

TEST & MONITORING



COMPANY PRESENTATION 3



DIGITAL TV & RADIO **MONITORING** 6

GlobalViewer 12

IPTV & OTT Service Platforms

High-density and scalable solution for QoS & QoE monitoring of hundreds of streams in parallel: ETR 101 290, audio levels, video freeze/black screen, live thumbnail mosaic view and service streaming.

- **StreamProbe IPTV & OTT** 14

Digital TV Broadcast Networks

Cost-effective and high quality monitoring probes for Head-End, Transmission and Reception sites – RF & SFN signal quality, Transport Stream QoS: ETR 101 290, DVB-T2-MI, OneBeam/Single Illumination (DVB-SIS), BTS.

- **EdgeProbe Advanced** 18
- **EdgeProbe Advanced module for High Density chassis** 19
- **EdgeProbe RF & Nano** 20
- **TRANSBOX confidence monitoring** 21

ATSC 3.0 Broadcast Networks

Reliable end-to-end SFN solution provided by ENENSYS TestTree.

- **EdgeProbe Advanced** 22

Digital Radio Broadcast Networks

Cost-effective and high quality monitoring probes: RF & SFN signal quality.

- **EdgeProbe Advanced** 24



TEST TOOLS FOR **LAB & FIELD** 26

RF Capture/Playback & Generate

70 MHz – 6 GHz frequency range with down conversion for Ku/C band

- **RF-Catcher Starter Kit** 30
- **Application Suite for RF-Catcher** 32
- **ATSC 3.0 LabMod** 33
- **RF-LiveSim** 34

Analyze RF & Baseband

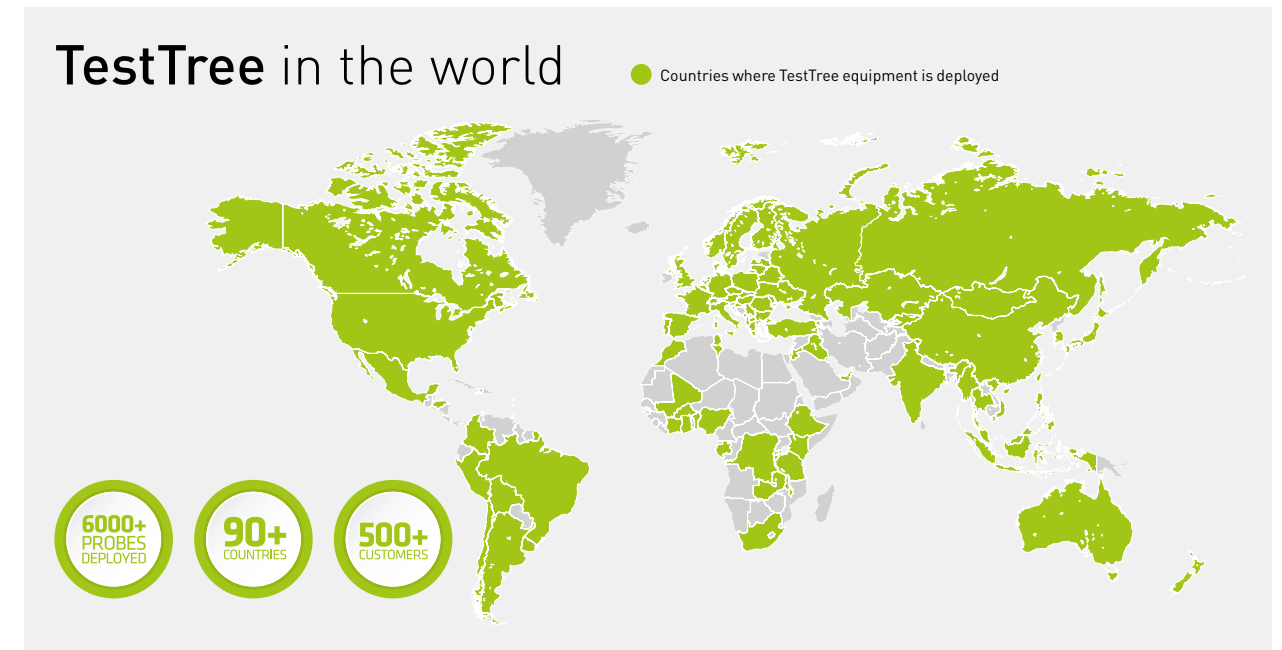
Multi-standard (ATSC 3.0/1.0, DVB-T/T2, DVB-C/C2, DVB-S/S2, ISDB-T/Tb) professional measurement receivers and pocket-size analyzers, recorders and players; connected via USB to a Windows PC running the DiviSuite analysis software

