

Technical Specifications

Prepared by: Bridge Technologies 22 September 2016 Version: 1



ABOUT NOMAD



NOMAD covers all the monitoring needs encountered in hybrid IP multicast, OTT and RF networks. It is the ultimate all-inone 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 QAM cable, 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-depth analytics for IP, OTT and DVB signal behaviorisms"



INCLUDED FACTORY OPTIONS AND FEATURES

DEFAULT OPTIONS OFFERED BY NOMAD

IP-OPT for multicast monitoring of up to 10 IP multicasts

OTT-ENG-OPT for OTT monitoring and analysis of SmoothStream, HLS, HDS and M-DASH. One engine by default allowing up to 10 individual OTT streams with unlimited profiles to be analyzed

AET-OPT for Advanced Ethernet Tools functionality for Ethernet protocol visualisation and IGMPv2/3 logging and analysis

AEO-OPT for Advanced Ethernet Option functionality for microburst jitter analysis on Ethernet, PCAP recording and advanced bulk-analysis functionality of uni/multicasts

ETR290-OPT for individual TR 101 290 analysis on IP (one engine), ASI, DVB-T/T2/C and DVB-S/S2 inputs

VB252-ARF-OPT for DVB-T/T2 Channel Impulse Response diagram and Constellation diagram

T2MI-OPT for T2MI protocol analysis as needed in DVB-T2 networks

SCTE35-OPT for digital cue tone logging and analysis as used for ad-insertion

FLASH32-OPT for built-in 32GB SD non-volatile storage card for use for signal and PCAP recording

DEFAULT FEATURES OFFERED BY NOMAD

- 10/100/1000-T RJ45 Management port with Link and Activity LED indicators
- 10/100/1000-T RJ45 video port with Link and Activity LED indicators
- SFP gigE video port Optical networks
- 75 ohm BNC linespeed ASI input
- 75 ohm BNC ASI output port for loopthrough monitoring purposes
- 50 ohm SMA female 1PPS input port for GPS synchronisation
- USB Type-A connector for initial setup (back of unit)
- USB Type-A connector for WiFi dongle (dongle included at front of unit)
- Thumbnail decoding of uni/multicast IP transport streams with audio bars and metadata
- Framework called RDP for relaying any IP multicast monitored to a different IP destination for further analysis. Two independent relay engines are available (part of RDP framework)



		Functionality for recording 500MB of the whole or parts of any transport stream monitored (RDP framework). There are two independent RDP record engines
		Automatic record trigger based on up to 3 configured alarm criteria with pre fill in order to catch fault, ideal for autonomous fault capture. There are two independent record engines available (part of RDP framework). Recorded clips are automatically stored in 32GB SD card flash
		Flexible template based alarming system to allow custom configuration of what parameters result in an alarm being generated on a per-TS level
		NTP client time synchronization support according to RFC2030
		DHCP client support on management and video ports according to RFC2131
		Easy web-based software and license upgrade
		TR 101 290 monitoring and analysis on ASI, RF and IP inputs
		Full DVB and ATSC table support
DEFAULT		PSI/SI/PSIP table display - high and low level including hex dump and table download
FEATURES		Analysis of EIT p/f and EIT Schedule
ooni.		MIP table analysis according to TR 101 190 and TR 101 191
		Unique tests designed by BRIDGE Technologies relevant to Conditional Access system
	▶	TS 101 290 analysis functionality on all IP multicasts in either round-robin fashion across all monitored IP multicasts or continuously on all monitored IP multicasts All Priority 1 tests (TS sync, Sync byte, PAT, CC, PMT, Missing PID) All Priority 2 tests except Buffer Fill (Transport, CRC, PCR, PCR acc., PTS, CAT) All Priority 3 tests (NIT, SI rep rate, Unref PID, SDT, EIT, RST, TDT) Custom tests (CA system, PID bitrates, Service bitrates, MIP, Content)
		Framework for monitoring and alarming on max/min service bandwidth
		Framework for monitoring and alarming on max/min PID bandwidth
		Visual tree representation of all PSI/SI tables with drill-down functionality
		PID overview
		Service overview
		PCR Accuracy (PCR-AC) jitter histogram for selectable PIDs on IP/ASI/RF inputs
		PCR Overall Jitter (PCR-OJ) jitter histogram for selectable PIDs on ASI/RF inputs
		Intuitive bitrate overview - service and PID based
		Comparison framework where a visual comparison between two transport streams or two services is possible in terms of TR 101 290 parameters and table set
		Transport stream service status view with visual colour coded indication of problem areas
		TR 101 290 alarm trending graph over last 24 hours

