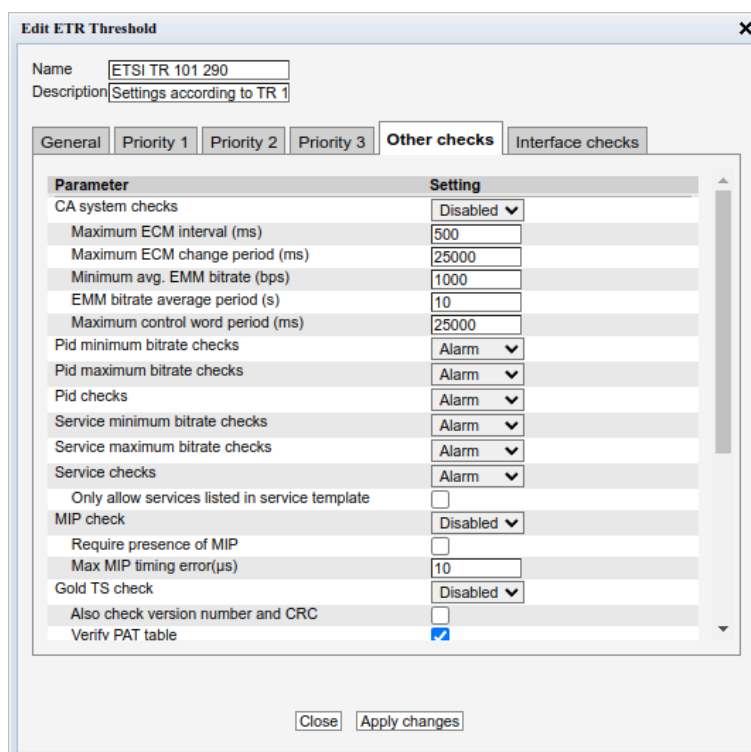
<i>ETR Thresholds — Priority 3:</i>	
NIT:	Enable or disable alarming of Network Information Table errors. Only relevant when DVB mode is selected.
NIT – Maximum interval actual (ms):	The maximum allowed section repetition interval for the NIT actual table. Default according to ETSI TR 101 290: 10 s
NIT – Maximum interval other (ms):	The maximum allowed section repetition interval for the NIT other table. Default according to ETSI TR 101 290: 10 s
NIT – Require network id:	If enabled the probe will require that the network ID found in the NIT matches the configured value. Default: Disabled
NIT – Require orig. netw. id:	If enabled the probe will require that the original network ID found in the NIT matches the configured value. Default: Disabled
NIT – Min. num. transport streams:	The minimum number of transport streams that must be present in the NIT. Set to 0 to disable this check. Default: 0
NIT – Cable descriptor (DVB-C):	If set to 'Required' an alarm will be generated if a DVB-C Cable descriptor is not present in the NIT for the monitored frequency. Similarly if set to 'Not allowed', an alarm will be generated if the DVB-C Cable descriptor is present. Default: Optional
NIT – Cable descriptor (DVB-C2):	If set to 'Required' an alarm will be generated if a DVB-C2 Cable descriptor is not present in the NIT for the monitored frequency. Similarly if set to 'Not allowed', an alarm will be generated if the DVB-C2 Cable descriptor is present. Default: Optional
NIT – Satellite descriptor (DVB-S):	If set to 'Required' an alarm will be generated if a DVB-S Satellite descriptor is not present in the NIT for the monitored frequency. Similarly if set to 'Not allowed', an alarm will be generated if the DVB-S Satellite descriptor is present. Default: Optional
NIT – Satellite descriptor (DVB-S2):	If set to 'Required' an alarm will be generated if a DVB-S2 Satellite descriptor is not present in the NIT for the monitored frequency. Similarly if set to 'Not allowed', an alarm will be generated if the DVB-S2 Satellite descriptor is present. Default: Optional

NIT – Terrestrial descriptor (DVB-T):	If set to 'Required' an alarm will be generated if a DVB-T Terrestrial descriptor is not present in the NIT for the monitored frequency. Similarly if set to 'Not allowed', an alarm will be generated if the DVB-T Terrestrial descriptor is present. Default: Optional
NIT – Terrestrial descriptor (DVB-T2):	If set to 'Required' an alarm will be generated if a DVB-T2 Terrestrial descriptor is not present in the NIT for the monitored frequency. Similarly if set to 'Not allowed', an alarm will be generated if the DVB-T2 Terrestrial descriptor is present. Default: Optional
NIT – Compare with reference NIT:	If enabled the NIT will be compared with the NIT on the reference frequency, and an alarm will be generated if a mismatch is found. The first frequency in the tuning list will be used as the reference frequency. Both the CRC values of the different sections and the number of sections must be identical. Default: Disabled
SI Repetition Rate:	Enable or disable alarming of SI Repetition Rate errors.
Unreferenced PID:	Enable or disable alarming of Unreferenced PID errors. To mask Unreferenced PID alarms for a PID create a PID threshold template where this error is masked.
SDT:	Enable or disable alarming of Service Description Table errors. Only relevant when DVB mode is selected.
SDT – Maximum interval actual (ms):	The maximum allowed section repetition interval for the SDT actual table. Default according to ETSI TR 101 290: 2 000 ms
SDT – Maximum interval other (ms):	The maximum allowed section repetition interval for the SDT other table. Default according to ETSI TR 101 290: 10 000 ms
SDT – Minimum gap interval (ms):	The minimum allowed section gap interval for the SDT table. Default according to ETSI TR 101 290: 25 ms
SDT – Verify SDT against PAT:	If enabled an alarm will be generated if a service found in the PAT is not listed in the SDT. Default: Disabled
SDT – Require service name:	If enabled an alarm will be generated if a service found in the PAT does not have a service name or if the service name is empty. Default: Disabled
SDT – Require BAT Presence:	If enabled an alarm will be generated if BAT is not present in the stream. Default: Disabled
EIT:	Enable or disable alarming of Event Information Table errors. Only relevant when DVB mode is selected.

EIT – Maximum interval actual (ms):	The maximum allowed section repetition interval for the EIT actual table. Default according to ETSI TR 101 290: 2 000 ms
EIT – Minimum gap interval (ms):	The minimum allowed section gap interval for the EIT tables. Default according to ETSI TR 101 290: 25 ms
EIT – Required Table IDs:	If one or more table IDs are specified an alarm will be generated if these table IDs are not present in the stream on the EIT PID. Entries should be separated by commas, or a range may be specified. Example: '78,79,80-85' Default: Disabled
EIT – Verify that present event is transmitted	If enabled, an alarm will be raised if one or more services don't have a present event transmitted in the EIT (i.e. no EPG for the current program)
EIT – Check valid time for present event	If enabled, an alarm will be raised if time signaled for the present event (the current program) is not correct. The maximum offset from the current time can be configured.
EIT – Maximum timing error for present event(s)	The maximum timing error to allow for the present event. If the current time is not inside the program start/stop times by this margin then an alarm will be raised.
EIT – Verify that following event is transmitted	If enabled, an alarm will be raised if one or more services don't have a following event transmitted in the EIT (i.e. no EPG for the next program)
RST:	Enable or disable alarming of Running Status Table errors. Only relevant when DVB mode is selected.
RST – Maximum interval (ms):	The maximum allowed section repetition interval for the RST table. Default according to ETSI TR 101 290: 20 s
TDT:	Enable or disable alarming of Time Date Table errors. Only relevant when DVB mode is selected.
TDT – Maximum interval (ms):	The maximum allowed section repetition interval for the TDT and TOT tables. Default according to ETSI TR 101 290: 30 000 ms
TDT – Require TOT presence:	Check this checkbox if TOT presence is required. Default: disabled
MGT:	Enable or disable alarming of Master Guide Table errors. Only relevant when ATSC mode is selected.

MGT – Maximum interval (ms):	The maximum allowed section repetition interval for the MGT table. Default: 150ms
VCT:	Enable or disable alarming of Virtual Channel Table errors. Only relevant when ATSC mode is selected.
VCT – Require TVCT:	Require presence of the Terrestrial Virtual Channel Table.
VCT – Require CVCT:	Require presence of the Cable Virtual Channel Table.
VCT – Maximum interval (ms):	The maximum allowed section repetition interval for the VCT table. Default: 400ms
PIM/PNM:	Enable or disable alarming of Program Information Message and Program Name Message tables. Only relevant when ATSC mode is selected.
PIM/PNM – Require PIM:	Require presence of the Program Information Message table.
PIM/PNM – Maximum interval PIM (ms):	The maximum allowed section repetition interval for the PIM table. Default: 500ms
PIM/PNM – Require PNM:	Require presence of the Program Name Message table.
PIM/PNM – Maximum interval PNM (ms):	The maximum allowed section repetition interval for the PNM table. Default: 1000ms
RRT:	Enable or disable alarming of Rating Region Table errors. Only relevant when ATSC mode is selected.
RRT – Maximum interval (ms):	The maximum allowed section repetition interval for the RRT table. Default: 30000ms
STT:	Enable or disable alarming of System Time Table errors. Only relevant when ATSC mode is selected.
STT – Maximum interval (ms):	The maximum allowed section repetition interval for the STT table. Default: 1000ms
ATSC EIT:	Enable or disable alarming of ATSC Event Information Table errors. Only relevant when ATSC mode is selected.
ATSC EIT – Maximum interval EIT-0 (ms):	The maximum allowed section repetition interval for the ATSC EIT-0 table. Default: 500ms

ATSC EIT – Maximum interval EIT–1 to EIT–3 (ms):	The maximum allowed section repetition interval for the ATSC EIT–1 to EIT–3 tables. Default: 5000ms
ATSC EIT – Maximum interval EIT–4 to EIT–127 (ms):	The maximum allowed section repetition interval for the ATSC EIT–4 to EIT–127 tables. Default: 30000ms
ETT:	Enable or disable alarming of Extended Text Table errors. Only relevant when ATSC mode is selected.
ETT – Maximum interval ETT–0 (ms):	The maximum allowed section repetition interval for the ATSC ETT–0 table. Default: 2000ms
ETT – Maximum interval ETT–1 to ETT–3 (ms):	The maximum allowed section repetition interval for the ATSC ETT–1 to ETT–3 tables. Default: 5000ms
ETT – Maximum interval ETT–4 to ETT–127 (ms):	The maximum allowed section repetition interval for the ATSC ETT–4 to ETT–127 tables. Default: 30000ms



Edit ETR Threshold

Name: ETSI TR 101 290
Description: Settings according to TR 1

General | Priority 1 | Priority 2 | Priority 3 | **Other checks** | Interface checks

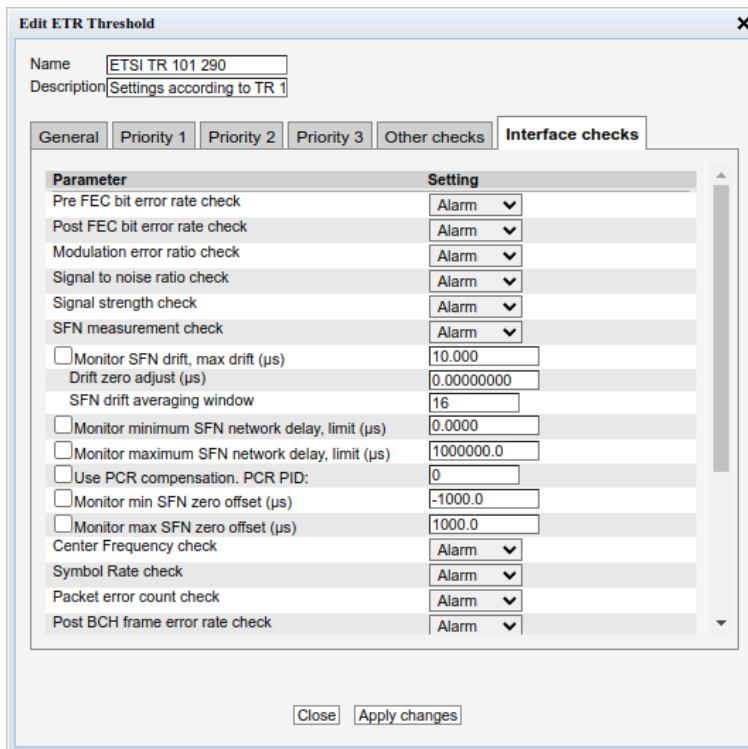
Parameter	Setting
CA system checks	Disabled ▼
Maximum ECM interval (ms)	500
Maximum ECM change period (ms)	25000
Minimum avg. EMM bitrate (bps)	1000
EMM bitrate average period (s)	10
Maximum control word period (ms)	25000
Pid minimum bitrate checks	Alarm ▼
Pid maximum bitrate checks	Alarm ▼
Pid checks	Alarm ▼
Service minimum bitrate checks	Alarm ▼
Service maximum bitrate checks	Alarm ▼
Service checks	Alarm ▼
Only allow services listed in service template	☐
MIP check	Disabled ▼
Require presence of MIP	☐
Max MIP timing error(μs)	10
Gold TS check	Disabled ▼
Also check version number and CRC	☐
Verifv PAT table	☒

Close Apply changes

<i>ETR Thresholds — Other checks:</i>	
CA system checks:	Enable or disable alarming of Conditional Access System errors.
CA system checks – Maximum ECM interval (ms):	The maximum allowed ECM repetition interval. Default: 500 ms
CA system checks – Maximum ECM change period (ms):	The maximum time allowed between ECM changes. Default: 25000ms
CA system checks – Minimum avg. EMM bitrate (bps):	The minimum allowed average EMM bitrate. Default: 1000 bps
CA system checks – EMM bitrate average period (s):	The averaging period used to calculate EMM bitrate. Note that the average period must be at least 20s less than the round-robin tuning period, e.g. with a round-robin tuning period of 70s the maximum EMM bitrate average period is 50s. Default: 10s
CA system checks – Maximum control word period (ms):	The maximum allowed control word period (the maximum time that can go by without a change in the scrambling control bits for scrambled PIDs). Default: 25 000 ms
PID minimum bitrate checks:	Enable or disable alarming of PID minimum bitrate. The bitrates are set in the PID threshold template .
PID maximum bitrate checks:	Enable or disable alarming of PID maximum bitrate. The bitrates are set in the PID threshold template .
PID checks:	Enable or disable alarming of PID presence errors, scrambling/clear requirements and PID type checks. The checks are set in the PID threshold template .
Service minimum bitrate checks:	Enable or disable alarming of service minimum bitrate errors. Requirements are specified in the service threshold template associated with the stream.
Service maximum bitrate checks:	Enable or disable alarming of service maximum bitrate errors. Requirements are specified in the service threshold template associated with the stream.
Service checks:	Enable or disable alarming of service presence, scrambling/clear required, service type, service name and service ID errors. Requirements are specified in the service threshold template associated with the stream.

Service checks – Only allow services listed in service template:	Check this box to enable service ID checks against the service ID list specified in the service threshold template associated with the stream.
MIP check:	Enable or disable alarming of errors related to the Megaframe Insertion Packet.
MIP checks – Require presence of MIP:	Check this box to enable an alarm if the MIP table is missing for the stream.
MIP checks – Max MIP timing error(μs):	The maximum MIP timing error before raising an alarm. The unit is μ s. Default: 10 μ s
Gold TS check:	Enable or disable alarming for tables failing Gold TS reference checking.
Gold TS check – Also check version number and CRC:	When enabled an alarm will be raised for any change, including a change in the table version number and CRC.
Gold TS check – Verify PAT table:	Do verification of the PAT table against the stored reference PAT table.
Gold TS check – Verify PMT tables:	Do verification of the PMT tables against the stored reference PMT tables.
Gold TS check – Verify CAT table:	Do verification of the CAT table against the stored reference CAT table.
Gold TS check – Verify SDT actual table:	Do verification of the SDT actual table against the stored reference SDT actual table.
Gold TS check – Verify SDT other tables:	Do verification of the SDT other tables against the stored reference SDT other tables.
Gold TS check – Verify BAT table:	Do verification of the BAT table against the stored reference BAT table.
Gold TS check – Verify NIT actual table:	Do verification of the NIT actual table against the stored reference NIT actual table.
Gold TS check – Verify NIT other tables:	Do verification of the NIT other tables against the stored reference NIT other tables.

Time information check:	Enable or disable alarming if there are errors in the time information sent in the streams. Probe should use NTP time sync to use this functionality.
Time information check – Check TDT:	Check the time in the TDT table and alarm if it is wrong.
Time information check – Check TOT:	Check the time in the TOT table and alarm if it is wrong.
Time information check – Check LTC:	Check the time in the Logical Time Code table and alarm if it is wrong.
Time information check – Max time offset:	The maximum number of seconds the time information provided in the stream can deviate from the probe time before an alarm is raised.
Time information check – Max repetition time:	The maximum time without any time information before an alarm is raised.



Edit ETR Threshold

Name: ETSI TR 101 290
Description: Settings according to TR 1

General | Priority 1 | Priority 2 | Priority 3 | Other checks | **Interface checks**

Parameter	Setting
Pre FEC bit error rate check	Alarm
Post FEC bit error rate check	Alarm
Modulation error ratio check	Alarm
Signal to noise ratio check	Alarm
Signal strength check	Alarm
SFN measurement check	Alarm
☐ Monitor SFN drift, max drift (µs)	10.000
Drift zero adjust (µs)	0.00000000
SFN drift averaging window	16
☐ Monitor minimum SFN network delay, limit (µs)	0.0000
☐ Monitor maximum SFN network delay, limit (µs)	1000000.0
☐ Use PCR compensation. PCR PID:	0
☐ Monitor min SFN zero offset (µs)	-1000.0
☐ Monitor max SFN zero offset (µs)	1000.0
Center Frequency check	Alarm
Symbol Rate check	Alarm
Packet error count check	Alarm
Post BCH frame error rate check	Alarm

Close Apply changes

ETR Thresholds — Interface checks:

Pre FEC bit error rate check:	If enabled an alarm will be raised provided that the pre FEC BER measured is above the threshold value associated with the stream. Only relevant for RF signals.
Post FEC bit error rate check:	If enabled an alarm will be raised provided that the post FEC BER measured is above the threshold value associated with the stream. Only relevant for RF signals.
Modulation error ratio check:	If enabled an alarm will be raised provided that the MER measured is above the threshold value associated with the stream. Only relevant for RF signals.
Signal to noise ratio check:	If enabled an alarm will be raised provided that the SNR measured is below the threshold value associated with the stream. Only relevant for RF signals.
Signal strength check:	If enabled an alarm will be raised provided that the signal level measured is below the minimum signal strength threshold value or above the maximum signal strength threshold value associated with the stream. Only relevant for RF signals.
SFN measurement check:	Enable or disable alarming of SFN drift errors. Only relevant for ASI, SAT and DVB-T/T2 signals.
SFN measurement check – Monitor SFN drift, max drift (μs):	Check the Monitor SFN drift box to enable SFN drift monitoring, and set the SFN drift alarm threshold. Default: disabled and 10 μ s.
SFN measurement check – Drift zero adjust (μs):	SFN drift zero adjustment to compensate for delays in transmitter and receiver equipment. When an optimal system is configured the Drift zero adjust figure should be set to yield an SFN drift figure close to zero in the COFDM — Status view.
SFN measurement check – SFN drift averaging window:	The number of SFN drift measurements to calculate an average over. The alarming and GUI will use the averaged value instead of the raw value which fluctuates more. When set to 1 the raw value will be used directly. For high values it will take some time to determine the averaged value.
SFN measurement check – Monitor minimum SFN network delay, limit (μs):	Minimum limit for the measured network delay for the signals (based on MIP for DVB-T signals and T2MI for DVB-T2 signals).
SFN measurement check – Monitor maximum SFN network delay, limit (μs):	Maximum limit for the measured network delay for the signals (based on MIP for DVB-T signals and T2MI for DVB-T2 signals).

SFN measurement check – Monitor minimum SFN (1–network delay), limit (μs):	Minimum limit for the measured negative network delay for the signals (1 second – the SFN network delay).
SFN measurement check – Monitor maximum SFN (1–network delay), limit (μs):	Maximum limit for the measured negative network delay for the signals (1 second – the SFN network delay).
SFN measurement check – Use PCR compensation. PCR PID:	To further improve the SFN drift measurements a PCR PID can be specified. This PID will be used to zero-adjust the SFN drift measurements automatically when the interface card have been retuned. (Retuning can happen when manually requested in the GUI or using Eii, and will also happen if the signal on the input is lost and then comes back.) Must be set to a valid PCR PID.
SFN measurement check – Monitor min SFN zero offset (μs):	The minimum limit for the SFN zero adjustment. An alarm will be raised if the zero adjustment value used for the SFN drift measurement is lower than the configured threshold.
SFN measurement check – Monitor max SFN zero offset (μs):	The maximum limit the SFN zero adjustment. An alarm will be raised if the zero adjustment value used for the SFN drift measurement is higher than the configured threshold.
Center frequency check:	Enable or disable alarming of center frequency inaccuracy with reference to the threshold setting. Only relevant for RF signals.
Symbol Rate check:	Enable or disable alarming of symbol rate inaccuracy with reference to the threshold setting. Only relevant for RF signals.
Packet error count check:	Enable or disable alarming when there are erroneous packets after FEC. Only relevant for DVB-S/S2 RF signals.
Post BCH frame error rate check:	Enable or disable alarming for when the frame error rate after BCH is above threshold. Only relevant for DVB-T/T2 RF signals.
T2MI check:	Enable or disable alarming for the T2MI related errors. Only relevant for T2MI streams.
T2MI check – Expected PLPs	Set the list of PLP IDs which are expected in the stream. If any of the listed PLPs are missing an alarm will be raised. Similarly, if PLPs not listed in the template are present then an alarm will be raised.
T2MI check – Expected T2 Timestamp	Set the T2 timestamp type required to be present in the stream. An alarm will be raised if this is incorrect. Set to 'Any type' to disable the check.

T2MI check – Expected leap seconds	When set to a non-zero value the leap second counter transmitted in the T2 timestamp will be compared against the reference value. An alarm will be raised if this is incorrect.
T2MI check – Enable T2-MIP check	When enabled the probe will perform verification the T2-MIP.
Eb/N0:	Enable or disable alarming when the Eb/N0 measurement is lower than the threshold set in the RF template. Only relevant for DVB-S/S2/S2X RF signals.
EVM:	Enable or disable alarming when the Error Vector Magnitude is higher than the threshold set in the RF template. Only relevant for DVB-S/S2 RF signals.
LDPC iteration count check:	Enable or disable alarming when the LDPC iteration count needed to recover the signal is higher than the threshold set in the RF template. Only relevant for DVB-T2 RF signals.
Link margin:	Enable or disable alarming when the link margin measurement is lower than the threshold set in the RF template. Only relevant for DVB-S/S2/S2X RF signals.
Input overflow check:	If enabled, an alarm will be raised provided input overflow is detected. An input overflow will only occur if the probe is overloaded.

7.9.12 ETR 290 — PID thresholds

Overview
ETR Details
PIDs
Services
Bitrates
Tables
PCR
Status
Compare
ETR thr.
PID thr.
Serv. thr.
Gold TS thr.

PID Thresholds
These thresholds are used to override the ETR thresholds on a per-PID basis

Name	Refs	Description	Edit
Default	139	No special rules for any PIDs.	Edit
Bitrate + pcr odd	0		Edit
Bitrate + pcr even	0		Edit
Err	0		Edit
Mask CC err EIT	2		Edit
Thor	1		Edit

PID thresholds: 6

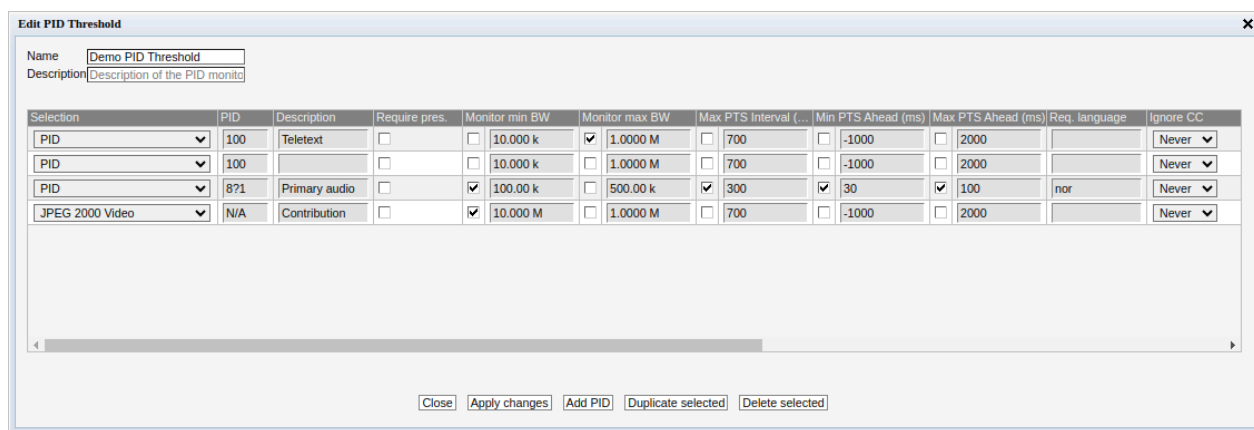
Add new threshold group
Duplicate selected
Delete selected

The **PID thresholds** make it possible to define detailed conditions for alarm triggering on a PID or PID type basis. There is one predefined PID threshold template that cannot be edited by the operator: 'Default'. The 'Default' PID threshold template contains no PID definitions and will therefore not alter alarming for any service.

By associating scheduling templates to checks it is possible to disable alarming at pre-selected time intervals. Scheduling templates are defined in the **Setup — Scheduling** view and will be available from a selection drop-down menu for some of the checks.

In the ‘PID Thresholds’ table, the ‘Refs’ column shows how many streams are associated with each threshold template.

There are two different ways of creating user-defined thresholds. To create a new threshold template from scratch the operator should click the **Add new threshold** template button. A pop-up window will appear allowing the user to define alarm conditions. Another way of creating a user-defined threshold template is by highlighting one of the templates already defined and then click the **Duplicate highlighted** button.



Deleting a PID threshold template is done by highlighting the threshold template that should be removed and clicking **Delete highlighted**. Note that if the deleted threshold template was assigned to a stream being monitored, the new threshold for that stream will default to the predefined **Default** threshold template.

The PID threshold template has the following settings:

Edit PID Threshold:

Name: The name of the PID threshold template

Description: Text field that should contain a meaningful description of the threshold template

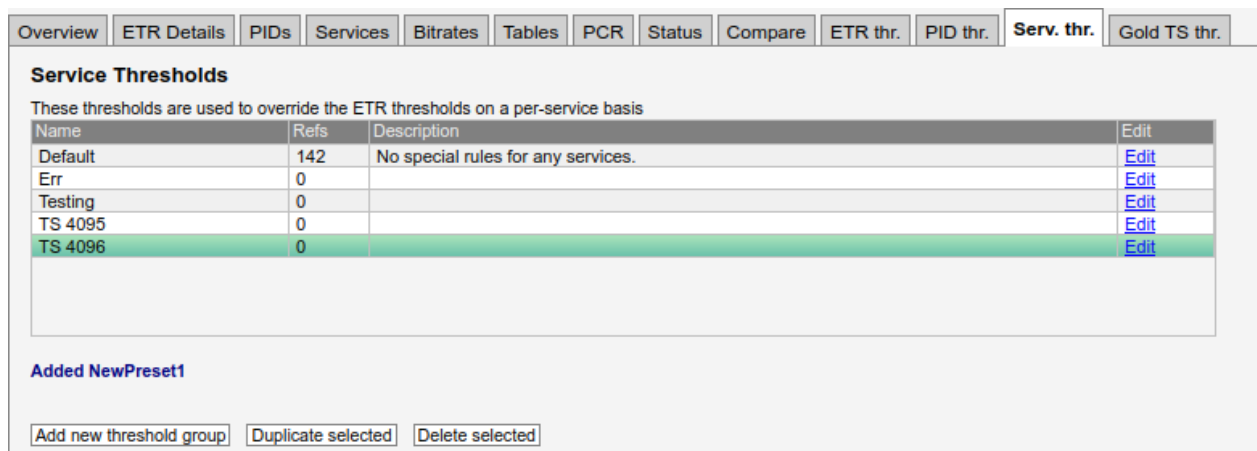
PID Threshold Parameters:

Selection: The user selects if the requirements should apply for a specific PID or for all PIDs of a specified type. Note that the PID type detection depends on correct PSI/SI/PSIP signaling.

PID:	The PID for which the specified requirements apply. If a PID type is selected in the 'Selection' column, this field will update to read N/A when the Apply changes button is clicked. A question mark can be used as a wild card to represent one digit. Example: The PID value 8?1 will match 3 digit PID numbers such as 801, 811 and 891. It will not match PID 81 or 8001.
Description:	A text field describing the PID or PID type requirement.
Require pres.:	If this field is checked an alarm will be raised provided that the specified PID is not present in the transport stream. Note that this check is only available for specified PIDs and not for PID types.
Monitor min BW:	An alarm is raised if the PID bandwidth goes below the specified minimum bandwidth (bandwidth in kbit/s or Mbit/s) and monitoring is enabled.
Monitor max BW:	An alarm is raised if the maximum PID bandwidth specified is exceeded (bandwidth in kbit/s or Mbit/s) and monitoring is enabled.
Max PTS interval (ms):	If the checkbox is enabled, the PTS interval measurement will be enabled for this PID and use the configured threshold. This will override the setting in the ETR thresholds template. An alarm is raised if the PTS repetition interval exceeds the configured limit.
Min PTS ahead (ms):	If the checkbox is enabled, the measurement of minimum PTS ahead will be enabled for this PID and use the configured threshold. This will override the setting in the ETR thresholds template. An alarm is raised if the PTS ahead measurement is lower than the the configured limit. The PTS ahead measurement measures the PTS value relative to the current PCR clock.
Max PTS ahead (ms):	If the checkbox is enabled, the measurement of maximum PTS ahead will be enabled for this PID and use the configured threshold. This will override the setting in the ETR thresholds template. An alarm is raised if the PTS ahead measurement is higher than the the configured limit. The PTS ahead measurement measures the PTS value relative to the current PCR clock.
Req. language:	If the PID need to have a certain language code signaled in the language descriptor it can be set here. An alarm will be raised if a wrong language is signaled or if the language is not signaled.
Ignore CC:	Select a scheduling template different from 'Never' for the probe to ignore CC errors for the specified PID or PID type.
Ignore missing:	Select a scheduling template different from 'Never' for the probe to ignore that the specified PID or PID type is signaled in PSI but missing in the stream.

Ignore PCR:	Select a scheduling template different from 'Never' for the probe to ignore any PCR errors for this PID or PID type.
Ignore unref.:	Select a scheduling template different from 'Never' for the probe to ignore that the specified PID is present in the stream but unreferenced in PSI.
Ignore all:	Select a scheduling template different from 'Never' for the probe to ignore all errors for a specified PID or PID type.
Scrambling:	An alarm will be raised provided that the specified PID is scrambled when 'require clr' has been selected. Similarly an alarm will be raised if the specified PID is clear when 'require scr' has been selected. The default setting is to ignore whether the PID or PID type is scrambled or not.

7.9.13 ETR 290 — Service thresh.



Service Thresholds

These thresholds are used to override the ETR thresholds on a per-service basis

Name	Refs	Description	Edit
Default	142	No special rules for any services.	Edit
Err	0		Edit
Testing	0		Edit
TS 4095	0		Edit
TS 4096	0		Edit

Added NewPreset1

[Add new threshold group](#) [Duplicate selected](#) [Delete selected](#)

The **Service thresholds** make it possible to define detailed conditions for alarm triggering on a per-service basis. There is one predefined service threshold template that cannot be edited by the operator: **Default**. The Default service threshold template contains no service definitions and will therefore not alter alarming for any service.

By associating scheduling templates to service threshold templates it is possible to disable alarming at pre-selected time intervals. Scheduling templates are defined in the **Setup — Scheduling** view and will be available from the schedule drop-down menu.

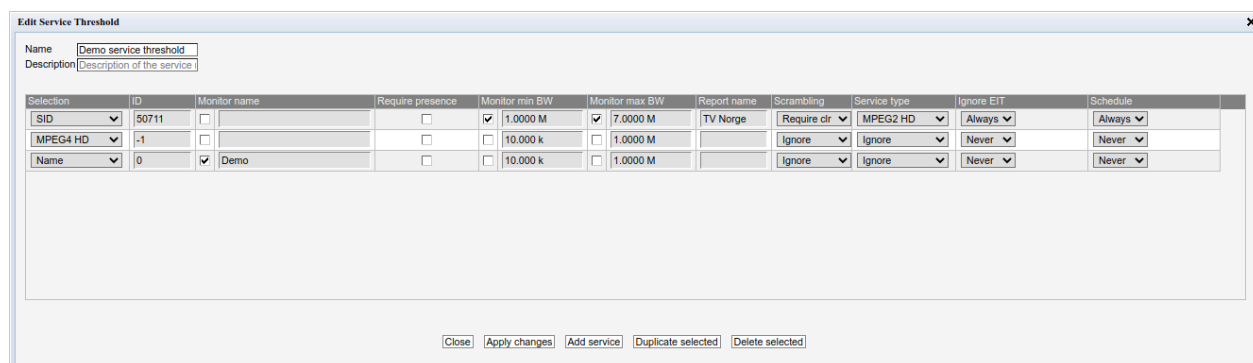
In the 'Service Thresholds' table, the 'Refs' column shows how many streams are associated with each threshold template.

There are two different ways of creating user-defined thresholds. To create a new threshold template from scratch the operator should click the **Add new threshold group** button. A pop-up window will appear allowing the user to assign a name and value to the new threshold and define the alarm

conditions. Another way of creating a user-defined threshold template is by highlighting one of the templates already defined and then click the **Duplicate selected** button.

Deleting a service threshold template is done by highlighting the template that should be removed and clicking **Delete selected**. Note that if the deleted threshold template was assigned to a stream being monitored, the new threshold template for that stream will default to the **Default** template.

The settings **Service minimum bitrate checks**, **Service minimum bitrate checks** and **Service checks** in the ETR threshold template controls whether or not to report alarms based on the service threshold template parameters.



Selection	ID	Monitor name	Require presence	Monitor min BW	Monitor max BW	Report name	Scrambling	Service type	Ignore ETT	Schedule
SID	50711		☐	☒ 1.0000 M	☒ 7.0000 M	TV Norge	Require clr	MPEG2 HD	Always	Always
MPEG4 HD	1		☐	☐ 10.000 k	☐ 1.0000 M		Ignore	Ignore	Never	Never
Name	0	Demo	☐	☐ 10.000 k	☐ 1.0000 M		Ignore	Ignore	Never	Never

Edit Service Threshold

Name: A text string that identifies the service threshold group

Description: Text field that should contain a meaningful description of the threshold

Service Threshold Parameters

Selection: The user selects if the requirements should apply for a specific service ID (as specified in the **ID** column), for all services of a specified type or for a service with a specified service name (as specified in the **Monitor name** column). Note that the service type detection depends on correct PSI/SI/PSIP signaling.

ID: The service ID for which the associated thresholds should apply. For an SPTS the service ID will generally be 1; adding several list entries with different service IDs allows different thresholds to apply for different services within an MPTS.

This value only applies if 'SID' is selected in the **Selection** column.

Monitor name: A text string may be specified that should match the service name of the associated service ID, as analyzed from the received SDT. Note that the check is case sensitive. An alarm will be raised if there is not a perfect match.

Require presence:	If this field is checked an alarm will be raised provided that the specified service is not present in the stream. This check only requires that the service is present in the PAT, the other ETR checks will give alarms if there are other problems with the service, such as missing PMT or missing components. Note that this check is only available for specified services and not for service types.
Monitor min BW:	If enabled an alarm is raised provided that the minimum service bandwidth goes below the specified bandwidth (in kbit/s or Mbit/s).
Monitor max BW:	If enabled an alarm is raised provided that the maximum service bandwidth specified (in kbit/s or Mbit/s) is exceeded.
Report name:	It is possible to define the service name that should be used for alarm traps and for alarm reporting to the VideoBRIDGE Controller. This can be convenient to be able to track a service that changes name (as signaled in PSI/SI) in the signal chain, when services within an MPTS are unnamed (no service names in the SDT) or when services should be recognized by the VideoBRIDGE Controller under a different name than indicated in the SDT. Note that this functionality will only work for services specified by service ID or by name (specified in the Selection column).
Scrambling:	If a value different from 'Ignore' is selected an alarm will be raised if the service scrambling status differs from the requirement. A service is considered scrambled if one of its components is scrambled.
Service type:	If a value different from 'Ignore' is selected it should match the service type detected by analyzing the received SDT. An alarm will be raised if the service types differ.
Ignore EIT:	Ignore missing EIT errors for this service. This is used for services which does not have EIT data. By ignoring EIT alarms on these services, false EIT alarms are avoided.
Schedule:	The Schedule drop-down menu allows the user to associate a scheduling scheme to a service, in effect masking alarms during selected intervals. Scheduling templates are defined in the Setup — Scheduling view. The predefined scheduling templates 'Never' and 'Always' will always be selectable, and these will result in service alarms never and always being masked, respectively. Note that if a PID is shared between several services and alarm masking is defined for one of the services, no alarms will be raised due to errors affecting this service.

Note that it is possible to create a service threshold template that allows probe alarming if a new service appears in a stream. This is done by creating a threshold template listing the service IDs

that are allowed to be present in a stream, and associating it to the stream. A complementary ETR threshold template should be created, that has the ‘Only allow services listed in service template’ check enabled. This ETR threshold template should also be associated with the stream.

7.9.14 ETR 290 — Gold TS thresholds

Overview

ETR Details

PIDs

Services

Bitrates

Tables

PCR

T2MI

SCTE 35

Status

Compare

ETR thr.

PID thr.

Serv. thr.

Gold TS thr.

Gold TS reference thresholds

Name	Refs	Description	Edit
OAM2, LTT OAM	1	TS 102, NW ID 42499 (Updated Mar 7 10:20:08)	Edit
Ethernet, NC_239.255.0.10	1	TS 27 (Added Mar 7 10:20:29)	Edit

Gold TS reference presets:0

Add/update threshold

Delete selected threshold

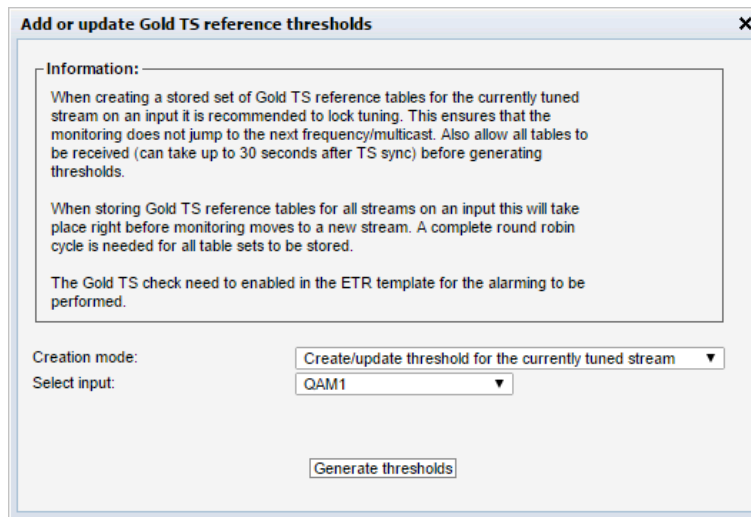
The Gold TS reference feature is used to compare the tables in the transport stream with a set of stored reference tables. This allows the operator to be notified of any changes in the PSI/SI tables such as:

- A service disappearing
- A new service being added
- Language descriptors suddenly changing
- Changes in service names
- Changes in frequencies used to transmit the signals
- And lots of misconfigurations in multiplexers

To use the Gold TS reference functionality, first store away tables for a stream or a set of streams. Go to **ETR 290 — Gold TS thr.**

Here you can see the reference thresholds currently stored on the probe and they can be renamed or edited.

To add new reference thresholds or update the existing thresholds click on the button named **Add/update threshold**. The following dialog is then shown:



There are two different ways of creating a Gold TS reference template:

- Creating a template for the currently tuned stream on a specific input
- Creating a template for all streams on a specific input (or all inputs)

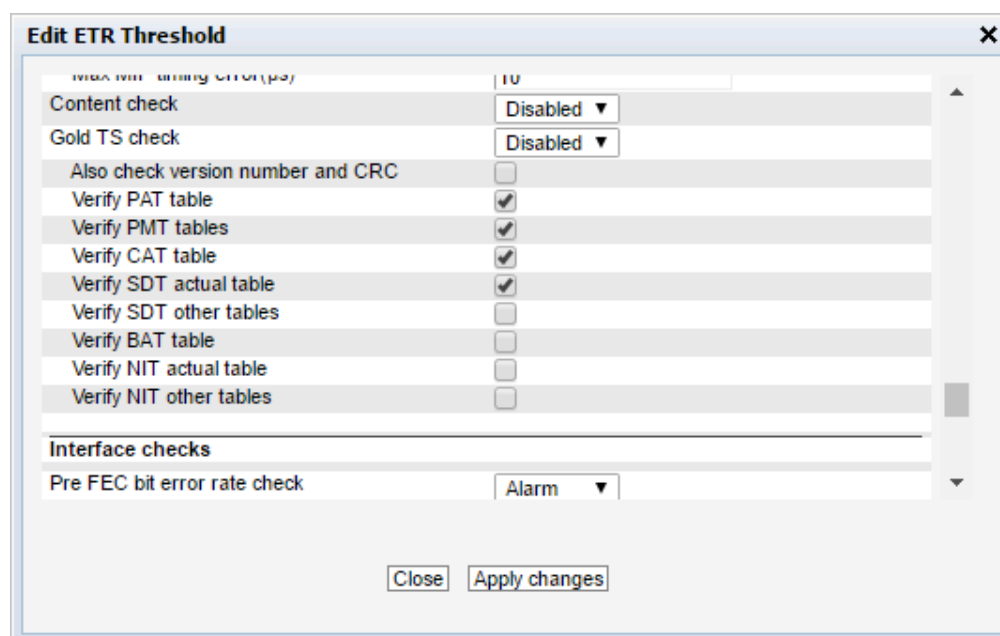
When creating a template for a specific stream the table set is saved immediately. It is therefore recommended that the ETR tuning is locked to this stream to avoid the round-robin operation from tuning to a new frequency just before the table set is stored. It can take 30 seconds after tuning to receive all tables.

When creating templates for all streams on an input this is done as a part of the round robin cycle at the end of the tuning period. It can then take a while for all thresholds to be generated (or updated) depending on the number of streams on that input.

When the reference template have been created it is automatically associated with the stream for which it was generated.

The operation of the Gold TS reference thresholds are controlled by the ETR threshold template associated with the stream. No settings are changed here when creating the reference templates so this needs to be done manually by going to **ETR 290 — ETR thr.**

If needed a new template can be created and associated with the stream(s). Or the existing template(s) can be changed.



The reference check needs to be set to alarm if the Gold TS reference checking are to be performed.