- **ReFeree 3** 35
- **DiviSuite™** 36
 - DiviSuite Base
 - DiviSuite options: RF Scope, TS Analyzer, T2-MI Analyzer, Drive Test Coverage
- **Hardware products used with the DiviSuite** 41
 - ReFeree II
 - DiviCatch RF Series
 - DiviDual ASI + SPI (LVDS or TTL)
 - DiviDual ETI
- **Pure software application using the DiviSuite** 45
 - DiviSuite-IP

About **TestTree**

TestTree provides innovative and easy-to-use end-to-end Test and Monitoring solutions for Network operators, TV Content Providers, IPTV & OTT Platform Operators, Regulators, Chipset & TV/STB Manufacturers, R&D Labs, Automotive.

TestTree is a proud member of the ENENSYS Technologies group. ENENSYS designs and manufactures innovative professional equipment and software enabling Efficient Video Delivery over Terrestrial (ATSC 3.0, DVB-T/T2, ISDB-T/Tb, HbbTV...), Satellite (DVB-S/S2/S2X) & Telecom Networks (4G/5G, IPTV, OTT).



Serial **Inventor**

TestTree culture is based on innovation. ENENSYS has a strong IPR portfolio, with more than 60 patents, all dedicated to the Video Delivery sector. Linked to this innovation work, TestTree is proud to be the first to introduce new test devices to support customers in their network improvements and deployments.



All products are fully developed and produced in France by TestTree: hardware, firmware, software... providing the complete knowledge and flexibility to our team to deliver new features according to customer requests and to imagine new solutions.

Our **Customers**

R&D Labs

Chipset and Receivers manufacturers / Digital TV R&D centers / Broadcast equipment manufacturers / Network & Service Platform Operators / Automotive, Telecom, Defense

Factory testing

End of production equipment test and validation

Demos

Receivers Promotion, Trade Show...