NOMAD

Condensed mosaic thumbnail view of all services monitored

ADDITIONAL NOMAD OPTIONS

EII-OPT allowing the NOMAD to communicate with a Northbound interface to a central monitoring and analysis system

STRM-OPT for additional concurrent monitoring of IP multicasts (up to 4 additional STRM-OPT can be fitted for a total of 50 IP multicasts)

ETR290-OPT for additional individual concurrent TR 101 290 analysis on the IP input (up to 7 additional individual ETR290-OPT can be fitted)

BULK-ETR290-OPT for 25 concurrent TR 101 290 monitoring engines for IP multicasts

EXTRACT-OPT objective QoE content analysis and alarming

OTT-ENG-OPT for 4 additional OTT engines up to a total of 5. One is included by default. Each OTT engine allows 10 services with unlimited profiles to be analyzed

VB1G2-OPT to activate the second Gigabit Ethernet port on the unit allowing two independent Gigabit Ethernet IP ports to analyze OTT and/or IP uni/multicasts

ADDITIONAL IP and STREAM OPTIONS

IP-OPT adds IP monitoring capabilities for up to 10 IP multicasts in parallel (included in NOMAD)

STRM-OPTx1 adds 10 further multicasts to those 10 already present through IP-OPT for 20 in total (optional)

STRM-OPTx2 adds 20 further multicasts to those 10 already present through IP-OPT for 30 in total (optional)

STRM-OPTx3 adds 30 further multicasts to those 10 already present through IP-OPT for 40 in total (optional)

STRM-OPTx4 adds 40 further multicasts to those 10 already present through IP-OPT for 50 in total (optional)

IP & STREAM	 Parallel and continuous monitoring of up to 50 IP unicasts/multicasts according to ETSI TS 102 034 (requires 1 IP-OPT and 4xSTRM-OPT): Monitor current/min/max UDP payload bitrate Monitor current/min/max TS payload not counting NULL TS packets Count number of IP packets Source/destination IP address Type-of-Service field (TOS/DSCP) Time-to-Live field (TTL) VLAN ID, if appropriate Max/min/average IP packet Inter-Arrival time (IAT) for jitter analysis TS Continuity Counter errors TS Sync errors Media Loss Rate - number of TS packets lost Delay Factor - time between IP frames Source/destination MAC address RTP dropped packets, duplicate packets, out-of-order packets RTP max/min hole size, hole separation Forward Error Correction analysis according to MPTE 2022 1-7 / COP3
CONT	jitter over up to 4 days across all active uni/multicasts
CONT.	History graphs from last 4 days of NoSignal, CC-errors, RTP-drops, RTP-duplicates, RTP-Out-of-order, Total interface bitrate, Monitored bitrate, Ethernet CRC frame errors
	Framework for automatic detection of present multicast/unicast streams
	Flexible template based alarming system to allow custom configuration of what parameters result in an alarm being generated on a per-TS level
	Microsoft mediaRoom X-bit RTP header extension support
	Alarm on changes to TOS/DSCP and TTL for detection of changes in network prioritization
	Time loss distance measurements according to RFC3357
	▶ IEEE 802.1Q VLAN tagging support for up to 20 individual VLANs with active IGMPv2/3
	Framework for automatic detection of present multicast/unicast streams



EXPLANATION OF INCLUDED OPTIONS

ADVANCED ETHERNET TOOLS OPTION (included)