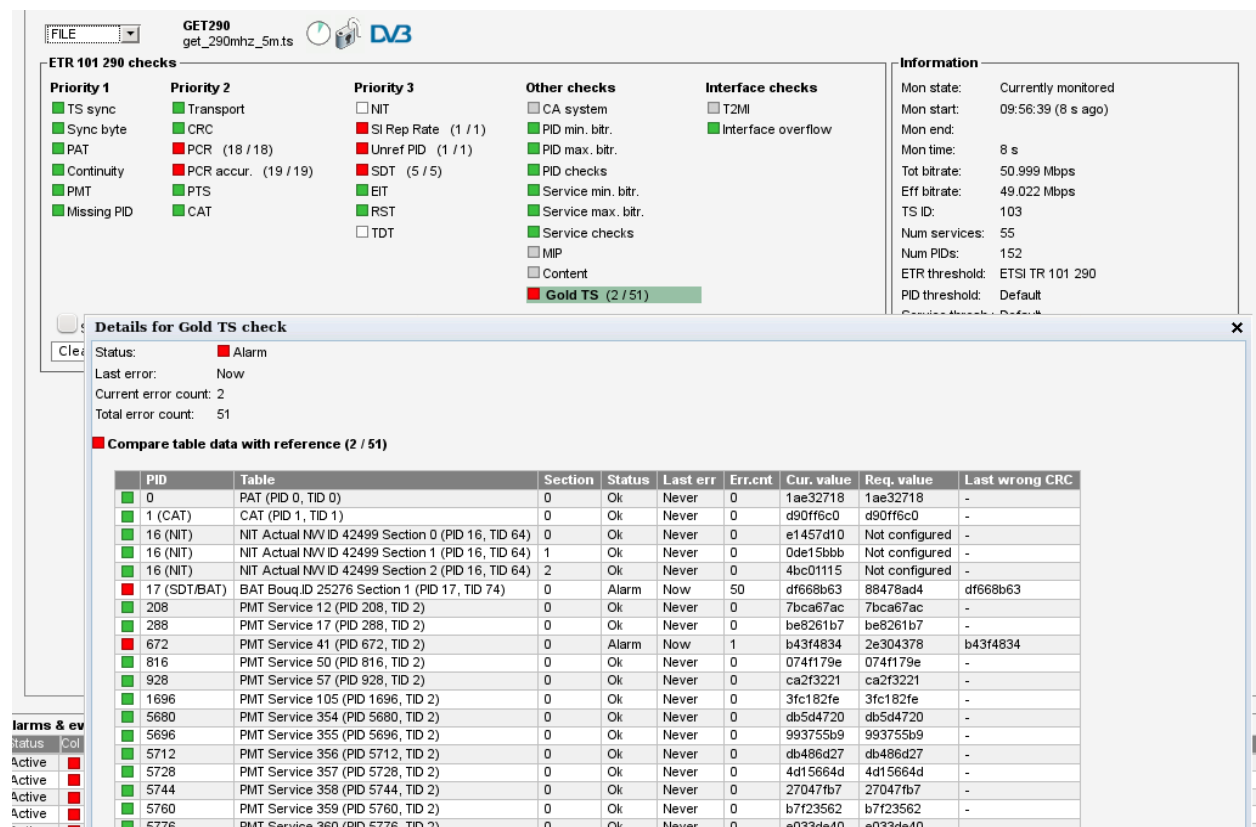
The settings are as follows:

Also check version number and CRC	By default the version number and the original CRC of the tables are not checked. In many systems the version number can be updated even if no other changes are performed (for instance if a multiplexer is rebooted). So for most cases this should be left disabled.
Verify PAT table	When enabled the Program Association Table will be checked. This allows the operator to catch addition and removal of services as well as changes to the PMT PIDs used for the different services.
Verify PMT table	When enabled the Program Map Table will be checked. This allows the operator to catch lots of changes to the different services: • Addition or removal of the various components such as audio and video PIDs. • Changes in language descriptors • Changed PCR PIDs • Changed or removed ECM PID • Lots of changes in the descriptors can be detected

Verify CAT table	When enabled the Conditional Access Table will be checked. This allows the operator to catch errors related to the signaling for the CA Systems such as EMM PID disappearing or the CA System ID being changed
Verify SDT actual table	When enabled the SDT table for the current stream will be checked. This allows the operator to catch changes is service and operator names, service types and the various descriptors, both DVB defined and private descriptors
Verify SDT other tables	When enabled the SDT tables for the other streams will be checked. Checking is not enabled as default. This allows the operator to catch changes is service and operator names, service types and the various descriptors, both DVB defined and private descriptors
Verify BAT table	When enabled the Bouquet Association Table will be checked. The BAT table is not checked as default.
Verify NIT actual table	When enabled the Bouquet Association Table will be checked. The BAT table is not checked as default When enabled the Network Information Table for the current network will be checked. This allows the operator to catch changes such as: • Changes in frequency • Changes in modulation parameters • Network name • Changes in service lists per transport stream • Changes in private as well as MPEG/DVB defined descriptors
Verify NIT actual tables	When enabled the Network Information Tables for the other networks will be checked. This is disabled as default. This allows the operator to catch changes such as: • Changes in frequency • Changes in modulation parameters • Network name • Changes in service lists per transport stream • Changes in private as well as MPEG/DVB defined descriptors

The Gold TS reference checking is performed by the ETR engines and can be performed in round

robin. To view the status go to the ETR Details page for the stream and click the Reference check:



ETR 101 290 checks

Priority 1

- TS sync
- Sync byte
- PAT
- Continuity
- PMT
- Missing PID

Priority 2

- Transport
- CRC
- PCR (18 / 18)
- PCR accur. (19 / 19)
- PTS
- CAT

Priority 3

- NIT
- SI Rep Rate (1 / 1)
- Unref PID (1 / 1)
- SDT (5 / 5)
- EIT
- RST
- TDT

Other checks

- CA system
- PID min. bitr.
- PID max. bitr.
- PID checks
- Service min. bitr.
- Service max. bitr.
- Service checks
- MIP
- Content
- Gold TS (2 / 51)**

Interface checks

- T2MI
- Interface overflow

Information

Mon state: Currently monitored
 Mon start: 09:56:39 (8 s ago)
 Mon end:
 Mon time: 8 s
 Tot bitrate: 50.999 Mbps
 Eff bitrate: 49.022 Mbps
 TS ID: 103
 Num services: 55
 Num PIDs: 152
 ETR threshold: ETSI TR 101 290
 PID threshold: Default

Details for Gold TS check

Status: ■ Alarm
 Last error: Now
 Current error count: 2
 Total error count: 51

■ Compare table data with reference (2 / 51)

PID	Table	Section	Status	Last err	Err.cnt	Cur. value	Req. value	Last wrong CRC
0	PAT (PID 0, TID 0)	0	Ok	Never	0	1ae32718	1ae32718	-
1 (CAT)	CAT (PID 1, TID 1)	0	Ok	Never	0	d90ff6c0	d90ff6c0	-
16 (NIT)	NIT Actual N/V ID 42499 Section 0 (PID 16, TID 64)	0	Ok	Never	0	e1457d10	Not configured	-
16 (NIT)	NIT Actual N/V ID 42499 Section 1 (PID 16, TID 64)	1	Ok	Never	0	0de15bbb	Not configured	-
16 (NIT)	NIT Actual N/V ID 42499 Section 2 (PID 16, TID 64)	2	Ok	Never	0	4bc01115	Not configured	-
17 (SDT/BAT)	BAT Bouq.ID 25276 Section 1 (PID 17, TID 74)	0	Alarm	Now	50	df668b63	88478ad4	df668b63
208	PMT Service 12 (PID 208, TID 2)	0	Ok	Never	0	7bca67ac	7bca67ac	-
288	PMT Service 17 (PID 288, TID 2)	0	Ok	Never	0	be8261b7	be8261b7	-
672	PMT Service 41 (PID 672, TID 2)	0	Alarm	Now	1	b43f4834	2e304378	b43f4834
816	PMT Service 50 (PID 816, TID 2)	0	Ok	Never	0	074f179e	074f179e	-
928	PMT Service 57 (PID 928, TID 2)	0	Ok	Never	0	ca2f3221	ca2f3221	-
1696	PMT Service 105 (PID 1696, TID 2)	0	Ok	Never	0	3fc182fe	3fc182fe	-
5680	PMT Service 354 (PID 5680, TID 2)	0	Ok	Never	0	db5d4720	db5d4720	-
5696	PMT Service 355 (PID 5696, TID 2)	0	Ok	Never	0	993755b9	993755b9	-
5712	PMT Service 356 (PID 5712, TID 2)	0	Ok	Never	0	db486d27	db486d27	-
5728	PMT Service 357 (PID 5728, TID 2)	0	Ok	Never	0	4d15664d	4d15664d	-
5744	PMT Service 358 (PID 5744, TID 2)	0	Ok	Never	0	27047fb7	27047fb7	-
5760	PMT Service 359 (PID 5760, TID 2)	0	Ok	Never	0	b7f23562	b7f23562	-
5776	PMT Service 360 (PID 5776, TID 2)	0	Ok	Never	0	e033de40	e033de40	-

alarms & ev

Status: ■ Active

All the different tables and sections monitored are listed here. If there have been any changes to the tables the check will turn red and alarms be sent.

When the ETR engine is tuned to a stream it is possible to compare the tables for this stream with the stored reference tables by clicking on the entry in the list. This opens up a new window where the table data can be compared, both as a tree-breakdown and as a hexadecimal dump:

Show summary
Show hex

Current table:

- table_id: 2 (0x02)
- section_syntax_indicator: 1 b
- reserved_future_use: 0 b
- reserved: 11 b
- section_length: 150 (0x096)
- program_number: 41 (0x0029)
- reserved: 0x3
- version_number: 6 (0x06)
- current_next_indicator: 1 b
- section_number: 0
- last_section_number: 0
- reserved: 111 b
- PCR PID: 673 (0x02a1)
- reserved: 1111 b
- program_info_length: 6
- program_info
 - components
 - component
 - component
 - component
 - component
 - component
 - component
 - stream_type: MPEG-2 Audio
 - reserved: 111 b
 - elementary_PID: 675 (0x02a3)
 - reserved: 1111 b
 - ES_info_length: 6
 - ES descriptors
 - language descriptor
 - descriptor_tag: 10 (0x0a)
 - descriptor_length: 4
 - languages
 - language
 - ISO 639 language code: nor
 - audio_type: Undefined

Stored reference table:

- table_id: 2 (0x02)
- section_syntax_indicator: 1 b
- reserved_future_use: 0 b
- reserved: 11 b
- section_length: 150 (0x096)
- program_number: 41 (0x0029)
- reserved: 0x3
- version_number: 6 (0x06)
- current_next_indicator: 1 b
- section_number: 0
- last_section_number: 0
- reserved: 111 b
- PCR PID: 609 (0x0261)
- reserved: 1111 b
- program_info_length: 6
- program_info
 - components
 - component
 - component
 - component
 - component
 - component
 - component
 - stream_type: MPEG-2 Audio
 - reserved: 111 b
 - elementary_PID: 675 (0x02a3)
 - reserved: 1111 b
 - ES_info_length: 6
 - ES descriptors
 - language descriptor
 - descriptor_tag: 10 (0x0a)
 - descriptor_length: 4
 - languages
 - language
 - ISO 639 language code: swe
 - audio_type: Undefined

```

0000: 02 80 96 00 29 CD 00 00 E2 A1 F0 06 09 04 09 26 .....&
0010: E2 A8 02 E2 A1 F0 00 06 E2 A7 F0 2F 56 2D 65 6E ...../V-en
0020: 67 09 00 73 77 65 09 01 73 77 65 11 99 6E 6F 72 g..swe..swe..nor
0030: 0A 01 6E 6F 72 12 99 64 61 6E 00 01 64 61 6E 15 ..nor..dan..dan.
0040: 99 66 69 6E 0E 01 66 69 6E 16 99 04 E2 A5 F0 06 ..fin..fin.....
0050: 0A 04 73 77 65 00 04 E2 A4 F0 06 0A 04 64 61 6E ..swe....dan
0060: 00 04 E2 A3 F0 06 0A 04 73 77 65 00 04 E2 A2 F0 .....nor....
0070: 06 0A 04 66 69 6E 00 06 E2 A6 F0 19 0A 14 65 6E ...fin....en
0080: 67 00 66 69 6E 00 73 77 65 00 6E 6F 72 00 64 61 g..fin.swe.nor.da
0090: 6E 00 6A 01 00 B4 3F 48 34 n..j...PH4
    
```

```

0000: 02 80 96 00 29 CD 00 00 E2 61 F0 06 09 04 09 26 .....a.....&
0010: E2 A8 02 E2 A1 F0 00 06 E2 A7 F0 2F 56 2D 65 6E ...../V-en
0020: 67 09 00 73 77 65 09 01 73 77 65 11 99 6E 6F 72 g..swe..swe..nor
0030: 0A 01 6E 6F 72 12 99 64 61 6E 00 01 64 61 6E 15 ..nor..dan..dan.
0040: 99 66 69 6E 0E 01 66 69 6E 16 99 04 E2 A5 F0 06 ..fin..fin.....
0050: 0A 04 73 77 65 00 04 E2 A4 F0 06 0A 04 64 61 6E ..swe....dan
0060: 00 04 E2 A3 F0 06 0A 04 73 77 65 00 04 E2 A2 F0 .....swe....
0070: 06 0A 04 66 69 6E 00 06 E2 A6 F0 19 0A 14 65 6E ...fin....en
0080: 67 00 66 69 6E 00 73 77 65 00 6E 6F 72 00 64 61 g..fin.swe.nor.da
0090: 6E 00 6A 01 00 2E 30 43 78 n..j...OCx
    
```

If the tables are inspected and the change found to be OK the operator can then go back to **ETR 290 — Gold TS thr.** and update the stored table set to the new version.

7.9.15 ETR 290 — Alarm filtering thresholds

Overview
ETR Details
PIDs
Services
Bitrates
Tables
PCR
T2MI
Status
Compare
ETR thr.
PID thr.
Serv. thr.
Gold TS thr.
Alarm filter thr.

Alarm filtering thresholds

The alarm filter threshold setting defines when the alarm should be activated. It sets the accumulated number of seconds that has to occur with faults within the alarm window period before raising an alarm.

Name	Refs	Error second limit	Error window	Description	Edit
Default	17	1	1	Alarm immediately.	Edit
Alarm after five seconds	0	5	10	Alarm after five error seconds summed over an alarm window of ten seconds.	Edit

Alarm filter thresholds: 2

[Add new alarm filter](#)
[Duplicate selected](#)
[Delete selected](#)
[Edit selected](#)

The **Alarm filtering thresholds** make it possible to delay alarms after a user-defined amount of error seconds has occurred during a user-defined window, on a per stream basis. Each template can be associated with an alarm check in the **ETR Thresholds**. In the **Alarm filtering thresholds** table, the 'Refs' shows how many **ETR Thresholds** are associated with each of them.

Alarm filtering thresholds are currently only for **Continuity errors**.

There are two predefined thresholds: **Default** and **Alarm after five seconds**. With the **Default** filter the alarming will be as if no filter is applied: The alarm is raised immediately when an error occurs. With the **Alarm after five seconds** the alarm will be raised after 5 seconds with errors has occurred during a 10 second window.

To configure alarm filtering, either use **Alarm after five seconds** or create a new template. Then apply this template to the **ETR Threshold**. To create a new alarm filtering template, either click **Add new** or **Duplicate**. To edit, use the **Edit** link in the table or the **Edit selected** button. With the **Edit selected** button, one or multiple templates can be edited.

A pop-up window will appear allowing the user to assign a name and description to the threshold and configure the alarm filter parameters.

Edit alarm filter threshold

Name
Filter

Description
Description of the alarm

Parameter	Setting	Description
Error seconds	1	Minimum number of error seconds before alarming
Alarm window (s)	1	The window during which error seconds are summed

The thresholds are used to specify how many error seconds are required during the alarm window defined here before raising the corresponding alarm. The alarm will clear again after a default of 10 seconds without any faults (can be adjusted in the ETR Threshold->General).

Close
Apply changes

Edit Alarm Filter Threshold

Name: A text string that identifies the alarm filter threshold. This name appears in the **ETR Threshold** Alarm filtering drop down for the check.

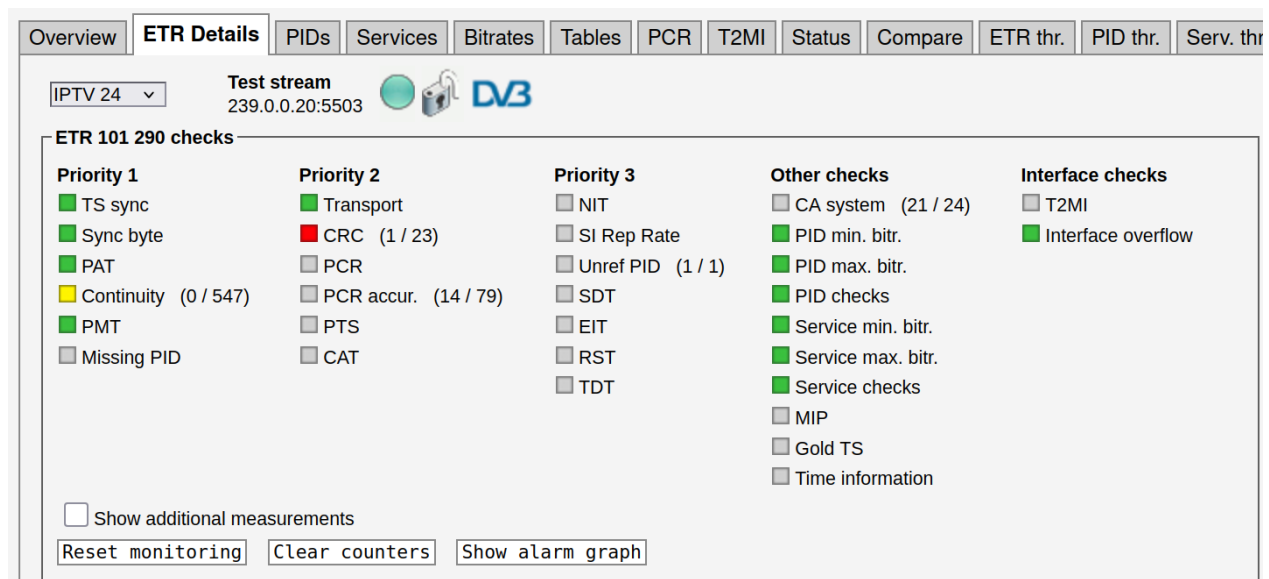
Description: Text field that should contain a meaningful description of the threshold

Alarm Filter Threshold parameters

Error seconds: The minimum number of error seconds that needs to occur before an alarm is raised. Error seconds up to 3600 (1 hour) is supported.

Alarm window (s): The window, in seconds, during which error seconds are summed. The window needs to be equal to or larger than the number of error seconds. The window is dynamic, which means that the amount of error seconds is always summed over the past x seconds, where x is the size of the window (unless the time since the first error is less than x). A window up to 3600 seconds (1 hour) is supported.

With alarm filtering applied a yellow bulb will appear in the **ETR Details** view and the **ETR Overview** view when there are not enough errors to raise an alarm.



Only after the error seconds limit is reached will the bulb be red and an alarm raised. All errors, whether they are over the error second limit or not, will be registered in the probes 'Last fault' that can be seen in the **ETR Details** view to the right and the Details popup for the check at the top.

The alarm clears after the amount of time specified in *Error timeout* in the associated **ETR Threshold** (default 10 seconds).

7.10 Content

7.10.1 Content — Thumbnails

This view replicates the **Thumbnails** view. Please see chapter 6.4 on page 49 for details.

7.10.2 Content — SCTE 35 (requires SCTE35-OPT)

Thumbnail	Captions	EBP	Timeline	SCTE 35	Content thresh.	Service thresh.	Setup
Services carrying SCTE 35 and SCTE 104 messages							
SID	Service name	Stream name	Interface	Events	Time since last event	Time since last place...	
65	DELUXE MUSIC	DELUXE MUSIC	IPTV	826	30s	160s	

SCTE 35/104 - Event information													
Event list SCTE 35/104													
Time	SID	Service name	PID	Type	Splice command	Cmd id	Event ID	Pre-roll	Cd	Imm	Switch mode	Seg. type	Type id
Apr 11 07:47:05	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772551	7.18			Program In Point		NA
Apr 11 07:44:55	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772551	6.24			Program Out Point		131.40
Apr 11 07:28:54	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772539	7.10			Program In Point		NA
Apr 11 07:28:29	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772539	7.02			Program Out Point		20.20
Apr 11 07:28:26	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772527	7.11			Program In Point		NA
Apr 11 07:27:16	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772527	5.55			Program Out Point		71.20
Apr 11 07:11:46	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772515	6.99			Program In Point		NA
Apr 11 07:09:53	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772515	5.59			Program Out Point		113.80
Apr 11 06:52:10	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772503	6.98			Program In Point		NA
Apr 11 06:50:08	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772503	6.04			Program Out Point		121.60
Apr 11 06:32:12	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772491	6.96			Program In Point		NA
Apr 11 06:29:32	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772491	6.80			Program Out Point		162.00
Apr 11 06:12:03	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772479	7.00			Program In Point		NA
Apr 11 06:10:11	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772479	5.88			Program Out Point		113.20
Apr 10 22:42:50	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772467	7.18			Program In Point		NA
Apr 10 22:40:35	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772467	6.79			Program Out Point		136.60
Apr 10 22:27:18	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772455	6.80			Program In Point		NA
Apr 10 22:27:10	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772455	5.89			Program Out Point		10.20
Apr 10 22:26:04	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772443	7.15			Program In Point		NA
Apr 10 22:24:36	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772443	6.38			Program Out Point		83.20
Apr 10 22:10:50	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772431	7.01			Program In Point		NA
Apr 10 22:08:10	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772431	6.99			Program Out Point		162.60
Apr 10 21:46:28	65	DELUXE MUSIC	60	35	Splice insert	0x5	1073772410	6.78			Program In Point		NA

SCTE 35 is a specification which allows equipment to splice in local content at specific times, SCTE 35 is basically just the signaling mechanism the equipment uses to know when to switch from the master transmission to insert local content. It can be used to allow insertion of local advertising at certain points in time or to allow the local operator to insert their own programs such as local news transmission.

SCTE 104 specifies carriage of these events in uncompressed streams.

The SCTE 35 option enables monitoring of SCTE 35 and SCTE 104 events of all streams and OTT channels monitored by the probe.

Service list parameters

SID:	The ID of the service for which SCTE 35 or SCTE 104 data has been received.
Service name:	The name of the service for which SCTE 35 or SCTE 104 data has been received.
Stream name:	Name specified by the user when adding a multicast or tuning.
Interface:	The input source of the transport stream.
Events:	The number of SCTE 35 or SCTE 104 events seen for the service.
Time since last event:	The time since the last SCTE 35 event specified in seconds, minutes, hours or days.
Time since last placement:	The time since the last SCTE 35 placement opportunity in seconds, minutes, hours or days.

To monitor SCTE 35 and SCTE 104 information, enable the **Monitor SCTE 35** checkbox in

Content — Content thresh. and configure the transport stream or OTT channel to use that content threshold. If it contains SCTE 35 or SCTE 104 information, the stream will be added to the list in the SCTE 35 view. By pressing the blue information button a new pop-up will show up, the pop-up will give specific information about events in the specified transport stream or OTT channel.

<i>Event information list parameters:</i>	
<i>Parameter</i>	<i>Description</i>
Time:	When the event occurred.
SID:	The ID of the service for which the event applies.
Service name:	The name of the service for which the event applies.
PID:	The PID carrying the SCTE 35 or SCTE 104 information. A service can have multiple SCTE 35 or SCTE 104 PIDs signaled in the PMT table(s).
Type:	Indicates whether the received event was SCTE 35 or SCTE 104.
Splice command:	The type of the splice command.
Cmd id:	The hex value of the command.
Event ID:	ID of the specific event.
Pre-roll:	Number of seconds before a splice the event was received.
Cxl:	Canceled indicator, if set it indicates that this splice message cancels a previously sent splice message.
Imm:	Immediate mode, if set it indicates that this message should take effect immediately.
Switch mode:	Specifies whether it is a splice in (switch to local content/ads) or splice out event (switch back to the audio/video in the stream). For messages with the splice command type 'Time signal' the Switch mode parameter will be empty and the Segment type parameter will contain the details.
Seg. type:	The segmentation type found in the segmentation descriptor (if found).
Type id:	The hex value of the segmentation type parameter.
Duration:	The time when a splice occurred to its end.
Tier:	Specifies which tier group are to use this splice message. Multiple splice messages can be sent addressed to different tier groups to allow switching at different times.

Use the drop-down at the top of the event list dialog to switch between displaying all events (default) or to display only SCTE 35 or only SCTE 104 events.

When pressing the information button for a specific event a new window will pop-up with detailed information about the event. The pop-up will show a log of the SCTE 35 or SCTE 104 events signaled for the specified transport stream or OTT channel. Splice NULL messages are not logged.

SCTE 35 - Event details

Show summary

Show hex

table_id: 252 (0xfc)

section_syntax_indicator: 0 b

reserved_future_use: 0 b

reserved: 11 b

section_length: 32 (0x020)

protocol_version: 1

encrypted_packet: Not encrypted

encryption_algorithm: 0 (0x00)

pts_adjustment: 0 (0x000000000)

cw_index: 0 (0x00)

reserved: 0xfff

splice_command_length: 4095 (0xffff)

splice_command_type: splice_insert

splice_insert

descriptor_loop_length: 0

descriptors

CRC32: 0xbb929b55

SCTE 35 Splice Information Table

Encryption	Not encrypted
PTS adjustment	0 (0x000000000)
CW index	0 (0x00)
Tier	NA
Splice command type	splice_insert
Splice event ID	1538790662 (0x5bb81506)
Cancel indicator	Not canceled
Out of network indicator	Program out point
Program splice flag	Program slice mode
Duration flag	Duration present
Splice immediate flag	Splice immediate mode
Break duration auto return	Auto return after specified duration
Break duration	10.00 s
Unique program ID	55233
Avail num.	1
Avails exp.	1

Please note that for some OTT manifest formats, the SCTE 35 message is not transmitted in binary form, and the message shown in the **Event details** view is then synthesized from the available input.

7.10.3 Content — Content thresh.

Thumbnails

Content thresh.

Service thresh.

Content threshold presets

These thresholds are used to generate content alarms and to determine when an error-second has occurred

Name	Refs	Freeze-frame	Freeze timeout	Edit
Default	18	Disabled	10 min	Edit
Freeze-frame	18	Trigger often	10 min	Edit

Thresholds: 2

Add new threshold

Duplicate selected

Delete selected

Edit selected

Thresholds are used to determine when to actually raise an alarm upon detection of an error. The Content thresholds are used for generating content alarms as well as for calculating error-seconds. Error seconds and content alarms are issued whenever measurements exceed the defined threshold levels for a parameter. The alarm level of each of these alarms is set in the **Alarms — Alarm setup** view. Note that it is also possible to disable alarms in the **Alarms — Alarm setup** view.

The **Content — Content thresh.** view makes it possible to define threshold values that operate at stream level. Thresholds are associated with each stream in the **Multicasts — Streams — Edit**, **ASI — Setup**, **COFDM/QAM/VSB/RF/SAT — Tuning setup** and **OTT — Channels** views. There are two different ways of creating user-defined thresholds. To create a new threshold template from scratch the operator should click the **Add new threshold** button. A pop-up window

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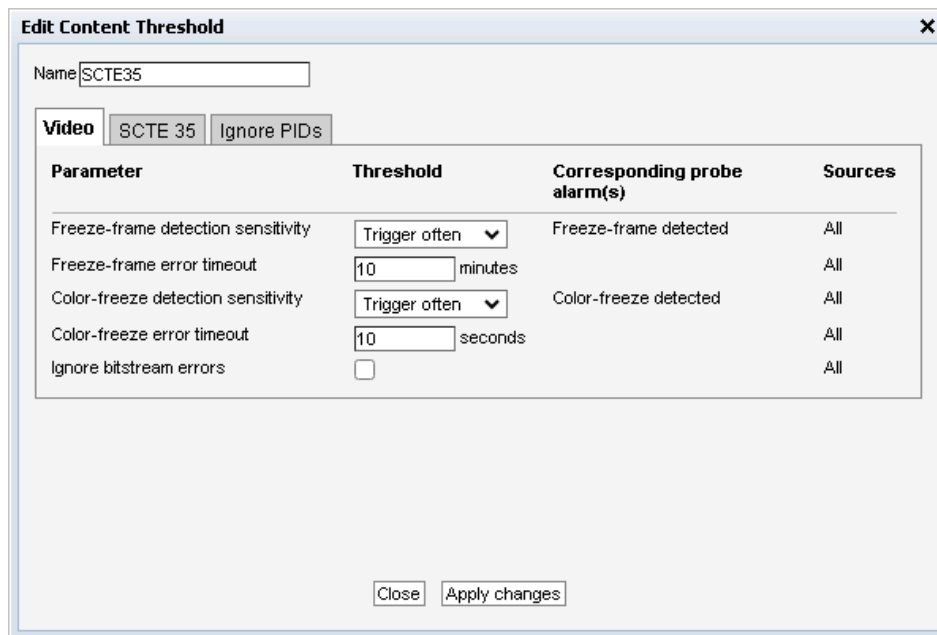
will appear allowing the user to define alarm conditions. Another way of creating a user-defined threshold template is by highlighting one of the threshold templates already defined and then click the **Duplicate highlighted** button.

Deleting a threshold template is done by highlighting the threshold template that should be removed and clicking **Delete selected**. It is possible to delete or edit several entries simultaneously. Several entries are selected by using the regular *Ctrl + click* or *Shift + click* functionality. Click the **Edit** button to edit one or more selected threshold templates. Note that the predefined ‘Default’ threshold template cannot be deleted or changed.

In the threshold presets list the ‘Refs’ column displays how many streams are associated with each stream threshold template.

The available thresholds depend on the currently active license. Applying content analysis on many concurrent streams can introduce a performance penalty, please refer to appendix B.5 for more details.

The **Sources** column indicates which of the different threshold settings are supported where.



Edit Content Threshold

Name:

Video | SCTE 35 | Ignore PIDs

Parameter	Threshold	Corresponding probe alarm(s)	Sources
Freeze-frame detection sensitivity	Trigger often ▼	Freeze-frame detected	All
Freeze-frame error timeout	10 minutes		All
Color-freeze detection sensitivity	Trigger often ▼	Color-freeze detected	All
Color-freeze error timeout	10 seconds		All
Ignore bitstream errors	☐		All

Video

Freeze-frame detection sensitivity:	Picture matching in video streams is not an exact science, as noise can be introduced in many of the stages the stream goes through. This setting makes it possible to define the amount of noise to be allowed when performing freeze-frame detection. When set to Disabled, the freeze-frame detection is disabled. When set to Trigger seldom, only a small amount of noise is allowed when deciding whether the picture has changed or not. This means that the pictures have to be close to identical before the freeze-frame alarm is raised. Normal is the recommended setting and should be used in most cases. Trigger often allows a high amount of noise. This means that it allows pictures to be quite different while still classifying them as identical, which may result in too many freeze-frame alarms.
Freeze-frame error timeout:	The time (in minutes) a freeze-frame error should persist before the probe will raise an alarm
Color-freeze detection sensitivity:	This setting makes is possible to define the amount of noise to be allowed when performing color-freeze detection. When set to Disabled, the color-freeze detection is disabled. When set to Trigger seldom, only a small amount of noise is allowed when comparing to the list of solid colors. Normal is the recommended setting, whereas Trigger often allows a high amount of noise, which may result in too many color-freeze alarms.
Color-freeze error timeout:	The time (in seconds) a color-freeze error should persist before the probe will raise an alarm.
Ignore bitstream errors:	In some cases, the video codec reports errors in the bitstream while still being able to generate thumbnails or partial thumbnails. If the stream shows a “Bitstream Errors” icon, you can try to ignore this by enabling this setting.

Edit content threshold

×

Name

Audio metadata

Video

Audio

SCTE 35

Ignore PIDs

Parameter	Threshold	Corresponding probe alarm(s)	Sources
Extract audio metadata	☒		All

Close

Apply changes

Audio

Extract audio metadata: By default, the NOMAD does not consider audio PIDs or profiles. With this setting enabled, it will also visit audio PIDs and profiles, extracting metadata such as sample rate and number of audio channels.

Please note that if audio PIDs or profiles are explicitly set to being ignored by other threshold settings, that setting is considered first, and will override this one.

Edit Content Threshold

×

Name

Everything

Video

Audio

QoE

Captions

EBP/IDR

SCTE 35

Timeline

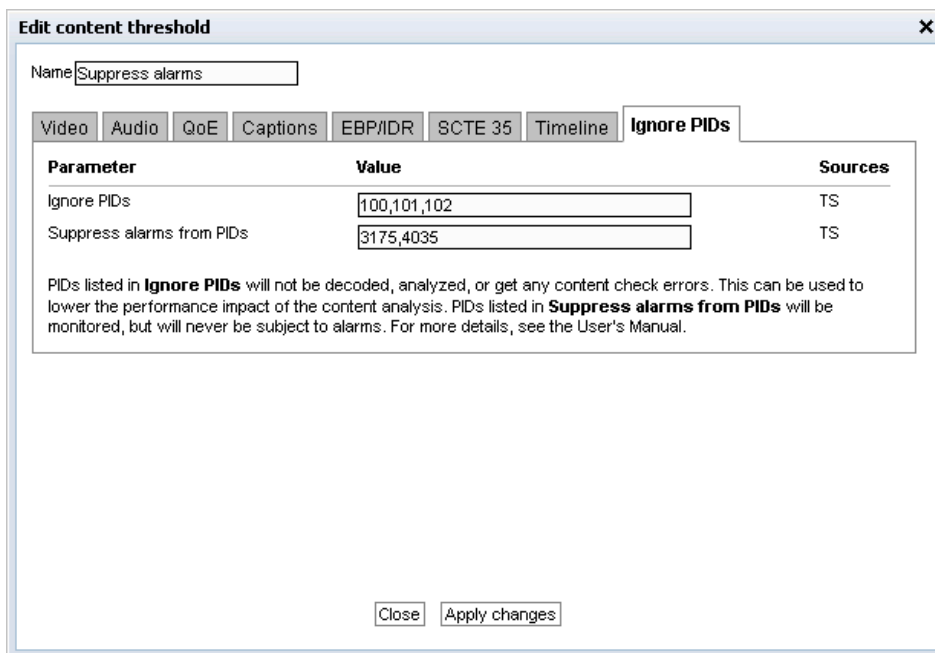
Ignore PIDs

Parameter	Threshold	Corresponding probe alarm(s)	Sources
Monitor SCTE 35 and 104	☒		All
Maximum event gap	1800 s	SCTE 35 event gap	All
Minimum number of placement opportunities per clock hour	2	Too few SCTE 35 placement opportunities	All
Maximum opportunity gap	1800 s	SCTE 35 opportunity gap	All
Maximum event pair gap	600 s	SCTE 35 end event without start SCTE 35 start event without end	All
Minimum event pre-roll time	4 s	SCTE 35 minimum pre-roll time	TS
Maximum event pre-roll time	10 s	SCTE 35 maximum pre-roll time	TS
Log time_descriptor messages	☒		All

Close

Apply changes

<i>SCTE 35</i>	
Monitor SCTE 35:	If enabled, SCTE 35 and SCTE 104 events are captured and displayed in the Content – SCTE 35 view
Maximum SCTE 35 event gap:	Specifies the maximum number of seconds allowed between two SCTE 35 or SCTE 104 events before an alarm is raised. Set to –1 to disable the alarm.
Minimum number of placement opportunities per clock hour:	Specifies the minimum number of placement opportunities that must be signaled for a full clock hour. An alarm will be raised at the top of the hour if the previous hour had fewer than this number of opportunities. Set to –1 to disable the alarm.
Maximum SCTE 35 opportunity gap:	Specifies the maximum number of seconds allowed between two SCTE 35 or SCTE 104 placement opportunities before an alarm is raised. Set to –1 to disable the alarm.
Maximum event pair gap:	Specifies the maximum number of seconds allowed between the a SCTE 35 or SCTE 104 start and end segmentation descriptor messages in Time signal events. An alarm will be raised for five seconds when this is detected. Additionally, an alarm will be raised if an end segmentation message was received without the corresponding start message. Set to –1 to disable these alarms.
Minimum event pre-roll time:	Specifies the minimum number of seconds allowed between when the SCTE 35 event is received and when the splice is supposed to happen. An alarm will be raised for five seconds when this is detected. Set to –1 to disable these alarms.
Maximum event pre-roll time:	Specifies the maximum number of seconds allowed between when the SCTE 35 event is received and when the splice is supposed to happen. An alarm will be raised for five seconds when this is detected. Set to –1 to disable these alarms.
Log time_descriptor messages	Determines whether the SCTE 35 or SCTE 104 messages containing nothing else than a time_descriptor should be included in the message log. In some systems there are a lot of these messages (they can be used as keep alive messages to ensure that there always is some traffic on the SCTE 35 or SCTE 104 PID). If the message log is filled up with the time_descriptor messages, disable logging of these messages



Edit content threshold [X]

Name:

Video Audio QoE Captions EBP/IDR SCTE 35 Timeline **Ignore PIDs**

Parameter	Value	Sources
Ignore PIDs	100,101,102	TS
Suppress alarms from PIDs	3175,4035	TS

PIDs listed in **Ignore PIDs** will not be decoded, analyzed, or get any content check errors. This can be used to lower the performance impact of the content analysis. PIDs listed in **Suppress alarms from PIDs** will be monitored, but will never be subject to alarms. For more details, see the User's Manual.

Close Apply changes

Ignore PIDs

Ignore PIDs: *Not applicable to OTT channels:* A comma separated list of PIDs for which the probe should not decode, analyze or report any content check errors. No thumbnails, loudness or captions will be decoded on these PIDs.

Suppress alarms from PIDs: *Not applicable to OTT channels:* A comma separated list of PIDs for which the probe should not report any content check errors. Thumbnails, loudness and captions will be decoded on these PIDs.

Some SCTE 35 alarms apply to the entire service (*SCTE 35 event gap, Too few SCTE 35 placement opportunities, SCTE 35 placement gap*), and are not affected by this setting.

The 'Ignore PIDs' and 'Suppress alarms from PIDs' settings are only applied from the stream content thresholds, they are ignored when used in the Content Service thresholds.

7.10.4 Content — Service thresh.

Thumbnails

Captions

EBP

Timeline

Content thresh.

Service thresh.

Setup

Content service thresholds

These thresholds are used to override the Content thresholds on a service basis

Name	Refs	Description	Edit
Default	11	No special rules for any services.	Edit
Service 1039	1	Override service 1039	Edit
MPTS	0	Service-specific rules	Edit

Add new threshold group

Duplicate selected

Delete selected

Thresholds are used to determine when to actually raise an alarm upon detection of an error. The **Content — Service thresh.** view makes it possible to define detailed conditions for alarm triggering on a per-service basis. This is particularly useful to specify individual alarm handling rules for services in a multi-program transport stream (MPTS). Note that if there is a stream and service threshold mismatch, the service threshold will apply. This may be the case if QoE or scheduling requirements are set differently in the stream threshold template and service threshold template associated with a stream. There is one predefined service threshold template that cannot be edited by the operator: **Default**. The Default service threshold template contains no service definitions and will therefore not alter alarming for any service.

By associating scheduling templates to service threshold templates it is possible to disable alarming at pre-selected time intervals. Scheduling templates are defined in the **Setup — Scheduling** view and will be available from the schedule drop-down menu.

In the 'Service Thresholds' table, the 'Refs' column shows how many streams are associated with each threshold template.

There are two different ways of creating user-defined thresholds. To create a new threshold template from scratch the operator should click the **Add new threshold group** button. A pop-up window will appear allowing the user to assign a name and value to the new threshold and define the alarm conditions. Another way of creating a user-defined threshold template is by highlighting one of the templates already defined and then click the **Duplicate selected** button.

Deleting a service threshold template is done by highlighting the template that should be removed and clicking **Delete selected**. Note that if the deleted threshold template was assigned to a stream being monitored, the new threshold template for that stream will default to the **Default** template.

Name:	A text string that identifies the service threshold group
Description:	Text field that should contain a meaningful description of the threshold

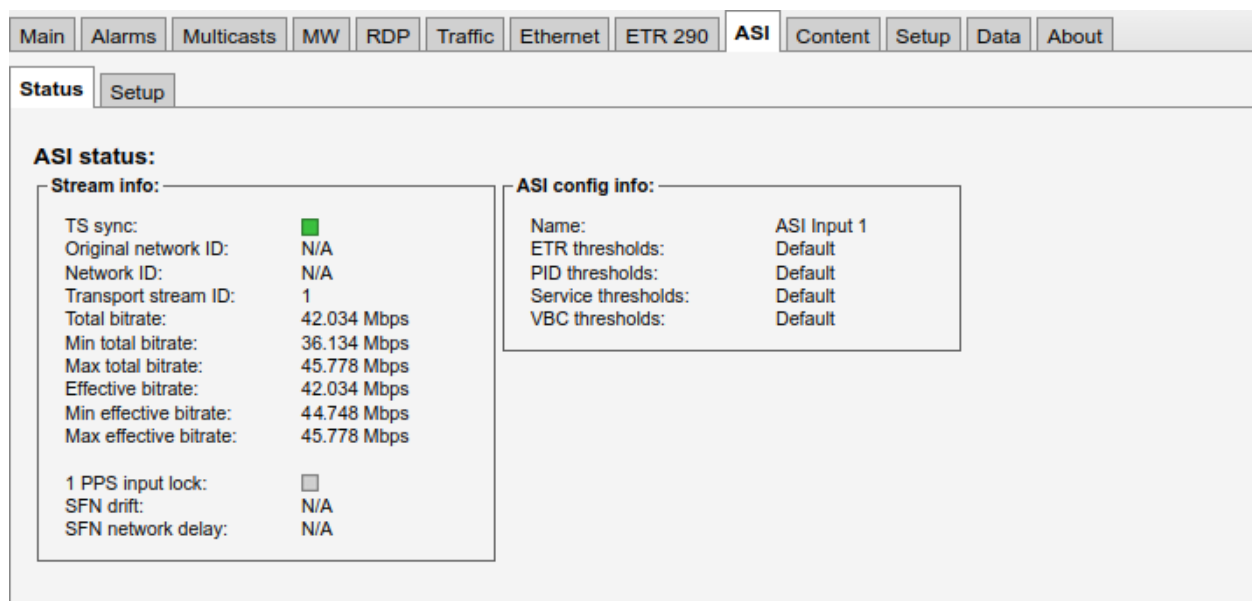
ID:	The service ID for which the associated thresholds should apply. For an SPTS the service ID will generally be 1; adding several list entries with different service IDs allows different thresholds to apply for different services within an MPTS.
Content thresholds:	This settings defines the content threshold settings that should be applied to this stream. The entire content threshold setting, with the exception for the ‘Ignore PIDs’ and ‘Suppress alarms from PIDs’ settings, will be applied to the service. Please refer to chapter 7.10.3 for the specific meaning of the settings. Set this to <i>Same as stream</i> to apply the default content thresholds for this service.
Schedule:	The Schedule drop-down menu allows the user to associate a scheduling scheme to a service, in effect masking alarms during selected intervals. Scheduling templates are defined in the Setup — Scheduling view. The predefined scheduling templates ‘Never’ and ‘Always’ will always be selectable, and these will result in service alarms never and always being masked, respectively. When <i>Same as stream</i> is selected, the requirement defined in the stream threshold will apply. Note that alarm masking only affects alarm lists and SNMP traps; other alarm indications in the GUI will remain visible.

7.11 ASI

The ASI will have status information and configuration settings for the built in ASI port. More information about the stream being monitored is found in the **ETR 290 — ETR Details** view.

Thumbnails for the ASI services are accessed from the **ETR 290 — Services** and **Content — Thumbnails** views. To get thumbnails for ASI, make sure that the **Extract thumbnails** check box is enabled, and also that the global thumbnail extraction setting is enabled in **Setup — Params**.

7.11.1 ASI — Status



The ASI view displays an overview of the ASI input signal contents, in addition to listing the threshold templates currently assigned to the ASI signal. Additional ASI measurements are found in Compare and ETR 290 views.

Click the graph button to display a detailed graph for the specified parameter. For probes licensed with FLASH32-OPT, the graph can contain up to 7 days of measurements. On probes without this license, the graph will contain data for the previous and the current day. Please refer to **Setup — Meas. log** to configure the logging.

ASI status - Stream info:

Status: Bulb indicating whether there is ASI sync or not. Green color indicates sync whereas red indicates no sync. Grey color shows that the ASI input is disabled.

Original Network ID: The original network ID as specified in the NIT table

Network ID: The network ID as specified in the NIT table

Transport Stream ID: The transport stream ID as specified in the PAT table

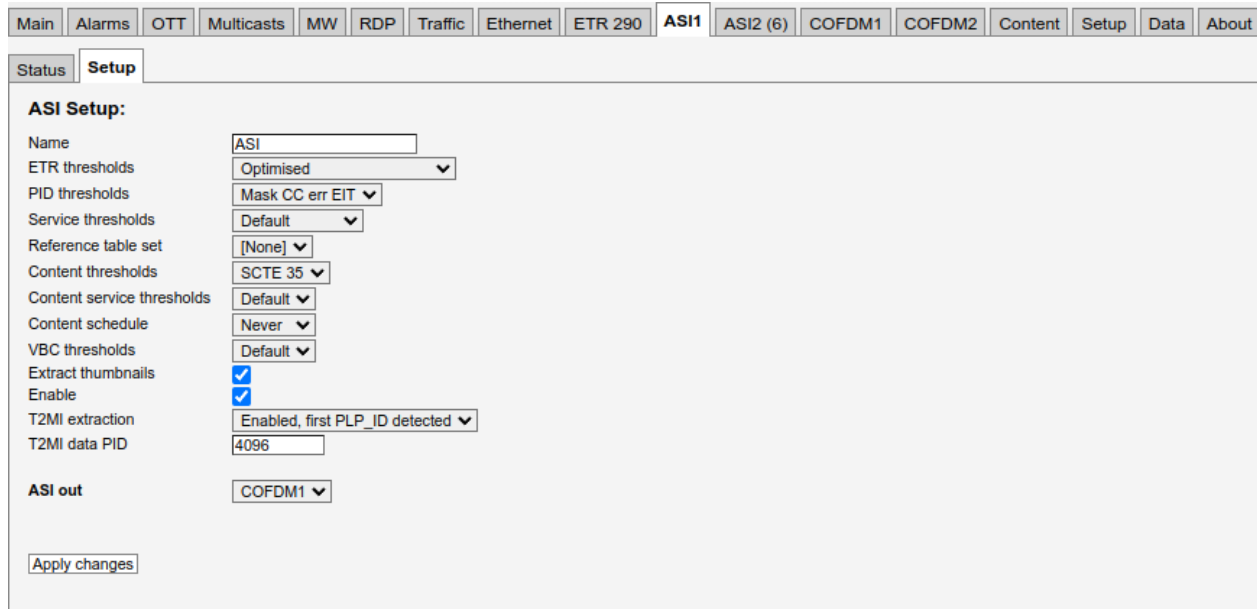
Total bitrate:	Total transport stream bitrate including null packets (PID 8191)
Min total bitrate:	The minimum total bitrate including null packets
Max total bitrate:	The maximum total bitrate including null packets
Effective Bitrate:	Transport stream bitrate excluding null packets (PID 8191)
Min effective bitrate:	The minimum effective bitrate excluding null packets
Max effective bitrate:	The maximum effective bitrate excluding null packets
1 PPS input lock:	Bulb indicating whether there is 1 PPM input lock or not. Green color indicates lock whereas red indicates no lock.
SFN drift:	SFN drift measurements are applicable for signals with DVB-T MIP and for T2MI signals. It behaves differently based on the type of signal: • DVB-T MIP: SFN drift is measured directly based on the timing information in the DVB-T MIP packet. In ETR 290 — ETR thr. one can specify Drift zero adjust to zero out this measurement. The value configured in the threshold will be subtracted from the measured value and the corresponding result is presented in the GUI and used for alarming. • T2MI: SFN drift can not be measured directly for T2MI streams. For such systems it is possible to get a calculated SFN drift value based on the SFN network delay. If a non zero value have been specified for Drift zero adjust in ETR 290 — ETR thr. then the probe will take the SFN network delay measurement, subtract the zero adjustment parameter and present this as SFN drift. This allows for graphing and easy alarming if the network delay changes. The SFN drift measurement will be 0 for T2MI streams if Drift zero adjust is not specified in ETR 290 — ETR thr.
SFN network delay:	SFN network delay is the accumulated network transmission delay as seen by the probe at any point after the SFN adapter. SFN network delay measurements are only applicable for signals with DVB-T MIP and for T2MI signals.
SFN (1–network delay):	SFN network delay is the negative SFN network delay, measured as 1 second – the SFN network delay.