FM & Digital Radio & Info Traffic

Field testing & recording / R&D Lab investigation

Video Content Providers

Service processing & delivery monitoring

IPTV & OTT Service Platform & Broadcast Network Operators

System Design and Operational teams / Network Monitoring

Broadcast regulators

Field testing & recording / Network compliance monitoring

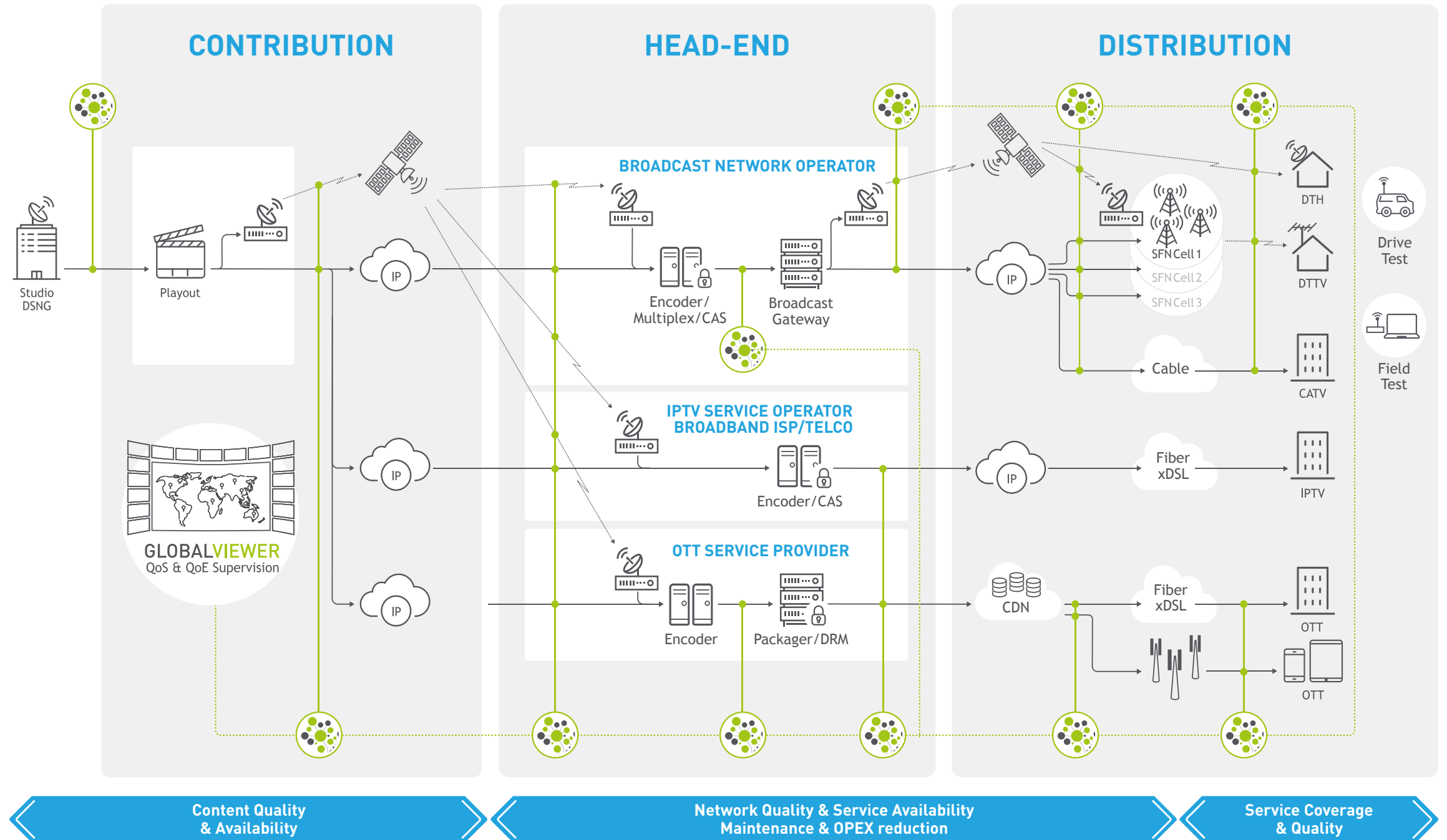
QoS & QoE TEST & MONITORING SOLUTIONS

FOR THE DIGITAL VIDEO DELIVERY CHAIN

In a modern broadcast and broadband video delivery environment, video streams originate from a variety of sources.

Ensuring the availability and quality of both live and file-based content is a critical challenge for video content owners and distributors moving to Adaptive Bit Rate (ABR) and Over-The-Top (OTT) delivery models.

TestTree monitors the whole video delivery chain and thus optimizes the overall service quality and customer experience.





DIGITAL TV & RADIO MONITORING

GLOBALVIEWER 12
Centralized Service Availability & Network Quality views

IPTV & OTT SERVICE PLATFORMS
High-density and scalable solution for QoS & QoE monitoring of hundreds of streams in parallel: ETR 101 290, audio levels, video freeze/black screen, live thumbnail mosaic view and service streaming.

StreamProbe IPTV & OTT 14

DIGITAL TV BROADCAST NETWORKS
Cost-effective and high quality monitoring probes for Head-End, Transmission and Reception sites – RF & SFN signal quality, Transport Stream QoS: ETR 101 290, DVB-T2-MI, OneBeam/Single Illumination (DVB-SIS), BTS.

EdgeProbe Advanced 18

EdgeProbe Advanced for High Density chassis 19

EdgeProbe Nano & RF 20

TRANSBOX confidence monitoring 21

ATSC 3.0 BROADCAST NETWORKS
Reliable end-to-end SFN solution provided by ENENSYS TestTree.

EdgeProbe Advanced 22

DIGITAL RADIO BROADCAST NETWORKS
Cost-effective and high quality monitoring probes: RF & SFN signal quality.

EdgeProbe Advanced 24



24/7 MONITOR PRODUCT RANGE

STREAMPROBE IPTV STREAMPROBE OTT

SOFTWARE SOLUTION:

Linux OS, VM for hypervisor type 1 (ESXi >6.0)

Off the shelf server, 1RU or 2RU (for large number of RF receivers)

CPU, RAM, HDD: depending on number of streams to monitor

One or Multiple **IP Data**: 1Gbps, 10Gbps support

One or Multiple **RF input(s)** F-type 75 Ω: DVB-T/T2, DVB-S/S2, DVB-C (J.83 A,B,C); demodulation for TS extraction

One or Multiple **ASI input(s)**: TS extraction

TSoIP OTT-ABR

• TS Monitor:

- ETSI TR 101 290 Priority 1, 2, 3
- MDI: Delay Factor, Media Loss Rate

• OTT-ABR Monitor:

- HLS, MPEG-DASH
- Playlist integrity & network performance

• QoE Monitor:

- Audio levels, silence detection
- Video freeze, black screen, missing Intra detection
- MPEG-2, H264, 4K, HEVC

• Live Thumbnail Mosaic:

- Audio levels, subtitles, penalty box

• CA processing:

- EMM/ECM presence & repetition
- FTA <-> scrambled transition timing

• Video processing:

- Live streaming over low bandwidth links
- TS recording on error or manual/scheduled

EDGEPROBE ADVANCED

STANDALONE UNIT:

1 RU 19" format: multi-standard support in 1 RU

Up to 4x **RF** inputs: N-type 50 Ω or F-type 75 Ω

Up to 4x **ASI** in/out

Up to 4x **IP Data** in/out (VLAN support)

Up to 2x **IP Control**

Up to 4x **32 GB** internal storage

1x **1PPS**, 1x **10MHz** inputs

1x **GNSS** input (GPS, GLONASS)

1x **ETH in/out** (alarm dry contact)*

2x **DVB-CI+ slots** (decrypt up to two CA systems in parallel)*

Up to 4x **HDMI** outputs*

Dual Power Supply

ATSC 3.0/1.0 DVB-T/T2 DVB-S/S2
ISDB-T/Tb DVB-C J.83 A, C
dab+ also available (See Page 25)

• RF Monitor:

- RF spectrum, Signal Quality
- SFN time & frequency synchronization
- Channel Impulse Response (Echoes)

• TS Monitor:

- TS, DVB T2-MI (PLP extraction), OneBeam / Single Illumination, STLTP, BTS
- ETSI TR 101 290 Priority 1, 2 & 3 and QoS SAE/SDE
- SFN Network Delay & IP Jitter

• Multiplex Service Plan description

• Extended Storage:

- Logs & Trends up to 6 months, TS recording

• Easy integration for NMS supervision:

- Low bitrate Web GUI (GPRS/3G/VSAT/4G)
- SNMPv2 Support + v2c INFORM (no trap loss)

EDGEPROBE NANO EDGEPROBE RF

STANDALONE UNIT:

1 RU 19" format: EdgeProbe RF

Compact 144x137x30 mm format: EdgeProbe Nano

1x **RF** input N-type 50 Ω (RF) / F-type 75 Ω (Nano)

1x **IP Control & Data** in/out (VLAN support)

1x **ASI** output

1x **32 GB** internal storage

DVB-T/T2 ISDB-T/Tb DVB-C J.83 A, B, C

• RF Monitor:

- Signal Quality, Channel Impulse Response (Echoes)

• TS Monitor:

- TS, BTS
- ETSI TR 101 290 Priority 1, 2 & 3 and QoS SAE/SDE

• Multiplex Service Plan description

• Extended Storage:

- Logs & Trends up to 6 months, TS recording

• Easy integration for NMS supervision:

- Low bitrate Web GUI (GPRS/3G/VSAT/4G)
- SNMPv2 Support + v2c INFORM (no trap loss)

TRANSBOX

- **HW/SW* Option for EdgeProbe Confidence Monitoring**
- **Streaming of multiplex services(s) over low bandwidth network links (compression down to 500 Kbps)**

GLOBALVIEWER

- **Server Application for a Centralized Network Quality & Service Availability view**
- **Supervision: live monitoring status on a world map**
- **Analytics: measurement data storage for customizable dashboard and automatic reports**