AET-OPT Offers Advanced Ethernet monitoring and analysis tools

- Full Service Monitoring of up to 10 network devices via built-in ICMP and HTTP query agents. Built-in SYSLOG server listening on UDP port 514. Capture, sort and store events
- ▶ User-initiated ICMP/PING and TRACEROUTE capabilities
- Protocol hierarchy view with bandwidth and packet count statistics for video interface
- TX bitrate, RX bitrate, VLAN tagged frames, IP-fragmented frames, UDP uni/ multicast bandwidth
- SMPTE-2022 1-4 compliant, FEC columns, FEC rows, correctable/uncorrectable frames
- Management interface TX bitrate, management interface RX bitrate
- IGMPv2/v3 protocol logging and analysis of last 300 events
- IGMPv2/v3 export as XML of last 300 events

AEO OPTION (included)

AEO-OPT Advanced Ethernet Option

- Offers general purpose network recording and analysis in the industry standard PCAP format
- Capture headers or full packets, caputre TCP, UDP, TCP/UDP or Everything
- Specify up to 5 additional match filters based on IP SRC/DST pairs
- Capture up to 1GB of PCAP data
- Offers custom video related statistics filters
- Ideal for characterizing bandwidth and packet loss for multicasts and unicasts that come and go such as is the case in VoD scenarios
- Offers analysis of micro burst jitter at the Ethernet level. This is particular useful when diagnostisizing issues with sporadic queue overflows and resulting packet losses
- Traffic filter definition capabilities where traffic can be categorized using the following criteria: RTP presence, VLAN ID presence, IP destination, IP source, UDP destination, UDP source, UDP payload as 7-TS/UDP or N-TS/UDP, Ethernet input
- ▶ Up to 10 individual filters can be defined



AEO OPTION CONT.	Perform real-time statistics gathering for each filter on the following parameters: Number of streams (flows), bitrate, RTP loss (%), MLR (%), Average stream bitrate, Average stream duration
	Timeline trend graphs available for most parameters listed above
	Micro burst packet jitter analysis
	Jitter trend graphing over time up to 4 hours down to last 2 minutes
	Measurement of traffic in 4 different bandwidt time windows: 1ms , 10ms, 100ms, 1 second
	Max interval in terms of frames and bandwidth (burst length)

Peak burst length and peak bandwidth observed

TR 101 290 OPTION (one included)

ETR290-OPTx1 ETR290-OPTx8 One through to up to eight parallel TR 101 290 engines BULK-ETR290-OPT 25 parallel TR 101 290 engines

- ▶ Up to 8 individual TR 101 290 engines on IP in parallel
- Alternatively one bulk TR 101 290 option with 25 parallel engines on IP
- Additional TR 101 290 engine activated on each active ASI or RF input
- Round-robin TR 101 290 analysis across all 260 IP multicasts or do continuous analysis by parking TR 101 290 engine on spesific IP multicast
- Define up to 100 separate frequencies per RF input for round-robin operation
- Full DVB and ATSC table support
- PSI/SI/PSIP table display high and low level including hex dump and table download
- Analysis of EIT p/f and EIT Schedule

.

- MIP table analysis according to TR 101 190 and TR 101 191 standards
- Unique tests designed by BRIDGE Technologies relevant to Conditional Access systems
- TR 101 290 engine automatically activated per RF/ASI input port present on expansion modules
- TS 101 290 analysis functionality on all IP multicasts in either round-robin fashion across all monitored IP multicasts or continuously on all monitored IP multicasts
 - All Priority 1 tests (TS sync, Sync byte, PAT, CC, PMT, Missing PID)
 - All Priority 2 tests except Buffer Fill (Transport, CRC, PCR, PCR acc., PTS, CAT)
 - All Priority 3 tests (NIT, SI rep rate, Unref PID, SDT, EIT, RST, TDT)
 - Custom tests (CA system, PID bitrates, Service bitrates, MIP, Content)