SFN drift slew rate: The SFN drift slew rate measurement takes the individual, unfiltered and non-averaged SFN drift measurements and computes a number of difference measurements between current and previous value. A number of the most recent difference measurements are then summed together and divided by the averaging window constant setting that forms part of the ETR290 template. In this manner it is possible to get a measure of and graph the changes to the slope of the SFN drift, or the Derivative of the SFN drift measurement. This tells the operator how much the SFN drift measurement is changing per unit time and has units of [microseconds per second]. Too large SFN drift slew rate measurements can indicate potential issues with the SFN timing and regulation algorithms inside the T/T2 excitors, or the studio to transmitter contribution network and that can again lead to video signal issues or even video loss.

ASI status - ASI config info:

Name:	The name of the ASI transport stream as defined in the ASI — Setup view
ETR thresholds:	The name of the ETR threshold template assigned to the ASI transport stream
PID thresholds:	The name of the PID threshold template assigned to the ASI transport stream
Service thresholds:	The name of the Service threshold template assigned to the ASI transport stream
VBC thresholds:	The name of the VBC threshold template assigned to the ASI transport stream

7.11.2 ASI — Setup



The **ASI — Setup** view enables selection of thresholds for the ASI input transport stream. In addition a name is assigned to the ASI stream. When changes have been made in the **ASI — Setup** view the **Apply changes** button should be clicked for the changes to take effect.

ASI - ASI setup info:

Name:	A user specified name for the ASI transport stream
ETR thresholds:	The name of the ETR threshold template assigned to the ASI transport stream
PID thresholds:	The name of the PID threshold template assigned to the ASI transport stream
Service thresholds:	The name of the Service threshold template assigned to the ASI transport stream
Reference table set:	The Reference table set selection is used to compare the tables in the transport stream with a set of stored tables. These tables are defined in the ETR 290 — Gold TS thresholds view.
Content thresholds:	The Content thresholds specify content alarming options. Selectable Content thresholds templates are defined in the Content — Content thresh. view.
Content service thresholds:	The Content service threshold group that should be assigned to the ASI transport stream. Content service threshold groups that have been defined in the Content — Service thresh. view are available for selection from the drop-down menu.

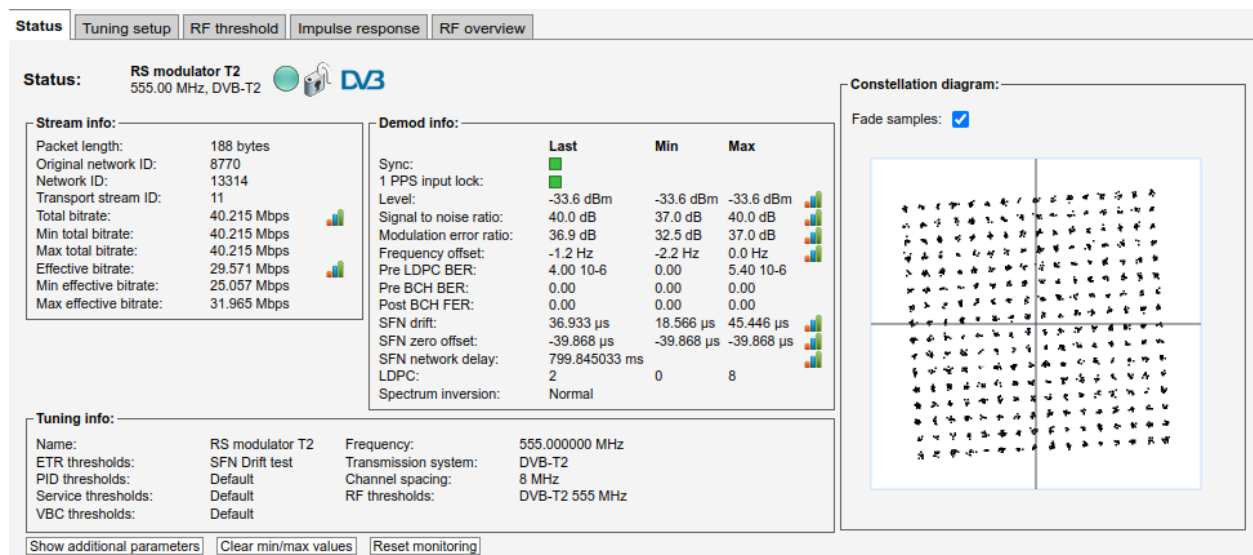
Content schedule:	The scheduling scheme that should be assigned to the content monitoring for the ASI transport stream. Scheduling schemes that have been defined in the Setup — Scheduling view are available for selection from the drop-down menu. Scheduling allows masking content alarms at predefined time periods. The schedules can be overridden for specific services using Content service thresholds.
VBC thresholds:	The name of the VBC threshold template assigned to the ASI transport stream
Extract thumbnails:	When enabled, the probe will generate thumbnails for this tuning whenever tuned to it. If not, they can be generated manually by opening the thumbnail pop-up from the Content — Thumbnails and ETR 290 — Services views. In order to enable this option, <i>extract thumbnails</i> also has to be enabled in the Setup — Params view
Enable:	Check the box to enable ASI monitoring and alarming.
T2MI extraction:	Enables extraction of T2MI and specifies which PLP to extract.
T2MI data PID:	PID of the container stream.
ASI out:	Select the input to be carried through ASI out.

7.12 COFDM/QAM

The COFDM/QAM tab will show the status for the RF-B input on the NOMAD. This input can receive signals in DVB-T, DVB-T2 and DVB-C format. The NOMAD US model supports QAM ITU.T J.83 Annex A/B/C and 8VSB instead of DVB-T/T2. Please refer to the section **QAM/VSF/RF** for the NOMAD US.

Thumbnails for the RF demodulated services are accessed from the **ETR 290 — Services** and **Content — Thumbnails** views. To get thumbnails for COFDM, make sure that the **Extract thumbnails** check box is enabled when defining the tuning frequency, and also that the global thumbnail extraction setting is enabled in **Setup — Params**.

7.12.1 COFDM/QAM — Status



The **COFDM/QAM — Status** view gives an overview of the key input interface parameters.

Click the graph button to display a detailed graph for the specified parameter. For probes licensed with FLASH32-OPT, the graph can contain up to 7 days of measurements. On probes without this license, the graph will contain data for the previous and the current day. Please refer to **Setup — Meas. log** to configure the logging.

The COFDM/QAM status view displays the following information:

Status - Stream info:

Packet length:	Indicates if the transport stream packets are 188 or 204 bytes
Original network ID:	The original network ID as specified in the NIT table
Network ID:	The network ID as specified in the NIT table
Transport stream ID:	The transport stream ID as specified in the PAT table
Total bitrate:	Total transport stream bitrate including null packets (PID 8191)
Min total bitrate:	The minimum total bitrate including null packets
Max total bitrate:	The maximum total bitrate including null packets
Effective Bitrate:	Transport stream bitrate excluding null packets (PID 8191)
Min effective bitrate:	The minimum effective bitrate excluding null packets
Max effective bitrate:	The maximum effective bitrate excluding null packets

Status - Demod info:

Sync:	A 'bulb' indicating frequency lock when green, red indicates no lock
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1 PPS input lock:	A 'bulb' indicating reference signal lock when green, red indicates no lock for the 1 PPS input
Level:	This is a measure of the channel power into the channel bandwidth configured. The last measurement, as well as the minimum and maximum measurements are displayed. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1mW. dBμV: in decibels relative to a reference value of 1 μV dB mV: in decibels relative to a reference value of 1 mV
Signal to noise ratio:	The signal to noise ratio in dB. The last measurement, as well as the minimum and maximum measurements are displayed.
Modulation error ratio:	The modulation error ratio in dB. The last measurement, as well as the minimum and maximum measurements are displayed.
Frequency offset:	The measured center frequency offset in Hz. The last measurement, as well as the minimum and maximum measurements are displayed.
Pre Viterbi BER: Pre LDPC BER:	The bit error rate before Viterbi or LDPC error correction
Pre RS BER: Pre BCH BER:	The bit error rate before RS or BCH error correction
Post BCH FER:	The frame error rate after BCH error correction
SFN drift:	SFN drift is the time delay of the signal from when it is transmitted out of the antenna to when the transport stream is received inside the demodulator of the VB252 module. It includes the delay through the air and the delay inside the demodulator chip used inside the VB252. The measurement is relevant only in SFN scenarios. It is useful for trending and alarming on SFN synchronization issues. In ETR 290 — ETR thr. one can specify Drift zero adjust to zero out this measurement. The value configured in the threshold will be subtracted from the measured value and the corresponding result is presented in the GUI and used for alarming. The last measurement, as well as the minimum and maximum measurements are displayed.
SFN zero offset:	When a PCR PID has been specified the accuracy of the SFN drift measurements will be improved. When the probe tunes to the signal the SFN drift measurement will be automatically zero adjusted for optimum performance. The adjustment factor used will be displayed as SFN zero offset. This will remain constant until the interface card is retuned (either manually, from Eii or due to a temporary signal loss. The last measurement, as well as the minimum and maximum measurements are displayed.

SFN network delay:	SFN network delay is the transmission delay through the transmitter contribution network prior to the exciter (typically ASI or IP-based). The last measurement, as well as the minimum and maximum measurements are displayed.
SFN (1–network delay):	SFN network delay is the negative SFN network delay, measured as 1 second – the SFN network delay.
SFN drift slew rate:	The SFN drift slew rate measurement takes the individual, unfiltered and non-averaged SFN drift measurements and computes a number of difference measurements between current and previous value. A number of the most recent difference measurements are then summed together and divided by the averaging window constant setting that forms part of the ETR290 template. In this manner it is possible to get a measure of and graph the changes to the slope of the SFN drift, or the Derivative of the SFN drift measurement. This tells the operator how much the SFN drift measurement is changing per unit time and has units of [microseconds per second]. Too large SFN drift slew rate measurements can indicate potential issues with the SFN timing and regulation algorithms inside the T/T2 excitors, or the studio to transmitter contribution network and that can again lead to video signal issues or even video loss.
LDPC:	Low-density parity-check iteration counter (only for DVB-T2). The last measurement, as well as the minimum and maximum measurements are displayed.
Spectrum inversion:	The spectrum inversion parameter may have the value ‘Normal’ or ‘Inverted’.
<i>Status - Tuning info:</i>	
Name:	The name assigned to the current frequency channel
Frequency:	The channel center frequency in MHz
Transmission system:	The transmission system can be DVB-T, DVB-T2 or DVB-C
Channel spacing:	The channel spacing in MHz
ETR thresholds:	The name of the ETR threshold template assigned to the current frequency
PID thresholds:	The name of the PID threshold template assigned to the current frequency
Service thresholds:	The name of the Service threshold template assigned to the current frequency
RF thresholds:	The name of the RF threshold template assigned to the current frequency

VBC thresholds: The name of the VBC threshold template assigned to the current frequency

Please note: If the signal power is stronger than -10 dBm there will be a warning shown by GUI. This is to warn a user to apply some attenuation on the input to protect the analog front end on the VB252.

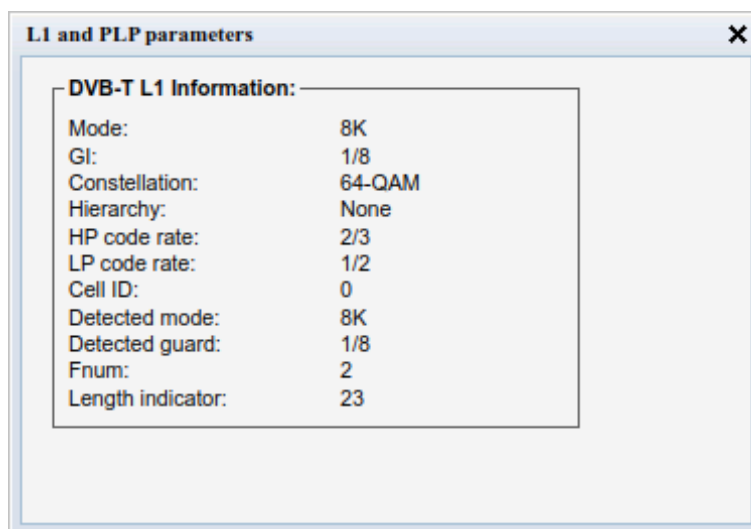
The constellation diagram displays the received symbols with respect to phase and amplitude. When **Fade samples** is checked the samples in the constellation diagram will fade out after a period of time so that the diagram only shows recent samples. The constellation diagram can be zoomed in by clicking the interesting part of the constellation diagram. Another click zooms out again.

Click the **Show additional parameters** button to view L1 and PLP details. The L1 and PLP information is not relevant for DVB-C signals (QAM).

Click the **Clear min/max values** button to clear the minimum and maximum values shown in this page. This will also clear the minimum and maximum values shown in the **ETR 290 — ETR Details** view for all the interface checks. The graphing is not affected.

Click the **Reset monitoring** button to reset the monitoring of the stream. The interface card will perform a full retune and monitoring will start again when the input has finished tuning. All error counters, minimum and maximum values will be cleared.

In case of DVB-T signal the additional parameters are shown in the following manner:



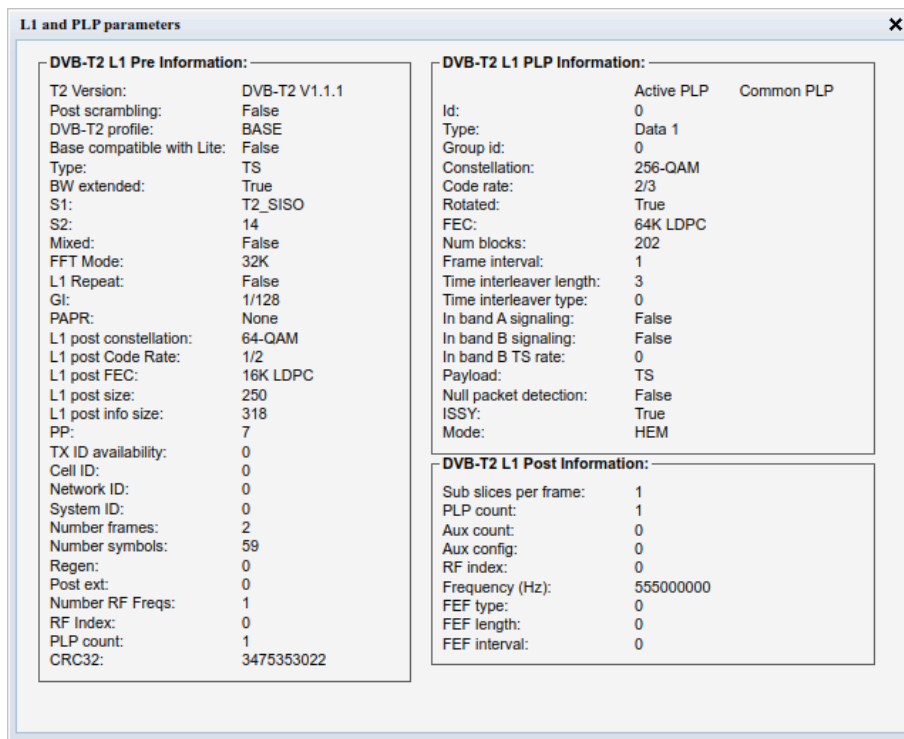
DVB-T L1 Information

Mode: The OFDM mode (DFT size). Possible OFDM modes are 2K and 8K

GI: The guard interval. The guard interval may be 1/4, 1/8, 1/16 or 1/32

Constellation:	Modulation constellation. Constellation may be QPSK, 16-QAM or 64-QAM
Hierarchy:	DVB-T hierarchy can have the values 'None', 1, 2 or 4.
HP code rate:	The FEC mode used for the high priority transport stream
LP code rate:	The FEC mode used for the low priority transport stream
Cell ID:	The cell ID is a number identifying the transmitter.
Detected mode:	The detected OFDM mode
Detected guard:	The detected guard interval
Fnum:	The current frame number
Length indicator:	The signaled length

In case of DVB-T2 signal the additional parameters are shown in the following manner:



L1 and PLP parameters

DVB-T2 L1 Pre Information:		DVB-T2 L1 PLP Information:	
T2 Version:	DVB-T2 V1.1.1	Id:	0
Post scrambling:	False	Type:	Data 1
DVB-T2 profile:	BASE	Group id:	0
Base compatible with Lite:	False	Constellation:	256-QAM
Type:	TS	Code rate:	2/3
BW extended:	True	Rotated:	True
S1:	T2_SISO	FEC:	64K LDPC
S2:	14	Num blocks:	202
Mixed:	False	Frame interval:	1
FFT Mode:	32K	Time interleaver length:	3
L1 Repeat:	False	Time interleaver type:	0
GI:	1/128	In band A signaling:	False
PAPR:	None	In band B signaling:	False
L1 post constellation:	64-QAM	In band B TS rate:	0
L1 post Code Rate:	1/2	Payload:	TS
L1 post FEC:	16K LDPC	Null packet detection:	False
L1 post size:	250	ISSY:	True
L1 post info size:	318	Mode:	HEM
PP:	7		
TX ID availability:	0		
Cell ID:	0		
Network ID:	0		
System ID:	0		
Number frames:	2		
Number symbols:	59		
Regen:	0		
Post ext:	0		
Number RF Freqs:	1		
RF Index:	0		
PLP count:	1		
CRC32:	3475353022		

DVB-T2 L1 Post Information:	
Sub slices per frame:	1
PLP count:	1
Aux count:	0
Aux config:	0
RF index:	0
Frequency (Hz):	555000000
FEF type:	0
FEF length:	0
FEF interval:	0

DVB-T2 L1 Pre Information

T2 Version:	DVB-T2 Version:
	1.1.1
	1.2.1
	1.3.1

Post scrambling:	Post scrambling: Informs if L1-Post scrambling is enabled, supported from DVB-T2 v1.3.1. 'True' or 'False'.
DVB-T2 profile:	DVB-T2 profile: Determines current profile of DVB-T2 Signal: Base Lite (only supported in DVB-T2 v1.3.1)
Base compatible with Lite:	Base compatible with Lite: Indicates if the DVB-T2 Base Profile is compatible with DVB-T2 Lite profile. If Base is incompatible with Lite one has to specify correctly which profile should be used for tuning: Base or Lite. If there is compatibility between both DVB-T2 profiles the tuning will be successful with any of them. 'True' or 'False'
Type:	Type: The stream type contained within the current T2 super-frame. TS (Transport stream only) GS (Generic streams only) Mixed TS and GS The OFDM mode (DFT size). Possible OFDM modes are 1K, 2K, 4K, 8K, 16K and 32K
BW extended:	BW extended: Bandwidth extension indicator (only for 8K/ 16K/ 32K). 'True' or 'False'.
S1:	S1: S1 Signaling. P1 S1 0 – T2_SISO (Single input, single output) 1 – T2_MISO (Multiple input, single output) 2 – Non DVB-T2
S2:	S2: S2 Signaling. P1 S2 0 – DVB-T2 2K mode with any guard. 2 – DVB-T2 8K mode with DVB-T guard. 4 – DVB-T2 4K mode with any guard. 6 – DVB-T2 1K mode with any guard. 8 – DVB-T2 16K mode with any guard. 10 – DVB-T2 32K mode with DVB-T guard. 12 – DVB-T2 8K mode with DVB-T2 guard. 14 – DVB-T2 32K mode with DVB-T2 guard.
Mixed:	Mixed: Mixed signaling indicator. 0 – Not mixed. 1 – Mixed (from S2 field).
FFT Mode:	FFT Mode: Specifies window size of Fast-Fourier-Transform (from S2 signaling). '1K', '2K', '4K', '8K', '16K', '32K'
L1 Repeat:	L1 Repeat: L1 repeat enable flag. 'True' or 'False'.
GI:	GI: The guard interval used for the current super-frame. '1/4', '1/8', '1/16', '1/32', '1/218', '19/128', '19/256'

PAPR:	Peak to average power ratio indicator. 'None', 'ACE', 'TR', 'TR-ACE'
L1 post constellation:	The L1-post modulation in the current frame. 'BPSK', 'QPSK', '16-QAM', '64-QAM'.
L1 post Code Rate:	The L1-post code rate in this frame. '1/2'
L1 post FEC:	The L1-post FEC (Forward Error Correction) type. '16K LDPC (Low-density parity-check).'
L1 post size:	Size of the L1-post in OFDM cells.
L1 post info size:	L1-post info size = L1-post configurable + dynamic + extension.
PP:	The pilot pattern for the OFDM symbols in this frame. '1', '2', '3', '4', '5', '6', '7', '8'.
TX ID availability:	The TX id.
Cell ID:	The T2 cell id.
Network ID:	The T2 network id.
System ID:	The T2 system id.
Number frames:	Number of T2-frames per T2 super-frame.
Number symbols:	Number of OFDM symbols per T2-Frame.
Regen:	Regeneration count indicator.
Post ext:	L1-post extensions enabled.
Number RF Freqs:	The number of RF frequencies in use.
RF Index:	The current RF index.
PLP count:	Number of PLPS (Physical Layer Pipes)
CRC32:	The CRC32 value signaled for the L1 information)
<i>DVB-T2 L1 PLP Information:</i>	
Id:	The PLP (Physical Layer Pipe) id.
Type:	The type of the PLP. 'Common type', 'Data 1', 'Data 2'.
Group id:	The group of PLPs that this PLP belongs to.
Constellation:	The constellation of the current PLP. 'QPSK', '16-QAM', '64-QAM', '256-QAM'.
Code rate:	The code rate of this PLP. '1/2', '2/3', '3/5', '3/4', '4/5' - DVB-T2 Base only, '5/6' - DVB-T2 Base only, '1/3' - DVB-T2 Lite only, '2/5' - DVB-T2 Lite only.
Rotated:	Indicates if constellation is rotated. 'True' or 'False'.

FEC:	The FEC (Forward Error Correction) type used on this PLP. 'LDPC (Low-density parity-check) 16K (Short FECFrame)', 'LDPC (Low-density parity-check) 64K (Long FECFrame)'. - DVB-T2 Base Only.
Num blocks:	Maximum number of PLP blocks.
Frame interval:	The T2 frame interval within the super frame of this PLP.
Time interleaver length:	Time interleaver length.
Time interleaver type:	Indicates type of Time Interleaver.
In band A signaling:	In-band A flag. Indicates whether PLP carries in-band signaling. 'True' or 'False'.
In band B signaling:	In-band B flag. Indicates whether PLP carries in-band signaling. 'True' or 'False'.
In band B TS rate:	In-band B signaling TS rate.
Payload:	The payload carried by the PLP. 'GFPS (Generic Fixed-length Packitized Stream)', 'GCS (Generic Continuous Stream)', 'GSE (Generic Encapsulated Stream)', 'TS (Transport Stream)'
Null packet detection:	Null packet detection indicator. 'True' or 'False'.
ISSY:	Input Stream Synchronization Indicator. 'True' or 'False'.
Mode:	PLP (Physical Layer Pipe) Mode. 'HEM (High Efficiency Mode)', 'Normal'

DVB-T2 L1 Post Information

Sub Slices per frame:	The number of sub-slices per T2 Frame.
PLP count:	The number of PLPs (Physical Layer Pipes) in the current super frame.
Aux count:	Number of auxiliary streams.
Aux config:	Auxiliary stream config.
RF index:	The RF index.
Frequency (Hz):	The frequency in Hz for the given RF index.
FEF type:	Indicates the type of FEF (Future Extension Frames) part.
FEF length:	The length of the FEF (Future Extension Frames) as part of the elementary period.
FEF interval:	The number of T2-Frames between two FEF (Future Extension Frames) parts.

7.12.2 COFDM/QAM — Tuning setup

Status

Tuning setup

RF threshold

Impulse response

RF overview

Tuning list

Name	Frequency	Channel spacing	System	Profile	PLP	ETR thresholds	PID thresholds	Service thresholds	Reference thresholds	RF thresholds	Enable	Edit
RIKSTV-MUX1-CH52	722.000 M	8 MHz	DVB-T	Base	Auto	ETSI TR 101 290	Default	Default	[None]	Test 1		Edit
RIKSTV-MUX4-CH30	546.000 M	8 MHz	DVB-T	Base	Auto	ONLY-TS-SYNC	Default	Default	[None]	Default		Edit
RIKSTV-MUX5-CH40	626.000 M	8 MHz	DVB-T	Base	Auto	ONLY-TS-SYNC	Default	Default	[None]	Default		Edit
RIKSTV-MUX3-CH46	674.000 M	8 MHz	DVB-T	Base	Auto	ONLY-TS-SYNC	Default	Default	[None]	Default		Edit
RIKSTV-MUX2-CH58	900.000 M	8 MHz	DVB-T	Base	Auto	ONLY-TS-SYNC	Default	Default	[None]	Default		Edit
RIKSTV-LOCAL-CH57	762.000 M	8 MHz	DVB-T	Base	Auto	ONLY-TS-SYNC	Default	Default	[None]	Test 1		Edit
NewPreset1	450.000 M	8 MHz	DVB-T2	Base	Auto	Default	Default	Default	COFDM1, NewPre...	Default	☒	Edit

Tuning setups: 7

Add new tuning

Duplicate selected

Delete selected

Import from NIT

Edit selected

In this view the operator can define frequencies that will be used by the RF demodulator for tuning. A name is associated with each tuning configuration, and this name will be used by the probe when referring to the stream. The frequencies and some associated key parameters are shown in the tuning list. Each entry in the list may be edited by clicking the **Edit** field.

To add a new frequency to the list click the **Add new tuning** button. A pop-up window will appear allowing the user to enter tuning parameters.

Edit

Name

RIKSTV-MUX1-CH52

Parameter

Frequency

722.000000 M Hz

Channel spacing

8 MHz

Transmission system

DVB-T

PLP selection

Auto

SFN drift reference

DVB-T MIP

RF thresholds

DVB-T2 555 MHz

ETR thresholds

PSB1 ETR

PID thresholds

PSB1 PID

Service thresholds

Default

Reference table set

[None]

Content thresholds

SCTE 35

Content service thresholds

Default

Content schedule

Never

VBC thresholds

Default

Extract thumbnails

☒

Enable tuning

☒

Tuning

722.000000 M Hz

8 MHz

DVB-T

Auto

DVB-T MIP

DVB-T2 555 MHz

PSB1 ETR

PSB1 PID

Default

[None]

SCTE 35

Default

Never

Default

☒

☒

Close

Apply changes

The following parameters are defined for each tuning entry:

COFDM/QAM — Tuning setup — Edit:

Name:	A name should be assigned to each tuning configuration.
Frequency:	The channel center frequency in MHz. Note that the center frequency of DVB-T/T2 transmissions is sometimes changed by an offset of ± 167 kHz in order to avoid interference with neighboring analogue channels. In this case this frequency setting should be adjusted accordingly.
Channel spacing:	The channel spacing in MHz
Transmission system:	Selection of DVB-C, DVB-T or DVB-T2 transmission system.
PLP selection:	The Physical Layer Pipe to be demodulated and analyzed. A specific PLP-ID may be selected or PLP selection can be set to 'Auto'. Only applicable for DVB-T2.
SFN drift reference:	For DVB-T signals this should be set to 'DVB-T MIP' to use the information in the MIP table to perform the SFN timing analysis. For DVB-T2 the RF signal does not contain the information needed to calculate the SFN drift (this also applies to signals with DVB-T2 MIP). To be able to calculate the SFN drift the probe also needs the T2MI signal to extract the timing information. Please note that the T2MI signal and the RF signal must match, and that the signals must contain service(s) with PCR timestamps. To enable SFN drift calculations for DVB-T2 signals, first add the T2MI stream to the probe and then set the SFN drift reference to the correct T2MI stream. This setting is not applicable for other transmission systems.
RF thresholds:	Selection of the DVB-T/T2/C threshold template that should be assigned to the current frequency
ETR thresholds:	Selection of the ETR threshold template that should be assigned to the current frequency
PID thresholds:	Selection of the PID threshold template that should be assigned to the current frequency
Service thresholds:	Selection of the Service threshold template that should be assigned to the current frequency
Reference table set:	The Reference table set selection is used to compare the tables in the transport stream with a set of stored tables. These tables are defined in the ETR 290 — Gold TS thresholds view.
Content thresholds:	The Content thresholds specify content alarming options. Selectable Content thresholds templates are defined in the Content — Content thresh. view.

Content service thresholds:	The Content service threshold group that should be assigned to the current frequency. Content service threshold groups that have been defined in the Content — Service thresh. view are available for selection from the drop-down menu.
Content schedule:	The scheduling scheme that should be assigned to the content monitoring for the current frequency. Scheduling schemes that have been defined in the Setup — Scheduling view are available for selection from the drop-down menu. Scheduling allows masking content alarms at predefined time periods. The schedules can be overridden for specific services using Content service thresholds.
VBC thresholds:	Selection of the VBC threshold template that should be assigned to the current frequency
Extract thumbnails:	When enabled, the probe will generate thumbnails for this tuning whenever tuned to it. If not, they can be generated manually by opening the thumbnail pop-up from the Content — Thumbnails and ETR 290 — Services views.
Enable tuning:	If this box is checked, the transport stream associated with the current frequency will be monitored

It is also possible to add new frequencies manually by copying existing tuning list entries using the **Duplicate highlighted** button.

Multi-edit functionality makes it possible to edit several threshold templates simultaneously. Highlight the tuning list entries that should be edited and click the **Edit selected** button.

Note that all tunings will automatically be ETR 290 analyzed, and hence be part of the round-robin loop unless the ‘Enable tuning’ box is unchecked.

7.12.3 COFDM/QAM — RF threshold

Status

Tuning setup

RF threshold

Impulse response

RF overview

RF threshold list

Name	Refs	Pre Vit./LDPC	Pre RS/BCH E	Post BCH FER	MER	SNR	▲	Min Level	Max Level	Max CFO	LDPC	Edit
Analog Carrier	0	1.00	0.00	0.00	0.00	0.00		-55.0	-10.0	0	0	Edit
Analog Carrier (1)	0	1.00	0.00	0.00	0.00	0.00		-10.0	-10.0	0	0	Edit
Default	7	1.00 10-3	0.00	0.00	20.0	20.0		-90.0	-50.0	100000	10	Edit
Test 1	2	1.00 10-3	0.00	0.00	20.0	20.0		-90.0	-50.0	100000	10	Edit
Test1	0	1.00 10-3	1.00	0.00	20.0	20.0		-90.0	-50.0	100000	10	Edit
RO	0	1.00 10-3	0.00	0.00	20.0	20.0		-90.0	-50.0	10	10	Edit
IBC	0	1.00 10-3	0.00	0.00	20.0	20.0		-90.0	-50.0	100000	10	Edit
Test CFO offset	0	1.00 10-3	0.00	0.00	20.0	20.0		-90.0	-50.0	100000	10	Edit
impulse	0	1.00 10-3	0.00	0.00	20.0	20.0		-90.0	-50.0	100000	10	Edit
Testing	1	1.00 10-3	0.00	0.00	30.0	30.0		-20.0	-20.0	100000	10	Edit

RF thresholds: 10

Add new threshold

Duplicate selected

Delete selected

Edit selected

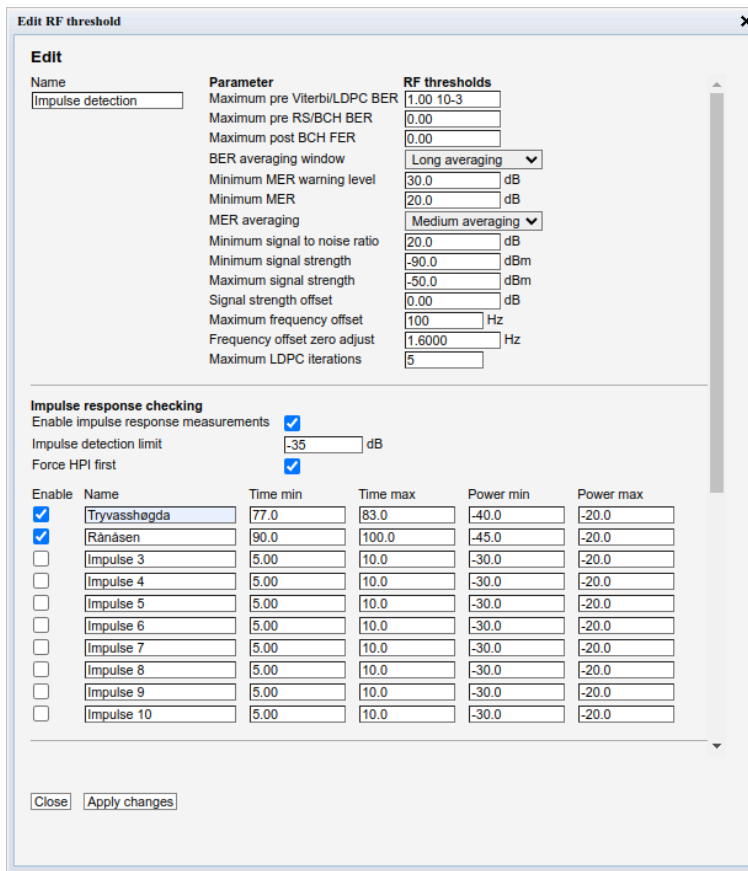
The probe will raise an alarm if one of the threshold settings associated with a tuning is violated. Note that this alarm may be disabled in the **ETR 290 — ETR thr. — Edit** view (Input interface checks).

In the threshold template list the ‘Refs’ column shows how many streams are associated with each template.

To add a new threshold template to the list, click the **Add new threshold** or **Duplicate selected** button. A pop-up window will appear allowing the user to enter parameters.

One or more threshold templates may be deleted or edited by highlighting them and clicking the **Delete selected** or **Edit selected** button.

The predefined threshold templates **Default** and **Analog carrier** cannot be edited or deleted.



The RF threshold parameters are:

<i>RF threshold — Edit:</i>	
Name:	A text field describing the threshold template
Maximum pre Viterbi/LDPC BER:	Threshold level for bit error ratio before Viterbi or LDPC error correction
Maximum pre RS/BCH BER:	Threshold level for bit error ratio before Reed-Solomon or BCH error correction
Maximum post BCH FER:	Threshold level for bit error ratio after BCH error correction
BER averaging window:	A preset selection of time windows for computing the average bit error rate
Minimum MER warning level:	Threshold level for raising a warning for calculated modulation error ratio
Minimum MER:	Threshold level for calculated modulation error ratio
MER averaging:	A preset selection of time windows for computing the average modulation error ratio
Minimum signal to noise ratio:	Threshold level for signal to noise ratio (dB)

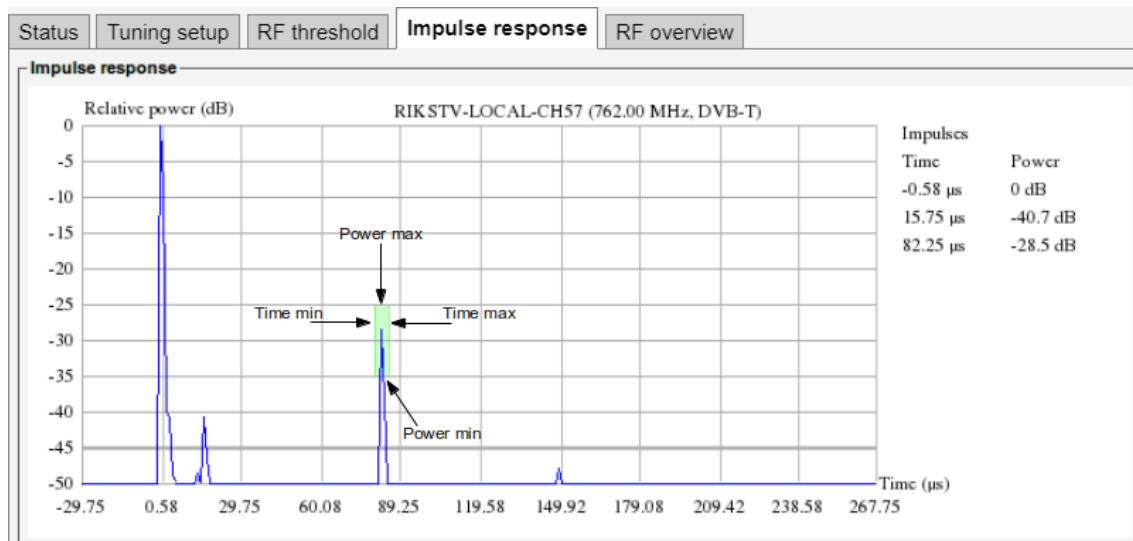
Minimum signal strength:	Threshold level for minimum signal strength. This is a measure of the stream signal power. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1 mW dB μ V: in decibels relative to a reference value of 1 μ V dB mV: in decibels relative to a reference value of 1 mV
Maximum signal strength:	Threshold level for maximum signal strength. This is a measure of the stream signal power. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1 mW dB μ V: in decibels relative to a reference value of 1 μ V dB mV: in decibels relative to a reference value of 1 mV
Signal strength offset:	It is possible to use the signal strength offset adjustment to calibrate the COFDM demodulator. This is achieved by tuning to a COFDM signal of known level and setting this adjustment accordingly.
Maximum frequency offset:	Threshold level for maximum center frequency offset
Frequency offset zero adjust:	Allows to define calibration adjustment for frequency offset
Maximum LDPC iterations:	Threshold level for Low-density parity-check iteration counter (only for DVB-T2)

The impulse response checking threshold values are only relevant for DVB-T/T2 signals. Threshold values for each impulse will become visible in the **COFDM/QAM — Impulse response** view as a highlighted box in the impulse response graph. If an impulse peak does not fall within its box an alarm will be raised. Threshold values for a maximum of ten impulses may be defined.

Impulse response checking:

Enable impulse response measurements:	Enable or disable impulse response measurements. Impulse response measurements are time consuming and should only be enabled when needed.
Impulse detection limit:	The impulse detection limit in dB. Signal peaks with lower level than the detection limit will be regarded as noise and not considered an impulse.
Force HPI first:	Force highest impulse response first. This forces the highest impulse response to t=0 in the impulse response graph.

Enable:	It is possible to enable or disable time location and level check of an impulse. Mark the 'Enable' check-box for the probe to raise alarm if an impulse peak is not found within the graph box defined by the specified time and power limits.
Name:	A text string specified by the user to name an impulse. Typically this will be the name of a transmitter
Time min:	The minimum time an impulse should occur after the main impulse
Time max:	The maximum time an impulse should occur after the main impulse
Power min:	The minimum power of an impulse compared to the main impulse (in dB)
Power max:	The maximum power of an impulse compared to the main impulse (in dB)



Modulation parameter checks
DVB-T2 L1 Pre
☐ Constellation 64-QAM
☐ FFT Mode 16K
☐ GI 1/8
☐ PAPR None
☐ PP 10
☐ Data symbols 50
☐ Data frames 2
☐ BW extended False
☐ S1 T2_SISO
☐ PLP count 2
☐ System ID 0
☐ Network ID 0
☐ Cell ID 0
☐ CRC32 0

DVB-T2 L1 PLP
☐ Type Common
☐ Group ID 1
☐ Constellation 16-QAM
☐ Rotated True
☐ Code rate 1/2
☐ FEC 16K LDPC
☐ Time int. length 3
☐ Time int. type 0
☐ Frame interval 1
☐ Num blocks 200
DVB-T2 L1 Post
☐ Frequency 0

DVB-T L1
☐ Constellation 64-QAM
☐ Mode 8K
☐ GI 1/8
☐ Hierarchy None
☐ HP code rate 1/2
☐ LP code rate 1/2
☐ Cell ID 0

Close Apply changes

Modulation parameter checks: DVB-T2 L1 Pre

Constellation:	Set the expected Constellation value (modulation scheme) associated with the DVB-T2 system
FFT Mode:	Set the nominal FFT size for a particular mode
GI:	Set the expected Guard Interval value
PAPR:	Describes what kind of PAPR (Peak to Average Power Ratio) reduction that is expected, if any
PP:	Set the expected pilot pattern used for the OFDM data symbols
Data symbols:	Set the expected number of OFDM data symbols per T2-frame (excluding P1 and P2)
Data frames:	Set the expected number of T2-frames per super-frame (minimum value is two)
BW extended:	If set to true, expect the usage of extended carrier mode (for 8K, 16K and 32K FFT sizes)
S1:	Set the expected S1 value (same value as in the P1 signaling)
PLP count:	Set the expected number of PLPs carried within a T2 super frame
System ID:	Set the expected T2 System ID (unique for each T2 system within a DVB network)

Network ID:	Set the expected ID of the current DVB network
Cell ID:	If non-zero, check if this T2 system has the expected geographic cell within the DVB-T2 network
CRC32:	Set the expected 32-bit error detection code computed from the entire L1-pre signaling

Modulation parameter checks: DVB-T2 L1 PLP

Type:	Set the expected type of Tx input stream carried within the T2 super-frame
Group ID:	Set the expected PLP group ID value for this PLP
Constellation:	Set the expected Constellation value used by this PLP
Rotated:	Set to true if constellation rotation is in use
Code rate:	Set the expected Code Rate associated with this PLP
FEC:	Set the expected FEC type used by this PLP
Time int. length:	Set the expected Time Interleaving Length (the number of T2-frames to which each Interleaving Frame is mapped)
Time int. type:	Set the expected type of time-interleaving
Frame interval:	Set the expected T2-frame interval within the super-frame associated with this PLP
Num blocks:	Set the expected maximum number of blocks for this PLP

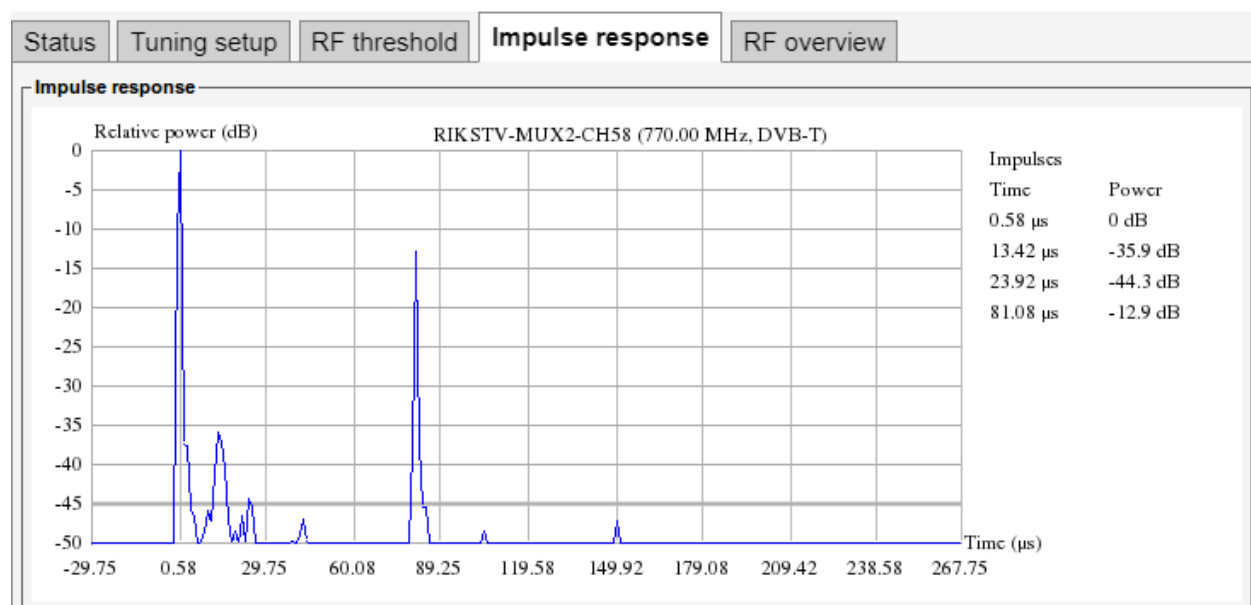
Modulation parameter checks: DVB-T2 L1 Post

Frequency:	Set the expected frequency to be signaled in L1 post
-------------------	--

Modulation parameter checks: DVB-T L1

Constellation:	Set the expected Constellation value (modulation scheme) associated with the DVB-T system
Mode:	Set the nominal FFT size for a particular mode
GI:	Set the expected Guard Interval value
Hierarchy:	Set the expected alpha value associated with a hierarchical transmission
HP code rate:	If hierarchy information is present, set the expected code rate that will be used at the beginning of the transmission (HP)
LP code rate:	If hierarchy information is present, set the expected code rate that will be used at the end of the transmission (LP)
Cell ID:	If non-zero, check if this T2 system has the expected geographic cell within the DVB-T network

7.12.4 COFDM/QAM — Impulse response



Impulse response measurements are not relevant for DVB-C signals.

The impulse response graph displays impulses as a function of time and power with reference to the main impulse. If impulse threshold values have been assigned to DVB-T/T2 stream (frequency) these will become visible in the graph as highlighted boxes defining minimum and maximum values for impulse time and power for each enabled impulse. Threshold templates are defined in the **COFDM/QAM — RF threshold** view. A RF threshold template is assigned to a DVB-T/T2/C stream in the **COFDM/QAM — Tuning setup** view.

Impulse time and power are listed at the right hand side of the impulse response graph. Power peaks that are lower than the impulse detection limit are not listed. The impulse detection limit is displayed in the graph as a bold light grey grid line.

If an impulse peak does not fall within its threshold limit box, the box color will change to red and an alarm is raised. Note that 'SFN measurements' must be enabled in the ETR thresholds template associated with a DVB-T/T2 stream for impulse check alarming to be active. ETR threshold templates are defined in the **ETR 290 — ETR thr.** view. An ETR threshold template is assigned to a DVB-T/T2/C stream in the **COFDM/QAM — Tuning setup** view.