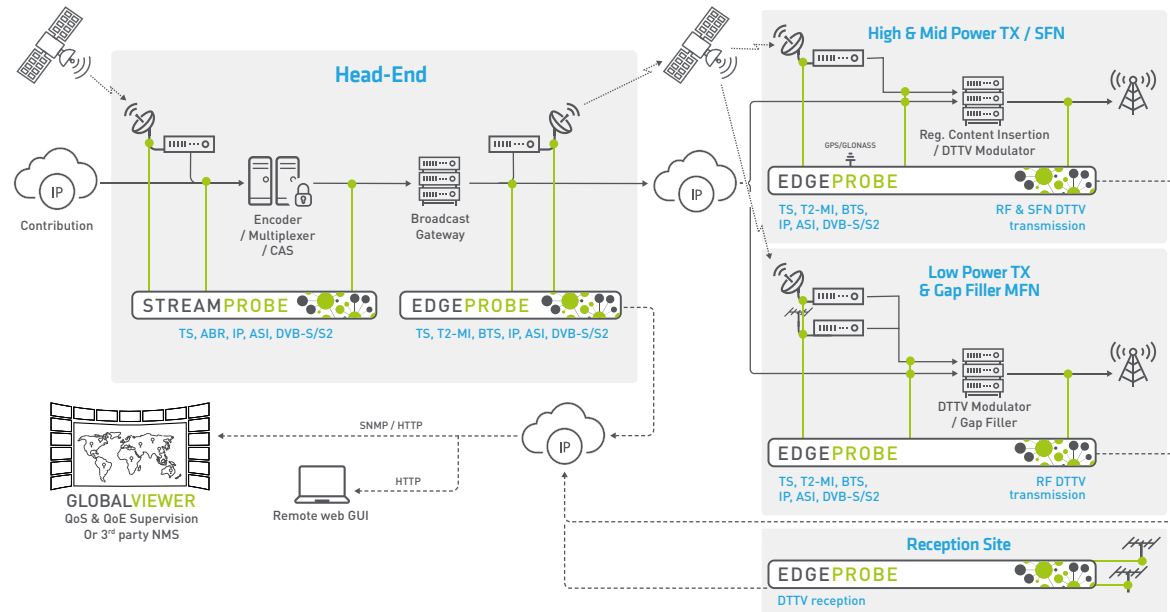
* Contact us for availability

DTTV Broadcast Network Operators

DVB-T/T2 ISDB-T/Tb DVB-S/S2

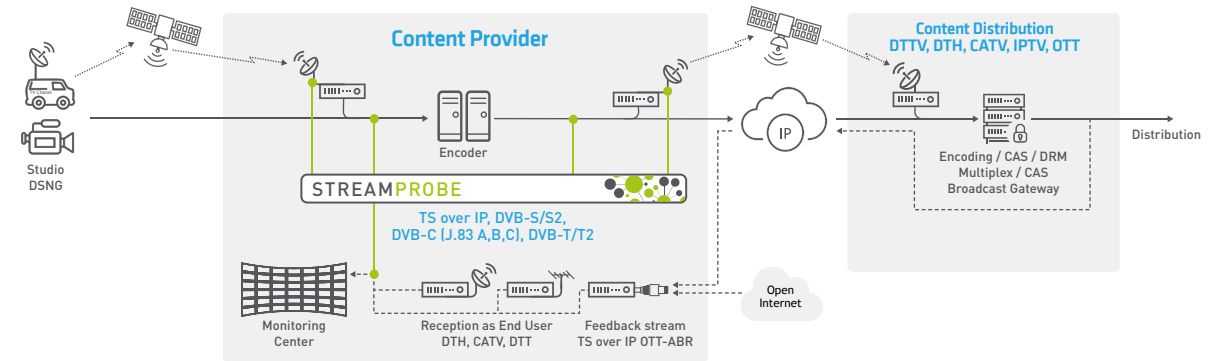
ATSC 3.0/1.0 See Page 23

dab+ See Page 25



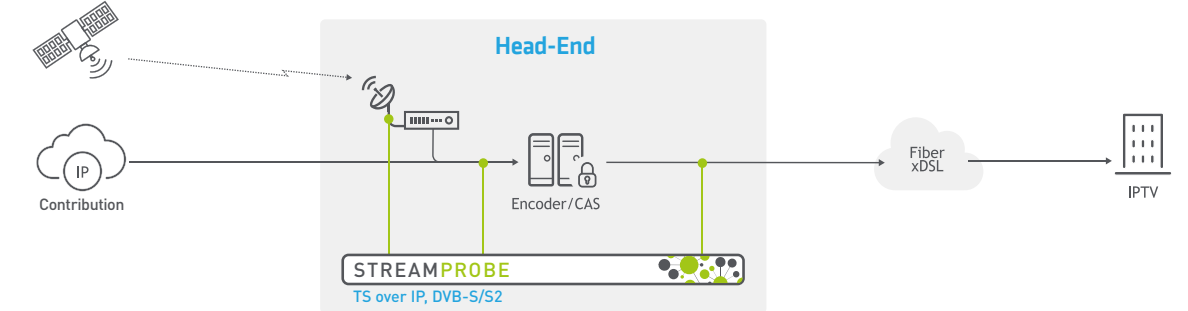
Video Content Provider

TSoIP OTT-ABR



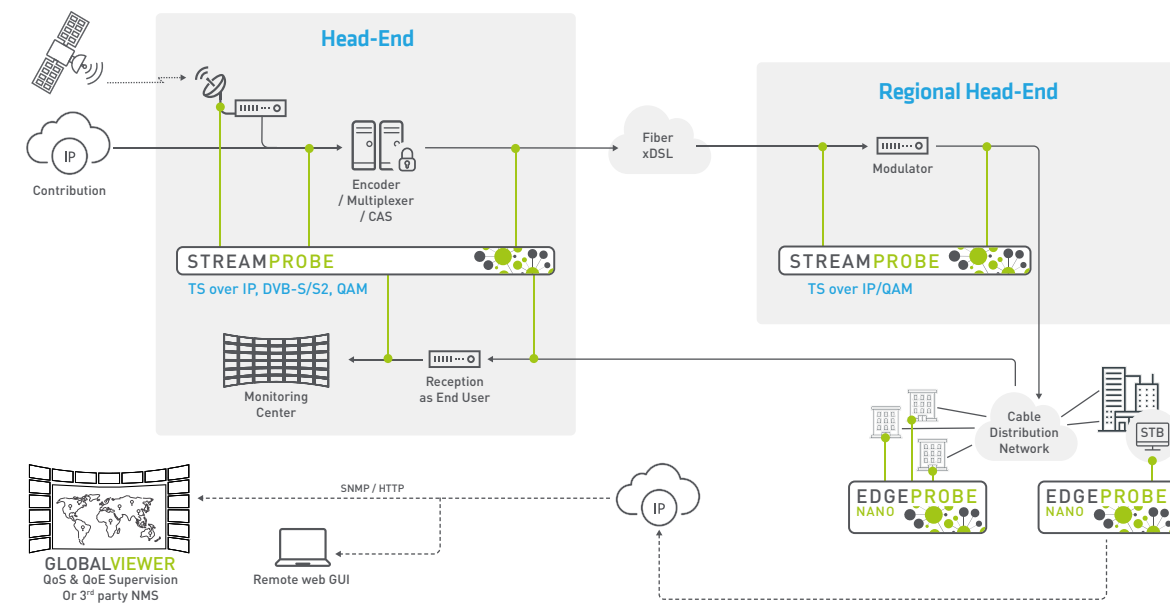