	Framework for monitoring and alarming on max/min service bandwidth
	Framework for monitoring and alarming on max/min PID bandwidth
	Visual tree representation of all PSI/SI tables with drill-down functionality
	PID overview
	Service overview
	PCR Accuracy (PCR-AC) jitter histogram for selectable PIDs
	PCR Overall Jitter (PCR-OJ) histogram for ASI and RF inputs
TR 101 290 OPTION	Intuitive bitrate overview - service and PID based
CONT.	Comparison framework where a visual comparison between two transport streams or two services is possible in terms of TR 101 290 parameters and table set
	Transport stream service status view with visual colour coded indication of problem areas
	TR 101 290 alarm trending graph over last 24 hours
	Innovative Gold TS(tm) framework for recording a perfect transport stream table set and then compare and alarm against template later on. Ideal for trapping faults with language descriptor
	Scheduling and alarm filtering functionality to mask alarms during spesific times of

T2MI OPTION (included)

the day

T2MI-OPT Enables T2MI analysis and extraction on IP and ASI

- ▶ IP and ASI analysis of incoming T2MI formatted transport stream
- Extract inner stream and perform TR 101 290 analysis on it
- T2MI Monitoring and analysis functionality one stream per TR 101 290 engine for a maximum of 25 in parallel on IP with BULK-TR 101 290-OPT:
 - T2MI Header CRC check
 - T2MI Body CRC check
 - Display detected and signalled PLPs with PLP ID, Type, Payload, PLP Group, Code, Modulation, Rotation, FEC
 - Display L1 pre wayside information
 - Display T2 timestamp, Super frame index, frame index, input streams, input stream format, input stream identifier, num TS last T2MI frame, null packet deletion, high efficiency mode, CRC errors BB header, CRC errors whole packet

SCTE-35 OPTION (included)

SCTE35-OPT Enables SCTE-35 digital cue tone monitoring, logging and analysis

- Expands each active TR 101 290 engine with SCTE-35 digital program insertion cue tone message monitoring capabilities. Requires one TR 101 290 engine per continuously monitored SCTE-35 TS
- 1000 events are logged per transport stream. Oldest events disappear automatically when log is full
- Monitors time when cue tone event occurs with seconds resolution
- ▶ Lists number of services present in transport stream carrying SCTE-35 information
- Lists count of number of SCTE-35 event occurrences in transport stream
- Lists time elapsed since last SCTE-35 event occurrence with seconds resolution
- Lists the Service ID and Service name for which the SCTE-35 event applies
- Lists the PID number carrying the SCTE-35 information (a service can have multiple SCTE-35 PIDs signalled in the the PMT table)
- Lists the type of splice command
- Lists the Event ID of event
- Lists the Cancelled indicator message
- Lists the Switch mode
- Lists the duration of splice event
- Lists the Tier Group
- Offers a hex view or tree structure view

FLASH32 OPTION (included)

FLASH32-OPT On-board 32GB FLASH SD card storage option

- Offers 32GB non-volatile file system in the form of SD card installed inside probe hardware
- Allows multiple RDP recordings (<500MB each) to be stored automatically onto the SD card
- Ideal for use in conjunction with the RDP alarm triggered recording functionality for automatic capture and storage of faulty transport stream
- Also acts as non-volatile storage file system for PCAP recordings if AEO-OPT is activated

OTT-ENGINE OPTION (one included)

OTT-E OTT-E OTT-E OTT-E	NG-OPTx1 NG-OPTx2 NG-OPTx3 NG-OPTx4 NG-OPTx5	Enables OTT monitoring on 10 TV channels (included) Enables OTT monitoring on 20 TV channels Enables OTT monitoring on 30 TV channels Enables OTT monitoring on 40 TV channels Enables OTT monitoring on 50 TV channels
	OTT monitoring	of up to 50 TV services (5 OTT engines)
	Time flow graphi visualisation ove	cal representation of channel and profile health for easy r 2 hours and 24 hours
	Supported forma	ts are HLS, HDS, SmoothStream, MPEG-DASH
	Availability check	c for RTMP streams
	Stream and profi	le manifest file integrity analysis
	Profile availability	y check
	Thumbnail deco	ding of unencrypted HLS and Adobe HDS streams
⊳	Fixed key AES d	escrambling for HLS
⊳	Visual profile alig	nment checks for unencrypted HLS and Adobe HDS streams
	Tokenized URL s	support as used in many CDN networks
	HTTPS support	
	Chunk sequence	update check
≥	Chunk download	time versus chunk length displaying
	Download bitrate	e versus actual bitrate check
	Profile bitrate, Ac	ctual bitrate, Download bitrate per profile
	Chunk length pe	r profile
	Download time p	er profile
	Download size p	er profile
	Encryption state	per profile
	Link to HTTP hea	ader for each profile
	Graph over up to	24 hours channel and profile health
	Sequence age	
	Minimum numbe	r of profiles alarm
	Stream type cha	nge between Live and VoD notification
	Manifest: Seque	nce age, size, manifest file, URL, HTTP header