7.12.5 COFDM/QAM — RF overview

Status

Tuning setup

RF threshold

Impulse response

RF overview

List of RF parameters and measurements

COFDM/QAM

Name	Frequency	Trans. system	Channel spacing	TS sync	Min level	Max level	Min SNR	Min MER	Max pre FB	Max post FB	Max post BF	1 PPS lock	Max SFN drift	Max LDPC
RIKSTV-MUX1-CH52	722000000	DVB-T	8000000	yes	-45.6 dBm	-45.6 dBm	25.0 dB	24.1 dB	5.44 10-3	2.66 10-5	NA	Locked	28.300 us	NA
RIKSTV-MUX4-CH30	546000000	DVB-T	8000000	yes	-40.6 dBm	-40.6 dBm	25.6 dB	25.4 dB	2.08 10-3	3.00 10-7	NA	Locked	24.200 us	NA
RIKSTV-MUX5-CH40	626000000	DVB-T	8000000	yes	-43.6 dBm	-43.6 dBm	24.9 dB	24.4 dB	3.38 10-3	9.80 10-6	NA	Locked	24.500 us	NA
RIKSTV-MUX3-CH46	674000000	DVB-T	8000000	yes	-43.6 dBm	-43.6 dBm	25.6 dB	24.6 dB	2.81 10-3	2.01 10-5	NA	Locked	27.400 us	NA
RIKSTV-MUX2-CH58	770000000	DVB-T	8000000	yes	-59.6 dBm	-59.6 dBm	23.1 dB	22.3 dB	1.49 10-2	8.24 10-4	NA	Locked	28.900 us	NA
RIKSTV-LOCAL-CH57	762000000	DVB-T	8000000	yes	-53.6 dBm	-53.6 dBm	25.1 dB	24.6 dB	2.74 10-3	2.23 10-5	NA	Locked	24.100 us	NA

The RF parameters and measurements list gives a status overview of all monitored DVB-T/T2/C frequencies from the selected RF input. The parameters and measurements in this list refer to the last completed monitoring period or, for a stream currently monitored, the current monitoring period.

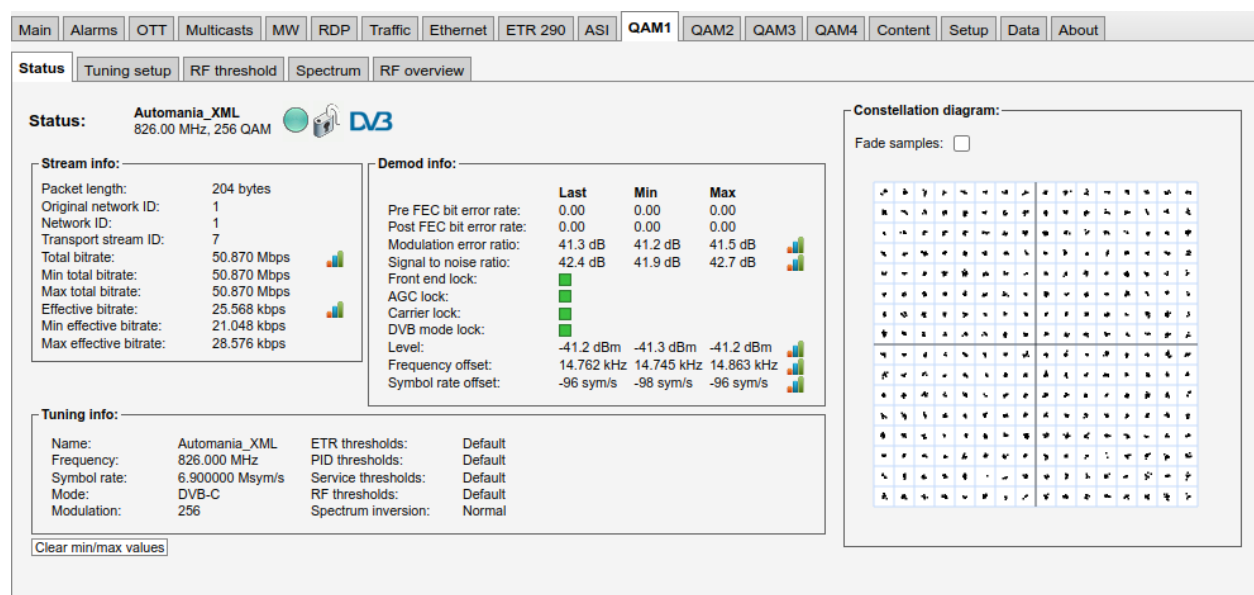
<i>List of RF parameters and measurements:</i>	
Name:	The name assigned to the stream
Frequency:	The stream frequency that the associated parameters apply to
Trans. System:	The transmission system: DVB-T or DVB-T2
Channel spacing:	The channel bandwidth
TS sync:	Transport stream sync: yes or no
Last level:	The last RF signal level
Min level:	The minimum RF signal level
Max level:	The maximum RF signal level
Last SNR:	The last signal to noise ratio
Min SNR:	The minimum signal to noise ratio
Last MER:	The last calculated modulation error ratio
Min MER:	The minimum calculated modulation error ratio
Last pre FB:	The last bit error rate before Viterbi or LDPC error correction
Max pre FB:	The maximum bit error rate before Viterbi or LDPC error correction
Last post FB:	The last bit error rate before BCH error correction
Max post FB:	The maximum bit error rate before BCH error correction
Last post BF:	The last bit error rate after BCH error correction
Max post BF:	The maximum bit error rate after BCH error correction
1 PPS lock:	An indication of reference signal lock. The value may be 'Locked' or 'No lock'.
Last SFN drift:	The last SFN drift (in μ s) detected during the monitoring period
Max SFN drift:	The maximum SFN drift (in μ s) detected during the monitoring period
Last LDPC:	The last Low-density parity-check (LDPC) iteration counter value (only for DVB-T2)
Max LDPC:	The maximum Low-density parity-check (LDPC) iteration counter value (only for DVB-T2)

7.13 QAM/VSF/RF (applies only to the NOMAD US version)

The QAM tab will show the status for the RF-B input on the NOMAD US. The input can receive cable signals according to QAM ITU.T J.83 Annex A, B and C and 8VSB for ATSC terrestrial applications as found in United States. The NOMAD model supports DVB-T/T2/C, please refer to the section **COFDM/QAM** for the NOMAD.

Thumbnails of QAM services are accessed from the **ETR 290 — Services and Content — Thumbnails** views. To get thumbnails, make sure that the **Extract thumbnails** check box is enabled when defining the tuning frequency, and also that the global thumbnail extraction setting is enabled in **Setup — Params**.

7.13.1 QAM — Status



The **QAM — Status** view gives an overview of the key input interface parameters.

Click the graph button to display a detailed graph for the specified parameter. For probes licensed with FLASH32-OPT, the graph can contain up to 7 days of measurements. On probes without this license, the graph will contain data for the previous and the current day. Please refer to **Setup — Meas. log** to configure the logging.

The QAM status view displays the following information:

<i>QAM status - Stream info:</i>	
Packet length:	Indicates if the transport stream packets are 188 or 204 bytes
Original network ID:	The original network ID as specified in the NIT table
Network ID:	The network ID as specified in the NIT table
Transport stream ID:	The transport stream ID as specified in the PAT table
Total bitrate:	Current total transport stream bitrate (including null packets – (PID 8191))
Min total bitrate:	Minimum total transport stream bitrate (including null packets)
Max total bitrate:	Maximum total transport stream bitrate (including null packets)
Effective bitrate:	Current transport stream bitrate (excluding null packets)

Min effective bitrate:	Minimum transport stream bitrate (excluding null packets)
Max effective bitrate:	Maximum transport stream bitrate (excluding null packets)

QAM status - QAM demod info:

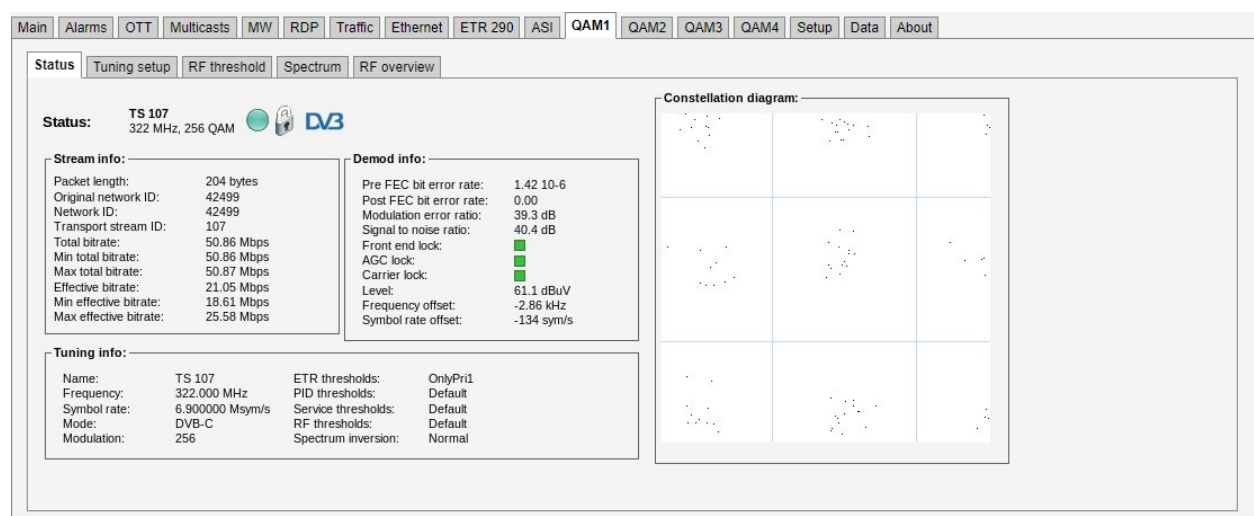
Pre FEC bit error rate:	The bit error rate before forward error correction. The last measurement, as well as the minimum and maximum measurements are displayed.
Post FEC bit error rate:	The bit error rate after forward error correction. The last measurement, as well as the minimum and maximum measurements are displayed.
Modulation error ratio:	The modulation error ratio (MER). The last measurement, as well as the minimum and maximum measurements are displayed.
Signal to noise ratio:	Signal to noise ratio (SNR) in dB. The last measurement, as well as the minimum and maximum measurements are displayed.
Front end lock:	A “bulb” indicating front end lock when green, red indicates no lock
AGC lock:	A “bulb” indicating AGC lock when green, red indicates no lock
Carrier lock:	A “bulb” indicating carrier lock when green, red indicates no lock
DVB mode lock:	A “bulb” indicating DVB mode lock when green, red indicates no lock
Level:	This is a measure of the channel power into the channel bandwidth configured. The last measurement, as well as the minimum and maximum measurements are displayed. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1 mW dB μ V: in decibels relative to a reference value of 1 μ V dB mV: in decibels relative to a reference value of 1 mV
Frequency offset:	The measured QAM center frequency offset. The last measurement, as well as the minimum and maximum measurements are displayed.
Symbol rate offset:	The measured QAM symbol rate offset. The last measurement, as well as the minimum and maximum measurements are displayed.

QAM status - QAM tuning info:

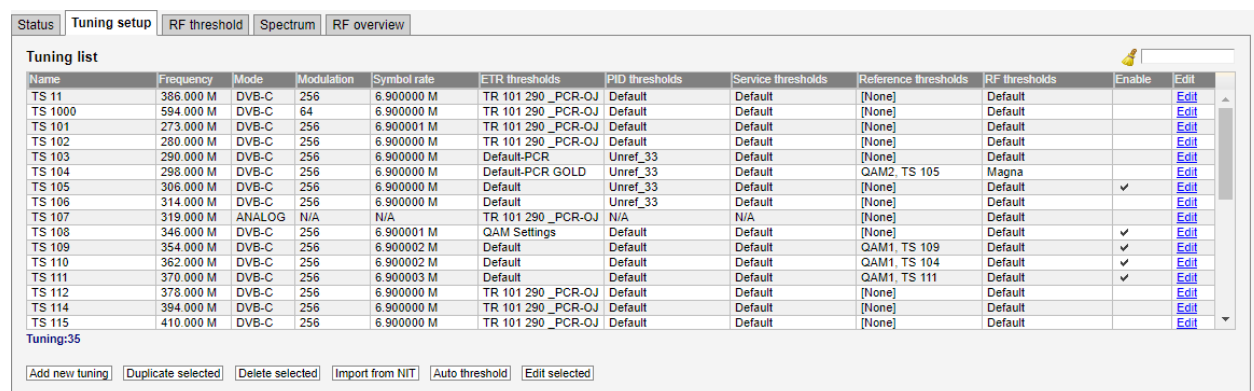
Name:	A name should be assigned to each frequency channel
Frequency:	The QAM tuning frequency in MHz
Symbol rate:	The QAM symbol rate in Msym/s
Modulation:	The QAM modulation scheme - may be 16, 32, 64, 128 or 256

Mode:	The modulation mode: DVB-C (Annex A) or QAM-B (Annex B)
ETR thresholds:	The name of the ETR threshold template assigned to the current frequency
PID thresholds:	The name of the PID threshold template assigned to the current frequency
Service thresholds:	The name of the Service threshold template assigned to the current frequency
VBC thresholds:	The name of the VBC threshold template assigned to the current frequency
Spectrum inversion:	Indicates whether the spectrum is inverted or not

The constellation diagram displays the received symbols with respect to phase and amplitude. When **Fade samples** is checked the samples in the constellation diagram will fade out after a period of time so that the diagram only shows recent samples. The constellation diagram can be zoomed in by clicking the interesting part of the constellation diagram. Another click zooms out again.

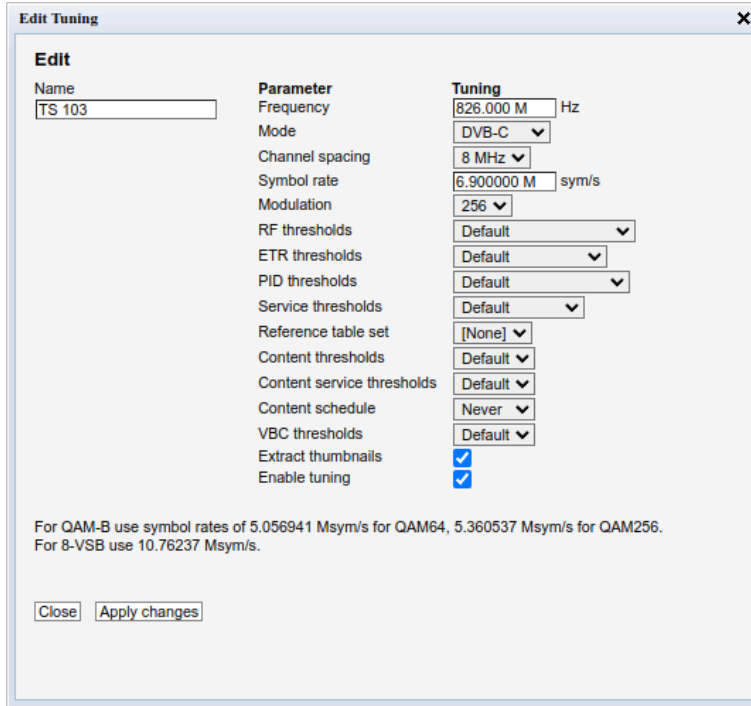


7.13.2 QAM — Tuning setup



In this view the operator can define frequencies that will be used by the QAM demodulator for tuning. A name is associated with each frequency, and this name will be used by the probe when referring to the stream. The frequencies and some associated key parameters are shown in the QAM tuning list. Each entry in the list may be edited by clicking the **Edit** field.

To add a new frequency to the list, click the **Add new tuning button**. A pop-up window will appear allowing the user to enter tuning parameters.



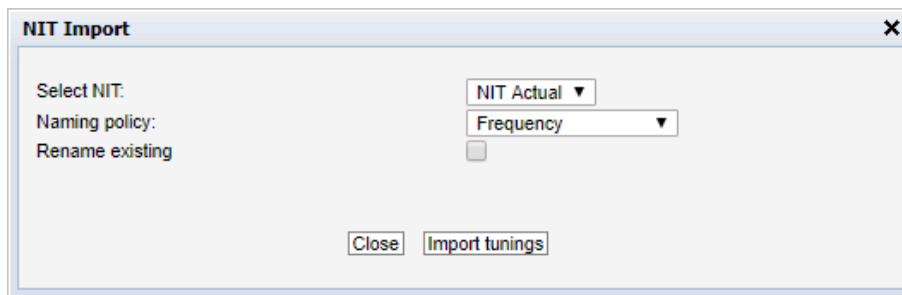
Edit Tuning

Edit		Tuning	
Name	TS 103	Frequency	826.000 M Hz
Parameter		Mode	DVB-C
		Channel spacing	8 MHz
		Symbol rate	6.900000 M sym/s
		Modulation	256
		RF thresholds	Default
		ETR thresholds	Default
		PID thresholds	Default
		Service thresholds	Default
		Reference table set	[None]
		Content thresholds	Default
		Content service thresholds	Default
		Content schedule	Never
		VBC thresholds	Default
		Extract thumbnails	☒
		Enable tuning	☒

For QAM-B use symbol rates of 5.056941 Msym/s for QAM64, 5.360537 Msym/s for QAM256.
For 8-VSB use 10.76237 Msym/s.

Please refer to the **QAM — RF Threshold** section for a description of the **Auto threshold** functionality.

Clicking the **Import from NIT** button will open the **NIT Import** pop-up view.



NIT Import

Select NIT:

Naming policy:

Rename existing ☐

NIT Import

Select NIT:	The ‘Select NIT’ drop-down menu shows NIT tables available in the transport stream currently being analyzed. Information in the selected NIT will be used to generate a tuning list when the Import tunings button is clicked.
Naming policy:	The probe will automatically name tunings according to the naming policy selected by the user: ‘Frequency’, ‘TS ID’ or ‘TS ID and frequency’.
Rename existing:	If the ‘Rename existing’ checkbox is marked, imported tunings that are already present in the tuning list will be renamed in accordance with the naming policy selected by the user.

Note that all tunings will automatically be ETR 290 analyzed, and hence be part of the round-robin loop unless the ‘Enable tuning’ box is unchecked.

The following parameters are defined for each QAM frequency:

QAM - Tuning setup:

Name:	A name should be assigned to each frequency channel
Frequency:	The QAM tuning frequency in MHz
Mode:	The QAM modulation mode. Selectable modulation modes are DVB-C, QAM-B, 8VSB, 16VSB and ANALOG.
Channel spacing:	The QAM channel spacing. Selectable spacing values are 6MHz, 7MHz and 8MHz.
Symbol rate:	The QAM symbol rate in Msym/s
Modulation:	The QAM modulation scheme - may be 16, 32, 64, 128 or 256
RF thresholds:	Selection of the RF threshold template that should be assigned to the current frequency
ETR thresholds:	Selection of the ETR threshold template that should be assigned to the current frequency
PID thresholds:	Selection of the PID threshold template that should be assigned to the current frequency
Service thresholds:	Selection of the Service threshold template that should be assigned to the current frequency
Reference table set:	The Reference table set selection is used to compare the tables in the transport stream with a set of stored tables. These tables are defined in the ETR 290 — Gold TS thresholds view.
Content thresholds:	The Content thresholds specify content alarming options. Selectable Content thresholds templates are defined in the Content — Content thresh. view.

Content service thresholds:	The Content service threshold group that should be assigned to the current frequency. Content service threshold groups that have been defined in the Content — Service thresh. view are available for selection from the drop-down menu.
Content schedule:	The scheduling scheme that should be assigned to the content monitoring for the current frequency. Scheduling schemes that have been defined in the Setup — Scheduling view are available for selection from the drop-down menu. Scheduling allows masking content alarms at predefined time periods. The schedules can be overridden for specific services using Content service thresholds.
VBC thresholds:	Selection of the VBC threshold template that should be assigned to the current frequency
Extract thumbnails:	When enabled, the probe will generate thumbnails for this tuning whenever tuned to it. If not, they can be generated manually by opening the thumbnail pop-up from the Content — Thumbnails and ETR 290 — Services views.
Enable tuning:	If this box is checked the transport stream associated with the current frequency will be monitored.

7.13.3 QAM — RF Threshold

Status

Tuning setup

RF threshold

Spectrum

RF overview

RF threshold list

Name	Refs	Pre FEC BER	Post FEC BER	MER	SNR	Min Level	Max Level	Max CFO	CFO adj	Max SRO	SRO adj	Edit
Default	3	5.00 10-5	0.00	28.0	30.0	-50.0	-10.0	100000	0	1000	0	Edit
Analog Carrier	1	1.00	0.00	0.00	0.00	-2.00	0.00	0	0	0	0	Edit
GET	0	5.00 10-5	0.00	28.0	30.0	-40.0	-10.0	1000	0	1000	0	Edit
GET (1)	0	5.00 10-5	0.00	28.0	30.0	-55.0	-10.0	1000	0	1000	0	Edit
SigStrength	0	5.00 10-5	0.00	28.0	30.0	-55.0	-10.0	1000	0	1000	0	Edit
Auto QAM1: MPTS 115	1	1.00 10-6	0.00	27.6	32.0	-57.0	-48.0	0	0	0	0	Edit
Auto QAM1: MPTS 116	1	1.00 10-6	0.00	26.2	32.0	-61.0	-51.0	0	0	0	0	Edit
Auto QAM1: MPTS 101	1	1.00 10-6	0.00	27.3	32.0	-62.0	-54.0	0	0	0	0	Edit
Auto QAM1: MPTS 102	1	1.00 10-6	0.00	27.5	32.0	-61.0	-53.0	0	0	0	0	Edit
Auto QAM1: MPTS 104	1	1.00 10-6	0.00	27.4	32.0	-60.0	-52.0	0	0	0	0	Edit
Auto QAM1: Analog NRK1	1	1.00 10-6	0.00	-4.00	18.0	-63.0	-55.0	0	0	0	0	Edit
Auto QAM1: Analog SVT2	0	1.00 10-6	0.00	-4.00	21.0	-62.0	-54.0	0	0	0	0	Edit
Auto QAM1: 140.00 M	0	1.00 10-6	0.00	24.1	26.0	-62.0	-54.0	0	0	0	0	Edit
Auto QAM1: 498.00 M	1	1.00 10-6	0.00	27.0	32.0	-43.0	-35.0	0	0	0	0	Edit
Auto QAM1: 314.00 M	1	1.00 10-6	0.00	27.4	32.0	-61.0	-53.0	0	0	0	0	Edit
Auto QAM1: 322.00 M	1	1.00 10-6	0.00	27.1	32.0	-61.0	-53.0	0	0	0	0	Edit
Auto QAM1: 346.00 M	1	1.00 10-6	0.00	27.3	32.0	-62.0	-54.0	0	0	0	0	Edit

RF threshold:57

Add new threshold

Duplicate selected

Delete selected

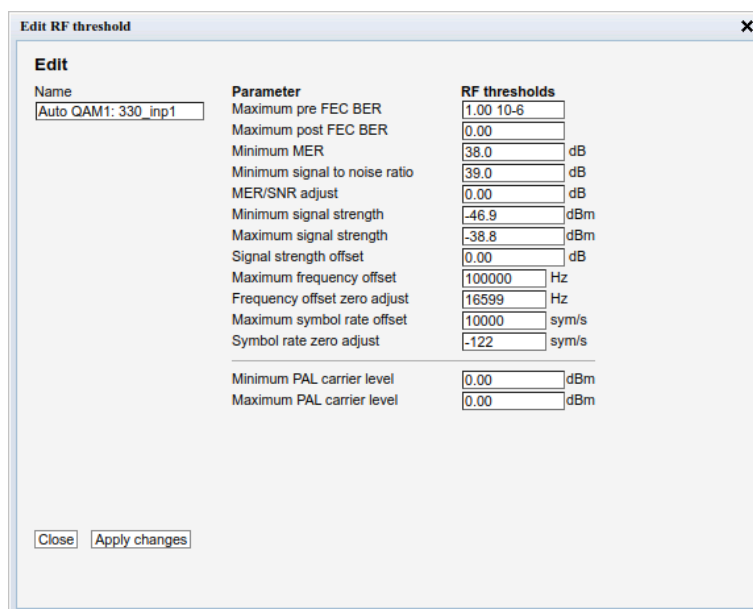
Edit selected

If a probe measurement is not in accordance with predefined threshold values, an alarm will be raised. Note that this alarm may be disabled in the **ETR 290 — ETR thr. — Edit view** (Input interface checks).

In the RF threshold list the 'Refs' column shows how many streams are associated with each RF threshold template.

To add a new threshold template to the list, click the **Add new threshold button**. A pop-up window will appear allowing the user to enter parameters.

The predefined threshold templates ‘Default’ and ‘Analog carrier’ cannot be edited or deleted.



Parameter	RF thresholds	
Maximum pre FEC BER	1.00	10-6
Maximum post FEC BER	0.00	
Minimum MER	38.0	dB
Minimum signal to noise ratio	39.0	dB
MER/SNR adjust	0.00	dB
Minimum signal strength	-46.9	dBm
Maximum signal strength	-38.8	dBm
Signal strength offset	0.00	dB
Maximum frequency offset	100000	Hz
Frequency offset zero adjust	16599	Hz
Maximum symbol rate offset	10000	sym/s
Symbol rate zero adjust	-122	sym/s
Minimum PAL carrier level	0.00	dBm
Maximum PAL carrier level	0.00	dBm

The RF threshold parameters are:

<i>RF threshold - Edit:</i>	
Name:	A text field describing the threshold template
Maximum pre FEC BER:	Threshold level for bit error ratio before forward error correction
Maximum post FEC BER:	Threshold level for bit error ratio after forward error correction
Minimum MER:	Threshold level for modulation error ratio (dB)
Minimum signal to noise ratio:	Threshold level for signal to noise ratio (dB)
Minimum signal strength:	Minimum threshold level for signal strength. This is a measure of the stream signal power. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1 mW dB μV: in decibels relative to a reference value of 1 μV dB mV: in decibels relative to a reference value of 1 mV

Maximum signal strength:	Maximum threshold level for signal strength. This is a measure of the stream signal power. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1 mW dB μ V: in decibels relative to a reference value of 1 μ V dB mV: in decibels relative to a reference value of 1 mV
Signal strength offset:	It is possible to use the signal strength offset adjustment to calibrate the QAM demodulator. This is achieved by tuning to a QAM signal of known level and setting this adjustment accordingly.
Maximum frequency offset:	Maximum QAM center frequency offset.
Frequency offset zero adjust:	It is possible to use the frequency offset zero adjustment to calibrate the measurement. This is achieved by compensating for the frequency offset measurement done at the time of calibration in order to get a measurement close to zero. The auto threshold functionality does this automatically.
Maximum symbol rate offset:	Maximum QAM symbol rate offset.
Maximum symbol zero adjust:	It is possible to use the symbol rate offset zero adjustment to calibrate the measurement. This is achieved by compensating for the symbol rate offset measurement done at the time of calibration in order to get a measurement close to zero. The auto threshold functionality does this automatically.
Minimum PAL carrier level:	The minimum limit for PAL carrier level when monitoring analog signals.
Maximum PAL carrier level:	The maximum limit for PAL carrier level when monitoring analog signals.

The QAM auto threshold functionality enables automatic generation of QAM thresholds based on current measurements. The user specifies how large deviations from current measurements should be tolerated before an alarm is raised. The worst measurements from the previous measurement period are used as the references. To have one or more RF threshold templates being generated automatically, highlight one or more streams in the QAM tuning list and click the **Auto threshold button**. This will open the **Auto threshold** pop-up view.

Auto Threshold

RF:

Create RF threshold:

Yes, create one shared threshold

Threshold policy:

Custom (Expert)

Threshold for Pre FEC BER:

5.0000 10-4

Threshold for Post FEC BER:

0.0000

Threshold adjustment for MER (dB):

2

Threshold adjustment for SNR (dB):

2

Threshold adjustment for Signal Level (dB):

2

Threshold adjustment for Centre Frequency Offset (Hz):

400

Threshold adjustment for Symbol Rate Offset (sym/sec):

400

Close

Generate thresholds

Using the ‘Create RF threshold’ drop-down menu select whether one common threshold template should be used for all streams, or if individual threshold templates should be created. Using the ‘Threshold policy’ drop-down menu select the acceptable deviation from reference measurements. When ‘Custom’ is selected the user specifies acceptable deviations for all parameters that constitute the RF threshold template, except Pre and Post FEC BER, for which the thresholds are fixed values not related to measurements.

7.13.4 QAM — RF overview

List of RF parameters and measurements																	
QAM1																	
Name	Frequency	Symbol rate	Modulation	Mode	TS sync	Last level	Min level	Max level	Last SNR	Min SNR	Last MER	Min MER	Last pre FB	Max pre FB	Last post FB	Max post FB	Last CFO
306 MHz	306000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.6 dBm	-22.7 dBm	-22.5 dBm	36.9 dB	36.8 dB	36.0 dB	36.9 dB	0.00	0.00	0.00	0.00	-1438.0 Hz
346 MHz	346000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.6 dBm	-22.7 dBm	-22.3 dBm	36.5 dB	35.7 dB	36.4 dB	36.2 dB	0.00	0.00	0.00	0.00	-1663.0 Hz
354 MHz	354000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.3 dBm	-22.4 dBm	-22.3 dBm	36.6 dB	36.5 dB	37.6 dB	36.9 dB	0.00	0.00	0.00	0.00	-1692.0 Hz
362 MHz	362000000 Hz	6900000 sym/s	256	DVB-C	yes	-21.2 dBm	-21.3 dBm	-21.1 dBm	36.2 dB	37.2 dB	37.8 dB	37.4 dB	0.00	0.00	0.00	0.00	-1723.0 Hz
370 MHz	370000000 Hz	6900000 sym/s	256	DVB-C	yes	-21.2 dBm	-21.2 dBm	-21.0 dBm	36.2 dB	37.2 dB	37.3 dB	37.3 dB	0.00	0.00	0.00	0.00	-1722.0 Hz
378 MHz	378000000 Hz	6900000 sym/s	256	DVB-C	yes	-21.5 dBm	-21.6 dBm	-21.4 dBm	37.5 dB	37.5 dB	37.6 dB	37.6 dB	0.00	0.00	0.00	0.00	-1778.0 Hz
386 MHz	386000000 Hz	6900000 sym/s	256	DVB-C	yes	-21.7 dBm	-21.8 dBm	-21.7 dBm	36.9 dB	37.2 dB	36.0 dB	37.6 dB	0.00	0.00	0.00	0.00	-1810.0 Hz
410 MHz	410000000 Hz	6900000 sym/s	256	DVB-C	yes	-21.6 dBm	-21.7 dBm	-21.5 dBm	36.8 dB	37.2 dB	37.8 dB	37.3 dB	0.00	0.00	0.00	0.00	-1910.0 Hz
330 MHz	330000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.9 dBm	-23.0 dBm	-22.9 dBm	37.5 dB	36.5 dB	37.9 dB	37.1 dB	0.00	0.00	0.00	0.00	-1558.0 Hz
338 MHz	338000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.5 dBm	-22.5 dBm	-22.4 dBm	34.2 dB	33.8 dB	35.1 dB	34.9 dB	0.00	0.00	0.00	0.00	-1594.0 Hz
264 MHz	264000000 Hz	6900000 sym/s	256	DVB-C	yes	-21.7 dBm	-21.8 dBm	-21.7 dBm	36.6 dB	37.5 dB	37.4 dB	37.4 dB	0.00	0.00	0.00	0.00	-1211.0 Hz
426 MHz	426000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.6 dBm	-22.7 dBm	-22.6 dBm	37.5 dB	36.1 dB	37.8 dB	36.7 dB	0.00	0.00	0.00	0.00	-2043.0 Hz
434 MHz	434000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.5 dBm	-22.6 dBm	-22.5 dBm	37.5 dB	36.1 dB	37.5 dB	36.9 dB	0.00	0.00	0.00	0.00	-2065.0 Hz
482 MHz	482000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.3 dBm	-22.3 dBm	-22.2 dBm	36.9 dB	37.5 dB	38.2 dB	37.8 dB	0.00	0.00	0.00	0.00	-2773.0 Hz
434 MHz (dup)	434000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.6 dBm	-22.7 dBm	-22.6 dBm	36.1 dB	36.1 dB	37.1 dB	36.9 dB	0.00	0.00	0.00	0.00	-2079.0 Hz
434 MHz (dup 2)	434000000 Hz	6900000 sym/s	256	DVB-C	yes	-22.6 dBm	-22.7 dBm	-22.5 dBm	37.2 dB	35.7 dB	37.1 dB	36.6 dB	0.00	0.00	0.00	0.00	-2076.0 Hz

The RF parameters and measurements list gives a status overview of all monitored QAM frequencies from the selected RF input. The parameters and measurements in this list refer to the last completed monitoring period or, for a stream currently monitored, the current monitoring period.

List of RF parameters and measurements:

Frequency: The stream frequency that the associated parameters apply to

Symbol rate: The detected QAM symbol rate

Modulation: The QAM modulation mode: 16, 32, 64, 128 or 256 QAM.

Mode: The QAM transmission mode: DVB-C (Annex A), QAM-B (Annex B) or 8VSB

TS sync: Transport stream sync: yes or no

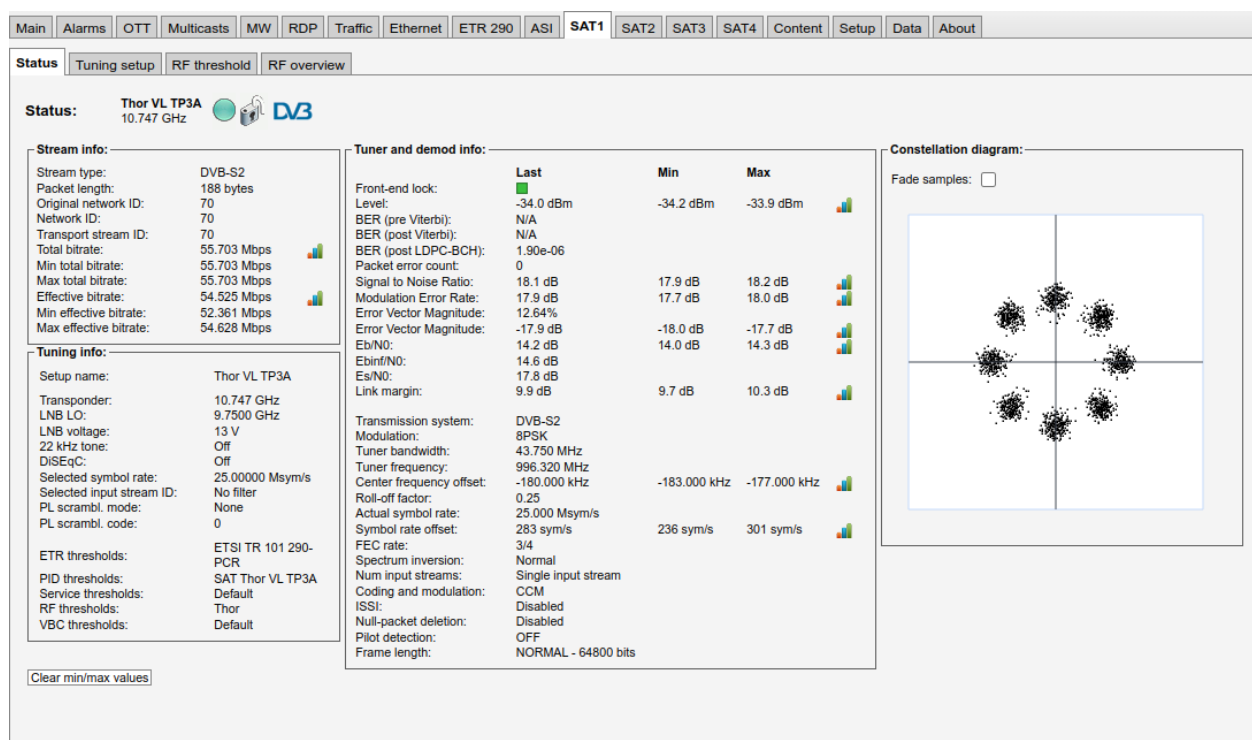
Last level:	The last measured RF signal level
Min level:	The minimum RF signal level
Max level:	The maximum RF signal level
Last SNR:	The last measured signal to noise ratio
Min SNR:	The minimum signal to noise ratio
Last MER:	The last measured modulation error ratio
Min MER:	The minimum modulation error ratio
Last pre FB:	The last measured bit error rate before forward error correction
Max pre FB:	The maximum bit error rate before forward error correction
Last post FB:	The last measured bit error rate after forward error correction
Max post FB:	The maximum bit error rate after forward error correction
Last CFO:	The last measured center frequency offset
Max CFO:	The maximum center frequency offset
Last SRO:	The last measured symbol rate offset)
Max SRO:	The maximum symbol rate offset)

7.14 SAT

The SAT tab will show the status for the RF-A input on the NOMAD. This input can receive signals in DVB-S and DVB-S2 format.

Thumbnails of SAT services are accessed from the **ETR 290 — Services and Content — Thumbnails** views. To get thumbnails for SAT, make sure that the **Extract thumbnails** check box is enabled when defining the tuning frequency, and also that the global thumbnail extraction setting is enabled in **Setup — Params**.

7.14.1 SAT — Status



The **SAT — Status** view gives an overview of the key input interface parameters.

Click the graph button to display a detailed graph for the specified parameter. For probes licensed with FLASH32-OPT, the graph can contain up to 7 days of measurements. On probes without this license, the graph will contain data for the previous and the current day. Please refer to **Setup — Meas. log** to configure the logging.

The SAT status view displays the following information:

<i>SAT status — Stream info:</i>	
Stream type:	Indicates transmission system: DVB-S or DVB-S2
Packet length:	Indicates if the transport stream packets are 188 or 204 bytes
Original network ID:	The original network ID as specified in the NIT table
Network ID:	The network ID as specified in the NIT table
Transport stream ID:	The transport stream ID as specified in the PAT table
Total bitrate:	Current total transport stream bitrate (including null packets – (PID 8191))
Min total bitrate:	Minimum total transport stream bitrate (including null packets)
Max total bitrate:	Maximum total transport stream bitrate (including null packets)
Effective bitrate:	Current transport stream bitrate (excluding null packets)

Min effective bitrate:	Minimum transport stream bitrate (excluding null packets)
Max effective bitrate:	Maximum transport stream bitrate (excluding null packets)
<i>SAT status — Tuner and demod info:</i>	
Front-end lock:	A “bulb” indicating front end lock when green, red indicates no lock
Level:	This is a measure of the channel power into the channel bandwidth configured. The last measurement, as well as the minimum and maximum measurements are displayed. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1 mW dBμV: in decibels relative to a reference value of 1 μV dB mV: in decibels relative to a reference value of 1 mV
BER (pre Viterbi):	The bit error rate before forward error correction (Viterbi) applies only to DVB-S
BER (post Viterbi):	The bit error rate after forward error correction (Viterbi) applies only to DVB-S
BER (post LDPC-BCH):	The bit error rate after forward error correction (LDPC-BCH) applies only to DVB-S2
Packet error count:	The number of erroneous packets after FEC. Packet errors are due to either packet loss or packet bit errors
Signal to noise ratio:	Signal to noise ratio in dB. The last measurement, as well as the minimum and maximum measurements are displayed.
Modulation error rate:	Modulation error rate in dB. The last measurement, as well as the minimum and maximum measurements are displayed.
Error Vector Magnitude:	Error Vector Magnitude in %
Error Vector Magnitude:	Error Vector Magnitude in dB. The last measurement, as well as the minimum and maximum measurements are displayed.
E_b/N_0 :	Energy per transmitted bit to noise power spectral density ratio in dB. The last measurement, as well as the minimum and maximum measurements are displayed.
$E_{b\text{inf}}/N_0$:	Energy per information bit to noise power spectral density ratio in dB
E_s/N_0 :	Energy per symbol to noise power spectral density ratio in dB
Link margin:	Link margin in dB
Transmission system:	The modulation standard – may be DVB-S, DVB-S2.
Modulation:	The SAT modulation scheme – may be QPSK, 8PSK, 16APSK or 32APSK

Tuner bandwidth:	The tuner bandwidth in MHz
Tuner frequency:	The RF tuner frequency in GHz
Center frequency offset:	The measured center frequency offset in kHz. The last measurement, as well as the minimum and maximum measurements are displayed.
Roll-off factor:	The filter roll-off factor – one of the following: 0.2, 0.25, 0.35
Actual symbol rate:	The actual SAT symbol rate in Msym/s
Symbol rate offset:	The offset between defined and actual symbol rate in sym/s. The last measurement, as well as the minimum and maximum measurements are displayed.
FEC rate:	The forward error correction rate – may be 1/2, 2/3, 3/4, 4/5 (for Turbocode only), 5/6, 6/7 (for DSS only), 7/8 or 8/9 (for Turbocode only)
Spectrum inversion:	Indicates whether the spectrum is inverted or normal
Num input streams:	Indicates whether the Single Input Stream (SIS) or Multiple Input Stream (MIS) is used
Coding and modulation:	Indicates type of coding – one of the following: Constant Coding and Modulation (CCM) or Adaptive Coding and Modulation (ACM) – VCM is signaled as ACM.
ISSI:	Shows if Input Stream Synchronization Indicator is Enabled or Disabled
Null packet deletion:	Indicates if Null packet deletion (NPD) is Enabled or Disabled
Pilot detection:	Indicates if pilot detection is Enabled or Disabled – applies only to DVB-S2
Frame length:	Indicates frame length – one of the following: “NORMAL FRAME – 64800 bits” or “SHORT FRAME – 16200 bits” – applies only to DVB-S2
<i>SAT status — Tuning info:</i>	
Setup name:	A name should be assigned to each frequency channel
Transponder frequency:	The transponder frequency in GHz
LNB LO:	The LNB LO frequency in GHz
LNB voltage:	The LNB voltage – may be 0V, 13V or 18V
22kHz tone:	Enable or disable 22kHz tone

DiSEqC:	The satellite front-end module supports DiSEqC 1.2 signaling. The operator can enable a particular DiSEqC message to be transmitted towards the antenna for each frequency defined in the tuning setup typically used to control L-band switches. Specifically, the message sent has the format (0xE0 0x10 0x38 N), where N is a byte configurable by the user to be between 0x00 and 0x0f. This is the command 0x38 “Write to Port group 1 (Committed switches)”.
Selected symbol rate:	The selected SAT symbol rate in Msym/s
Selected input stream ID:	The selected input stream identifier in Multi input stream (MIS) or “No filter” in Single input stream (SIS) – applies only to DVB-S2
PL scrambling mode:	The PL scrambling mode selected: None, Gold, Root – applies only to DVB-S2
PL scrambling code:	The PL scrambling code: 0–262141 – applies only to DVB-S2
ETR thresholds:	Selection of the ETR threshold template that should be assigned to the current frequency
PID thresholds:	Selection of the PID threshold template that should be assigned to the current frequency
Service thresholds:	Selection of the Service threshold template that should be assigned to the current frequency
RF thresholds:	Selection of the RF threshold template that should be assigned to the current frequency
VBC thresholds:	The name of the VBC threshold template assigned to the current frequency

The constellation diagram displays the received symbols with respect to phase and amplitude. When **Fade samples** is checked the samples in the constellation diagram will fade out after a period of time so that the diagram only shows recent samples. The constellation diagram can be zoomed in by clicking the interesting part of the constellation diagram. Another click zooms out again.

Click the **Clear min/max values** button to clear the minimum and maximum values shown in this page. This will also clear the minimum and maximum values shown in the **ETR 290 — ETR Details** view for all the interface checks. The graphing is not affected.

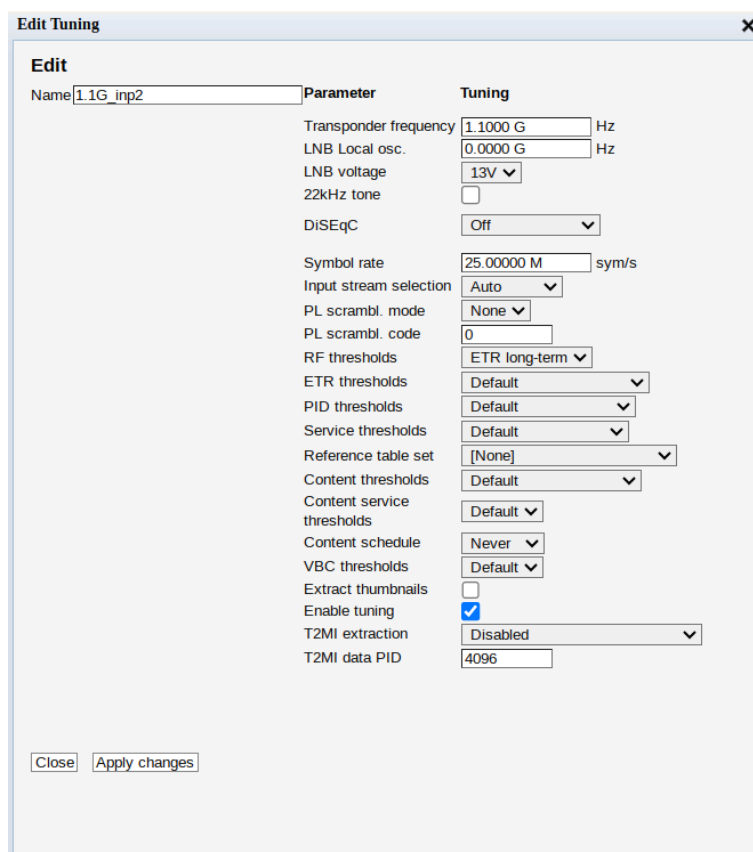
7.14.2 SAT — Tuning setup

Status Tuning setup RF threshold RF overview																
Tuning list																
Name	Transponder	Symbol rate	LNB	LNB V-22k	DiSEqC	IS	T2MI PLP	T2MI PID	ETR thresholds	PID thresholds	Service thresholds	Reference thresholds	Content thresholds	RF thresholds	Enable	Edit
1.1G_inp2	1.1000 G	25.00000 M	0.0000 G	0	Off	Auto	Disabled	4096	SAT 1.1 GHz	Default	Default	[None]	Default	ETR long-term	✓	Edit
1.2G_inp2	1.2000 G	45.00000 M	0.0000 G	0	Off	Auto	Disabled	4096	ETR long-term 1.2	ETR long-term 1.2G	Default	SAT2, 1.2G_inp2	Default	ETR long-term	✓	Edit
Thor TP45	10.778 G	25.00000 M	9.7500 G	13	Off	Auto	Disabled	4096	Signe	Default	Default	[None]	Default	Default		Edit
TP46	10.778 G	25.00000 M	9.7500 G	18	Off	Auto	Disabled	4096	Signe	Default	Default	[None]	Default	Default		Edit
TS - 10.778 GHz	10.778 G	25.00000 M	9.7500 G	13	Off	Auto	Disabled	4096	Signe	Default	Default	[None]	Default	Default		Edit
TS 66- 10.778 GHz	10.778 G	25.00000 M	9.7500 G	18	Off	Auto	Disabled	4096	Signe	Default	Default	[None]	Default	Default		Edit

In this view the operator can define frequencies that will be used by the SAT demodulator for tuning. A name is associated with each frequency, and this name will be used by the probe when referring to the stream. The frequencies and some associated key parameters are shown in the SAT tuning list. Each entry in the list may be edited by clicking the **Edit** field.