IPTV Service Platform Operator (Broadband ISP/Telco)

TSoIP



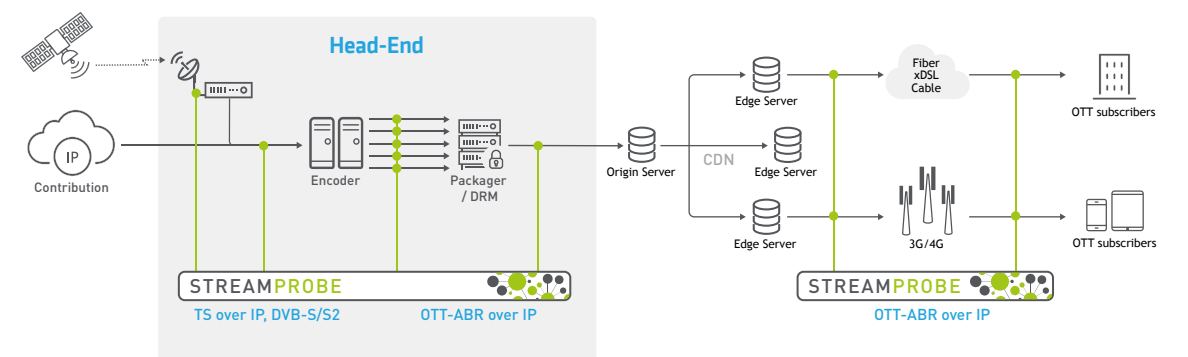
CATV Broadcast Network Operators

DVB (A, B, C)

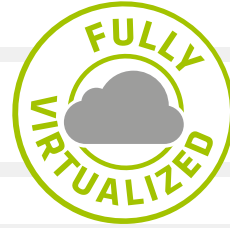


OTT Service Platform Operator (Live, VoD, Catch-up TV)

OTT-ABR



* Contact us for availability



GLOBALVIEWER

Centralize your Service Availability & Network Quality views!