TT- PTION ONT.	 Different types of OTT alarms available: The number of profiles changed Profile stream type changed Minimum profiles Download bitrate low Download bitrate too low Manifest size Actual bitrate Download timeout Address resolve error Connection failed Send error Receive error Empty reply HTTP redirect error HTTP redirect error HTTP server error Static manifest Manifest parse error
----------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------





DVB-T/T2/C TERRESTRIAL/DVB-C RF INPUT (included)

DVB-T/T2 status:	NewPreset1 562.00 MHz, DVE		Constellation diagram:
Stream info: Packet length: Original network ID: Network ID: Transport stream ID: Total bitrate: Min total bitrate: Max total bitrate: Effective bitrate: Min effective bitrate:	188 bytes 8468 12358 17920 36.936 Mbps 36.944 Mbps 11.512 Mbps 10.312 Mbps	DVB-T/T2 demod info: Sync: Level: -44.0 dBm Signal to noise ratio: 40.0 dB Modulation error ratio: 39.5 dB Frequency offset: -170 Hz Spectrum inversion: Normal Pre LDPC BER: 5.17 10-5 Pre BCH BER: 0.00 Post BCH FER: 0.00	
DVB-T/T2 tuning info:- Name: ETR thresholds:	NewPreset1 Default	FRV drift: 0 ns SFN drift: 0 ns LDPC: 2 Frequency: 562.000 MHz Transmission system: DVB-T2 Chromethanisticm State	$\begin{array}{c} 1 & 1 & 2 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 &$
PID thresholds: Service thresholds: VBC thresholds: Show additional parame	Default Default Default	Channel spacing: 8 MHz DVB-T/T2 thresholds: Default	

Figure - The Constellation diagram of the DVB-T/T2 transmission gives an intuitive view of the signal quality.

DVB-T/T2/C FEATURES

- > 75 ohm female F-type RF input connector
- ▶ 50 ohm female SMA 1-pulse-per-second GPS input for SFN Drift measurements
- Supports DVB-T EN 300-744 and DVB-T2 EN-302-755
- Frequency range 43 1002 MHz
- Symbol rate range 0.7 7.2 Msym/s
- All versions of DVB-T2 supported: 1.1.1, 1.2.1 and 1.3.1
- DVB-T2 Base and DVB-T2 Lite profiles supported (1.3.1)
- Channel bandwidth: 1.7 (T2-Lite only), 5, 6, 7 and 8 MHz
- Round-robin capability across multiple PLPs within one frequency
- Support for ITU.T J.83 Annex A/C cable QAM16, 32, 64, 128 and 256

NOMAD

DVB-T/T2/ C TERR/ DVB-C RF INPUT OPTION CONT.		Capable of monitoring the following parameters for DVB-C Annex A/C: SYNC status Channel power RF level Signal to Noise ratio SNR Modulation Error Ratio MER Center Frequency Offset Spectrum Inversion Pre/Post FEC BER 1PPS Input lock SFN drift and Network Delay Symbol rate
		Capable of monitoring the following RF parameters for DVB-T/T2 Channel power RF level Modulation Error Rate MER(PLP) Signal to Noise Ratio SNR Center Frequency Offset Spectrum sense 1PPS Input Lock Pre Viterbi BER (DVB-T) Pre Reed Solomon BER (DVB-T) Pre LDPC BER (DVB-T2) Pre BCH BER (DVB-T2) Post BCH FER (DVB-T2) Packet Error Rate LDPC Iterations count
		DVB-T SFN Drift monitoring for measuring absolute transmission time of mega frame
		DVB-T2 SFN Drift monitoring by measuring timing of T2MI frame versus received RF super frame
		Readout of TPS information (DVB-T)
		Readout of signalled L1 and PLP parameters (DVB-T2)
		Channel impulse Response diagram with alarming capabilities on echo strength and time position
	⊳	Constellation diagram for DVB-T/T2
		Extract and display over 30 signalled DVB-T2 L1 Pre information parameters
		Extract and display over 20 signalled DVB-T2 L1 PLP information parameters
		Extract and display 9 signalled DVB-T2 L1 Post information parameters
		Accurate Center Frequency Offset measurements to <100 Hz given 1PPS satellite input reference connected