To add a new frequency to the list click the **Add new tuning** button. A pop-up window will appear allowing the user to enter tuning parameters.

Multi-edit functionality makes it possible to edit selected streams simultaneously. Highlight the tuning list entries that should be edited and click the **Edit selected** button.



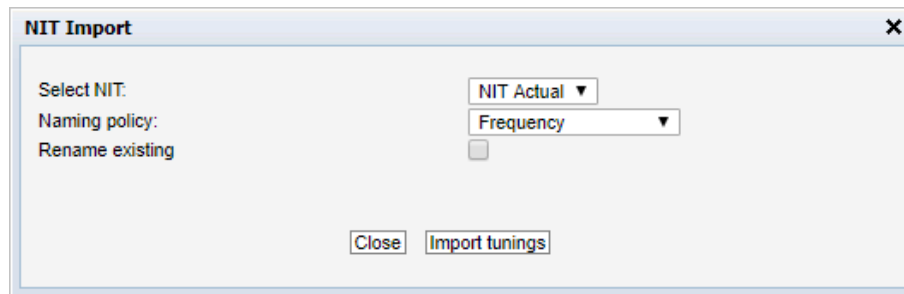
The **Edit Tuning** dialog box is used to configure parameters for a specific tuning entry. It features a table with two columns: **Parameter** and **Tuning**. The **Name** field is set to **1.1G_inp2**. The parameters and their current values are as follows:

Parameter	Tuning
Transponder frequency	1.1000 G Hz
LNB Local osc.	0.0000 G Hz
LNB voltage	13V
22kHz tone	☐
DiSEqC	Off
Symbol rate	25.00000 M sym/s
Input stream selection	Auto
PL scrambl. mode	None
PL scrambl. code	0
RF thresholds	ETR long-term
ETR thresholds	Default
PID thresholds	Default
Service thresholds	Default
Reference table set	[None]
Content thresholds	Default
Content service thresholds	Default
Content schedule	Never
VBC thresholds	Default
Extract thumbnails	☐
Enable tuning	☒
T2MI extraction	Disabled
T2MI data PID	4096

At the bottom of the dialog are two buttons: **Close** and **Apply changes**.

When one tuning entry has been defined it is possible to click the button **Import from NIT** in order to have the other frequencies automatically added to the list, as defined in the Network Information Table analyzed by the probe. Default values will be assigned to parameters that are not a part of the NIT.

Clicking the **Import from NIT** button will open the **NIT Import** pop-up view.



NIT Import

Select NIT:	The ‘Select NIT’ drop-down menu shows NIT tables available in the transport stream currently being analyzed. Information in the selected NIT will be used to generate a tuning list when the Import tunings button is clicked.
Naming policy:	The probe will automatically name tunings according to the naming policy selected by the user: ‘Frequency’, ‘TS ID’ or ‘TS ID and frequency’.
Rename existing:	If the ‘Rename existing’ checkbox is marked, imported tunings that are already present in the tuning list will be renamed in accordance with the naming policy selected by the user.

The following parameters are defined for each SAT frequency:

SAT — Tuning setup:

Name:	A name should be assigned to each frequency channel
Transponder frequency:	The transponder frequency in GHz
LNB Local osc.:	The LNB local oscillator frequency in GHz
LNB voltage:	The LNB voltage – may be 0V, 13V or 18V
22kHz tone:	Enable or disable 22kHz tone
DiSEqC:	The satellite front-end module supports DiSEqC 1.2 signaling. The operator can enable a particular DiSEqC message to be transmitted towards the antenna for each frequency defined in the tuning setup typically used to control L-band switches. Specifically, the message sent has the format (0xE0 0x10 0x38 N), where N is a byte configurable by the user to be between 0x00 and 0x0f. This is the command 0x38 “Write to Port group 1 (Committed switches)”.
Symbol rate:	The SAT symbol rate in Msym/s. If the symbol rate is set to 0, the symbol rate of the signal will be detected automatically. However, it is recommended to set the symbol rate as accurate as possible. An accurately set symbol rate will improve the signal reception.

Input stream selection:	Chooses the input stream identifier (ISI) for Multi input stream (MIS), AUTO should be selected for Single input stream (SIS) – applies only to DVB-S2
PL scrambling mode:	The PL scrambling mode selected: None, Gold, Root – applies only to DVB-S2
PL scrambling code:	The PL scrambling code: 0–262141 – applies only to DVB-S2
RF thresholds:	Selection of the RF threshold template that should be assigned to the current frequency
ETR thresholds:	Selection of the ETR threshold template that should be assigned to the current frequency
PID thresholds:	Selection of the PID threshold template that should be assigned to the current frequency
Service thresholds:	Selection of the Service threshold template that should be assigned to the current frequency
Reference table set:	The Reference table set selection is used to compare the tables in the transport stream with a set of stored tables. These tables are defined in the ETR 290 — Gold TS thresholds view.
Content thresholds:	The Content thresholds specify content alarming options. Selectable Content thresholds templates are defined in the Content — Content thresh. view.
Content service thresholds:	The Content service threshold group that should be assigned to the current frequency. Content service threshold groups that have been defined in the Content — Service thresh. view are available for selection from the drop-down menu.
Content schedule:	The scheduling scheme that should be assigned to the content monitoring for the current frequency. Scheduling schemes that have been defined in the Setup — Scheduling view are available for selection from the drop-down menu. Scheduling allows masking content alarms at predefined time periods. The schedules can be overridden for specific services using Content service thresholds.
VBC thresholds:	Selection of the VBC threshold template that should be assigned to the current frequency
Extract thumbnails:	When enabled, the probe will generate thumbnails for this tuning whenever tuned to it. If not, they can be generated manually by opening the thumbnail pop-up from the Content — Thumbnails and ETR 290 — Services views.

Enable tuning: Enable tuning for frequencies that should be monitored. If tuning for a stream is enabled it will automatically be part of the round-robin analysis loop.

T2MI extraction: Enables extraction of T2MI and specifies which PLP to extract.

T2MI data PID: PID of the container stream.

It is also possible to add new frequencies manually by copying existing tuning list entries using the **Duplicate highlighted** button.

Recommended Symbol rate values

The following table gives the recommended **Symbol rate** setting, depending on actual symbol rate of the input RF signal:

Actual Symbol rate	Configured Symbol rate
1 MS/s	1–4 MS/s
6 MS/s	1–9 MS/s
22 MS/s	1–38 MS/s
35 MS/s	1–45 MS/s
45 MS/s	1–45 MS/s

7.14.3 SAT — Frequency scan

This feature is currently not supported in this release.

Status

Tuning setup

Frequency scan

SAT threshold

RF overview

Scan status: In progress

Progress: 1.115 GHz

LNB frequency

0.0000 k

Hz

Start frequency

1.0000 G

Hz

Stop frequency

1.2500 G

Hz

Scan step

1.0000 M

Hz

Min. Symbol Rate

1.0000 M

sym/s

Max. transponders

20

LNB voltage

18V

22KHz tone

DISEqC

Committed 1

PL scrambl. mode

None

PL scrambl. code

0

Frequency	Symbol rate	LNB	Locked	Standard	PunctureRate	Modulation	Modcode	Pilots	FrameLength	FallOff	Power	C/N
996.260 MHz	25.000 Msym/s		True	DVB-S2	2/3	8PSK	8PSK 3/4	OFF	NORMAL - 64800 bits	0.25	-44 dBm	16.6 dB
1.026 GHz	24.500 Msym/s		True	DVB-S	7/8	QPSK	QPSK 3/5	OFF	NORMAL - 64800 bits	0.35	-43 dBm	16.3 dB
1.059 GHz	24.500 Msym/s		True	DVB-S	7/8	QPSK	QPSK 3/5	OFF	NORMAL - 64800 bits	0.35	-41 dBm	16.2 dB
1.090 GHz	25.000 Msym/s		True	DVB-S2	2/3	8PSK	8PSK 3/4	OFF	NORMAL - 64800 bits	0.25	-42 dBm	17.2 dB

Start scanning

Interrupt

Add selected to tuning list

As opposed to a satellite scan, which scans according to pre-set transponder values its purpose is to find transponders on a particular satellite without any scanning rules. It “blindly” scans every possible horizontal and vertical satellite frequency and symbol rate. It means that the tuner will do an automatic scan of the incoming satellite signal in small steps for active symbol rates to determine if there are any live transponder signals.

In order to start frequency scan fill in parameters and click **Start scanning**. It is important to note that monitoring will be suspended for the given input during the scan process. So if you want to interrupt the process click the **Interrupt** button. After the frequency scan is finished the input state will be restored to the state prior to the scan automatically.

To add frequencies to the tuning list select one or more transponders found and click the **Add selected to tuning list**.

Frequency scan parameters are:

<i>SAT — Frequency scan:</i>	
LNB frequency:	The LNB local oscillator frequency in GHz
Start frequency:	The beginning of the range to scan in GHz
Stop frequency:	The end of the range to scan in GHz
Scan step:	Minimal step to scan the range in MHz
LNB voltage:	The LNB voltage – may be 0V, 13V or 18V
22kHz tone:	Enable or disable 22kHz tone
DiSEqC:	The satellite front-end module supports DiSEqC 1.0 signaling. The operator can enable a particular DiSEqC message to be transmitted towards the antenna for each frequency defined in the tuning setup typically used to control L-band switches. Specifically, the message sent has the format (0xE0 0x10 0x38 N), where N is a byte configurable by the user to be between 0x00 and 0x0f. This is the command 0x38 “Write to Port group 1 (Committed switches)”.
Min. Symbol rate:	The SAT symbol rate in Msym/s
PL scrambling mode:	The PL scrambling mode selected: None, Gold, Root – applies only to DVB-S2
PL scrambling code:	The PL scrambling code: 0-262141 – applies only to DVB-S2

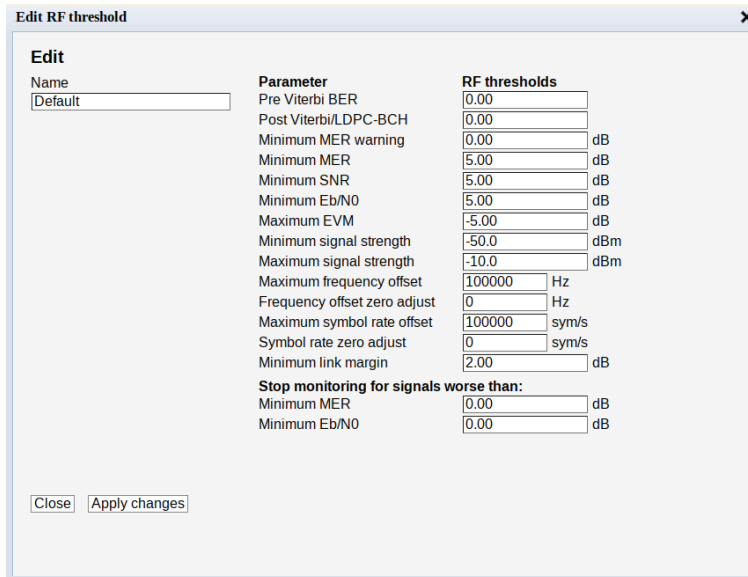
7.14.4 SAT — RF threshold

Status Tuning setup RF threshold RF overview													
RF threshold list													
Name	Ref	Pre-Viter BER	Post-Viter BER	Min MER	Min SNR	Min EVM	Max EVM	Min Level	Max Level	Max freq. off	Max symb. rate off	Min link margin	Edit
Default	4	0.00	0.00	5.00	5.00	5.00	-5.00	-50.0	-10.0	100000	100000	2.00	Edit
Analog Carrier	0	0.00	0.00	0.00	0.00	0.00	0.00	-2.00	0.00	0	0	0.00	Edit
Test signals	2	0.00	0.00	0.00	5.00	5.00	-5.00	-65.0	-50.0	100000	100000	0.00	Edit
Thor	0	0.00	1.00 10-5	5.00	5.00	5.00	-5.00	-50.0	-10.0	250000	100000	0.00	Edit
ETR long-term	5	0.00	1.00 10-5	15.0	15.0	15.0	-15.0	-65.0	-40.0	100000	100000	0.00	Edit

The probe will raise an alarm if one of the threshold settings associated with a SAT frequency is violated. Note that this alarm may be disabled in the **ETR 290 — ETR thr. — Edit** view (Input interface checks).

To add a new threshold template to the list click the **Add new threshold** button. A pop-up window will appear allowing the user to enter parameters.

The predefined threshold templates Default and Analog carrier cannot be edited or deleted.



Parameter	RF thresholds
Pre Viterbi BER	0.00
Post Viterbi/LDPC-BCH	0.00
Minimum MER warning	0.00 dB
Minimum MER	5.00 dB
Minimum SNR	5.00 dB
Minimum Eb/N0	5.00 dB
Maximum EVM	-5.00 dB
Minimum signal strength	-50.0 dBm
Maximum signal strength	-10.0 dBm
Maximum frequency offset	100000 Hz
Frequency offset zero adjust	0 Hz
Maximum symbol rate offset	100000 sym/s
Symbol rate zero adjust	0 sym/s
Minimum link margin	2.00 dB
Stop monitoring for signals worse than:	
Minimum MER	0.00 dB
Minimum Eb/N0	0.00 dB

The RF threshold parameters are:

<i>RF Threshold — Edit:</i>	
Name:	A text field describing the threshold template
Pre Viterbi BER:	Threshold level for bit error ratio before forward error correction (Viterbi) – only for DVB-S
Post Viterbi/LDPC-BCH:	Threshold level for bit error ratio after forward error correction
Minimum MER warning level:	Threshold level for raising a warning for modulation error ratio
Minimum MER:	Threshold level for modulation error ration (dB)
Minimum SNR:	Threshold level for minimum signal to noise ratio (dB)
Minimum E_b/N_0:	Threshold level for energy per transmitted bit to noise power spectral density ratio (dB)
Maximum EVM:	Threshold level for maximum error vector magnitude (dB)

Minimum signal strength:	Minimum threshold level for signal strength. This is a measure of the stream signal power. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1 mW dBμV: in decibels relative to a reference value of 1 μV dB mV: in decibels relative to a reference value of 1 mV
Maximum signal strength:	Maximum threshold level for signal strength. This is a measure of the stream signal power. It is expressed according to the level mode selection made in the Setup — ETR view: dBm: in decibels relative to a reference value of 1 mW dBμV: in decibels relative to a reference value of 1 μV dB mV: in decibels relative to a reference value of 1 mV
Maximum frequency offset:	Threshold level for maximum frequency offset (Hz)
Frequency offset zero adjust:	Allows to define calibration adjustment for frequency offset (Hz)
Maximum symbol rate offset:	Threshold level for maximum symbol rate offset (sym/s)
Symbol rate zero adjust:	Allows to define calibration adjustment for symbol rate offset (sym/s)
Minimum MER:	If the MER is lower that the Stop monitoring for signals worse than setting the probe will stop monitoring and treat it as it has a TS sync error. This can avoid lots errors such as CC errors for really bad signals.
Minimum E_b/N_0:	If the E_b/N_0 is lower that the Stop monitoring for signals worse than setting the probe will stop monitoring and treat it as it has a TS sync error. This can avoid lots errors such as CC errors for really bad signals.

7.14.5 SAT — RF overview

Status

Tuning setup

RF threshold

RF overview

List of RF parameters and measurements

SAT2

Name	Trsp. frequency	LNB frequency	Symbol rate	LNB Volt	22 kHz tone	Diseq	TS sync	Last level	Min level	Max level	Last SNR	Min SNR	Last MER	Min MER	Last Eb/N0	Min Eb/N0	Last EVM	Max EVM	Last pre FS	Max pre FS	Last post FS	Max post FS	Last freq. off	Max freq. off	Last symb. off	Max symb. off	Last link margin	Min link margin
1.10_imp2	1100000000	0	25000000	0	off	Off	yes	-61.1 dBm	-61.1 dBm	-61.1 dBm	23.0 dB	23.0 dB	22.7 dB	22.7 dB	20.8 dB	20.8 dB	-22.7 dB	-22.7 dB	0.00	0.00	0.00	0.00	31000.0 Hz	31000.0 Hz	1439.0 sym/sec	1483.0 sym/sec	15.3 dB	15.3 dB
1.20_imp2	1200000000	0	45000000	0	off	Off	yes	-56.5 dBm	-56.5 dBm	-56.4 dBm	24.4 dB	24.2 dB	24.1 dB	23.9 dB	20.9 dB	20.7 dB	-24.1 dB	-23.9 dB	0.00	0.00	0.00	0.00	68000.0 Hz	68000.0 Hz	2685.0 sym/sec	2685.0 sym/sec	17.3 dB	17.1 dB

The RF parameters and measurements list gives a status overview of all monitored SAT frequencies from the selected RF input. The parameters and measurements in this list refer to the last completed monitoring period or, for a stream currently monitored, the current monitoring period.

7.15 Setup

7.15.1 Setup — Params

Main	Alarms	Multicasts	MVW	RDP	Traffic	Ethernet	ETR 290	Content	Setup	Data	About
Params	Pages	Colors	Time	Ethernet	VLANs	Login	ETR	VBC thresh.	Scheduling	Routing	Security

Various
Probe name
Organization
Probe contact
Probe location
Enable thumbnails ☒
Date format

Network settings
Join multicasts ☒
Enable SAP discovery ☒
Enable IGMPv3 support ☒
Import source address ☐
Gap between joins (milliseconds)

SNMP
Community string
Trap destination 1
Trap destination 2
Trap destination 3
Year in trap time ☐

Alarms
Freeze log when full ☐
Treat Ethernet events as alarms ☐

Time synchronization
Use time server
NTP time server
Time zone

The **Setup — Params** view is used to configure basic parameters for the NOMAD. This page is displayed by default when accessing the web interface, until the configuration has been saved by clicking the **Apply changes** button.

Various

Probe name: Each probe can be assigned a user-defined name. It is part of the probe's MIB. The name is shown in the **Main — Summary** view, which is the probe default page, as well as in the browser's title line. The name is also used for identifying the system when activating the license on-line, see E Appendix: On-line License Activation for more details.

Organization: The name of the organization (usually the company name) that is running the probe. This name is only used for identifying the system when activating the license on-line.

Probe contact: The probe contact is part of the probe's MIB, and this parameter is relevant for SNMP use only. It is used to identify the contact person responsible for this probe.

Probe location: The probe location is part of the probe's MIB. It is used to identify the physical location of the probe. The probe location is also shown in the **Main — Summary** view and in the browser's title line. This name is also used for identifying the system when activating the license on-line.

Enable thumbnails:	Enable or disable thumbnail generation globally. When enabled, thumbnails are only decoded automatically if the Extract thumbnails option has been enabled in the associated tuning, OTT or multicast setup. If freeze-frame or color-freeze alarming has been enabled in the Content threshold template, the video frames are investigated regardless of this setting. For high bitrates (above 700 Mbit/sec) the probe may feel more responsive if thumbnail picture generation is switched off. This does not affect the accuracy of the measurements.
Date format:	The date format used in the user interface can be changed here. Dates exported through machine-readable interfaces are not affected by this setting.

Alarms

Freeze log when full:	When enabled the alarm list will freeze when full (an event will show that it is full). When the list is full new alarms are ignored until Clear alarms is pressed. This can sometimes be useful if a unit is placed unattended.
Treat Ethernet events as alarms:	When enabled each event is treated as an alarm that is active for ten seconds. This may be useful when reporting to external systems that do not support events but only active or cleared alarms. This setting affects the local alarm list and SNMP traps.

Network settings

Join multicasts:	If switched off probe will not send IGMP messages which is useful if connected to a trunk port and there is no need to join multicasts.
Enable SAP discovery:	When enabled, the NOMAD makes streams announced using the Session Announcement Protocol available through the Multicasts — SAP view.
Enable IGMPv3 support:	Required for probe to support the IGMP v3 protocol. Should always be enabled in networks that support IGMP v3.
Import source address:	When enabled, the detected source address is added to the configuration when importing streams from Traffic — Detect or Traffic — Multicast scan. This instructs the probe to request the stream as a source specific multicast.

Gap between joins (milliseconds): When monitoring a lot of multicasts, sending join requests for all of them at the same time may overload the network infrastructure. This setting specifies the minimum time, in milliseconds, between join requests.

Time synchronization

Use time server: Select between *Off* and *NTP* (Ethernet).
When NTP is selected the probe will synchronize with an upstream NTP server as often as is needed to maintain accurate timekeeping on the probe. If Off is selected, or NTP is selected and no NTP server is configured, the probe will try to synchronize with the VBC server.

NTP time server: The IP address or host name of the time server.

Time zone: By setting the time zone the probe time can be offset from the reference NTP time. Time zone definitions come from the IANA Time Zone Database.

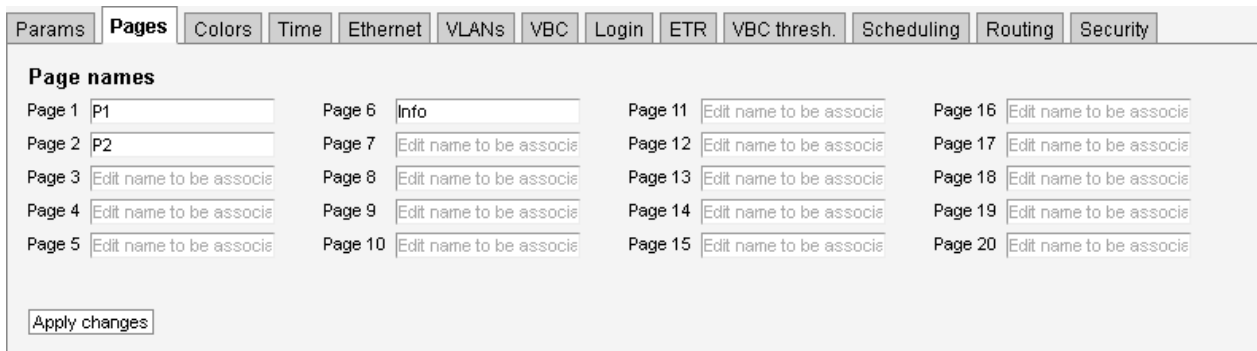
SNMP

Community string: The probe SNMP community string can be changed.

Trap destination 1–3: SNMP traps will be sent to the specified destinations.
Set all three destinations to 0.0.0.0 to disable SNMP trap transmission.
This will also disable storing of traps accessible through SNMP queries.

Year in trap time: If enabled, dates in SNMP traps include the year number.

7.15.2 Setup — Pages

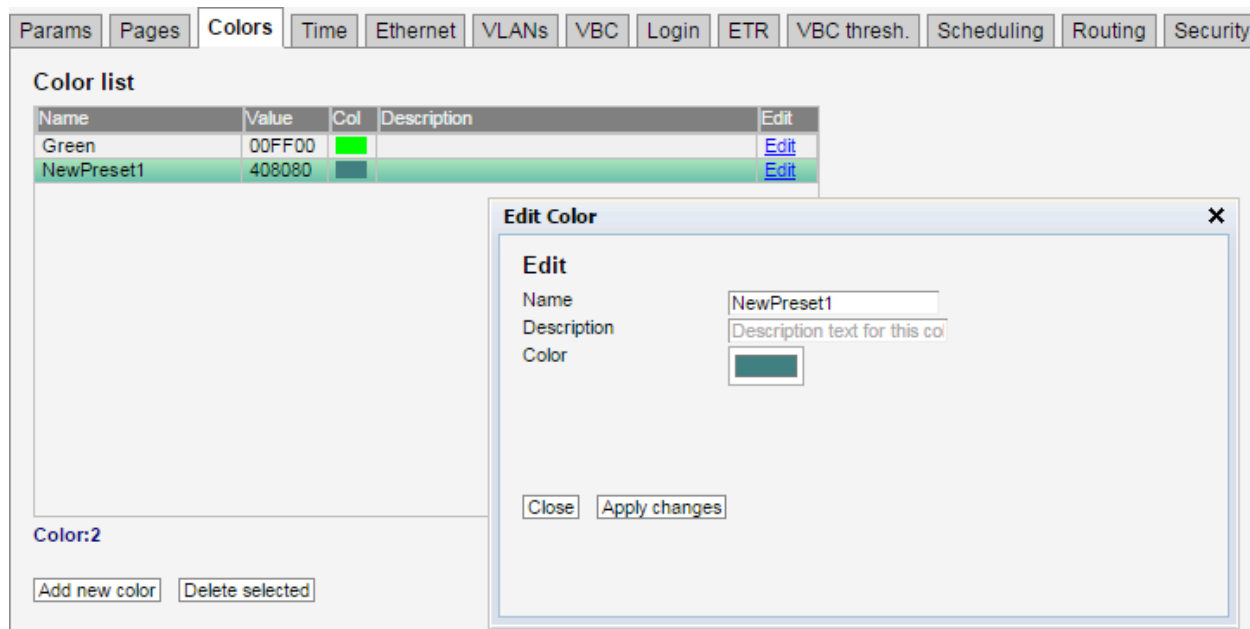


The screenshot shows the 'Setup — Pages' configuration window. At the top, there is a tabbed interface with 'Pages' selected. Below the tabs, the 'Page names' section contains a grid of 20 input fields. The first two fields are labeled 'Page 1' and 'Page 2' with values 'P1' and 'P2'. The remaining 18 fields are labeled 'Page 3' through 'Page 20' and are currently empty, with a placeholder text 'Edit name to be associated'. At the bottom left of the grid, there is an 'Apply changes' button.

The **Setup — Pages** view allows names to be associated with different pages. Individual multicasts can be assigned to different pages in the **Multicasts — Streams** view, to facilitate easier navigation in the different **Multicasts** views.

The page names for OTT channels are configured using the **OTT — Settings** view.

7.15.3 Setup — Colors



Params Pages **Colors** Time Ethernet VLANs VBC Login ETR VBC thresh. Scheduling Routing Security

Color list

Name	Value	Col	Description	Edit
Green	00FF00			Edit
NewPreset1	408080			Edit

Edit Color [X]

Edit

Name:

Description:

Color: 

Color:2

The **Setup — Colors** view allows the user to define colors that should be recognized if a color-freeze condition should occur. A mono-colored freeze frame condition may in some cases indicate what equipment is failing, resulting in the color-freeze.

A freeze color is defined by clicking the **Add new color** button and assigning an RGB value to a name. A maximum of four colors may be defined. An existing color may be modified by clicking the associated **Edit** link.

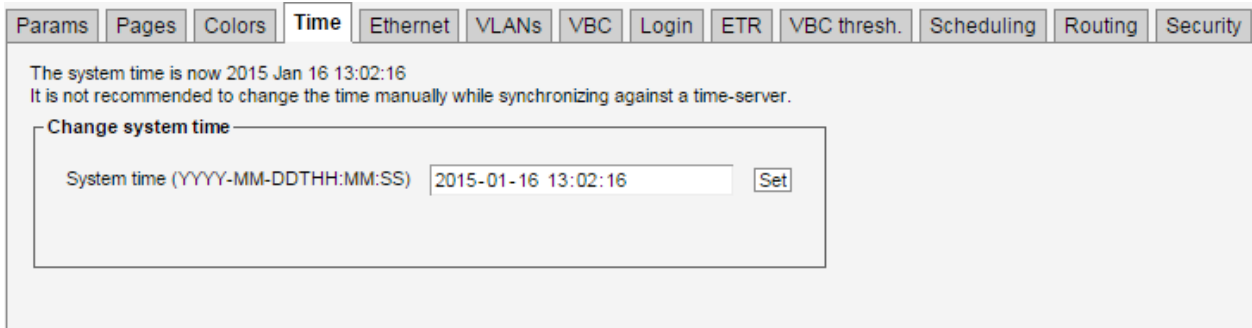
Edit color

Name: The color name. This name will be part of a color alarm description and the associated SNMP trap.

Description: A description of the color or an error indication.

Color: The RGB color on the format #XX(Red)XX(Green)XX(Blue) where XX represents a hexadecimal figure spanning 0-255 in decimal notation. If supported by the browser, clicking the color should pop up a color selection dialog.

7.15.4 Setup — Time



Params Pages Colors **Time** Ethernet VLANs VBC Login ETR VBC thresh. Scheduling Routing Security

The system time is now 2015 Jan 16 13:02:16
It is not recommended to change the time manually while synchronizing against a time-server.

Change system time

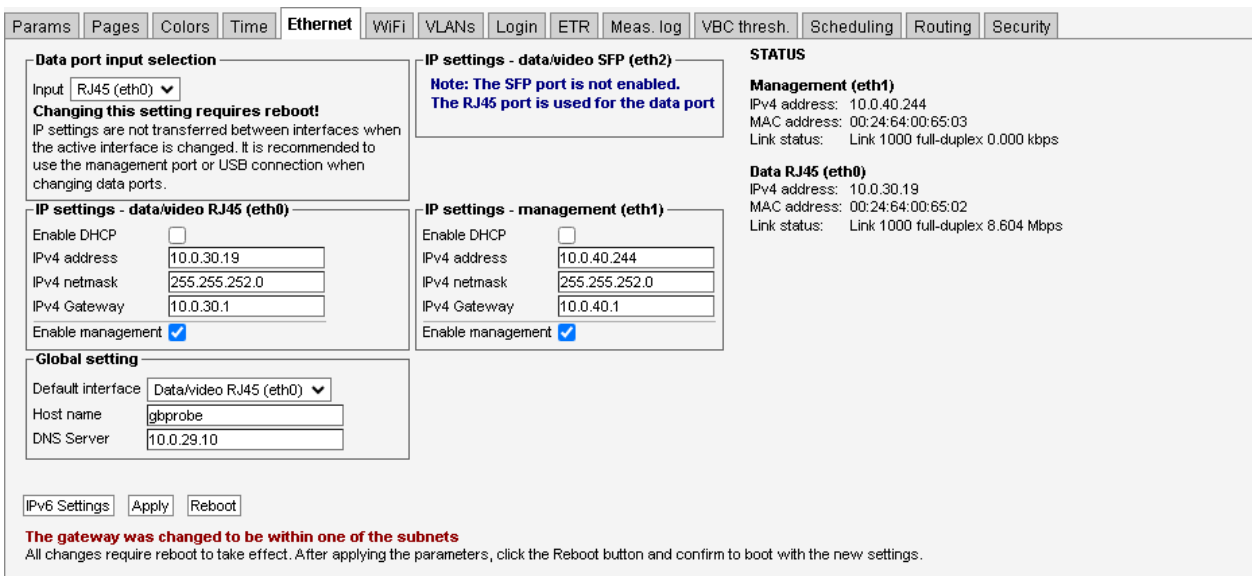
System time (YYYY-MM-DDTHH:MM:SS)

The time of the probe is used to timestamp events in the **alarm list**. The local time is always presented just below the **alarm list**.

The probe time should not be set manually if the probe is synchronizing against a time server (refer to the **Setup — Params** view).

If supported by the browser, you should be able to set the time and date using a calendar and time control by clicking the input box.

7.15.5 Setup — Ethernet



Params Pages Colors Time **Ethernet** WiFi VLANs Login ETR Meas. log VBC thresh. Scheduling Routing Security

Data port input selection
Input:
Changing this setting requires reboot!
IP settings are not transferred between interfaces when the active interface is changed. It is recommended to use the management port or USB connection when changing data ports.

IP settings - data/video SFP (eth2)
Note: The SFP port is not enabled. The RJ45 port is used for the data port

IP settings - data/video RJ45 (eth0)
Enable DHCP ☐
IPv4 address:
IPv4 netmask:
IPv4 Gateway:
Enable management ☒

IP settings - management (eth1)
Enable DHCP ☐
IPv4 address:
IPv4 netmask:
IPv4 Gateway:
Enable management ☒

Global setting
Default interface:
Host name:
DNS Server:

IPv6 Settings

STATUS
Management (eth1)
IPv4 address: 10.0.40.244
MAC address: 00:24:64:00:65:03
Link status: Link 1000 full-duplex 0.000 kbps
Data RJ45 (eth0)
IPv4 address: 10.0.30.19
MAC address: 00:24:64:00:65:02
Link status: Link 1000 full-duplex 8.604 Mbps

The gateway was changed to be within one of the subnets
All changes require reboot to take effect. After applying the parameters, click the Reboot button and confirm to boot with the new settings.

The WiFi interface on the NOMAD is configured in the **Setup — WiFi** view.

The **Setup — Ethernet** view defines the Ethernet setup parameters for the management interface (eth1) and the data/video interface (RJ45/eth0 or SFP/eth2). If the license for the second data interface is enabled, both data interfaces can be configured. The link statuses for the interfaces are updated live to reflect the current settings. Rebooting the probe from this page is achieved by

clicking the **Reboot** button after changes have been confirmed by clicking the **Apply** button. Click the **IPv6 Settings** button to access the IPv6 view.

The 10/100/1000 BASE-T management port corresponding to eth1 is located at the front of the probe and is labeled *Management*. For the data/video port, the user can choose between eth0, which is the electrical 10/100/1000 BASE-T Ethernet port labeled *10/100/1000T*, or eth2, which is the optical gigabit SFP port labeled *SFP*. If the license for the second data interface is enabled, both data ports can be enabled simultaneously.

Connecting a data/video port is mandatory. The probe will only be able to join multicasts on the data ports. For management, the probe supports both in-band management (i.e. using eth0 for both data/video and management) and separate management (i.e. using eth1 for management). In any case make sure that the subnets configured for the network interfaces do not overlap – otherwise the probe will not work properly. If the IP addresses for network interfaces are configured so that the subnets overlap, the settings will be automatically reverted by the probe.

Dual stack functionality enables the probe to support both IPv4 and IPv6 for management.

A valid DNS configuration is required for parts of the probe functionality. Configure a valid DNS under the **Global settings** heading, or use a publicly available DNS such as Google Public DNS (8.8.8.8 or 8.8.4.4) or OpenDNS (208.67.222.22 or 208.67.220.220).

Data port input selection

Input: Select whether to use the electrical RJ45 (eth0) or the optical SFP (eth2) port as the data port.

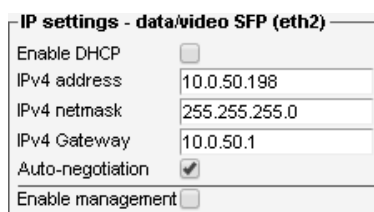
IP settings – data/video RJ45 (eth0)

Enable DHCP: If enabled, IP address (eth0), netmask (eth0) and gateway are updated by a remote DHCP server next time the probe boots.

IPv4 address: IPv4 IP address of management interface

IPv4 netmask: IPv4 netmask of management interface

Enable management: If enabled a web server will be started on eth0 next time the probe boots.



IP settings - data/video SFP (eth2)	
Enable DHCP	☐
IPv4 address	10.0.50.198
IPv4 netmask	255.255.255.0
IPv4 Gateway	10.0.50.1
Auto-negotiation	☒
Enable management	☐

IP settings – data/video SFP (eth2)

Enable DHCP:	If enabled, IP address (eth2), netmask (eth2) and gateway are updated by a remote DHCP server next time the probe boots.
IPv4 address:	IPv4 IP address of management interface
IPv4 netmask:	IPv4 netmask of management interface
Auto-negotiation	Check the box to actively attach to the network. Uncheck auto-negotiation if the SFP port is used to attach passively to a fiber tap.
Enable management:	If enabled a web server will be started on eth2 next time the probe boots.

IP settings – management (eth1)

Enable DHCP:	If enabled, IP address (eth1), netmask (eth1) and gateway are updated by a remote DHCP server next time the probe boots.
IPv4 address:	IPv4 address of the data/video interface
IPv4 netmask:	IPv4 netmask of data/video interface
Enable management:	If enabled a web server will be started on eth2 next time the probe boots.

Global settings

Default interface:	The default interface determines which interface is used for out-going probe traffic, unless specified otherwise in the Setup — Routing view.
Host name:	The host name is displayed when logging in to the probe over the USB serial port and is also visible in LLDP broadcasts.
DNS Server:	If DHCP is not enabled, this field can be used to define the IP address of the DNS server. If DHCP is enabled, this field is disabled, and the gateway provided by the DHCP server is used.

7.15.5.1 Setup — Ethernet — IPv6 Settings

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Scheduling
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Security

IPv6 settings - data/video SFP (eth2)

Note: The SFP port is not enabled. The RJ45 port is used for the data port

IPv6 settings - data/video RJ45 (eth0)
Enable IPv6 ☐
Enable IPv6 autoconf ☐
IPv6 address
IPv6 prefix
IPv6 Gateway

IPv6 settings - management (eth1)
Enable IPv6 ☐
Enable IPv6 autoconf ☐
IPv6 address
IPv6 prefix
IPv6 Gateway

IPv4 Settings
Apply
Reboot

All changes require reboot to take effect. After applying the parameters, click the Reboot button and confirm to boot with the new settings.

Status management:
02:64:00:00:00:3c
No Link

Status data/video RJ45:
02:64:00:00:00:3b
Link 1000 full-duplex 114.785 Mbps

IPv6 settings – data/video RJ45 (eth0)

Enable IPv6:	If IPv6 is enabled, the probe will use IPv6 for management on eth0.
Enable IPv6autoconf:	If IPv6 auto-configuration is enabled, the probe will receive IPv6 address, IPv6 prefix and gateway address from a network router when booting.
IPv6 address:	If IPv6 auto-configuration is not enabled, this field is used to define the IPv6 address of the probe.
IPv6 prefix:	If IPv6 auto-configuration is not enabled, this field is used to define the IPv6 prefix of the probe (corresponding to netmask for IPv4).
IPv6 Gateway:	Required to allow clients with an address outside the probe subnets to access the probe (HTTP, FTP, SSH, TELNET, SNMP). It is also required for the probe to access an NTP server or DNS server with IPv6 address outside the probe's subnets. If IPv6 auto-configuration is enabled, this field is disabled.

Note that auto-configuration should only be enabled for one of the Ethernet ports to avoid possible conflicts.

IPv6 settings – data/video SFP (eth2)

Enable IPv6:	If IPv6 is enabled, the probe will use IPv6 for management on eth2.
Enable IPv6autoconf:	If IPv6 auto-configuration is enabled, the probe will receive IPv6 address, IPv6 prefix and gateway address from a network router when booting.

IPv6 address:	If IPv6 auto-configuration is not enabled, this field is used to define the IPv6 address of the probe.
IPv6 prefix:	If IPv6 auto-configuration is not enabled, this field is used to define the IPv6 prefix of the probe (corresponding to netmask for IPv4).
IPv6 Gateway:	Required to allow clients with an address outside the probe subnets to access the probe (HTTP, FTP, SSH, TELNET, SNMP). It is also required for the probe to access an NTP server or DNS server with IPv6 address outside the probe's subnets. If IPv6 auto-configuration is enabled, this field is disabled.

IPv6 settings – management (eth1)

Enable IPv6:	If IPv6 is enabled, the probe will use the management port for IPv6 management
Enable IPv6autoconf:	If IPv6 auto-configuration is enabled, the probe will receive IPv6 address, IPv6 prefix and gateway address from a network router when booting.
IPv6 address:	If IPv6 auto-configuration is not enabled, this field is used to define the IPv6 address of the probe.
IPv6 prefix:	If IPv6 auto-configuration is not enabled, this field is used to define the IPv6 prefix of the probe (corresponding to netmask for IPv4).
IPv6 Gateway:	Required to allow clients with an address outside the probe subnets to access the probe (HTTP, FTP, SSH, TELNET, SNMP). It is also required for the probe to access an NTP server or DNS server with IPv6 address outside the probe's subnets. If IPv6 auto-configuration is enabled, this field is disabled.

7.15.5.2 Example 1 – Separate Management IPv4

This model is useful if the management traffic is to be separated from the data/video traffic by utilizing two completely disjointed networks. In this example the management subnet is defined as 192.168.0.0/16 and the data/video subnet is 10.0.30.0/24.

Parameter	Management (eth1)	Data/video (eth0)	Explanation
Enable DHCP	Optional	Optional	Use DHCP to configure the eth1 and/or eth0 interface automatically
IP address	192.168.7.5	10.0.30.5	The IP addresses of each interface
Netmask	255.255.0.0	255.255.255.0	The netmasks – 16 and 24 bits
Enable management	Yes	No	Only run web server on the management interface

Gateway	192.168.0.1	–	The default gateway is required for the probe to connect to devices that are not on the same subnet
----------------	-------------	---	---

7.15.5.3 Example 2 – In-Line Management IPv4

This model is useful if there is no separate management network and both data/video and management traffic are to use the same network. In this configuration the probe's management network may not even be connected. Even if the probe's management port is not to be used it must be configured carefully so that it does not interfere with the data/video interface.

In this example there is only one network defined as 10.0.30.0/24.

Parameter	Management (eth1)	Data/video (eth0)	Explanation
Enable DHCP	Off	Optional	We cannot use DHCP for eth1 since the device is not used
IP address	0.0.0.0	10.0.30.5	The IP addresses of each interface – configure eth1 to a non-existing address
Netmask	255.255.255.255	255.255.255.0	The netmasks – the subnet for eth1 contains only one address
Enable management	No	Yes	Only run web server on the data/video interface
Gateway	—	10.0.30.1	The default gateway is required for the probe to connect to devices that are not on the same subnet

7.15.5.4 Example 3 – Mixed Mode IPv4

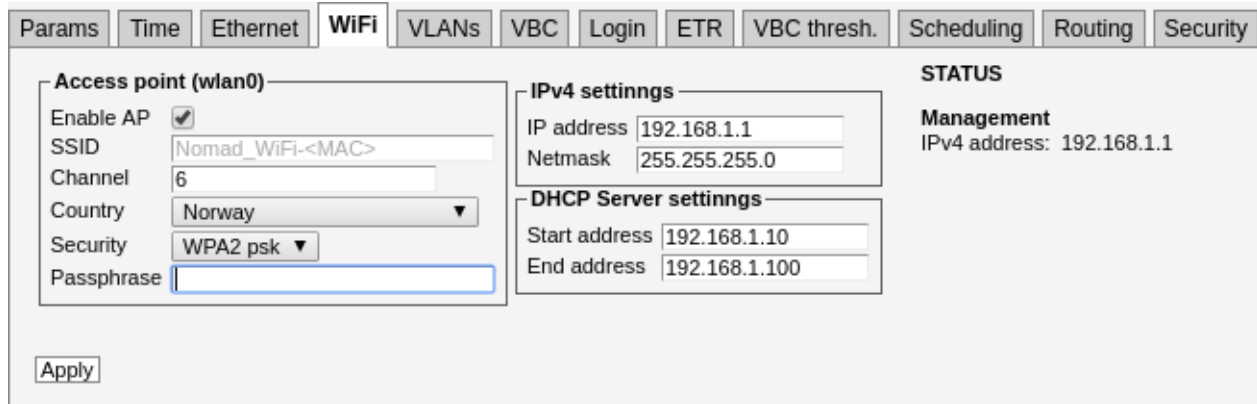
This model is similar to the separate management model with the difference that a web server is also run on the data/video management.

Since there is only one default gateway, in this case pointing to the management network, clients accessing the probe via the data/video interface need to be on the same subnet as the probe's data/video interface.

Parameter	Management (eth1)	Data/video (eth0)	Explanation
Enable management	Yes	Yes	Run web server on both interfaces
The other settings are the same as in example 1			

The principles shown in the previous examples also apply for IPv6 management. IPv4 and IPv6 can be used simultaneously. In theory the probe's web server can be accessed using four different IP addresses, provided that the network architecture allows it.

7.15.6 Setup — WiFi



By default the NOMAD's WiFi interface is configured in Access Point (AP) mode which is the only supported option at the moment. It means that the WiFi interface may be either disabled or enabled in AP mode. Note that it is a management interface and it may not be configured as a data port.

WiFi Access Point settings

Enable AP: Once enabled the WiFi interface is enabled in AP mode.

SSID: The name of the wireless network. You may leave it empty in order to assign the default value "Nomad_WiFi-<MAC>", where <MAC> is the hardware address of the wireless network interface. You may check MAC on your WiFi dongle if you have more than one NOMAD's AP enabled.

Channel: Choosing the best Wi-Fi channel on your router helps to reduce interference and improve your Wi-Fi signal. Channels 1, 6, and 11 are the most frequently used for 2.4 GHz Wi-Fi networks.