APPLICATIONS

- **Live Supervision** of your Network's QoS
- **Centralized monitoring data** with a **real-time Dashboard**
- **Report generation** for SLA commitments
- **SMS/Email alerting**

BENEFITS

- **Centralized** management of your deployed EdgeProbe & StreamProbe
- **Easy to use and configure**
- **Compatible with low bandwidth control network (GPRS/3G/4G)**
- **Virtualized SW based solution**

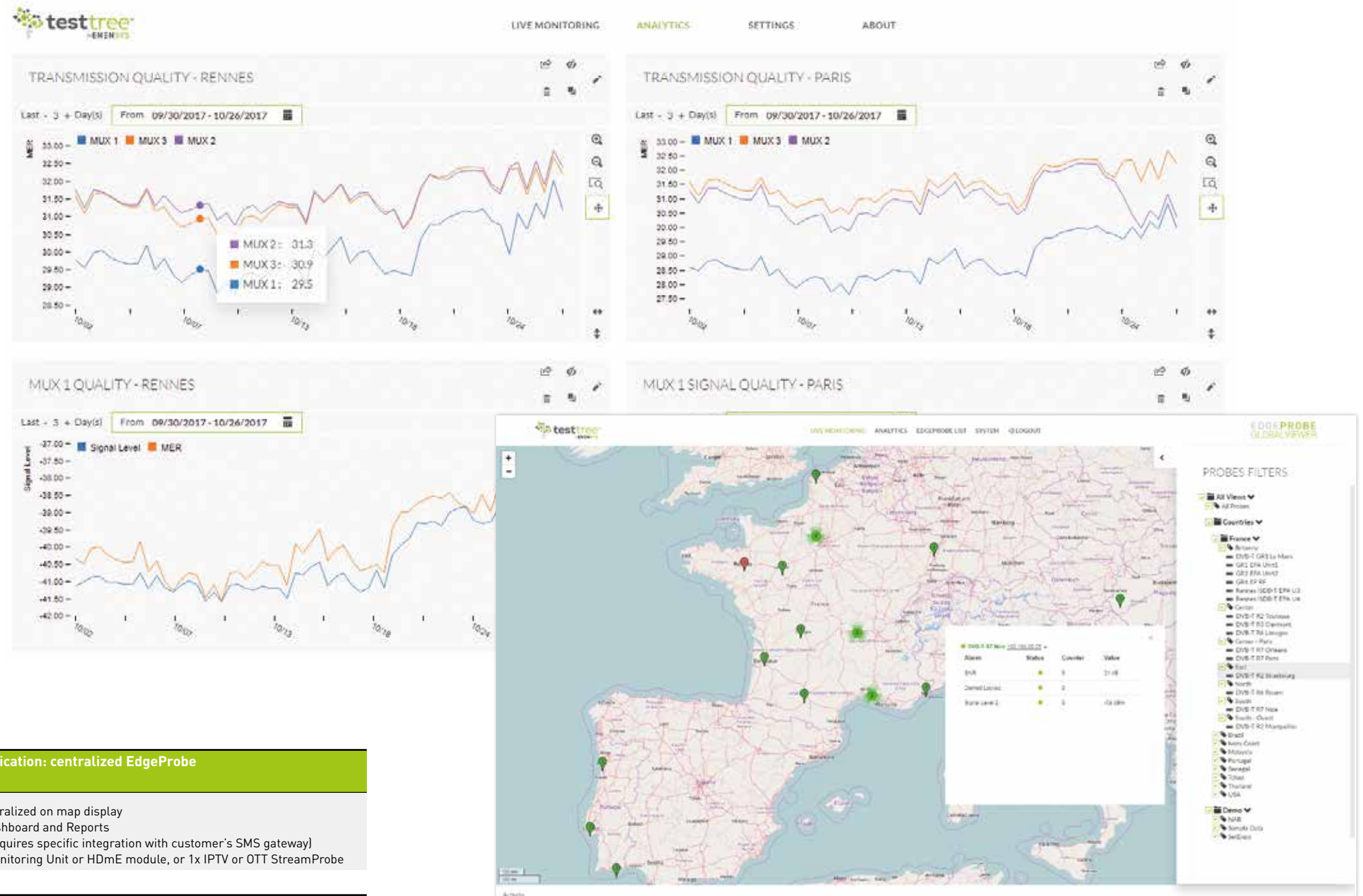
TECHNICAL CHARACTERISTICS

VM for hypervisor type 1 (ESXi >6.0)