DVB-S/S2 SATELLITE RF INPUT (included)

Status Tuning setup Fre	equency scan SAT th	reshold RF overview			
SAT status: NewPreset1 1.000 GHz	● ∯ ▷⁄ 3				
Stream info:	s	AT tuner / demod info:		Constellation diagram:	
Stream type: Packet length: Original network ID: Network ID: Transport stream ID: Total bitrate: Min total bitrate: Max total bitrate: Effective bitrate: Min effective bitrate: Max effective bitrate:	DVB-S2 F 188 bytes L 1999 B 2000 B 2241 B 55.720 Mbps P 55.712 Mbps S 55.728 Mbps M 4.552 Mbps E 4.576 Mbps E	iront-end lock: evel: ER (pre Viterbi): ER (post Viterbi): JER (post LDPC-BCH): acket error count: ignal to Noise Ratio: Addulation Error Rate: irror Vector Magnitude: iror Vector Magnitude: ib/NO:	-23.7 dBm N/A < 1.00e-07 0 N/A 53.9 dB 0.20 % -53.9 dB 96.0 dB	, ,	У
SAT requested tuning:		DINT/NU:	96.4 dB		
Setup name: New	vPreset1	ransmission system:	DVB-S2		5
Transponder: 1.00	000 GHz M	Adulation:	8PSK	1	
LNB LO: 0.00	000 GHz T	uner bandwidth:	43.750 MHz		
LNB voltage: 0 V	Т	uner frequency:	1.000 GHz		
22 kHz tone: Off	C	Centre frequency offset:	0 Hz		
DISEQC: Off	R	coll-off factor:	0.35		
Selected symbol rate: 25.0	filter A	Symbol rate offset:	20.000 Misymi/s		
Di scrambi modo: Non	initer 5	FC rate:	3/4		
PL scrambl. code: 0	S	spectrum inversion:	Normal		

Figure - An 8PSK transmission picked up by the Satellite input of the NOMAD

DVB-S/S2 FEATURES

- > 75 ohm female F-type connector
- Capable of demodulating DVB-S, DVB-S2 8PSK, 16APSK, 32APS
- Supports DVB-S2 GOLD CODES, ROOT CODES and BOTH
- ▶ Input frequency range from 950 to 2150 MHz (L-band)
- Automatic symbol rate detection requires only frequency to be configured by user for most wideband carriers
- Symbol rate range between 1 to 45Msym/s
- ▶ Input stream selection (for DVB-S2)
- PL scrambling mode setting (for DVB-S2)
- PL scrambling code setting (for DVB-S2)
- DVB-S 1/2, 2/3, 3/4, 5/6, 7/8 FEC
- DVB-S2 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 FEC
- Solution Configure LNB local oscillator frequency and set input satellite frequency directly
- 13V/18V/22kHz antenna drive present can drive LNB up to 0.5 A