Country: Depending on what country/region the AP is used in, regulations provide for the router to automatically set the transmit power and frequencies that may be used in that country.

Security: A method of securing your network. WPA2-PSK (Wi-Fi Protected Access 2 – Pre-Shared Key) is the only implemented option. Caution: If the method is set to None then your AP is passwordless.

Password: Wi-Fi security key.

WiFi IPv4 settings

IP address: The IP address of the Access Point. Please make sure that the AP address/network does not conflict with your LAN.

Netmask: The Access Point's local subnet mask.

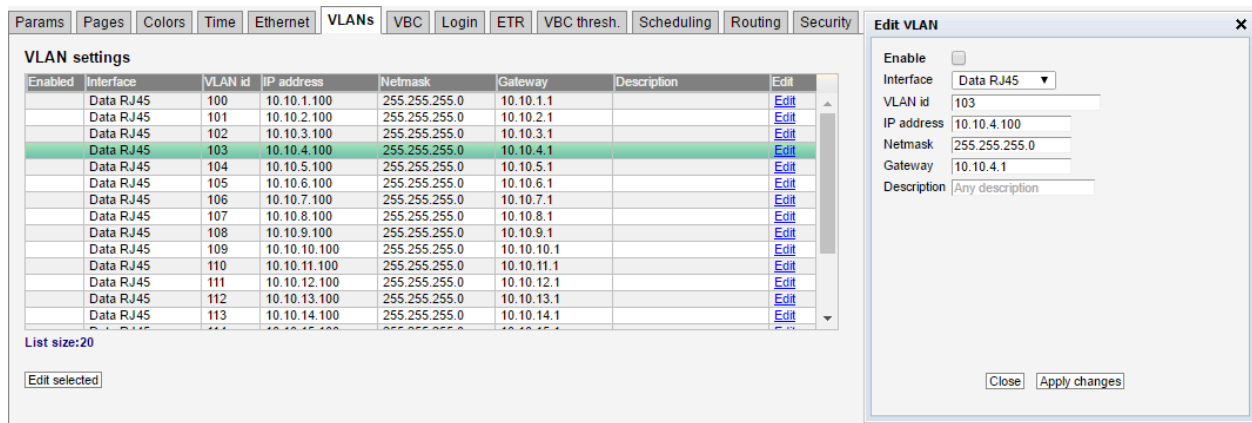
WiFi DHCP Server settings

Start address: Starting IP Address. Specifies the first of the contiguous addresses in the IP address pool. Any new DHCP client joining the LAN will be assigned an IP address between this address and the Ending IP Address.

End address: Ending IP Address.

Please note that all the settings take effect immediately after applying. For that reason it is recommended to check settings carefully before applying, as you may lose wireless connection to your NOMAD due to wrong settings. If this has happened you always have a wired network interface and a USB serial port as a backup.

7.15.7 Setup — VLANs



The NOMAD probe supports a large number of VLAN interfaces. The VLAN interfaces can be associated with any of the physical interfaces. Once enabled, these VLAN interfaces can be used for routing and joining of multicasts.

The VLAN interface can be used to monitor OTT traffic – also if it is associated with the management interface. Multicasts can be joined from any of the VLANs, as long as the VLAN belongs to one of the two physical data interfaces. The VLAN interfaces are not available for serving the web interfaces.

Edit VLANs

Enable: Once enabled the virtual interfaces are created and available.

Interface: The physical interface to associate the VLAN with.

VLAN id: The VLAN id (1-4095)

IP address:	The IP address of the interface.
Netmask:	The Netmask of the interface.
Gateway:	The Gateway of the interface.
Description:	A user given description of the interface.

Note that editing VLANs should not require a reboot to take effect.

7.15.8 Setup — Login

Params
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User login

Current user

You are currently logged out
Your login message here

Login

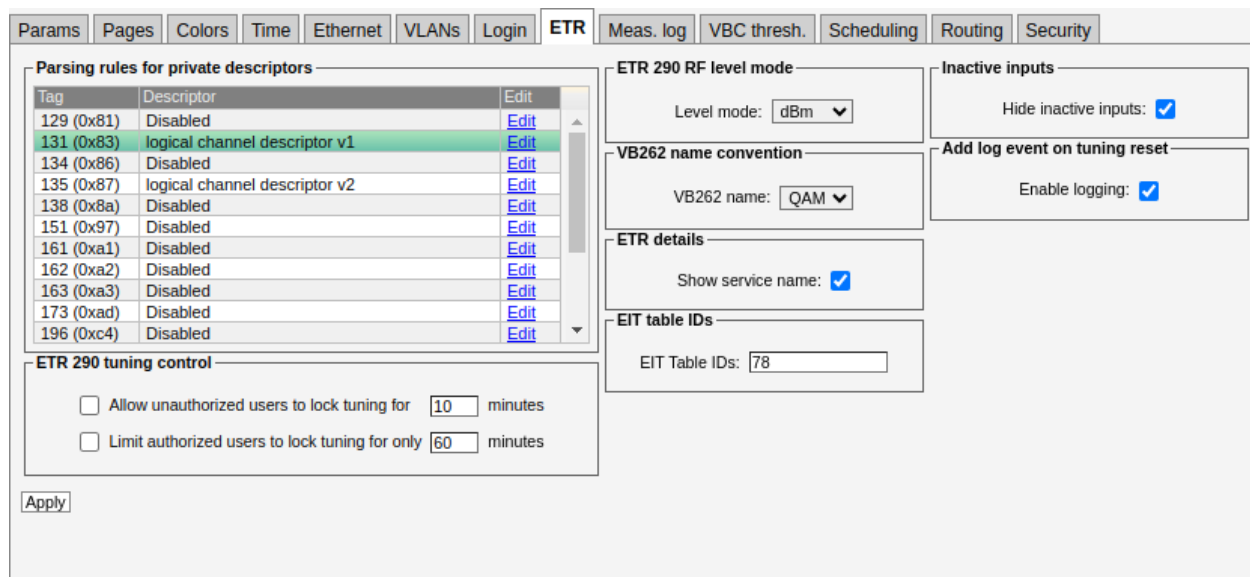
Name
Password

Login

By default, there is no access control and all users have access to all features. If access control is disabled, you need to log in using this view before accessing any of the settings in **Setup — Security**.

See chapter 6.6 on page 69 for more details.

7.15.9 Setup — ETR

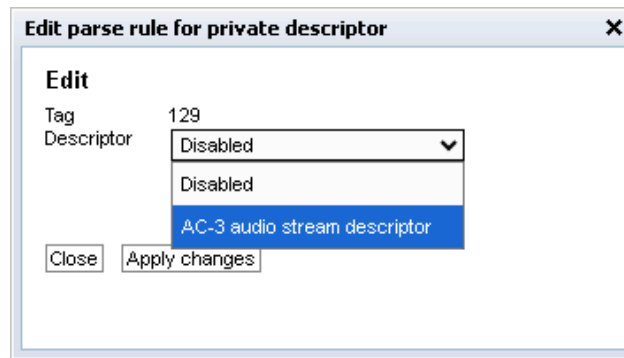


The **Setup — ETR** view allows the user to select miscellaneous ETR handling modes.

Parsing rules for private descriptors

Probe recognition of a number of selected private descriptors may be defined by the user:

129 (0x81):	‘Disabled’ or ‘AC-3 audio stream descriptor’
131 (0x83):	‘Disabled’, ‘Extended video descriptor’ or ‘logical channel descriptor v1’
134 (0x86):	‘Disabled’ or ‘caption service descriptor’
135 (0x87):	‘Disabled’, ‘logical channel descriptor v2’ or ‘content advisory descriptor’
138 (0x8a):	‘Disabled’ or ‘cue identifier descriptor’
151 (0x97):	‘Disabled’ or ‘SCTE_adaptation_field_data_descriptor’
161 (0xa1):	‘Disabled’, ‘service location descriptor’ or ‘etv_bif_platform_descriptor’
162 (0xa2):	‘Disabled’ or ‘etv_integrated_signaling_descriptor’
163 (0xa3):	‘Disabled’ or ‘Component name descriptor’
173 (0xad):	‘Disabled’ or ‘ATSC private information descriptor’
196 (0xc4):	‘Disabled’ or ‘Anc data descriptor’
201 (0xc9):	‘Disabled’ or ‘download_content_descriptor’
206 (0xce):	‘Disabled’ or ‘extended_broadcaster_descriptor’
215 (0xd7):	‘Disabled’ or ‘SI_parameter_descriptor’
231 (0xe7):	‘Disabled’ or ‘private cable delivery system descriptor’
233 (0xe9):	‘Disabled’ or ‘EBP descriptor’
239 (0xef):	‘Disabled’ or ‘evertz_descriptor’



The default value for private descriptors is 'Disabled'. To change this value, select a new descriptor interpretation from the drop-down menu and click the **Apply changes** button.

ETR 290 tuning control

By default authorized users will be allowed to lock the ETR 290 analysis to one stream for an infinite length of time and unauthorized users will not be allowed to lock the analysis. The **Setup — ETR** view makes it possible to time limit the locking for authorized users and unauthorized users can be granted permission to lock to a stream for a selectable time period.



If the locking mechanism works in a time limited mode a clock icon (see image on the left) is superimposed on the regular lock icon in the different **ETR 290** sub-views. When the specified lock time is out the round-robin cycling will resume. When ETR tuning control parameters have been changed, click the **Apply** button for changes to take effect.

ETR 290 RF level mode

The user selects how RF level should be displayed in demodulator views: dBm, dB μ V or dB mV. Note that this setting is only relevant if the probe is used with one or two RF interface modules.

dBm: in decibels relative to a reference value of 1 mW

dB μ V: in decibels relative to a reference value of 1 μ V

dB mV: in decibels relative to a reference value of 1 mV

ETR details

The user selects if service names should be displayed in the **ETR 290 — ETR Details** view. Note that a large screen size is required for proper service name displaying.

EIT table IDs

The user defines which DVB EIT table IDs should be analyzed by the probe. By default only table ID 78 (EIT p/f actual) is analyzed.

It is possible to extend EIT analysis to include EIT schedule, however this is not recommended except for ad-hoc troubleshooting, as analysis of EIT schedule can be extremely demanding on probe processing resources. If full-time monitoring of all EIT information is required, dedicated probes should be used for this task.

Table IDs are specified as a comma separated list, or alternatively an ID range can be defined, e.g. 78, 80–95.

<i>EIT table IDs:</i>	
78	P/F for Actual TS
79	P/F for Other TS
80–95	Schedule for Actual TS
96–111	Schedule for Other TS

Inactive inputs

It is possible to hide disabled inputs from the **ETR 290** views. This is convenient when one or more inputs are never used, and therefore have been disabled. Check the **Hide inactive inputs** checkbox to hide disabled inputs.

Add log event on tuning reset

When the **Enable logging** checkbox is enabled, the probe will log events that cause monitoring of a ETR monitored stream to be reset, or when ETR measurements are cleared:

- Tuning reset from the GUI
- Min/max measurements for a stream reset from the GUI
- Min/max measurements for a specific measurement for a stream reset from the GUI
- Tuning reset from the Eii interface
- Min/max measurements for a stream reset from the Eii interface
- Min/max measurements for a specific measurement for a stream reset from the Eii interface
- Monitoring of a stream was restarted due to a configuration change (templates changed etc.)
- Monitoring of the stream was started due to round robin tuning between frequencies or multicasts

The events logged are shown in the **Alarms — Event log** view.

7.15.10 Setup — Meas. log

Params	Pages	Colors	Time	Ethernet	VLANs	Login	ETR	Meas. log	VBC thresh.	Scheduling	Routing	Security
--------	-------	--------	------	----------	-------	-------	-----	------------------	-------------	------------	---------	----------

Common settings

Enable logging: ☒

Sampling period: 1 minute

Retention time: 1 day

Input specific settings

Input	Stream	Service	PID
ASI:	☒	☐	☐
COFDM/QAM:	☒	☐	☐
SAT:	☒	☐	☐

NOTE:

Probes without the FLASH32-OPT has limited logging to RAM of measurement data for graphing purposes. To get full logging please contact your reseller to get the FLASH32-OPT which gives the following functionality:

- Storage up to 35 days
- Logging of Service and PID bitrates
- Export of data as CSV format
- Large storage for pcap and transport stream recordings

Apply changes

The measurement logger enables logging and storage of several parameters and measurements from the ASI, terrestrial, cable and satellite inputs. This includes stream, RF, service and PID data.

The measurements are sampled at a configurable rate. The samples are stored in comma-separated values files, and the individual measurements are stored as key-value pairs. The keys are stored for each measurement sample. This is because the number of values written to the log file can change between samples (e.g. tuning between different streams, or changes in a stream's content). This format allows for easy import into a spreadsheet program.

The list of inputs matches the ones installed on the NOMAD. The RF measurements logged will depend on the type of input, and the type of stream. Details about the parameters and measurements are available below.

Common settings

Enable logging:	Enable/disable logging for all streams.
Sampling period:	Time period between log samples. To keep the time between samples consistent, the timing of samples will be relative to the start of an hour. <i>Example:</i> the time is 10:01:03 when the measurement logger starts running. 5 seconds sampling period: the first sample is logged at 10:01:05, the second at 10:01:10, the third at 10:01:15 etc. 2 minutes sampling period: the first sample is logged at 10:02:00, the second at 10:04:00, the third at 10:06:00 etc.
Retention time:	The retention time of log files. When a log file has been stored longer than the retention time it will be deleted automatically. The logger will remove files with names ending in “.csv”. Renaming files to not end in “.csv” will prevent them from being deleted. Files are not deleted if the measurement logger is disabled. FLASH32-OPT is required to enable retention times over one day.

The common settings, in the table above, apply to all inputs. The input specific settings, in the table below, apply to the inputs individually. If none of the input specific settings are enabled, the logging on that input will be disabled completely and no files are created.

<i>Input specific settings</i>	
Input:	Specifies the input. The name will correspond to the respective tab in the GUI.
RF:	Enable/disable logging of RF measurements.
Service:	Enable/disable logging of Service measurements.
PID:	Enable/disable logging of PID measurements.

On probes licensed with FLASH32-OPT, the log files are saved to the flash storage, and are available in the **Data — Storage** view. These files can be downloaded, deleted and renamed using this view. This is also possible using the Eii. The Eii documentation's **Storage** section contains instructions on how to do this.

The logs are divided in daily files, and probes without FLASH32-OPT has the retention time limited to a single day. New files are created when a new day starts at midnight UTC, and one file is created per actively logging input. The log files will start with the date (yymmdd), followed by the name of the input. All times and dates are stored in UTC and are not affected by the timezone configured in the probe. If the storage is full, the logger will stop logging new samples.

The size of the log files will vary widely depending on the setup and the content of the monitored stream. After configuring the measurement logger, it is recommended to check the file size after a full day of logging. Compare this to the free storage space, and adjust the setup if needed.

The flash storage is shared between the measurement logger and RDP/PCAP recordings. If these features are used in parallel, keep track of the available storage to ensure continuous logging and prevent loss of data.

Log fields

The following tables present the parameters and measurements available for logging. The content in each column is the following:

Log key: the key in the key-value pairs. These will be present in the log files.

Parameter: the parameter or measurement the key represent.

Description: description of the parameter or measurement.

Presence: the condition for when this parameter or measurement will be present in the log file.

Please refer to the *External integration interface* (Eii) documentation for an overview of the possible values and more detailed descriptions of each parameter.

Stream information

The following table describes the stream information fields. These are included if one or more of the *Input specific setup* options are enabled.

<i>Stream information</i>			
Log key	Parameter	Description	Presence
Name	Name	The name of the stream. This is set by the user in the tuning setup	All
Frequency	Frequency	The carrier frequency of the stream. This is set by the user in the tuning setup	All
nwId	Network ID	The network ID for this transport stream as found in the NIT	All
tsId	Transport stream ID	The transport stream ID for this transport stream as found in the PAT	All
tsSync	Transport stream sync	The transport stream sync status	All
totalBitrate	Total bitrate	The bitrate of the stream (including null packets) specified in bps	All
effectiveBitrate	Effective bitrate	The bitrate of the stream (excluding null packets) specified in bps	All

RF measurements

The following table describes the RF measurements logged by the probe. The status views (**COFDM — Status**, **QAM — Status**, **SAT — Status**, and **ASI — Status**) also describe most of these measurements.

<i>RF measurements</i>			
Log key	Parameter	Description	Presence
symbolRate	Symbol rate	The symbol rate of the transmitted signal specified in symbols per second. This is set by the user in the tuning setup	QAM, SAT

syncLossCnt	Sync loss count	The number of sync losses during the current monitoring period	SAT
transmissionSys	Transmission system	The DVB standard of the monitored stream	SAT
modulation	Modulation	The modulation used to transmit the signal	COFDM, QAM, SAT
rolloff	Roll-off factor	The filter roll-off factor	SAT
fecRate	FEC rate	The forward error correction rate	SAT
spectrumInv	Spectrum inversion	The spectrum inversion status of the transmitted signal	SAT
pilot	Pilot	Indicates if pilot detection is on or off	SAT (DVB-S2/S2X only)
frameLen	Frame length	Indicates length of FEC frames	SAT (DVB-S2 only)
LKM-dBx10	Link margin	Link margin in dB and increased by a factor of 10	SAT
CFOx10	Center frequency offset	The center frequency offset is the difference between the frequency set in the tuning setup and the current center frequency of the monitored stream. Increased by a factor of 10	COFDM, QAM, SAT
SRO	Symbol rate offset	The difference between the symbol rate set in the tuning setup and the current symbol rate of the monitored stream	QAM, SAT
Level-dBx10	Signal strength level	Logged in dB and increased by a factor of 10	COFDM, QAM, SAT
MER-dBx10	Modulation error ratio	Logged in dB and increased by a factor of 10	COFDM, QAM, SAT
SNR-dBx10	Signal noise ratio	Logged in dB and increased by a factor of 10	COFDM, QAM, SAT

Pre-Viterbi-BER	Pre Viterbi BER	The BER before the Viterbi forward error correction	COFDM (DVB-T only), SAT (DVB-S only)
Pre-RS-BER	Pre Reed-Solomon BER	The BER before the Reed-Solomon forward error correction	COFDM (DVB-T only)
Post-LDPC-BCH-BER	Post LDPC-BCH BER	The BER after the LDPC-BCH forward error correction	SAT (DVB-S2 only)
PEC	Packet error count	The total number of packet errors which have occurred during the current monitoring period	SAT
Eb/N0-dBx10	E_b/N_o	The energy per bit (E_b) to noise spectral density (N_o) ratio of the stream	SAT
EVM-dBx10	Error vector magnitude	The Error Vector Magnitude (EVM) (also referred to as Relative Constellation Error) of the stream	SAT

Service measurements

The following table describes the service measurements logged by the probe. More information about services and the service measurements is available in section **ETR 290 — Services**.

<i>Service parameters</i>			
Log key	Parameter	Description	Presence
serviceId	Service ID	The number used to identify the service	All
serviceName	Service name	The name of the service	All
serviceBitrate	Service bitrate	The current bitrate measurement	All
serviceMinBitrate	Service minimum bitrate	The minimum bitrate measured for the service	All
serviceMaxBitrate	Service maximum bitrate	The maximum bitrate measured for the service	All

PID measurements

The following table describes the PID measurements logged by the probe. The **ETR 290 — PIDs** section contains more information about the PID measurements.

<i>PID measurements</i>			
Log key	Parameter	Description	Presence
PID	Packet identifier	13 bit number used to identify content of a transport stream	All
BW	Bandwidth	This is the bitrate of the preceding PID	All
TYPE	PID type	The type of content the packets with the preceding PID contains (e.g. PMT, PCR, MPEG2 Video etc.)	All
PID-PCR	PID-PCR	The PID that the following PCR jitter measurements are for	If PCR is present for this PID, and PCR accuracy check is enabled
PCR-AC-ns	PCR accuracy jitter	The PCR accuracy jitter measured in nanoseconds	If PCR is present, and the PCR_AC jitter PCR accuracy check is enabled
PCR-OJ-ns	PCR overall jitter	The PCR overall jitter measured in nanoseconds	If PCR is present, and the PCR_OJ jitter PCR accuracy check is enabled

7.15.11 Setup — VBC thresh.

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VBC threshold presets

Search...

These error second thresholds are used by VBC to generate VBC alarms

Name	Refs	Sig	RTP	MLR	JAT	Pri1	Pri2	Pri3	Otr	Tra	HTTP	XML	Vid	Aud	SCTE35	EBPIDR	CapA	CapQ	Edit
Default	182	5	5	20	20	250	250	250	250	60	60	60	60	60	60	60	60	60	Edit
HD exception	0	5	5	70	40	500	500	500	500	60	60	60	60	60	60	60	60	60	Edit
Sensitive	21	5	5	20	20	250	250	250	250	60	60	60	30	30	30	30	30	30	Edit
ONLY-NO-SIGNAL	600	1	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	Edit

Thresholds: 4

Add new threshold
Duplicate selected
Delete selected
Edit selected

The VBC error second thresholds are used by the VideoBRIDGE Controller to issue VBC specific alarms. The VBC will raise an alarm when the number of error seconds exceeds the error seconds

threshold. The VBC thresholds are only relevant when a VideoBRIDGE Controller is part of the monitoring system.

The reason for using error second thresholds is to avoid alarms that toggle on and off, which for a large monitoring system might otherwise lead to an unintelligible user interface. The VBC thresholds will allow masking of minor error incidences thus resulting in a control system GUI that presents persistent alarms only.

The VBC error second thresholds are specified as the number of seconds affected by an error situation. These thresholds refer to a monitoring window of one hour, meaning that if the number of error seconds summed over any one-hour period exceeds the associated error second threshold an alarm will be raised by the VBC.

If a monitoring window different from one hour is selected by the VBC user, the threshold values will be automatically recalculated to proportional values.

In the 'VBC threshold presets' table the 'Refs' column shows how many streams are associated with each VBC threshold template.

By clicking the **Add new threshold** button the user will enter a VBC thresholds edit view enabling definition of a new threshold template. It is possible to copy or delete an existing threshold template by clicking the **Duplicate selected** or **Delete selected** button respectively. To edit a highlighted threshold template, the **Edit selected** button should be clicked.

Multi-edit functionality allows editing several VBC thresholds simultaneously. Highlight the list entries that should be edited and click the **Edit selected** button.

Edit VBC threshold

Name

Parameter	Threshold	Corresponding VBC alarm
<i>Ethernet:</i>		
No signal	5	No signal
RTP drops	5	RTP drops
MLR error	20	MLR error
IAT error	20	IAT error
Max bitrate error	20	Bitrate overflow
Min bitrate error	20	Bitrate underflow
<i>ETR:</i>		
ETR pri one errors	250	ETR pri one error
ETR pri two errors	250	ETR pri two error
ETR pri three errors	250	ETR pri three error
ETR pri other errors	250	ETR pri other error
ETR interface errors	250	ETR interface error
<i>OTT:</i>		
OTT transport error	60	OTT transport errors
OTT HTTP error	60	OTT HTTP errors
OTT XML error	60	OTT XML errors
<i>QoE & captions:</i>		
QoE video	60	QoE video
QoE audio	60	QoE audio
Captions availability	60	Captions availability
Captions quality	60	Captions quality

The thresholds are used by VBC and specify how many error-seconds are required during an alarm window of 60 minutes to raise the corresponding alarm.

VBC will automatically adjust these error second numbers according to the alarm window specified on the VBC. There is one error-window per alarm.

So 30 error-seconds specified here will be scaled to 10 seconds for error windows of 20 minutes etc.

VBC thresholds

Name: The name of the VBC threshold template

No signal: Number of seconds with 'No signal'

RTP error: Number of seconds with RTP packet drops. This measurement will be zero unless the stream is encapsulated in RTP headers

MLR error:	Number of seconds with packet drops in the TS layer (seconds when media loss rate is non-zero). This is equal to the number of error seconds with CC errors.
IAT error:	Number of seconds when the inter-packet arrival time exceeds the threshold
Max bitrate error:	Number of seconds the bitrate can exceed the error-threshold before a VBC alarm is generated
Min bitrate error:	Number of seconds the bitrate can fall below the error-threshold before a VBC alarm is generated
ETR Pri 1 errors:	Number of seconds with ETSI TR 101 290 Priority 1 alarms before a VBC alarm is generated
ETR Pri 2 errors:	Number of seconds with ETSI TR 101 290 Priority 2 alarms before a VBC alarm is generated
ETR Pri 3 errors:	Number of seconds with ETSI TR 101 290 Priority 3 alarms before a VBC alarm is generated
ETR other errors:	Number of seconds with ETR 'other' alarms before a VBC alarm is generated
ETR interface errors:	Number of seconds with ETR interface alarms before a VBC alarm is generated
OTT transport errors:	Number of seconds with OTT transport related alarms
OTT HTTP errors:	Number of seconds with OTT HTTP related alarms
OTT XML errors:	Number of seconds with OTT XML related alarms
QoE video:	Number of seconds with QoE video-related alarms, such as freeze-frame and MOS below average
QoE audio:	Number of seconds with QoE audio-related alarms, such as audio silence or out of phase
SCTE 35:	Number of seconds with SCTE 35-related alarms, such as event gap or number of placement opportunities
EBP / IDR:	Number of seconds with EBP/IDR-related alarms, such as EBP PTS gap outside of threshold or EBP and IDR PTS unaligned
Captions availability:	Number of seconds with captions availability alarms
Captions quality:	Number of seconds with captions quality alarms

7.15.12Setup — Scheduling

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Schedule list


These schedules can be used to define when alarms are to be ignored, or when streams should be recorded

Name	Refs	All days	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Edit
Never	18									Edit
Always	0	0000-2400								Edit
Maintenance	0				0500-0600					Edit

Schedules: 3

Add new schedule
Duplicate selected
Delete selected
Edit selected

The **Setup — Scheduling** view enables definition of schedules. These schedules can be used to mask alarms during selected time intervals, e.g. due to maintenance. To mask ETR 290 alarms, schedules can be assigned to a PID threshold or service threshold. To mask content alarms, schedules can be assigned to a multicast, RF channel or OTT channel, or to a specific service using a content service threshold.

In the Schedule list table the ‘Refs’ column shows how many references exist for each scheduling template. References to scheduling templates may be found in the places mentioned above.

The search field in the upper right corner of the view allows the user to type a text string and the schedule list is updated to display only scheduling templates matching the specified text.

The predefined scheduling templates **Never** and **Always** result in alarms being masked never or always, respectively. A new scheduling template is created by clicking the **Add new schedule** button. It is also possible to copy an existing scheduling template by highlighting a schedule template and clicking the **Duplicate selected** button. The alarm masking intervals are defined for individual week days or for all week days. Intervals are specified on the form hhmm–hhmm, for instance the interval 1200–1400 means that the schedule starts at noon and finish at 2 pm. Several alarm masking intervals may be specified for each day using comma separation. To edit an existing scheduling template, highlight it and click the **Edit selected** button. To delete a template, highlight it and click the **Delete selected** button.

When a scheduling template has been modified, click the **Apply changes** button. Defined scheduling templates become available as selections in the **Multicasts — Streams — Edit — Content, ASI — Setup, COFDM/QAM/VSF/RF/SAT — Tuning setup, OTT — Channels — Edit, ETR 290 — PID thresh. — Edit, ETR 290 — Service thresh. — Edit** and **Content — Service thresh. — Edit** views.

×

Edit schedule

Name

Midnight Wed

Schedule

All days

Monday

Tuesday

Wednesday

Thursday

Friday

Saturday

Sunday

Timing

Common schedule for all days

Schedule for Mondays

2330-2400

0000-0030

Schedule for Thursday

Schedule for Friday

Schedule for Saturday

Schedule for Sunday

Schedules are used to define when alarms are to be filtered (i.e. ignored) and to define when streams are to be recorded.

Times are specified as hhmm-hhmm in 24-hour format and can be comma separated. Example: "0000-0258,2350-2400" (from midnight to two minutes before three o'clock, and ten minutes before midnight to midnight).

Close

Apply changes

7.15.13 Setup — Routing

Params

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Routing setup

Default

eth1 - Management

IP monitoring (default)

eth0 - SFP+ B

OTT monitoring (default)

eth0 - SFP+ B

NTP date

Default interface

SNMP

Default interface

VBC auto-detect

Default interface

For each of the listed services traffic will be forced on the selected interface.

The probe must be rebooted for any changes to take effect.

Apply changes

Auto-detect

Enable VBC auto-detect of this device

☒

VBC server (DNS-name or IP-address):

vbc.example.com

Resolved IP-address of the VBC server:

10.0.30.39

The **Setup — Routing** view allows configuring the default interface for out-going probe traffic, and VBC detection. System networking configuration is configured using the **Setup — Ethernet** view.

Note: When monitoring both multicast (UDP) and OTT (TCP) traffic, we recommend using different network interfaces. Mixing the two traffic types on the same network can have unwanted impact on the monitored signals.

The VideoBRIDGE Controller can automatically detect the NOMAD and add it to the VBC equipment list, provided that the auto-detect functionality is enabled and the VBC server address is known to the NOMAD. Note that the network must be transparent to traffic between the VBC server and NOMADs for auto-detection to work.

When changes have been made in the **Setup — Routing** view, click the **Apply** button for changes to take effect.

<i>Routing setup</i>	
Default	This setting determines the default interface, and is configured through the Setup — Ethernet view.
IP monitoring	Defines the interface to use for the multicasts specified in the Multicasts — Streams view. The available interfaces depend on the probe license.
OTT	Interface to use for OTT channels specified in the OTT — Channels view.
NTP date	Interface to use to connect to the NTP server defined in the Setup — Params view.
SNMP	Interface to use for SNMP traps.
VBC auto-detect	Interface to use for VBC auto-detect, as specified in the Auto-detect column.

Note that routing for Full Service Monitoring (FSM) is selected in the **Ethernet — FSM — Setup — Edit** view.

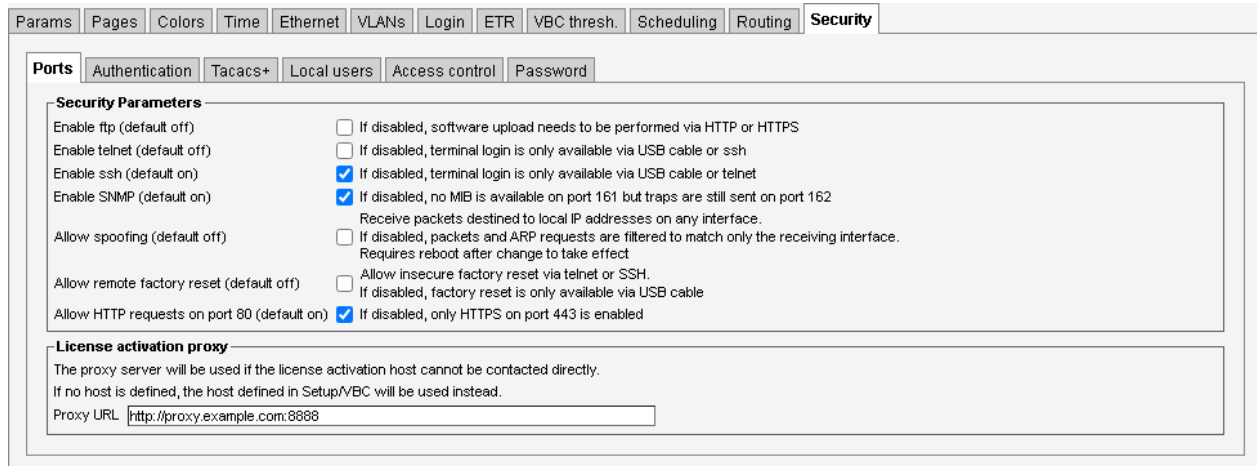
<i>Auto-detect</i>	
Enable VBC auto-detect of this device	Check this box to enable auto-detect
VBC server	Enter the host name name or IP address of the VBC
Resolved IP address	The IP address associated with the DNS name will be displayed here. If host name lookup fails, it is necessary to type the VBC server's IP address instead. Host name lookup is only performed if auto-detect is enabled.

7.15.14 Setup — Security

The **Setup — Security** view is a restricted section where only the administrator should have access, making it possible to disable selected communication protocols to increase safety against unauthorized access to the NOMAD. It is also possible to have the probe disregard IP packets with source address outside the Ethernet interface's subnet.

To access this view, you must be logged in as the **admin** user, please refer to chapter 6.6 for details. You also need to access the NOMAD user interface directly, it is not available when logged in through the VBC.

7.15.14.1 Setup — Security — Ports



Params Pages Colors Time Ethernet VLANs Login ETR VBC thresh. Scheduling Routing **Security**

Ports Authentication Tacacs+ Local users Access control Password

Security Parameters

Enable ftp (default off) ☐ If disabled, software upload needs to be performed via HTTP or HTTPS

Enable telnet (default off) ☐ If disabled, terminal login is only available via USB cable or ssh

Enable ssh (default on) ☒ If disabled, terminal login is only available via USB cable or telnet

Enable SNMP (default on) ☒ If disabled, no MIB is available on port 161 but traps are still sent on port 162

Allow spoofing (default off) ☐ Receive packets destined to local IP addresses on any interface.
If disabled, packets and ARP requests are filtered to match only the receiving interface.
Requires reboot after change to take effect

Allow remote factory reset (default off) ☐ Allow insecure factory reset via telnet or SSH.
If disabled, factory reset is only available via USB cable

Allow HTTP requests on port 80 (default on) ☒ If disabled, only HTTPS on port 443 is enabled

License activation proxy

The proxy server will be used if the license activation host cannot be contacted directly.
If no host is defined, the host defined in Setup/VBC will be used instead.

Proxy URL

The **Setup – Security — Ports** view makes it possible to enable and disable a number of protocol ports used by the NOMAD. To disable a protocol, deselect it by removing the associated check-mark and click the **Apply changes** button. Available security parameters are:

Security parameters

Enable ftp	Enables support for uploading software update images using ftp, which might be useful if uploading through the regular web interface (from the Data — Software view) fails. Defaults to off .
Enable telnet	Enables text-based remote login using the plain-text telnet protocol. Defaults to off .
Enable ssh	Enables text-based remote login using the encrypted ssh (secure shell) protocol. Defaults to on .
Enable SNMP	If SNMP is disabled, no MIB is available on port 161. However SNMP traps are sent as usual on port 162. Defaults to on .
Allow spoofing	If disabled, IP packets received on the data interface are dropped if they are spoofed and would be replied to on the management interface. Defaults to off .
Allow remote factory reset	If enabled, factory reset (see appendix H) is available remotely using telnet or ssh (if these protocols are enabled above). If disabled, it can only be accessed from the USB interface using the method described in chapter 4.4.3. Defaults to off .
Allow HTTP requests on port 80	If disabled, the NOMAD is only available through encrypted HTTPS communication. If enabled, it is also available through plain-text HTTP. It is not possible to disable NOMAD access via HTTPS port 443 since it is considered secure. Defaults to on .

License activation proxy

Proxy URL	When using on-line activation, the NOMAD needs to be able to connect to the license activation server. If the NOMAD is not connected directly to the Internet, you can add the URL to a proxy server that it can use here. If not configured, the NOMAD will try to use the proxy installed on the VBC host, as configured in the Setup — Routing view; see E Appendix: On-line License Activation for more details
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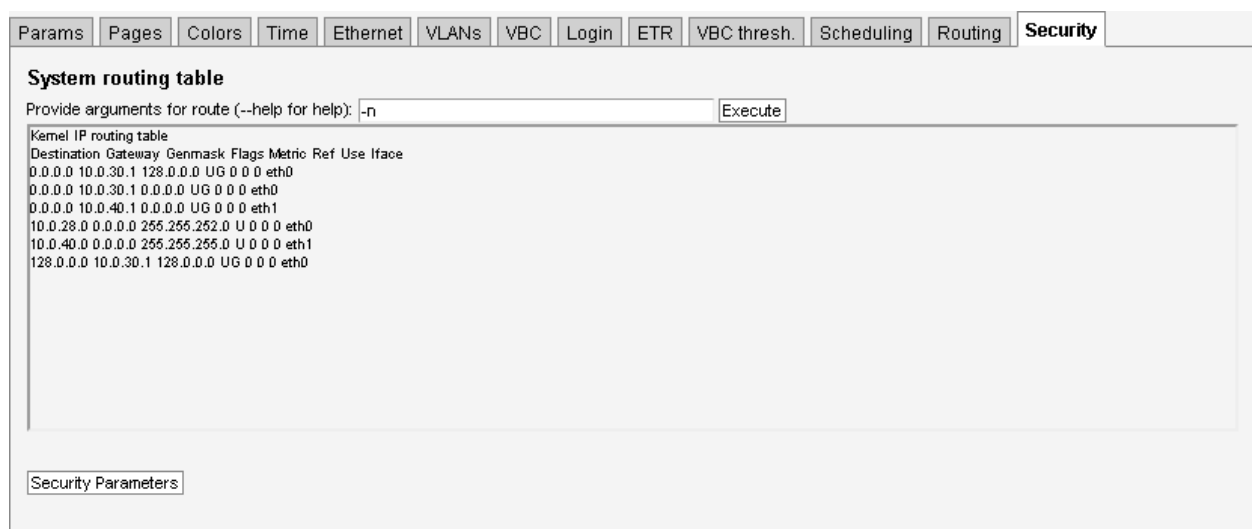
If both telnet and ssh are disabled, terminal login is only available via USB cable, i.e. remote login is disabled. Please refer to section 4.4.3 for information on how to connect to the probe using a USB cable.

The NOMAD will create a self-signed SSL certificate and use this when clients access the user interface via HTTPS (port 443). Since the certificate is not signed by a certificate authority, the web browser will display an error message saying that the connection towards the probe may not be secure.

The certificate is used to encrypt the communication between the client (usually a web browser) and the NOMAD. The NOMAD can also be accessed via HTTPS from the VideoBRIDGE Controller (requires version 5.5 or later). Choosing the HTTPS protocol over HTTP will cause a small and, in almost all cases, insignificant additional load on the probe since the communication must be encrypted by the web server.

Changing settings for spoofing should be followed by a probe reboot for changes to take effect. Reboot is performed from the **Setup — Ethernet** view.

Clicking the **Routing** button will open a new window, allowing the user to display or modify the probe's routing table.



The screenshot shows the 'Security' tab of the 'Security Parameters' dialog. The 'System routing table' section displays the following text:

```

Provide arguments for route (--help for help): -n [Execute]

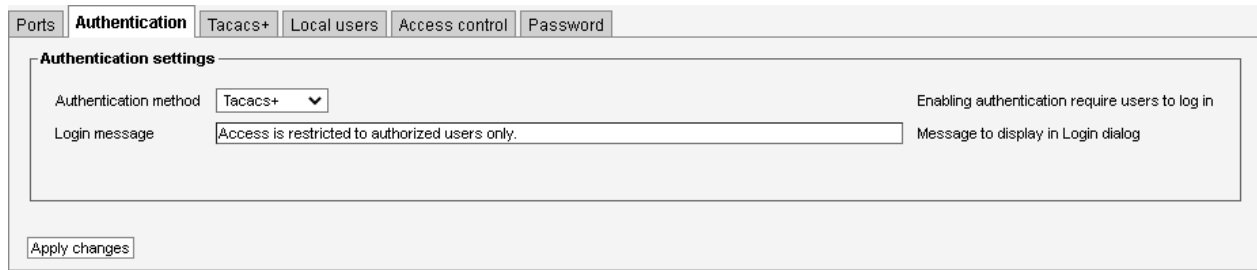
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 10.0.30.1 128.0.0.0 UG 0 0 0 eth0
0.0.0.0 10.0.30.1 0.0.0.0 UG 0 0 0 eth0
0.0.0.0 10.0.40.1 0.0.0.0 UG 0 0 0 eth1
10.0.28.0 0.0.0.0 255.255.252.0 U 0 0 0 eth0
10.0.40.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
128.0.0.0 10.0.30.1 128.0.0.0 UG 0 0 0 eth0

```

Below the routing table, there is a 'Security Parameters' button.

Please note that any modifications to the routing table that is made in this dialog will be lost when the probe is rebooted.

7.15.14.2 Setup — Security — Authentication



The **Setup — Security — Authentication** view makes it possible to restrict access to the NOMAD user interface by requiring the user to log in first.

<i>Authentication method</i>	
Disabled	NOMAD authentication is disabled, and no login is required when accessing the NOMAD from a web browser. The NOMAD is seamlessly accessible from the VideoBRIDGE Controller. This is the default setting.
Tacacs+	NOMAD authentication is enabled. When accessing the NOMAD with a web browser, users need to authenticate themselves with a username and password. These need to match the pre-defined admin user, a user available on the Tacacs+ server configured through the Setup — Security — Tacacs+ view, or any of the users configured in the Setup — Security — Local users view.
Local users	NOMAD authentication is enabled. When accessing the NOMAD with a web browser, users need to authenticate themselves with a username and password. These need to match either the pre-defined admin user, or any of the users configured in the Setup — Security — Local users view.

If authentication has been enabled when accessing the NOMAD through the VideoBRIDGE Controller, the local NOMAD user will be “admin”, but with restrictions imposed by the user account. If the password has been changed from the default, the same password needs to be configured in the **Edit device** popup in the **VBC Equipment** view.

The message entered in the **Login message** text field will be displayed to the user in the **Login** view before logging in.

7.15.14.3 Setup — Security — Tacacs+

Ports
Authentication
Tacacs+
Local users
Password

Tacacs+ parameters

Server IP address
10.0.28.118

Secret

Default local user
TAC

Auth-key
VBUserLevel

Access level 1
Admin
admin

Access level 2
Read/Write
TAC

Access level 3
ReadOnly
demo

Apply

Tacacs+ server IP address

Used to encrypt communication - must match setting on Tacacs+ server

This user account will be used by default for all Tacacs+ authenticated users

Key to be used to authorize user access level if enabled on Tacacs+ server

Select local user account to match value assigned by Tacacs+ server for Auth-key

Select local user account to match value assigned by Tacacs+ server for Auth-key

Select local user account to match value assigned by Tacacs+ server for Auth-key

This view is used to configure a Tacacs+ server for user authentication. For this to be used, Tacacs+ authentication must be selected in the **Setup — Security — Authentication** view.

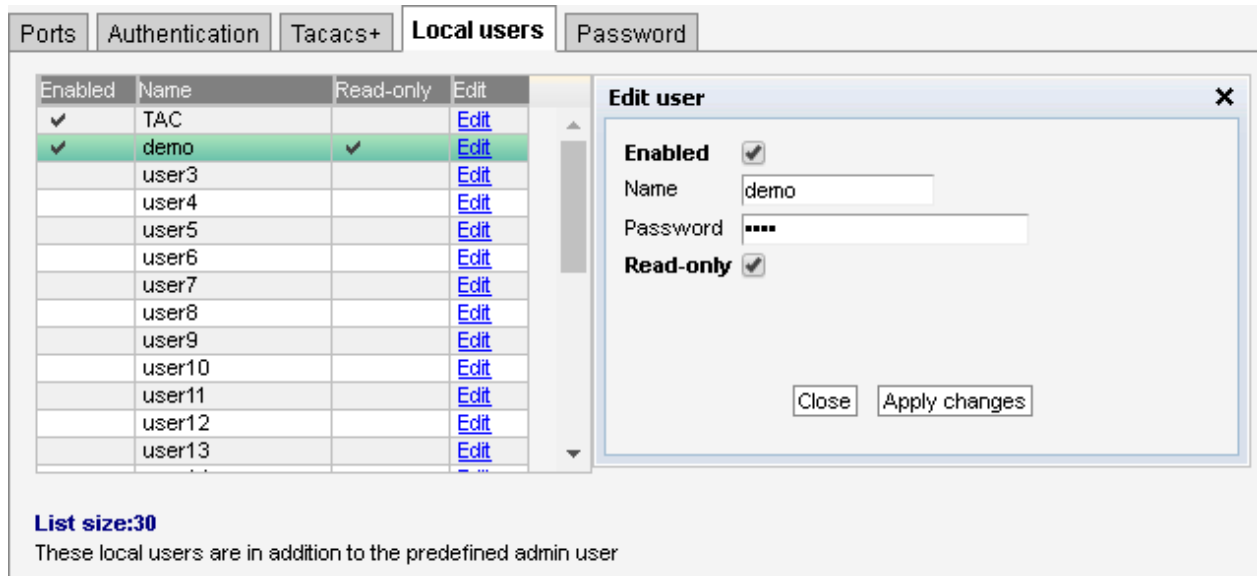
To use Tacacs+ authentication, the IP address of the Tacacs+ server must be specified, along with the secret key used to encrypt the communication between the Tacacs+ server and the NOMAD server. The same key must also be specified as part of the Tacacs+ server configuration.

We recommend using HTTPS when using authentication, as this combines authentication with encryption. Using authentication with HTTP is not considered very secure since it is possible to sniff the un-encrypted communication and possible reverse engineer the scrambling of login details.

Tacacs+ parameters

Server IP address	IP address of the Tacacs+ server used for authentication.
Secret	Configures a fixed string used to encrypt the communication with the server.
Default local user	Defines the local user ID that should be used on successful Tacacs+ authentication.
Auth-key	Defines which key in the Tacacs+ authentication response to use to determine the user access level. The value of this key is compared to the Access level below.
Access level 1–3	Up to three different Tacacs+ access levels can be configured to map to different local user accounts, allowing different authenticated users to have different access levels. The value configured here is matched with the value of the Auth-key configured above.

7.15.14.4 Setup — Security — Local users



Enabled	Name	Read-only	Edit
☒	TAC		Edit
☒	demo	☒	Edit
☐	user3		Edit
☐	user4		Edit
☐	user5		Edit
☐	user6		Edit
☐	user7		Edit
☐	user8		Edit
☐	user9		Edit
☐	user10		Edit
☐	user11		Edit
☐	user12		Edit
☐	user13		Edit

List size:30
These local users are in addition to the predefined admin user

This view is used to configure local users that are allowed to access the NOMAD user interface. For these to be used, Local users authentication must be selected in the **Setup — Security — Authentication** view. The NOMAD supports up to 30 local users.

In addition to the users defined here, the predefined “admin” user can also log in. The password for the “admin” user is configured in the **Setup — Security — Password** view. Note that the login requirements towards the **Security** tab is independent of the general authentication and always requires the login of the admin user.

It is not possible to see which user is actually logged in to the NOMAD, as this information is not kept or used by the probe.

Edit user

Enabled	If this is checked, the user is allowed to log in.
Name	User-name of the account used to log in.
Password	Password of the account used to log in.
Read-only	If this is checked, the user only has read-only access to the user interface. When read-only access is activated a READ-ONLY access message is displayed under the alarm list. To change any parameters, the user needs to log out and then log in as another user.

7.15.14.5 Setup — Security — Access control

Ports	Authentication	Tacacs+	Local users	Access control	Password						
Access control list - all Ethernet interfaces											
<table> <tr> <td>Enable</td> <td>☒</td> </tr> <tr> <td>Allowed sources</td> <td>10.0.30.1,10.0.30.2</td> </tr> <tr> <td>VBC server</td> <td>10.0.30.15</td> </tr> </table>						Enable	☒	Allowed sources	10.0.30.1,10.0.30.2	VBC server	10.0.30.15
Enable	☒										
Allowed sources	10.0.30.1,10.0.30.2										
VBC server	10.0.30.15										
When the Access control list is enabled only clients with IP source address matching the Allowed sources will have access to the probe. This means that the client will lose contact with the probe if his IP address is not in the list. Clicking Test ACL for 30 seconds button will apply the settings and automatically switch off ACL after 30 seconds so that the user can verify what happens. Multiple IP addresses can be entered separated by spaces or comma. Single IP addresses and subnets are supported. Example: 10.20.30.40 10.0.30.0/24 If an address has been configured in Setup/VBC, it will be added automatically. It is possible to disable ACL from a serial port login. Apply settings permanently Test ACL for 30 seconds											

The probe user interface can be protected by a firewall. The firewall is configured in the **Setup — Security — Access control** view.

The firewall settings are remembered across reboots. It is possible to lock oneself completely out of the web and remote login interfaces. In that case a serial port login towards the probe, using a USB cable, is required to disable the firewall, as described below.

The firewall is enabled by checking **Enable** in the dialog. When the firewall is enabled, only clients accessing from IP source addresses listed in the “Allowed sources” field are allowed. In addition, the VBC server will be allowed access if it has been enabled in the **Setup — Routing** view. Please note that the firewall will not be enabled if no VBC server is specified and the “Allowed sources” field is left blank.

We recommend testing the effect of enabling the firewall by clicking the “Test ACL for 30 seconds” button first. Any surprises, such as unintentionally being blocked by the firewall and losing connection to the probe, are then detected before the setting becomes permanent.

To disable the firewall using the USB interface, connect to the NOMAD using the method described in chapter 4.4.3 and log in as the **admin** user. The default password is **elvis**, but can be changed as described in chapter 7.15.14.6. Navigate to the `/ewe/probe/core/setup/security/accessList/` menu by selecting **Back**, **security**, **accessList** and change the value for **enableACL** to **false**.

The firewall will filter the following ports: ftp(tcp), ssh(tcp), telnet(tcp), web(tcp), snmp(udp), https(tcp).

7.15.14.6 Setup — Security — Password



The **Setup — Security — Password** view is used to change the password used to access all of the **Setup — Security** section. The password is changed by entering a new password and clicking the **Apply changes** button. If authentication has been enabled in the **Setup — Security — Authentication** view, the password defined here can be used with the special username “admin”.

This password also applies for the **admin** user when logging in over USB or ssh as described in chapter 4.4.3, as well as for software upload using ftp as described in appendix G.

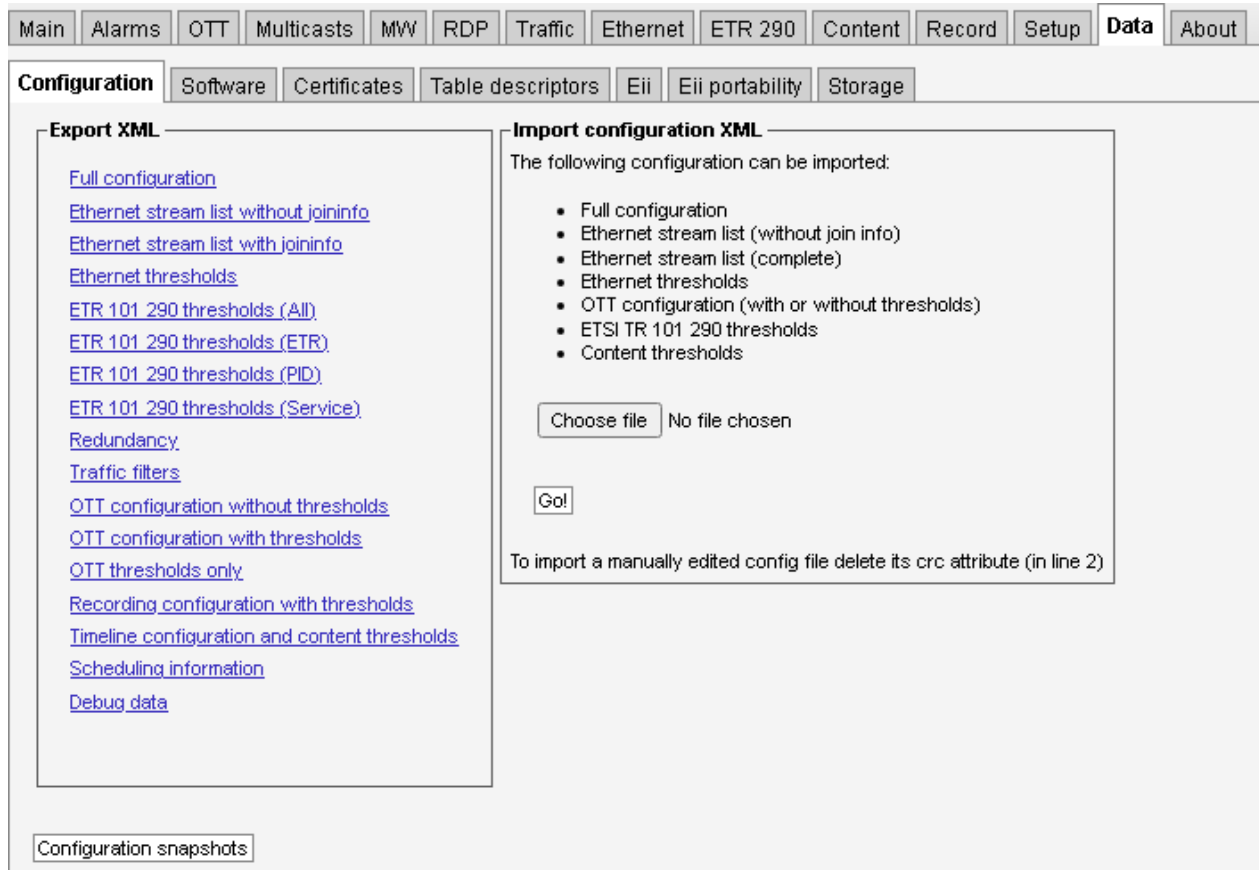
Note that if the password is lost, the probe will have to be factory reset to access the **Setup — Security** view.

The method for storing passwords in the configuration file changed in version 6.5, making it incompatible with previous versions. The **Allow insecure downgrade** checkbox allows downgrades to a version that is unable to read the passwords from the configuration. Please note that the **admin** user password will be reset to the default, and that you will lose all passwords defined for local users, DRM passphrases and keys configured for OTT channels and SRT passphrases and stream IDs configured for multicasts.

It is possible to downgrade without losing passwords. Versions 6.3.0–12 and 6.4.0–5 and later can read the new password storage, converting to the old format. If you need to downgrade further, make sure the configuration is re-saved in the old format before proceeding, by making an inconsequential change to the configuration before applying another downgrade. You could, for instance, change the **Probe name** in the **Setup — Params** view and press **Apply changes** to save the configuration to disk.

7.16 Data

7.16.1 Data — Configuration



The screenshot shows the 'Data' tab selected in the top navigation bar. Below it, the 'Configuration' sub-tab is active. The interface is divided into two main sections: 'Export XML' and 'Import configuration XML'.

Export XML: This section contains a list of links for exporting different parts of the configuration:

- [Full configuration](#)
- [Ethernet stream list without joininfo](#)
- [Ethernet stream list with joininfo](#)
- [Ethernet thresholds](#)
- [ETR 101 290 thresholds \(All\)](#)
- [ETR 101 290 thresholds \(ETR\)](#)
- [ETR 101 290 thresholds \(PID\)](#)
- [ETR 101 290 thresholds \(Service\)](#)
- [Redundancy](#)
- [Traffic filters](#)
- [OTT configuration without thresholds](#)
- [OTT configuration with thresholds](#)
- [OTT thresholds only](#)
- [Recording configuration with thresholds](#)
- [Timeline configuration and content thresholds](#)
- [Scheduling information](#)
- [Debug data](#)

Import configuration XML: This section contains a list of configurations that can be imported:

- Full configuration
- Ethernet stream list (without join info)
- Ethernet stream list (complete)
- Ethernet thresholds
- OTT configuration (with or without thresholds)
- ETSI TR 101 290 thresholds
- Content thresholds

Below the list, there is a 'Choose file' button and a 'No file chosen' status. A 'Go!' button is also present. A note at the bottom states: 'To import a manually edited config file delete its crc attribute (in line 2)'.

At the bottom left, there is a 'Configuration snapshots' button.

Full and partial configuration of the NOMAD can be exported as XML documents. This is achieved by clicking one of the links inside the **Export XML** frame. A new browser window pops up containing the selected XML document. The browser will allow the contents of the page to be saved to file.

Restoring the NOMAD configuration, multicast stream list or OTT channel list is just as simple. Just click the **Browse** button and select the file that contains the XML document. Then click the **Go!** button and the information in the XML document will be applied. The configuration, stream list and thresholds exports can all be imported.

Configuration files generated by a probe can be imported by the NOMAD. Multicast stream lists, OTT channel lists and scheduling information can also be exported to and imported from the VB7880 Advanced Content Extractor.

You can also import and export license and software maintenance keys in XML format from this page.

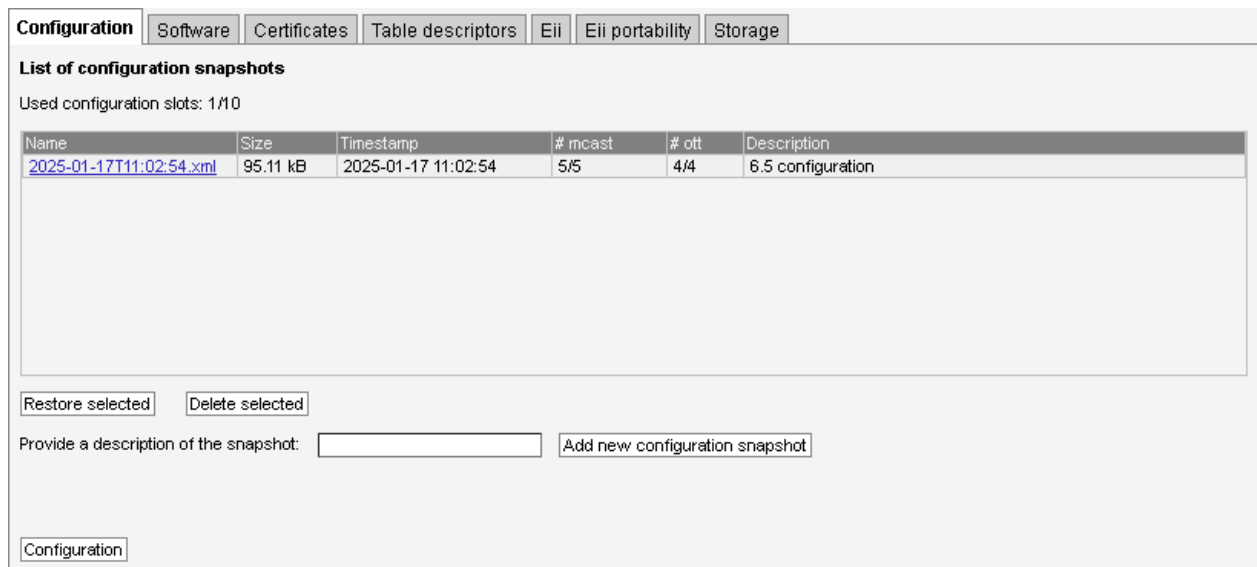
To import documents that have been manually edited the CRC attribute at the very top of the document must be deleted (i.e. delete `crc="..."` from the file). This will bypass the checksum verification mechanism.

Please refer to the document **Eii External Integration Interface** for detailed information about XML import and export.

Note that the Ethernet setup parameters (IP address, netmask and gateway) and probe name and location are not part of the XML document. Hence exporting the full configuration of one NOMAD and restoring it on another will make the two NOMADs identical except for the network settings.

Clicking the Debug data export option will generate a document containing debug information that may be useful if NOMAD misbehavior is reported. This file should be sent along with a description of the misbehavior.

7.16.1.1 Configuration snapshots



Name	Size	Timestamp	# mcast	# ott	Description
2025-01-17T11:02:54.xml	95.11 kB	2025-01-17 11:02:54	5/5	4/4	6.5 configuration

Configuration snapshots allow you to save up to 3 named probe configurations directly on the probe. Each snapshot represents a **Full configuration** XML document and can be used to restore the probe to a previous state, similar to uploading a configuration XML.

Access the **Configuration snapshot** view by clicking the **Configuration snapshots** button below the XML export options in the **Data — Configuration** view. From here you can restore any existing snapshot by selecting it and clicking the **Restore selected** button, and create new snapshots by providing a name and clicking the **Add new configuration snapshot** button. If all snapshot slots are used, you can delete an existing snapshot by selecting it and clicking the **Delete selected** button.

Click the **Configuration** button to return to the **Data — Configuration** view.

7.16.2 Data — Software

Configuration	Software	Table Descriptors	Eii
---------------	-----------------	-------------------	-----

Import device software

Device software files have the extension .tea

Choose File No file chosen

Go!

Software upgrade information

The software maintenance period on this device is valid until 2023 Nov 1.

After this date the device cannot receive new software updates.
Maintenance versions of previous releases can still be installed.
The software maintenance period can be extended by contacting your sales representative.
The hardware key found in About→License will be required to get the upgrade key.

The software section allows the NOMAD to be upgraded to a newer software version and for timezone definitions to be updated independently from the software. Select the **.tea** file from the local PC and click **Go!** to copy the software to the NOMAD. When the upload is complete, clicking the **Save flash** button will store the new software to flash. Note that the probe must not be powered down during the flash save process. Flash save progress is indicated by progress bars. Note that the probe will reboot when the new software has been successfully stored in flash, and it will be unresponsive until reboot is completed.

A more detailed description on the software update procedure can be found in G Appendix: Software Upload

Configuration	Software	Table Descriptors	Eii
---------------	-----------------	-------------------	-----

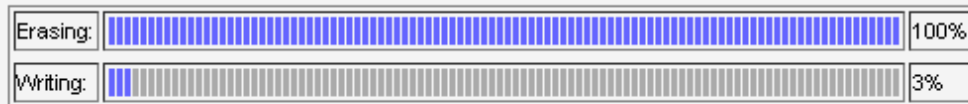
Software image uploaded successfully

14505925 bytes saved to disk

Save flash

Software update in progress

Writing ...



-- Do not power off --

The probe will automatically reboot on completion

Status updated: 2/1/2017, 8:14:38 AM

Upgrading to a new major release requires a valid software maintenance license, please refer to F Appendix: Software Maintenance for more details. If the current software maintenance license does not cover the uploaded software version, the upgrade will be aborted and the current version is kept.

7.16.3 Data — Certificates (requires OTT-OPT)

Configuration
Software
Certificates
Table descriptors
Eli
Eli portability
Storage

Certificate storage

Import PKCS #12 certificate

Import certificates from PKCS #12 archives (file extensions .p12 or .pfx)

Passphrase
Enter passphrase used for the PKCS #12 archive

Name
Name to store the imported ce

Type
☒ Client certificate
☐ CA certificate

Choose file
No file chosen

Go!

Name	Subject	Refs	Type	Uploaded	Valid from	Valid until	Size
old-ca.pem	Bridge Technologies co as	0	CA	1956 Aug 15 20:27:40	2024 Oct 17 13:43:13	2034 Oct 15 13:43:13	2.279 kB
selfsigned-ca.pem	Bridge Technologies co as	2	CA	1956 Aug 15 20:22:10	2024 Oct 17 15:20:06	2034 Oct 15 15:20:06	2.279 kB
selfsigned-cli-1.pem	Bridge Technologies co as	0	Client	1956 Aug 15 20:22:58	2024 Oct 17 13:52:22	2025 Oct 17 13:52:22	5.599 kB
selfsigned-cli.pem	Bridge Technologies co as	2	Client	1956 Aug 15 20:22:36	2024 Oct 17 15:27:58	2034 Oct 15 15:27:58	5.602 kB

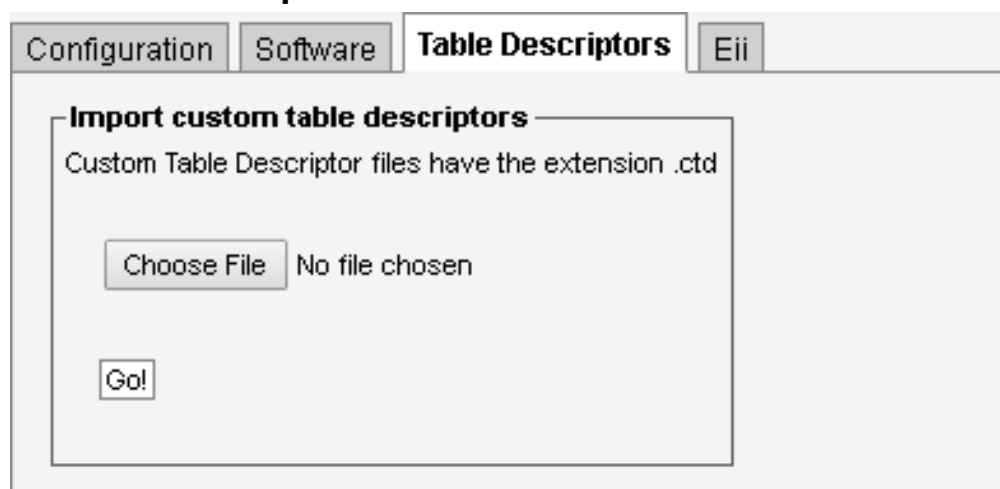
Delete selected

This view makes it possible to upload client certificates for mTLS authentication and CA certificates for TLS host verification.

Use **Import PKCS #12 certificate** to upload a certificate. Certificates must be available as a PKCS #12 archive (these files usually have a **p12** or **pfx** file extension). Enter the passphrase used for the PKCS #12 archive, enter a name under which to store the certificate, and select whether the certificate is a client certificate or a CA certificate. Click the **Browse** button to select the file that contains the certificate and then click the **Go!** button and the certificate will be imported.

All imported certificates are displayed in the certificate list in the bottom half of the screen. To remove certificates from the certificate store, select the certificate or certificates to remove and click the **Delete selected** button.

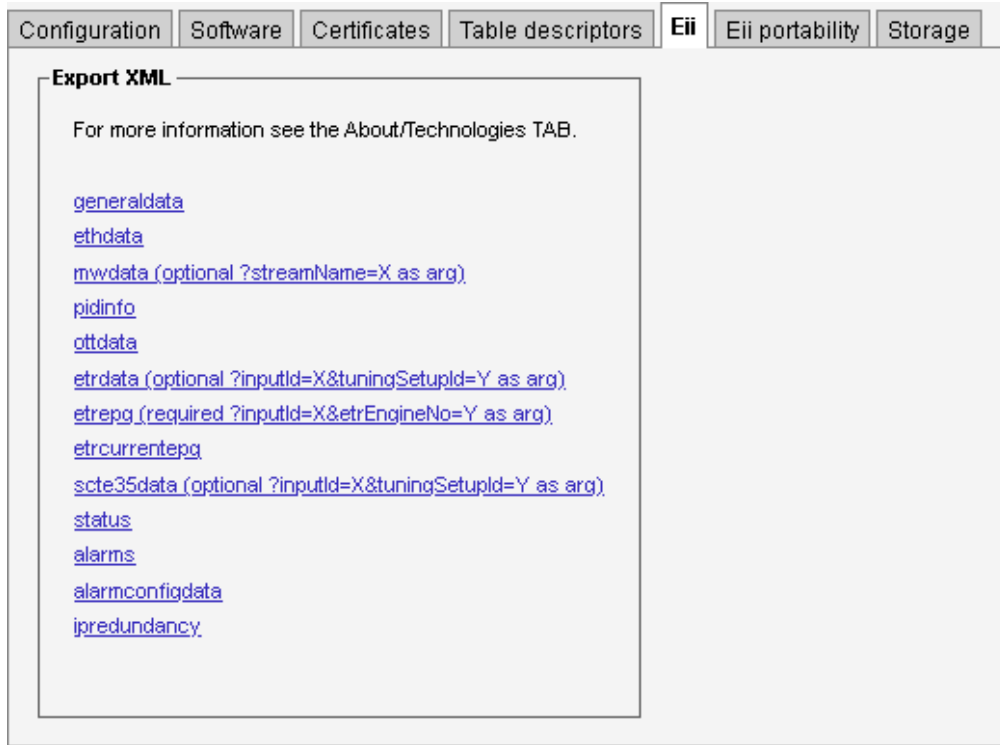
7.16.4 Data — Table Descriptors



It is possible to upload parser files to the probe adding support for private descriptors. Private descriptors should be enabled (in the **Setup — ETR** view).

Contact Sencore for more information about private descriptors.

7.16.5 Data — Eii



Configuration Software Certificates Table descriptors **Eii** Eii portability Storage

Export XML

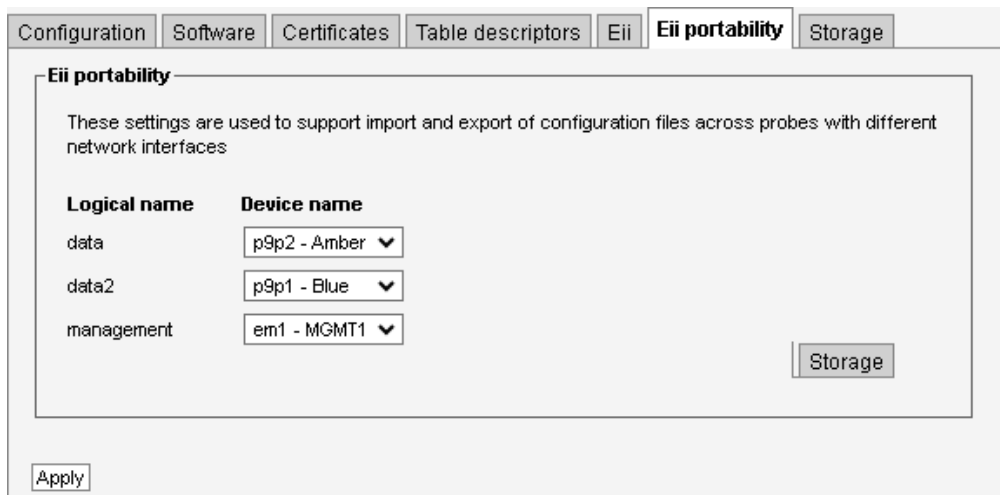
For more information see the About/Technologies TAB.

- [generaldata](#)
- [ethdata](#)
- [mwdata \(optional ?streamName=X as arg\)](#)
- [pidinfo](#)
- [ottdata](#)
- [etrdata \(optional ?inputId=X&tuningSetupId=Y as arg\)](#)
- [etrepg \(required ?inputId=X&etrEngineNo=Y as arg\)](#)
- [etrcurrentepg](#)
- [scte35data \(optional ?inputId=X&tuningSetupId=Y as arg\)](#)
- [status](#)
- [alarms](#)
- [alarmconfigdata](#)
- [ipredundancy](#)

The **External integration interface** (Eii) allows inclusion of Sencore VideoBRIDGE equipment into 3rd party NMS systems. In order to facilitate integration the **Data — Eii** view allows export of XML files containing the data typically being requested by an NMS system via the regular Eii interface.

Please refer to the document **Eii External Integration Interface** for detailed information about Eii.

7.16.6 Data — Eii Portability



Configuration Software Certificates Table descriptors Eii **Eii portability** Storage

Eii portability

These settings are used to support import and export of configuration files across probes with different network interfaces

Logical name	Device name
data	p9p2 - Amber ▼
data2	p9p1 - Blue ▼
management	em1 - MGMT1 ▼

Storage

Apply

This view makes it possible to map the logical network interface names **data**, **data2** and **management** to the physical network interfaces available on the NOMAD. These mappings are used when importing and exporting configuration files between probes of different types and when using the **setrdp** Eii interface.

7.16.7 Data — Storage (requires FLASH32-OPT)

Configuration
Software
Table Descriptors
Eii
Storage

SDcard File Storage

PCAP
PCAP file ready for transfer
PCAP_2020-02-28::11:32:19
Transfer files

Name	Timestamp	Size	Rename
RDP1_2016-12-15::11:52:28.ts	2016-12-15 10:53:01	377.95 MB	Rename
RDP1_2016-12-15::11:52:28.meta.txt	2016-12-15 10:52:31	1017 B	Rename
RDP2_2016-12-15::09:50:23.ts	2016-12-15 08:51:22	715.26 MB	Rename
RDP2_2016-12-15::09:50:23.meta.txt	2016-12-15 08:50:35	31 B	Rename
RDP2_2016-12-14::16:35:52.ts	2016-12-14 15:37:20	715.26 MB	Rename
RDP1_2016-12-14::16:35:22.ts	2016-12-14 15:36:47	715.26 MB	Rename
RDP2_2016-12-14::16:35:52.meta.txt	2016-12-14 15:35:56	1017 B	Rename
RDP1_2016-12-14::16:35:22.meta.txt	2016-12-14 15:35:26	1017 B	Rename
RDP1_2016-12-14::16:17:08.meta.txt	2016-12-14 15:17:09	1011 B	Rename
RDP1_2016-12-14::16:17:08.ts	2016-12-14 15:17:08	677.28 kB	Rename
RDP2_2016-12-14::16:08:11.ts	2016-12-14 15:09:15	715.26 MB	Rename

Delete selected
Delete all files

Used: 6.808 GB / 23.12%
Free: 22.64 GB / 76.88%
Total: 29.45 GB

The FLASH option allows a 32 Gbyte flash card to be used for storing recordings and log files from the measurement logger. Log files from the measurement logger, configured using the **Setup — Meas. log** view, are available here. RDP recordings made from the **RDP — Control** view are automatically stored and can be retrieved from here.

PCAP recordings made from the **Ethernet — PCAP** view can also be stored for later retrieval. When a PCAP recording is available, clicking the **Transfer files** button copies it to the persistent storage area.

The probe will generate system information messages when the storage has less than 10 % free memory. When the storage is full, a system error is generated. These are configured in the **Alarms — Alarm setup** view.

The flash storage is shared between the measurement logger and RDP/PCAP recordings. If these features are used in parallel, keep track of the available storage to ensure continuous logging and prevent loss of data.

7.17 About

7.17.1 About — Release info

[Main](#) [Alarms](#) [Multicasts](#) [MW](#) [RDP](#) [Traffic](#) [Ethernet](#) [ETR 290](#) [Content](#) [Setup](#) [Data](#) [About](#)

[Release info](#) [License](#) [Technologies](#) [Credits](#) [System](#)



Product: VB330
Version: 7.0.0-0
Built: Mar 4 2026 12:52:26
HWtype: 100

This view shows the product name, software version, the software build date and the hardware type of the NOMAD.

7.17.2 About — License

Release info **License** Technologies Credits System

Available options

Available	Installed	Option code	Option name	Details
✓	✓	IP-OPT	IP Monitoring and Analysis (50 streams)	i
✓	✓	AEO-OPT	Advanced Ethernet Option	i
✓	✓	ETR290-OPT	ETSI TR 101 290 for Ethernet (50/50 parallel engines)	i
✓	✓	OTT-OPT	OTT Active Testing (50/50 channels)	i
✓		T2MI-OPT	DVB-T2MI Encapsulation Synchronization Monitoring	i
✓	✓	SCTE35-OPT	SCTE35 Signaling Analysis and Logging	i
✓	✓	VB1G2-OPT	Second 1 Gbit Data Interface	i
✓		FLASH32-OPT	Flash Storage (32GB)	i
✓	✓	VB2xxRF-OPT	Additional RF inputs (6/6 inputs)	i

Current license details

Probe status: Permanent
 Hardware key: Verified
 Current license: 0706-5429
 Controller serial: 27-07283485-270124
 Board serial slot 2: 24-07273324-250723
 Board serial slot 3: 2024 Dec 18
 Production date: Ends 2026 Mar 31
 Software maintenance period:

License key

Product license key or software maintenance period key:

 The license has been activated on-line and will be verified periodically.
Note: Changing the feature license key will reboot the probe!

Manage license activation

The current license does not require on-line activation.

If you release the license, you will need to enter the license key again to re-activate it.

The **License** view displays the currently active license. The license includes the available NOMAD options and software maintenance details. By clicking the blue information icon associated with each option it is possible to view option details.

The NOMAD supports two different licensing schemes, on-line activated licenses and classic licenses. When using a classic license, product and software maintenance license keys are tied to the hardware key, in a non-transferable manner. The license is installed once, and can also be exported in XML format from this page. The classic keys can be imported using the **Data — Configuration** view.

When using an on-line activated license, the license key is activated towards a license server. Depending on the license properties, the activation might need to be updated periodically. The **Current license** field will display information on when the license key was last activated and possibly when it needs to be activated again. Click the **Renew** button to immediately renew the license with the license server.

Click the **Release** button to remove the current license, making it available to another host. Please make sure you have the license key available before you do this, as you must enter it again on the system you wish to transfer the license to. If you have lost the license key, contact your dealer to retrieve it. Make sure you include all details from this page in your request.

Please refer to E Appendix: On-line License Activation for more information on how to use on-line activated licenses. This appendix also describes how to renew the license when the NOMAD cannot connect to the Internet.

Please refer to F Appendix: Software Maintenance for more details on software maintenance licenses.

A basic probe may be upgraded to include the ETR 290 option. This can be done on-site by the user when the option has been purchased.

Current license details

Probe status: This shows information about the current status of the license.
Activated indicates a license has been activated successfully, and **Permanent** indicates a non-transferable on-line activated license.
Demo license indicates a time-limited license, and also indicates the time remaining.
Not activated means that the system does not have a valid license; if the status says **Not activated yet**, the system has a valid license but the system time is set incorrectly to a time before the activation. If the status says **activation period has expired**, the system has a valid license, but the activation period has expired, either because the system has not been able to renew the license or because the system time is set to be into the future.
Not covered by software maintenance license is displayed if the installed version is not covered by the maintenance license. The software upgrade procedure usually blocks the installation of such versions.
Please refer to E Appendix: On-line License Activation for more information on how to use on-line activated licenses.

Hardware key: The unique ID used to identify the system. This ID is used to tie the license to the system.

Current license:	If using a classic license key, the license key will be displayed here. When using an on-line activated key, the license status is displayed instead: Verified indicates that the current license was read properly; when using a license that is not permanent, the time the license was last verified against the license activation server is also displayed. Off-line indicates that the current license has not been verified against the license activation server. The message will also include information about when the license activation must be renewed to avoid losing access to the license. Checked indicates that the system does not have an activated license, and includes the time when the status was last checked with the license activation server. Unknown is displayed if the activation status could not be determined, this is often because the system time is configured incorrectly.
Controller serial:	The serial number of the NOMAD.
Production date:	Displays the date when the system was produced.
Software maintenance period:	Displays the end date of software maintenance for the currently attached license. Please refer to F Appendix: Software Maintenance for more details on software maintenance licenses.

7.17.3 About — Technologies

Release info
License
Technologies
Credits



As part of the VBC, the Timeline functionality enables operators to go back and explore, understand, verify and document in complete detail what happened at any given time, or look for patterns over longer periods of time to identify and eliminate problems.



Gold TS Protection makes monitoring for digital services much quicker to set up, and fault-tracking much faster, more accurate and secure. Gold TS Protection includes all the checks specified in the ETR290 standard, but goes much further to include testing for critical conditions missed by ETR290.



External Integration Interface (Eii) is a well defined interface allowing easy integration of Bridgetech probes into a 3rd party network management system (NMS). Measurement data and alarms from the probes can be accessed by the NMS through SNMP traps and/or XML files, enabling development of a customised graphical user interface that could comprise equipment from several manufacturers. The Eii interface is described in a document that is open and available.



Full Service Monitoring (FSM) allows easy validation of any server reachable by the probe via Ethernet. The servers may be probed by either sending an ICMP echo request packet (also known as ping) or performing an HTTP get request. The FSM feature thus allows the operator to verify that vital system components like remote VoD, CA and middleware servers are active, ensuring correct overall system performance. In the event of a server not being reachable, the operator will be notified by an alarm so that the problem may be corrected.

The **Technologies** view lists some of the technologies available in the Sencore VideoBRIDGE product family.

7.17.4 About — Credits

Release info	License	Technologies	Credits	System
Contains software licensed under the GNU General Public License version 2. Please contact your dealer to receive copies of the source code for these parts.				
Contains software licensed under the GNU Lesser General Public License version 2.1.				
Contains software licensed under the Mozilla Public License version 2.0.				
Contains software licensed under the Apache License version 2.0. Contributors: Zhi Li (zli@netflix.com), Todd Goodall (beyondmetis@gmail.com), Zhengxiong Zhang (zhang.zhixiong@gmail.com), Joe Lin (joe.yuchieh.lin@gmail.com), Eddy Wu (chihao.eddy.wu@gmail.com)				
Contains software from the cURL project licensed under the cURL license .				
Contains software from the FFmpeg project licensed under the GNU Lesser General Public License version 2.1.				
This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). OpenSSL is licensed under both the OpenSSL license and original SSLeay license				
Contains software based on the json.hpp library . json.hpp is copyright © 2013-2019 Niels Lohmann.				
Contains the jQuery library from the JS Foundation , licensed under the MIT license . Copyright JS Foundation and other contributors.				
Contains software from the bitStream project, licensed under the MIT license . Copyright © 2010-2011 VideoLAN.				
Contains software from the brunsli project, licensed under the MIT license . Copyright © 2019 Google LLC.				
Contains libebur128, licensed under the MIT license . Copyright © 2011 Jan Kokemüller.				
Contains software from the libpqxx project, licensed under the BSD license . Copyright © 2001-2017 Jeroen T. Vermeulen.				
Contains software from the libpcap project licensed under the BSD license .				

This view shows information about the software included with the NOMAD.

7.17.5 About — System

Release info

License

Technologies

Credits

System

Probe processes

Process	Status	Started	Usr	Sys	Memory
probe.ewe	Running	2024-03-22 16:48:09	5%	0%	100M
probe.sap	Running	2024-03-22 16:48:10	0%	0%	4M
probe.flashserver	Running	2024-03-22 16:47:14	0%	0%	3M
probe.tsoffload	Running	2024-04-21 11:33:28			
probe.linkout	Running	2024-04-21 11:33:28			
demodd	Running	2024-03-22 16:47:12	0%	0%	4M
vb258	Disabled				
backplane	Running	2024-03-22 16:47:11	0%	0%	1M
probe.esyslog	Running	2024-03-22 16:47:14	0%	0%	2M
probe.etr	Running	2024-03-22 16:47:12	0%	0%	55M
probe.relay	Running	2024-03-22 16:47:12	0%	0%	81M
probe.ana	Running	2024-03-22 16:47:12	1%	0%	27M
probe.psi	Running	2024-03-22 16:47:12	0%	0%	5M
probe.vidana	Running	2024-03-22 16:47:12	123%	13%	125M (+2M)
probe.capture	Running	2024-03-22 16:47:12	0%	0%	4M
probe.ott	Running	2024-03-22 16:48:10	31%	13%	14M
probe.microbitr	Running	2024-03-22 16:47:12	0%	0%	5M
probe.srtrx	Running	2024-03-22 16:47:12	0%	0%	6M
nginx	Running	2024-03-22 16:48:03	0%	0%	6M
scgi-wrapper	Running	2024-03-22 16:47:12	0%	0%	2M
lldpd	Running	2024-03-22 16:48:03	0%	0%	2M

Disk status

RAM Disk: 88% free (896M)

Configuration: 94% free (8M)

Flash Alarms: 99% free (32M)

SD storage: 99% free (29G)

Server response time

Static request: 57ms

Redo

Jittery values may be caused by browser overhead, network latency or heavy load

Links

[Debug...](#)

[System status \(XML\)...](#)

The **System** view displays a snapshot of the current status of the system, to ensure correct NOMAD operation.

The **Probe processes** overview displays the NOMAD services that are required. All the NOMAD services listed should have status *Running* or *Disabled* if the corresponding feature is not licensed or available. The current CPU and memory usage is also displayed.

Disk status displays free disk space to give the user some overview of disk resources available.

Server response time is determined upon entering the **System** view. When the **Redo** button is clicked, a new request is sent to the web server.

Clicking the **Debug...** link allows the user to generate a document containing debug information that may be useful if NOMAD misbehavior is reported. This file should be sent along with a description of the misbehavior.

Clicking the **System status (XML)...** link generates an XML document with a short description of the system status.

A Appendix: NOMAD Versus VBC Alarms

Please note that Eii and support for the VBC is not enabled for NOMAD probes by default. Enabling external integration for the NOMAD probe requires the Eii optional license. Please refer to the **About — License** view from NOMAD’s Web UI to check the license availability.

The NOMAD alarms are independent of the VideoBRIDGE Controller alarms. The NOMAD has been designed to yield instantaneous alarms based on the current measurements. This typically results in lots of short-lived alarms that would be “too much” for the VBC to report, as the VBC may control a large number of NOMADs. The VBC therefore generates alarms based on error-second statistics gathered from NOMADs during a selectable time period (default 60 minutes – sliding window).

Some the VBC alarms map to only one probe alarm type. Other the VBC alarms map to several probe or VB7880 Advanced Content Extractor alarms. As an example, the VBC alarm ETR pri one error does alarming for the following probe alarms:

- TS sync
- Sync byte
- PAT
- Continuity
- PMT
- Missing PID

The VBC GUI has functionality for searching for all NOMAD alarms that have corresponding VBC alarms. This makes it easier to find the cause of an VBC alarm.

Ethernet measurement data are sent from the NOMAD together with Ethernet error-second threshold values (as set in the NOMAD **Setup — VBC thresh.** view). The VBC monitors the error seconds for each parameter and will raise an alarm provided that the error-seconds figure exceeds the threshold value, as monitored during the windowing period.

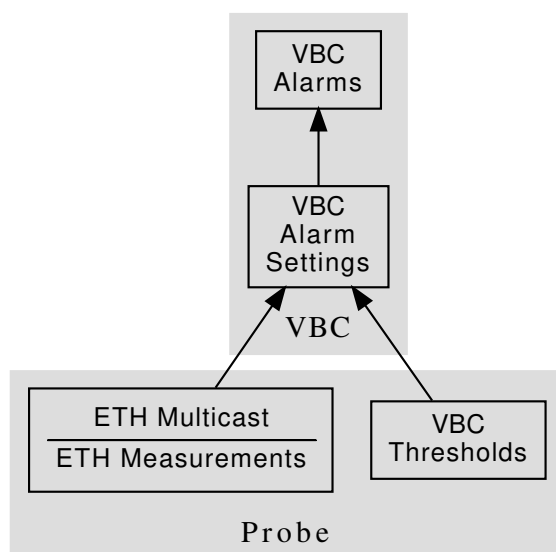


Figure A.1: VBC alarming based on NOMAD measurements

B Appendix: Monitoring Practices

This Appendix summarizes a few useful monitoring practices.

B.1 RTP Monitoring

When running video inside an RTP wrapper it is possible to exactly deduce the number of dropped IP frames due to network issues. This is possible as a result of the 16-bit sequence counter inside the RTP header. When the protocol mapping is nTS/RTP the RTP parameters **RTPdrop**, **RTPdup**, **RTPooo** and **RTPlag** will be updated and the corresponding alarms **Packet drops:N**, **Duplicate packets:N** and **Out of order packets(lag:N)** are fired (if not switched off).

Note that the probe will perform out-of-order corrections before RTP packet loss analysis is performed.

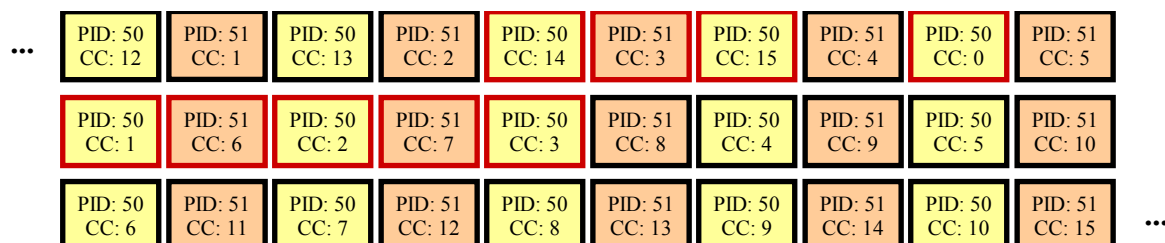
Example of RTP sequences and their effects on monitoring:

Sequence	Effect
..., 10, 11, 12, 13, 14, 17, 18, 19, ... 2 dropped packets (15-16)	Monitoring page: RTPdrop:+2 Alarms & events: RTP Packet drop: 2
..., 10, 12, 13, 16, 17, 18, 19, ... 1 and 2 dropped packets (11, 14-15)	Monitoring page: RTPdrop:+3 Alarms & events: RTP Packet drop: 3
..., 10, 11, 15, 12, 14, 16, 18, 19, ... 2 dropped packets (13, 17) 1 out of order packets of order 3 (15 → 12)	Monitoring page: RTPdrop:+2 Monitoring page: RTPooo:+1 Monitoring page: RTPlag: 3 (at least) Alarms & events: RTP Packet drops: 2 Alarms & events: RTP out of order packets (lag:3)

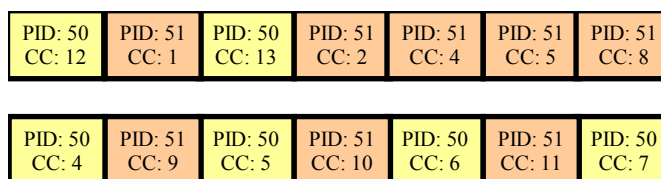
B.2 Default Multicast Monitoring

When the protocol mapping is nTS/UDP, meaning there is no RTP information in the multicast stream, there is no easy way to isolate and register network-induced errors. Assumptions can be done by performing continuity counter analysis for the content of each received UDP-frame on the fly. The probe will note CC-errors (**CCerr**) and generate corresponding alarms (**CC skips:N**).

Imagine the following MPEG-2 Transport Stream being generated by an encoder. The TS contains two PIDs (50 and 51) and the Continuity Counter (CC) values are continuous for each PID since there are no packets missing.



When the Transport Stream reaches our imaginary head-end some packets (those with red frame) have been lost (maybe due to a bad satellite connection). Our IP-Streamer packs 7 and 7 MPEG-2 TS packets into each UDP-frame (mapping is 7TS/UDP) and the resulting frames may look like:



...

The probe's response to this multicast is summarized in the following table:

Sequence	Effect
UDP packet #1 (7 MPEG2 TS packets): PID 50: 12, 13, 14, 15 PID 51: 1, 2, 4, 5, 8 PID 51 has 2 CC discontinuities of 2 (2 → 4) and 3 (5 → 8)	Monitoring page: CCerr:+2
UDP packet #2 (7 MPEG2 TS packets): PID 50: 4, 5, 6, 7 PID 51: 9, 10, 11 PID 50 has 1 CC discontinuity of 6 (13 → 4)	Monitoring page: CCerr:+1
If no more CC-errors for at least 1 second	Alarms & events: CC skips:9 discontinuities:3 Depending on the thresholds you may also get: MLR >= warning-threshold (9 >= 1)

There were 9 TS packets missing (with red frame) and the alarm reflects this.

B.3 Strategy for MediaWindow Analysis

This section provides further insight into MediaWindow analysis and suggests how the Ethernet threshold settings can be configured to maximize the usefulness of the MediaWindow graphs and alarms.

The MLR value is always calculated using the continuity counter inside the transport stream packets. Since the continuity counter is expected to increase by one for each packet of the same PID it is possible to detect missing TS packets by noting gaps in the continuity counters. Knowing that there are usually 7 transport stream packets inside one UDP packet you expect a continuity counter error of 7 if one UDP packet goes missing. This corresponds to an MLR value of 7. The range of the continuity counter is 4 bits meaning that if you are unlucky and lose exactly 16 packets for the same PID you will not be able to detect the packet loss at all. Losing 16 or more packets of the same PID is very rare and will only happen in networks with plenty of obvious problems.

Not all PIDs carry continuity counters. The null packets (PID 8191) and PIDs carrying PCR (program clock reference) do not carry continuity counters. This is the reason why losing one UDP packet does not necessarily result in an MLR of 7 but maybe 6 or even 5 (assuming the mapping is 7TS/UDP).

Systems typically do not mix the mappings among their streams so there is seldom a need to remember the mapping for streams in order to interpret the exact impact of MLR values.