		DiseqC 1.0 compatible for control of Committed L-band Switches up to 16 positions
		Modulation Error Rate (MER) in dB up to 50 dB
		Signal to Noise Rate (SNR) in dB up to 50 dB
		Error Vector Magnitude (EVM) in% and in dB
		Constellation diagram maintained in GUI
		BER pre Viterbi (for DVB-S)
		BER post Viterbi (for DVB-S)
		BER post LDPC-BCH (for DVB-S2)
		RS Packet Error Count
		Channel power with an absolute accuracy of +/- 3 dB and a resolution of 1 dB
		Carrier frequency offset
		Symbol rate offset
DVB-S/S2 RF INPUT		Energy per information bit to noise power spectral density ratio (Ebinf/N0) in dB
		Energy per transmitted bit to noise power spectral density ratio (Eb/N0) in dB
00111	⊳	Energy per symbol to noise power spectral density ratio (Es/N0) in dB
		Pilot detection (for DVB-S2)
	⊳	Frame length (for DVB-S2)
		Null packet deletion (for DVB-S2)
		Input Stream Synchronization Indicator (ISSI) (for DVB-S2)
		Number of input streams (for DVB-S2)
		Capable of Short and Normal frames
		Stream types Generic Packetized Stream Generic Continuous Stream Transport Stream
		Coding and modulation Constant Coding and Modulation Adaptive/Variable Coding and Modulation (ACM/VCM)
		Roll-off factors: 0.35 / 0.25 / 0.20
		Capable of Multi Input Stream (MIS) with tuning selection of individual Input Stream Identifiers (ISI)
		Blind scan functionality allowing portions or whole spectrum to be scanned for presence of carriers. Allows detected transponders to be added into channel list



VB252-ADV-RF OPTION (included)

The VB252 ADVANCED RF OPTION (VB252-ADV-RF-OPT) is ideal for when more RF analysis and monitoring is required typically at transmitter sites or at SFN fringe areas:

VB252-ADV-RF OPTION

- Constellation diagram
 Channel Impulse response dir
- Channel Impulse response diagram with advanced alarming capabilities
- Configurable alarm template to verify position of CIR echoes in both time and relative amplitude
- Supports alarming on up to 10 CIR echoes

ASI INPUT and OUTPUT (included)

ASI INPUT & OUTPUT OPTION	BNC 75 ohm input
	BNC 75 ohm output with loopthrough of incoming ASI, DVB-T/T2/C or DVB-S/S2 selectable
	Supports DVB-ASI according to EN 50083-9, Annex B
	Supports Burst mode, Spread mode and legacy M2S
	Supports 188-byte packet format and 204-byte packet format
	Supports up to 211Mbit/s of TS rate on ASI input (linespeed ASI

EXPLANATION OF UPGRADE OPTIONS

EXTRACT OPTION (upgrade)

EXTRACT-OPT Objective QoE Content Extraction option

- The Objective QoE Extraction option on the probe offers picture analysis functionality in the form of freeze-frame detection and color-freeze detection
- Configured as part of the TR 101 290 engine and appears as Content check underneath Other checks
- Allows picture freeze-frame alarms to be detected by probe on all IP and ASI/RF interfaces monitored. Typical performance will vary depending on probe load but 5 minutes for detection delay for 3 multiplex carrying 4 HD H.264 services each is typical

VB1G2 OPTION (upgrade)

VB1G2-OPT Second independent DATA/Video IP input port active

- Offers a second IP input on the probe with full functionality compared to the default first port
- Allows effective monitoring in redundancy scenarios or in cases where the total bandwidth exceeds 1Gbit/s
- Data rate is conservatively stated as 1.5Gbit/s across the two IP inputs although this will depend on probe load

Ell OPTION (upgrade)

EII-OPT Activate External Integration Interface for VBC connection

- Activates the capability of the NOMAD to connect to the VBC centralized monitoring and anslysis system
- Powerful and openly available XML-based External Integration Interface (Eii) for 3rd party integration



INTERFACES

- USB-WiFi
- Data A 10/100/1000T
- Management 10/100/1000T
- Data B SFP
- ASI Output
- ASI Input
- RF A DVB-S/S2 Satellite
- RF B DVB-T/T2/C Terrestrial & Cable
- 1PPS
- Power 12V / Serial

PHYSICAL

- Dimensions: width x length x height (mm): 180x230x20
- Weight: 0.9 kg
- Power usage (max): 22 Watts
- Power supply: External power unit +12V, 1.8A (included)
- Operating temperature: -20 up to +45 degrees C
- Operating humidity: 5% up to 95% noncondensing
- Initial setup by Wi-Fi, Ethernet or separate USB Type-A cable (included)