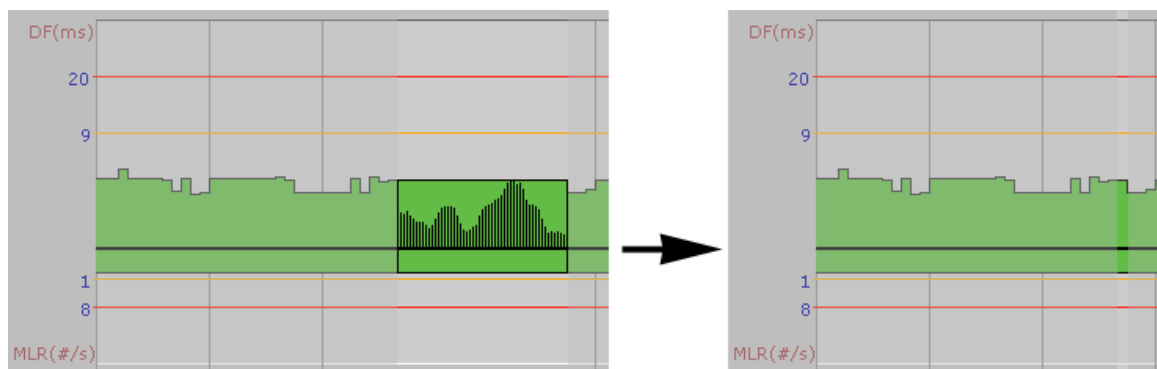
The range of the MediaWindow graphs can be configured by the user. Even when the graph is updated in “real-time” each bar in the graph will represent a large number of elementary measurements. For a 5Mbit/s stream there will be approximately 500 elementary measurements per second, assuming a mapping of 7 TS packets into each UDP-frame (i.e. there are approximately 500 UDP packets per second). An elementary measurement is generated for each interval between two neighboring UDP frames.

Within each update-interval only the extreme IAT and MLR values are displayed in the graph. For IAT the peak inter-arrival time over the measurement period represents the IAT for that period. For MLR the highest loss ratio within any second represents the MLR for that period.

When the range of the graph is set to larger intervals, even more elementary measurements are merged for each bar-interval.

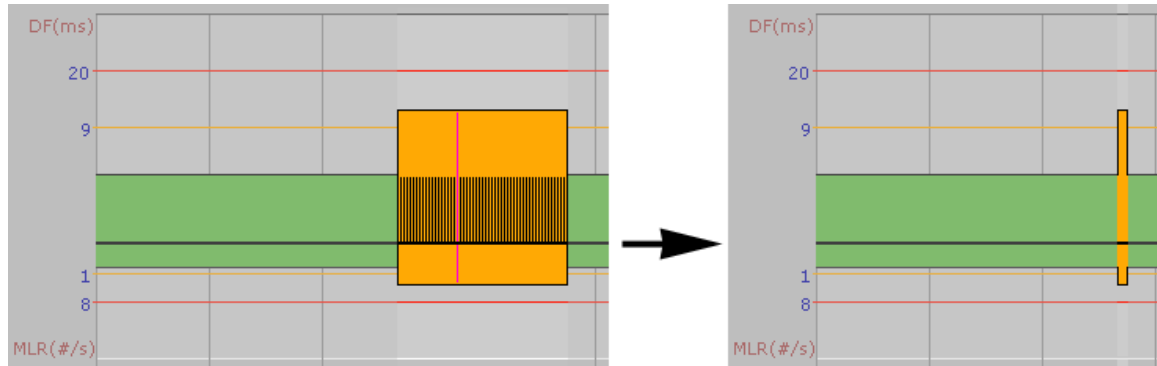
The rest of this discussion assumes the MediaWindow graph range is set to “running” since that lowers the probability that more packet losses occurred inside the same bar-interval.

The following figure shows how a large number of elementary measurements are represented by one bar in the graph.

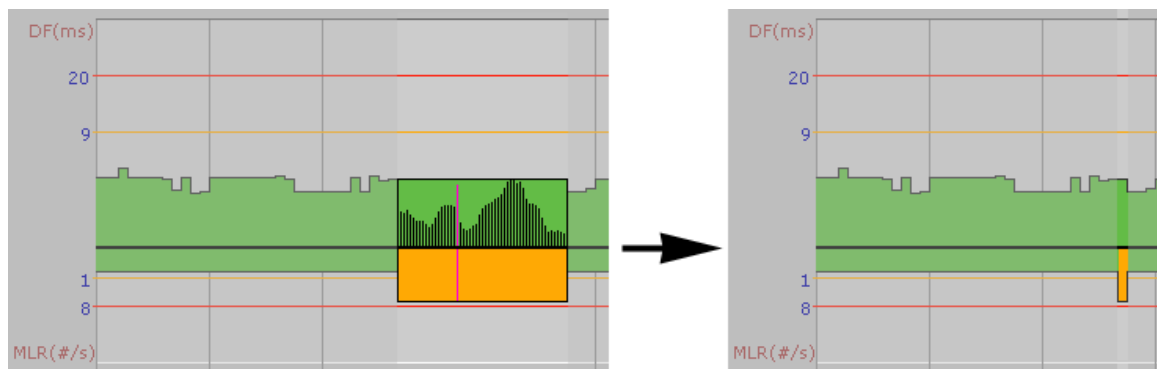


B.3.1 IAT Before and After Router

Packet-loss that occurs before or inside a router will usually not be visible since the queuing mechanism at the outgoing interface of the router will send out packets in an orderly fashion. If however the packet-loss did occur after the router (due to line noise for example) thus affect the timing between two neighboring packets – effectively doubling it – the packet loss will always affect the IAT component for CBR streams. For VBR streams, that are jittery by default, the extra time gap may have no effect since there may already be other larger gaps within the MediaWindow interval.



If a UDP packet goes missing after it has left the router it will visually affect both the IAT and MLR for CBR streams. The pink line represents one elementary measurement.

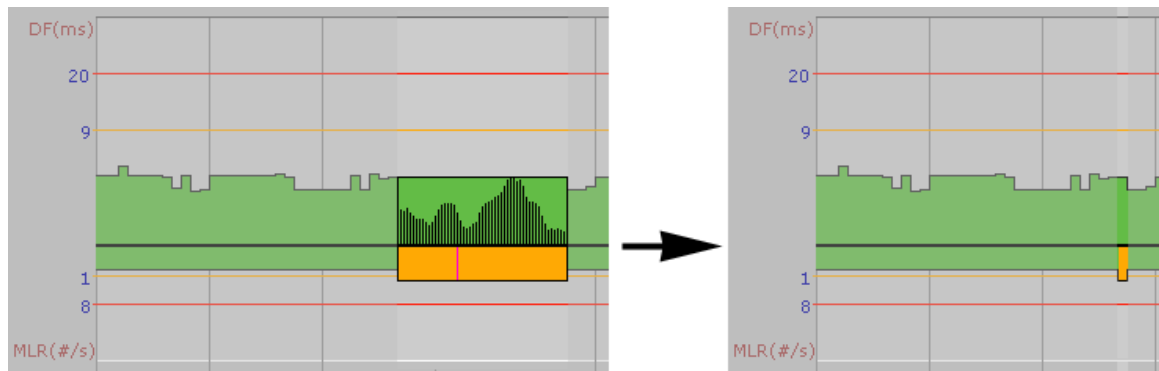


For VBR streams a similar packet-loss will not necessarily affect the IAT graph even if the time between two neighboring packets doubles. The pink line represents the IAT and MLR value measured for the missing packet.

B.3.2 Identifying UDP Packet Loss

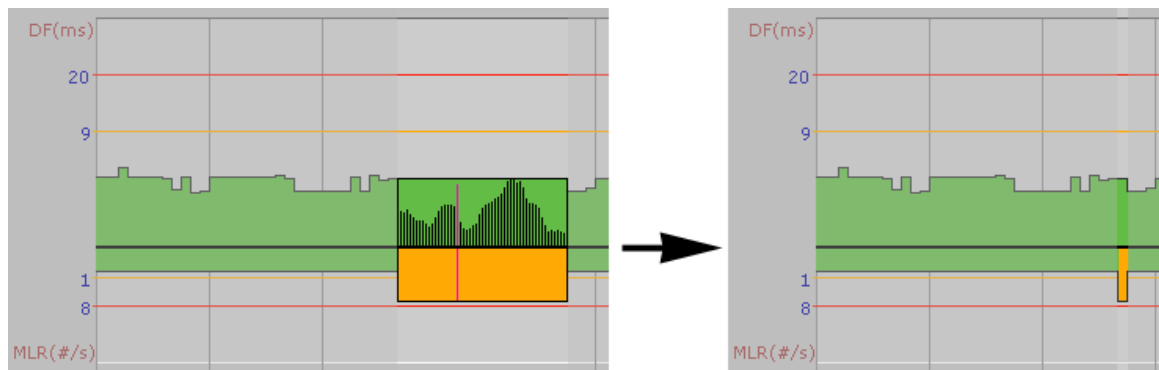
This discussion does not apply to streams with TS/RTP mapping since in that case identifying UDP packet loss is straight forward.

There is no fail-safe way to distinguish packet loss caused by dropping UDP packets from packet loss caused by dropping packets inside the TS layer. IP based networks will generally not introduce new errors in the TS layer. As soon as the TS layer is wrapped inside UDP packets all further processing operates on the UDP packets.



The pink line indicates a packet loss of 1-4 with no jitter component.

As a rule of thumb, the co-existence of small MLR readings (1-4) and no IAT readings can be assumed to have been caused by packet loss in the original TS data.



The pink line indicates a packet loss of 6 or 7 and a doubling of the jitter component.

A UDP packet-drop will usually show up in the MLR value as a multiple of the mapping value; for a mapping value of 7 TS packets into each UDP packet, the MLR component will be equal to 7, 14, 21 etc.

Slightly lower values such as 6, 13, and 20 can be expected if a missing UDP packet did contain one TS packet without continuity counter (i.e. a PCR packet with no payload).

As we have seen, there is no sure way to distinguish between UDP packet-loss and loss in the underlying TS packets. One way to deal with the situation is to have a probe doing zero readings close to the signal source before the network can introduce UDP packet loss.

B.4 Multicast Thresholds

It is useful to configure individual threshold settings for IAT for each stream unless they are fixed at the same bit-rate. Streams that are being monitored by several probes should have equal Ethernet thresholds configured on each probe to make it easy to compare measurements for a stream across several probes.

As a rule of thumb the IAT warning threshold could be set to 50% above the max IAT value observed over a considerable period of time, the last 24h or so. The IAT error threshold could be set a little below the maximum jitter the system can tolerate – usually limited by the STB jitter tolerance. STB manufacturers should be able to provide information about how much jitter they can handle. Setting the Ethernet warning-threshold too high results in a graph where almost all plots are close to the x-axis and it becomes less useful to visually compare MediaWindow graphs.

For streams with TS/UDP mapping the default MLR threshold is set so that errors are reported if the number of CC errors exceeds the number of TS packets in one UDP frame (assumed to be 7).

B.5 Content Thresholds

When enabling the various content analysis options in the **Content — Content thresh.**, a processing overhead is introduced. Some of the options introduce a relatively small performance overhead, whereas some may introduce a greater overhead. The overhead is also relative to the data that is being analyzed, performing picture analysis is heavier on a 4K UHD video stream than on an SD stream.

The **Main — CPU usage** view contains a **Backlog** column that indicate the length of the content analysis queue for each of CPU core. As long as the backlog value is stable, the system should have enough resources to handle the configured load. If the value keeps increasing, try disabling content analysis for a few streams, or filter away PIDs that do not need to be analyzed in the content threshold.

The NOMAD will raise a *Content analysis overloaded* system alarm if it detects that it is unable to keep up with the configured load. Try to reduce the load, as described above.

If the load on the content analysis process becomes extremely high, it might start to drop incoming data that it is unable to process. If this happens, the NOMAD will raise a *Data queue overflow (btvidana) – Thumbnailing and freeze-frame analysis paused, SCTE35 data may be lost* system alarm.

B.6 Dedicated interface for OTT

As a rule of thumb, you should never have OTT traffic on the same network as multicasts. This means that you should either use one NOMAD for multicast and one for OTT, or you should use different and dedicated interfaces for each.

The interface used for OTT traffic is controlled using the **Setup — Routing** view.

B.7 Monitoring HTTP Live Streaming (HLS)

In HLS, each profile is identified by its own playlist, whose URL is listed in the master playlist, which in turn is downloaded from the **Manifest URL** as configured in the channel configuration in the **OTT – Channels** view.

By default, the OTT profiles are identified by their URL. Some streaming systems generate profile URLs based on a session ID, and in some cases these session IDs are re-generated every time the master manifest is downloaded. In these cases, the OTT engine will see all profiles as new every round and is unable to retain any profile history. If this happens once, the event *All playlist URLs changed* is flagged, and if it happens repeatedly, the alarm *HLS playlist URLs unstable* will be raised on the channel.

In both cases, the recommendation is to enable the setting **Monitor HLS profile manifests only**. This will keep the downloaded master manifest in memory until the session times out (as indicated by the playlist URLs becoming unavailable), and will also change the way profiles are identified to instead use their position in the master manifest.

To avoid unwanted alarms about the session timing out, and gaps in the monitoring, set the **Reset connection after** timeout value in the **OTT — Settings** view to a value shorter than the session timeout.

B.8 Monitoring RTMP and SHOUTcast

For RTMP and SHOUTcast, data is transmitted in real-time. To allow time for analysis, the NOMAD downloads data in chunks of ten seconds and then stops, which means that it cannot continuously monitor streams of these types. Since network access blocks the OTT engine, channels of these types should be assigned their own engine or at least not be mixed with channels of other types.

B.9 OTT descrambling with Verimatrix

If you are using a Verimatrix VCAS 3.7 server to encrypt your OTT stream, you can get the NOMAD to descramble the segments. It will use the same API to descramble the segments, as the encoder or segmenter uses to encrypt the segments. To achieve this, the NOMAD needs to be able to reach the VCAS server's private encoder interface.

Since the NOMAD only uses a single interface for OTT, your network needs to be configured so that the NOMAD can reach both the VCAS server and your origin server on the same interface.

B.10 OTT Bandwidth requirements

The recommended available bandwidth for full coverage OTT monitoring is equal to the sum of the profile bitrates monitored plus an estimated overhead of 20 % for manifests and IP, TCP and HTTP headers.

Note: The OTT engines will be using all available bandwidth on the interface in spikes while downloading the segments, this is the main reason why it is not a good idea to mix multicasts on the same interface, as it can cause packet drops which multicasts cannot handle.

C Appendix: OTT Profile Health

C.1 OTT Profile Health Bar

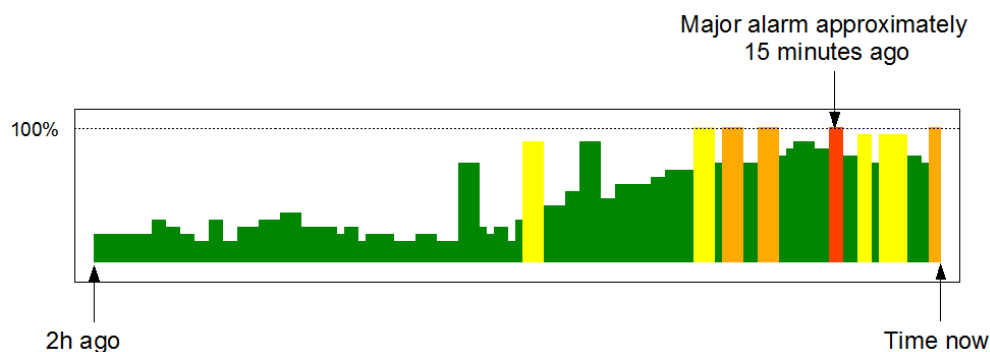


The profile health bar displayed at channel level shows an overview of current status for individual channel profiles. Different colors indicate status:

- Green: OK
- Yellow: Warning
- Orange: Error
- Red: Major
- Black/Dark red: Fatal

All enabled alarms may affect the profile health bar, and alarm severities can be assigned to each alarm in the **Alarms — Alarm setup** view.

C.2 OTT Profile Health Timeline



The OTT profile health timeline shows information about channel bitrate and channel alarm status for the last two hours, with a time resolution of one minute. Green parts of the timeline indicate profile download time versus segment length. The graph is scaled so that 100% indicates a segment download time identical to segment length (in seconds), segment length being signaled in the profile

manifest. Quick segment download times therefore result in a 'low' green graph, as seen in the left hand part of the graph above. When download times exceed the user-defined profile bitrate warning and error thresholds the graph is colored yellow and orange respectively.

In addition to profile bitrate indication the graph displays profile status information related to non-bitrate alarms. Active profile alarms are represented in the graph as 100% bars, the color reflecting the severity of the alarm. If several alarms are active within a one minute period the graph color will reflect the most severe alarm. Historical alarms can be examined in more detail by viewing the OTT alarm list.

D Appendix: SRT Streams

D.1 Introduction

D.1.1 Overview

SRT is a user-level transport protocol that ensures *secure, reliable transport* of video and audio across multiple unstable network connections. With the UDP data transfer protocol at its base, SRT introduces several enhancements such as end-to-end encrypted data packets (using AES), improved congestion control and efficient packet loss recovery.

D.1.2 Reception

The probe currently supports receiving up to 4 concurrent SRT streams. SRT reception is configured by editing a stream in the **Multicasts — Streams** Edit view and providing the necessary SRT parameters. In this manner the received SRT stream is turned into a stream for TS monitoring. More details are provided in section 7.4.8.

The probe can use the SRT protocol to receive streams in three modes of operation:

- **Caller**: the probe sends the connection request to the peer, which must be listener, and this way it initiates the connection.
- **Listener**: the probe waits to be contacted by any peer caller.
- **Rendezvous**: both parties are equivalent and both the probe and the peer attempt to initiate a connection simultaneously. Whichever party happens to start first (or succeeds in punching through the firewall first) is considered to have initiated the connection.

When using the probe in **Listener** mode it is mandatory to specify:

- **Port**: local port to listen for connections on

The **Host** field is ignored in **Listener** mode.

When using the probe in **Caller** or **Rendezvous** mode it is mandatory to specify:

- **Host**: remote IP address to connect to
- **Port**: remote port to connect to

All modes of operation may be encrypted and therefore accept a passphrase to decrypt the stream.

In all modes of operation the probe utilizes the network interface the stream is “joined” on, specified in the **General** tab in the **Multicasts — Streams** Edit view.

D.1.3 Transmission

The probe supports relaying up to two streams using **RDP (Return Data Path)**, and these may be transmitted using the SRT protocol. SRT transmission is configured in the **RDP — Setup** view.

When mode *Relay over IP* is selected, *Encapsulation* can be set to *SRT*.

Encapsulation can be set to *SRT* when the *Relay over IP* mode is selected. It is then possible to specify these SRT Transmit options:

- Mode: The SRT mode of operation utilized to transmit.
- Passphrase: passphrase to encrypt the forwarded stream. Must be between 10 and 79 characters long.
- The latency value insisted upon by the sender side as a minimum value for the receiver. Minimum 120ms.

The probe can use the SRT protocol to transmit streams in three modes of operation:

- Caller: the probe sends the connection request to the peer, which must be listener, and this way it initiates the connection.
- Listener: the probe waits to be contacted by any peer caller.
- Rendezvous: both parties are equivalent and both the probe and the peer attempt to initiate a connection simultaneously. Whichever party happens to start first (or succeeds in punching through the firewall first) is considered to have initiated the connection.

In all modes of operation the probe utilizes the network interface the stream is “relayed” over, specified by the *Relay via interface* configuration option in the RDP Setup page.

The current version of the SRT implementation is based on version 1.4 of the Haivision reference implementation.

E Appendix: On-line License Activation

E.1 Introduction

The NOMAD uses licenses which are activated and updated periodically over the Internet, without the need for human intervention.

When the NOMAD sends the on-license activation over the Internet, it includes some basic information to verify the NOMAD. This includes a basic hardware footprint, as well as parts of the SNMP identification data configured in the **Setup — Params** view.

E.2 Requirements

The NOMAD needs to be able to contact the license server either directly or via a proxy server, as described below. If proxy connectivity also is not available, an off-line activation procedure is available as well.

The NOMAD must also be configured with a correct date and time. Time synchronization is configured in the **Setup — Params** view. If time synchronization is not possible, set the time manually using the **Setup — Time** view.

Direct access to activation server

To activate the license automatically, the NOMAD needs to be configured with a valid DNS server address in the **Setup — Ethernet** view, which is able to look up the host name `license.microanalytics.org`. The NOMAD needs to be able to contact the host this name resolves to using HTTPS on port 443.

Using the VBC server as a proxy

When installing the VBC software to a server, a proxy is automatically configured to allow its connected blades to connect to (and only to) the licensing system as described in the previous section.

When the NOMAD has been configured with the address to the VBC server in the **Setup — Routing** view, the NOMAD will automatically attempt to use this proxy if a direct connection fails.

Using an arbitrary proxy server

The NOMAD can be configured to use an arbitrary proxy server to connect to the licensing server. By adding the URL to a proxy server in the **Setup — Security — Ports** view, the NOMAD will automatically attempt to use this proxy if a direct connection fails.

Off-line activation procedure

If the NOMAD network is completely disconnected from the Internet, it is still possible to activate the license using the off-line activation procedure. The off-line activation procedure needs to be repeated whenever there is a need to have the license feature set upgraded, or when the software maintenance license needs to be extended, typically in connection with software upgrades across major versions.

Click the **Renew license off-line** button to start the off-line activation procedure.

Renew license off-line

Perform the following steps to renew the license:

1. Please verify that the system time is set correctly (time is now 2020-11-02 14:37:30 UTC).
2. [Download the license request document to your computer.](https://license.microanalytics.org/offline)
3. Upload the license request document to the license activation interface by visiting <https://license.microanalytics.org/offline>
4. Upload the license document received from the license activation interface:

Välj fil
Ingen fil har valts

Go!

Please note: If the system is restarted prior to completing step 4, you must start over from step 2.

License details

Follow the steps described in the dialog to renew or activate the license. To abort the procedure, click the **License details** button to return to the previous screen.

First, download the license request document from the NOMAD to the computer you are browsing from. Once the file has been downloaded, connect the computer to the Internet if not already connected, and open the link to the off-line license manager¹.

Activate license

Please upload the license request document (.bin) here:

Choose File
No file chosen

If you are activating a new system and need to claim a license, enter the license key here:

License key to claim, if any

Leave empty to renew an existing or pre-allocated license.

Request license

¹<https://license.microanalytics.org/offline>

Select the `.bin` file that was downloaded in the first step, and optionally add a license key if the system you are activating did not already have a license attached. Once done, click the **Request license** button and save the license document file to the computer.

If needed, re-connect to the NOMAD network, return to the **Renew license off-line** view, select the `.pem` file that was generated by the license manager and press **Go!**

The license should now be added to the system. If this is a new or different license, the NOMAD will reboot. Use the **License details** view to verify that the license was applied correctly.

F Appendix: Software Maintenance

Purchasing yearly software maintenance enables future feature protection and guarantees access to the latest software for the NOMAD.

The software maintenance can be purchased for a two or four year period, typically initially purchased together with the system itself, during which new major releases can be installed.

The current software maintenance period is displayed in the **About — License** view, see chapter 7.17.2 for more details. For an overview of software maintenance periods for multiple units, please refer to the **Equipment** view on the VideoBRIDGE Controller server.

Use the **Data — Software** view to update the NOMAD software, please refer to chapter 7.16.2.

G Appendix: Software Upload

The process of performing a software upload to the probe involves the following steps:

1. Obtain the software image.
2. Export and save the probe configuration.
3. Delete any existing probe stream recordings.
4. Transfer the image to the probe using the software upload functionality in the **Data — Software** view or by using ftp, and save the image to flash.
5. Wait while the software is being saved.
6. Verify the new image.

G.1 Obtain the software image

The image will have a **.tea** extension and is distributed in a compressed ZIP archive together with the readme file detailing changes for this patch release.

Please study the **readme** file to be aware of any important information related to your current software patch. Subsequent patch details may indicate that significant bugs were identified and resolved after your current version and indicate where special care is recommended.

You can find the current version number under **About — Release**.

When upgrading to a new major version, please also study the release notes and **readme** files for all versions between your currently installed major version and the one you are upgrading to, as there might be important changes that you need to be aware of.

If you require any assistance understanding the release notes or readme files please contact your first line support service.

For information on how to update a probe running hardware revisions 1–3, please refer to the User's Manual for the corresponding software release.

G.2 Export and save the probe configuration

Software upgrade should not alter the probe configuration, however for safety is is a good idea to export the probe configuration (from the **Data — Configuration** view) and save it to a file. Please refer to chapter 7.16.1.

G.3 Delete any existing probe stream recordings

If any stream recordings is stored on the probe, this may prevent software upgrade, as there might not be enough internal disk space available for the software image upload to be possible. Therefore delete any recordings prior to software upload – this is done in the **RDP — Control** view.

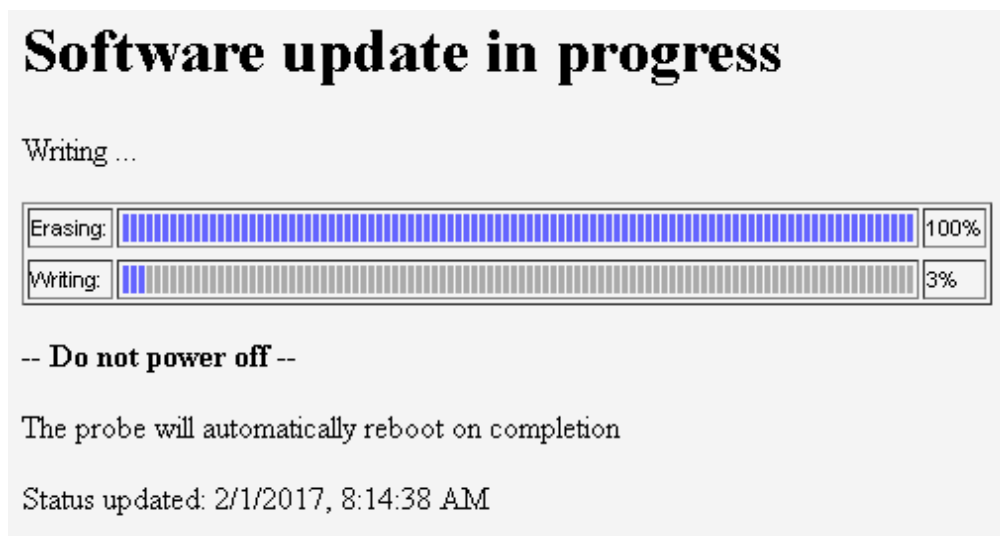
G.4 Transfer the image to the probe and save to flash

Using the software upload functionality in the Data view

From the **Data — Software** view select the software image file to be uploaded and click the **Go!** button. When the software has been successfully transferred to the probe click the **Save flash** button and confirm.



Progress bars are displayed to show the flash save status.



Note that the probe will reboot when the new software is successfully stored in flash, and the probe will be unresponsive until reboot has completed.

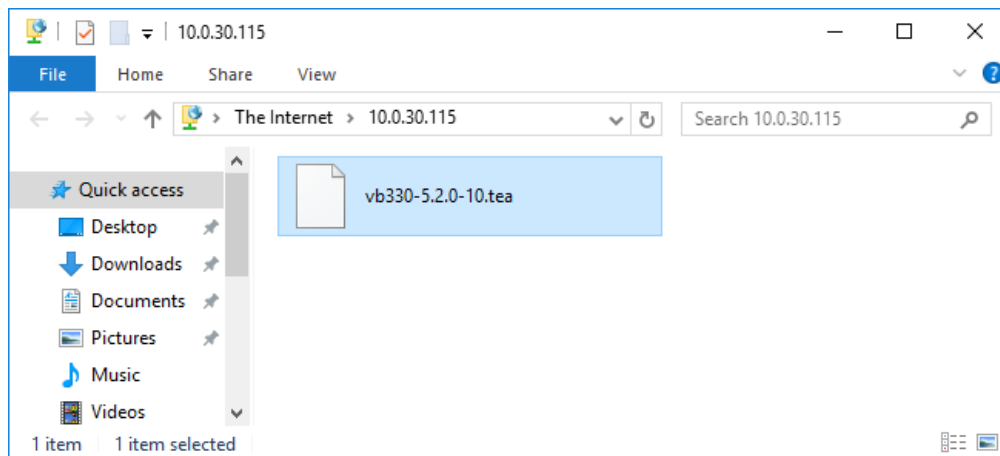
Using ftp and telnet/ssh

This method is only available if the corresponding services have been enabled in the **Setup — Security — Ports** view. The *ftp* service is needed for the file transfer, and either *telnet* or *ssh* for remote login.

Step 1, alternative A: Using Windows Explorer

Open a Windows Explorer window. Click the address field and type `ftp://10.0.20.101` (replace 10.0.20.101 with the probe's IP address) and hit **Enter**. When asked to log in, enter the User name **admin** and password **elvis** in all lower-case letters (this password can be changed in the **Setup — Security — Password** view).

Then drag the software image onto the empty Windows Explorer window. It may be necessary to retype the string including user and password, as described above. When the file has been copied onto the probe the Windows Explorer window may look as shown below.



Step 1, alternative B: Using a terminal based ftp client

In a terminal window type the following commands, replacing the software image name with the relevant one (the path to the folder in which the software is located should be specified): When asked to log in, enter the User name **admin** and password **elvis** in all lower-case letters (this password can be changed in the **Setup — Security — Password** view).

```
ftp 10.0.20.101
Connected to 10.0.20.101.
220 bftpd 4.4 at 10.0.20.101 ready.
503 USER expected.
User (10.0.20.101:(none)): admin
331 Password please.
Password: elvis
```

```
230 User logged in.  
ftp> binary  
200 Transfer type changed to BINARY  
ftp> put vb330-5.2.0-10.tea  
...  
ftp> bye
```

Step 2: Initiate the save to flash using telnet, ssh or USB cable

The image, which is now stored on the probe's RAM-disk, needs to be saved to flash.

In a terminal window type these commands, replacing the IP address with the relevant one (note that the password will not be visible on the screen):

```
telnet 10.0.20.101  
gbprobe login: save_flash  
password: save_flash
```

You can also use an Secure Shell (ssh) client, such as PuTTY¹, or connect directly using a USB cable as explained in section 4.4.3. Log in using the same user-name and password as mentioned for the Telnet option above.

G.5 Wait while the software is being saved

This will take 6–15 minutes. The probe will then reboot automatically. The probe should state that the software image has been saved successfully.

When using the alternate method do not disconnect the telnet, ssh or USB session before the software upgrade is completed.

Note that if the probe is powered off while saving image to flash it will not be able to reboot normally afterwards.

G.6 Verify the new image

Connect a browser towards the probe and verify the version and build time in the **About — Release info** view.

¹<https://www.chiark.greenend.org.uk/~sgtatham/putty/>

G.7 Software upload troubleshooting

If the upgrade is rejected, verify that the software version you are trying to upload is covered by software maintenance. Refer to F Appendix: Software Maintenance for more details.

Probes that are unable to execute the user program (usually caused by interrupting the save-to-flash process described above) can still be upgraded. Contact Sencore for details.

If the web interface does not appear to work correctly straight after upgrading the probe it may be because the web browser is using files that are cached. Files may be cached for up to one hour in the web browser. To fix the issue, clear the cache manually:

Google Chrome: Settings — Privacy and security — Delete browsing data — Cached images and files

Mozilla Firefox: Settings — Privacy & Security — Cookies and Site Data — Clear Data — Temporary cached files and pages

Microsoft Edge: Settings — Privacy, search and services — Clear browsing data — Choose what to clear — Cached images and files

Note that the probe configuration may be lost when downgrading to an older software version. In this case the saved configuration file may be useful.

H Appendix: Restoring NOMAD factory defaults

It is possible to reset the probe to factory settings, erasing most information about the probe configuration and alarm history. For convenience, the network configuration is kept.

Also note that the unit license key should be noted and stored before the factory reset is performed, as it might be reset by the factory reset process. The license key is found in the **About — License** view of the probe, please refer to section 7.17.2. The license key is also printed during the factory reset process.

To perform a factory reset of the probe, connect to it using the USB cable using the method described in section 4.4.3. Instead of logging in as **admin**, log in with the user name **reset_factory** and the password **reset_factory**. This will start the factory reset process. Do not close the terminal window during the reset process. It is also possible to connect using telnet or ssh, if the corresponding setting has been enabled in the **Setup — Security — Ports** view. Remote factory reset is by default disabled.

When regular web connection is established, verify that the license key is present in the **About — License** view of the probe GUI. If it is not, type or paste it in the license key field and click the Submit button.

I Appendix: SFN drift measurements

I.1 Overview

Different measurement scenarios for DVB-T SFN:

1. Measuring on TS after SFN Adapter but before Exciter (typically ASI or SAT)
2. Measuring on TS after SFN Adapter and after Exciter (typically DVB-T COFDM)

Different measurement scenarios for DVB-T2 SFN:

1. Measuring on TS after T2MI generator and before Exciter (typically ASI or SAT)
2. Measuring on TS after T2MI generator and after Exciter (typically DVB-T2 COFDM)

Observe:

- For DVB-T all the timing information is embedded inside the TS itself via the MIP packet (if passed). This means timing parameters can be calculated fully with only a 1PPS GPS source present and the TS itself.
- For DVB-T2 this is not the case since there is typically no MIP transmitted. Instead the timing information resides partly inside the T2MI structure and in the TS itself. So in order to perform timing measurements the NOMAD needs access to the T2MI stream and the resulting TS, as well as a valid 1PPS GPS signal.

Descriptions further in this document are relevant to probe software version v6.5.

I.2 DVB-T

The following SFN timing related parameters is calculated given a good 1PPS GPS reference applied to either the NOMAD port or one of the 1PPS ports on the VB252 or VB258 RF input modules and a valid TS input carrying a MIP:

- SFN drift
- SFN drift slew rate
- SFN network delay

- SFN zero offset

If we first consider the measurement scenario #2 for DVB-T as defined above which is the most common. Then **SFN drift** is the transmission delay of the signal from the output of the RF transmitter antenna through to the output of the demodulator chip inside the NOMAD unit.

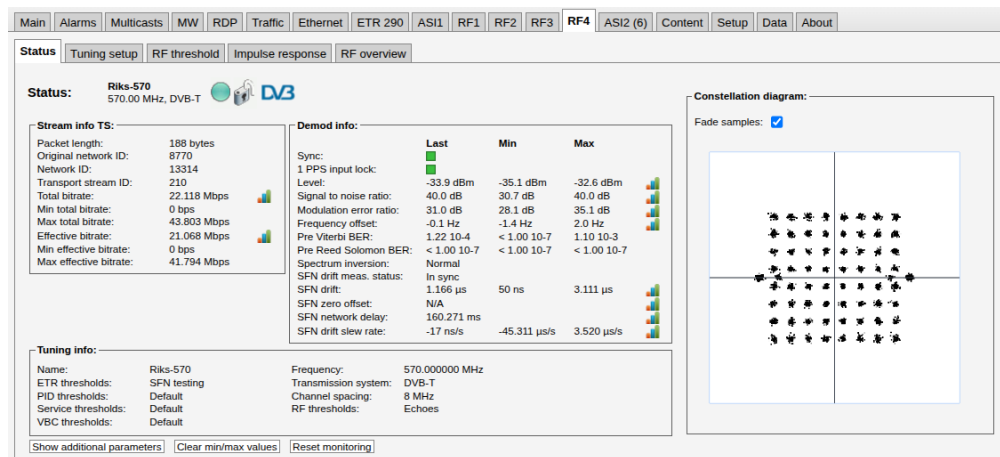
This number will be made up of an over-the-air transmit time component (typically tens of microseconds) and a demodulator delay component inside the NOMAD (typically in the tens of milliseconds). In addition, the number presented in the GUI can be adjusted by the user by adding an offset compensation set in the ETR290 threshold template. In the screenshot below offset calibration has been done to bring the value of SFN drift down into a value that varies between zero so as better to pick up on variation trends over time.

From a computational point of view. SFN drift is arrived at first by timestamping (relative to a locked 1PPS GPS clock) the reception of the beginning of each megafame at the TS layer after demodulation in the NOMAD. We call this timestamp the **Actual** time (a). Then we subtract from this timestamp an **Ideal** (i) timestamp, which is signalled inside the MIP and referred to as the Synchronization Timestamp (STS) in the specifications. The STS is the point in time at which each exciter in the SFN constellation is dictated to start the transmission of the megafame. **Actual** will be larger than **Ideal** in this particular measurement scenario because the NOMAD is analyzing the TS signal after it has been through the exciter, antenna, over-the-air and finally the demodulator inside the RF front-end of the NOMAD. This will not be the case if we measure before the exciter. More on this later.

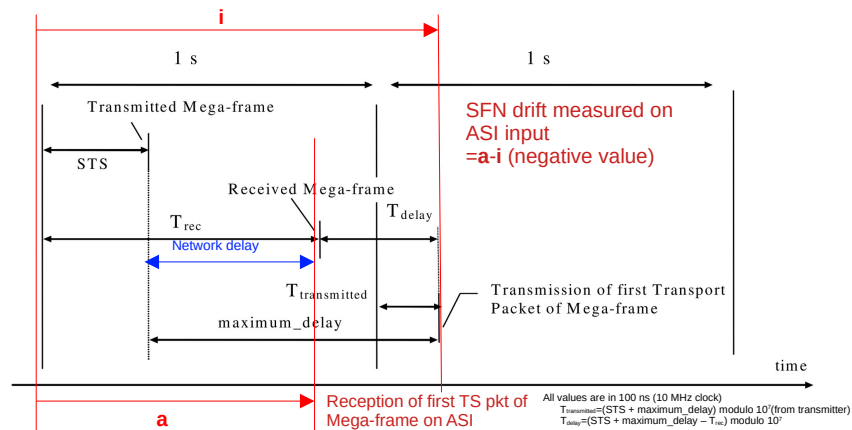
SFN drift slew rate is just the time differential of the SFN drift value: Normally in a well-behaved system this value will be zero. However, if for example the exciter starts to overly compensate its regulation loop parameters in order to adhere to the SFN criteria then the change in the delay is picked up as a fixed value (positive or negative) in the SFN drift slew rate. Units for SFN drift slew rate is typically microseconds of change per second measured and is comparable to a similar setting inside the Exciter that sets how much the SFN timing is allowed to changed per unit of time while still staying within SFN regulation. A typical alarm criteria in a fine-tuned SFN network could be 4 ± 5 microsecond/second.

SFN network delay is the SFN drift parameter from above (but without the offset compensation potentially added by the operator) plus the maximum delay setting of the SFN network modulo 1-second. In the screenshot below the maximum delay setting of the SFN network happens to be 150 ms and the SFN drift reading (without offset calibration added by user) is 10.27 ms, giving a SFN network delay of 160.27 ms. For a practical interpretation of SFN network delay in this scenario one could think of it as the total delay of the signal through the SFN adaptation and after signal demodulation inside the set-top box.

SFN zero offset is not relevant for DVB-T here.



If we now consider the first scenario (#1) where the NOMAD is measuring on the TS signal after MIP insertion, but before the exciter then things change slightly – not because the NOMAD changes its behavior but because we are not in series with the Exciter anymore. This is a measurement scenario common in the primary transport network between the central MIP insertion location and the transmitter towers. The interface here for the TS is typically ASI or SAT, but not DVB-T RF. Consider the following timing diagrams with the marked **i** indicating the **Ideal** timestamp and **a** the **Actual** timestamp as described earlier:



Actual minus **Ideal** is the uncompensated SFN Drift and is marked **T_{delay}** in the diagram above. But in this particular case the measurements are done before the exciter and therefore the timestamp **a** occurs prior to **i** in time. Another way to look at this is to say the SFN Drift value has changed

sign and is negative. However, we are only operating with modulo 1-second arithmetic so there is no such thing as a negative number. Instead -10 ms, for example would come up as 990,000 ms.

SFN network delay is marked in blue in the diagram for this particular measurement scenario (before exciter). It is the delay introduced by the contribution network measured from the output of the SFN adapter to the input of the exciter where the probe is typically situated.

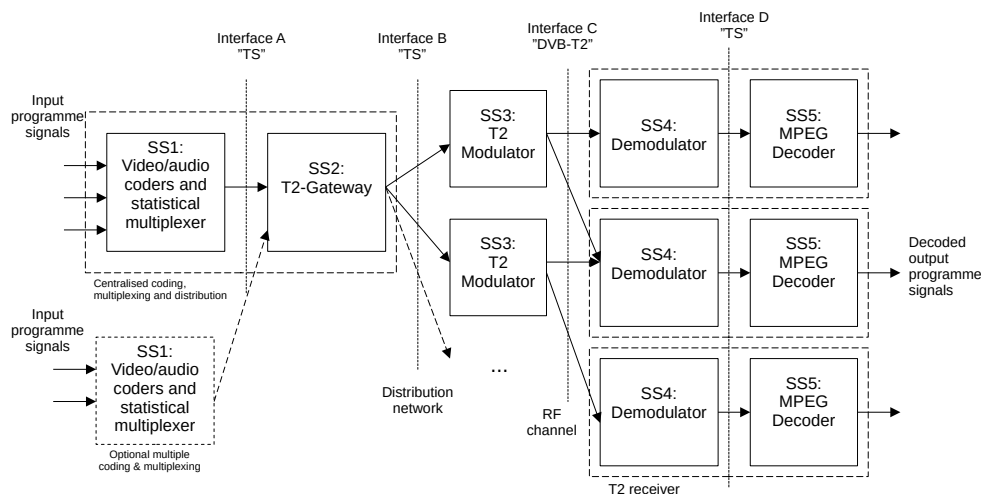
The SFN network delay is calculated by taking: (**Actual** – **Ideal** + *maximum_delay*) modulo 1-second

I.3 DVB-T2

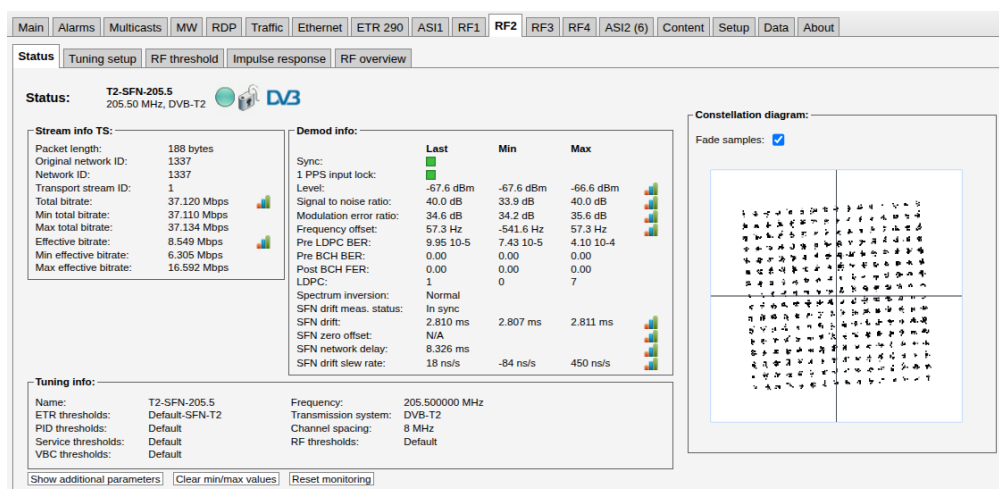
The NOMAD can also monitor SFN timing parameters in the DVB-T2 scenario. In this case the architecture is slightly more complex due to the fact that no MIP with STS usually exists in T2 networks. Instead, the T2MI protocol carries the STS timestamp, but the STS information does not carry over into the TS domain since the T2MI protocol terminates inside the exciter.

The NOMAD can still extract SFN timing parameters but now relies on a synchronized 1PPS GPS source, access to the T2MI stream and also the TS stream after the exciter.

A general T2 system diagram from the specifications is shown below:



The NOMAD probe measures SFN timing parameters based on data from the Interface-B and Interface-D planes (Interface-D would be after the T2 demodulator stage in the NOMAD here).



SFN drift is still calculated as the difference in time between an **Ideal** and **Actual** timestamp. The **Ideal** is the synchronization timestamp (STS) carried inside the T2MI layer and signifies the point in time when all the exciters in the SFN constellation must transmit the start of the SFN SuperFrame. The **Actual** timestamp is the time (relative to a locked 1PPS GPS) when the same SuperFrame is received at the TS layer inside the NOMAD probe after RF demodulation. The SFN drift measurement therefore still has the same significance as for DVB-T in that it indicates the transmission delay from the output of the exciter (Antenna), through the air and through the demodulator inside the NOMAD.

SFN network delay on the other hand, is different for DVB-T2. Here the calculation is to compute the difference in time between the value of the Synchronization Timestamp (STS) carried inside the T2MI protocol and the actual arrival time of the first TS packet of the first BB frame in the SuperFrame inside the same T2MI – all modulo 1-second. Both timestamps being locked to the same 1PPS GPS reference.

An example calculation would be STS = 340,000 μ s (relative to last 1PPS), actual arrival time of first TS/BB frame on the T2MI layer = 50,000 μ s (also relative to last 1PPS). SFN network delay is then:

$$340,000 - 50,000 = 290,000 \mu\text{s}.$$

It is possible to think of this number as the margin of time remaining before the SuperFrame must be transmitted out of the exciter.

SFN drift slew rate has the same definition as for DVB-T and is the time derivative of the SFN Drift measurement.

SFN drift zero offset is an optional mechanism that – when activated – uses the PCR discontinuities to detect if a major change has occurred in the SFN network timing and if so, performs an automatic zero-adjust of the SFN Drift parameter. This can be useful when setting narrow alarm threshold values on the SFN drift parameter.

I.4 Standards

Some relevant standards:

- ETSI TS 102 773 Digital Video Broadcasting (DVB); Modulator Interface (T2-MI) for a second generation digital terrestrial television broadcasting system (DVB-T2)
- ETSI TS 101 191 Digital Video Broadcasting (DVB); DVB mega-frame for Single Frequency Network (SFN) synchronization