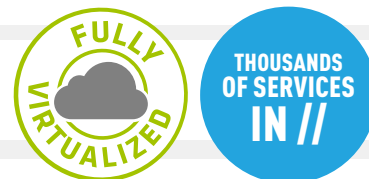
Minimum server requirement: 4 cores CPU, 16GB RAM, 100GB HDD; depending on the number of Probes to centralize

ORDERING CODES

GlobalViewer Perpetual Software License for server application: centralized EdgeProbe and StreamProbe monitoring		
Included	Supervision Analytics Alerting 10 Probes	Live monitoring status centralized on map display Monitoring data history Dashboard and Reports SMS/Email notifications (requires specific integration with customer's SMS gateway) 1 Probe = 1x EdgeProbe Monitoring Unit or HDmE module, or 1x IPTV or OTT StreamProbe
SW Options	Additional Probes	



STREAMPROBE IPTV OTT



StreamProbe is a high density & scalable software solution for content QoS & QoE monitoring throughout the video service processing chain.

APPLICATIONS

- **Monitoring of the content QoS & QoE:** received from contribution, prior & after encoding/packaging as well as from an end user point of view
- **Generation of Service Availability reports** for SLA commitments
- **Live TS Recording for Compliance Recording and conflict/litigation proof**
- **All services view at-a-glance:** Live Thumbnail Mosaic

BENEFITS

- **High density:** hundreds of services monitored in real-time & in parallel in a single 1RU server; 10Gb interfaces supported
- **Scalable:** from an all-in-one system to a fully distributed architecture
- **Software only:** Linux OS, VM for virtualized environments
- **Remotely accessible:** compatible with low bandwidth control networks (GPRS/3G/4G)
- **Northbound interface** (SNMP, open API)

KEY FEATURES IPTV

- **QoS TS monitoring:**
 - **MDI:** Delay Factor, Media Loss Rate, Delta (min, max, average), Drift & Period Drift
 - **FEC** support (packets recovered/lost), IP jitter
 - ETSI TR 101 290 Priority 1, 2, 3
 - **PSI/SI** repetition rates, scrambling
 - **Bitrates:** TS, service & service components, PSI/SI
- **QoE monitoring:**
 - **Video monitoring:** freeze, black screen, missing Intra detection
 - > PID codec information: type, pixel format, profile, level, GOP structure and size, image count and weight, width, height, aspect ration, frame rate and type, VB delay
 - **Audio monitoring:** levels, silence detection
 - > PID codec information: type, channel number and layout, sample rate and format
 - **Subtitles** DVB and Teletext: decoding and display
 - Formats: MPEG-1 audio, MPEG-2 audio/video, H264 SD & HD, 4K, HEVC
- **Live Thumbnail Mosaic:** all services or group filtering, audio levels, subtitles, penalty box
- **Live service(s) streaming** over low bandwidth links (service compression)
- **TS recording:** on error or manually scheduled
- **CA processing:**
 - EMM/ECM: presence, repetition, bitrates
 - **FTA <-> scrambled: transition** timing detailed display
- Configurable alarming thresholds: general and daily alarm profiles
- **NMS integration:** SNMPv2 support for alarm traps
- Monitoring information available via an open API (HTTP/JSON API)

TSoIP

KEY FEATURES OTT

- **QoS ABR monitoring:** playlist integrity & network performance check
 - **HLS, MPEG-DASH**
 - **Manifest** integrity check, content display & download
 - **Profile** information: availability, type, bitrate statistics, codec, resolution, base and relative URL, playlist content/format, chunk number, media sequence...
 - **Chunk** HTTP information: availability, length, bitrate statistics, playlist format
 - **HTTP connection** time statistics: connection, DNS redirection, upload, download
- **QoE monitoring:**
 - **Video monitoring:** freeze, black screen, missing Intra detection
 - > PID codec information: type, pixel format, profile, level, GOP structure and size, image count and weight, width, height, aspect ration, frame rate and type, VB delay
 - **Audio monitoring:** levels, silence detection
 - > PID codec information: type, channel number and layout, sample rate and format
 - **Subtitles** DVB and Teletext: decoding and display
 - Formats: MPEG-1 audio, MPEG-2 audio/video, H264 SD & HD, 4K, HEVC
- **Live Thumbnail Mosaic:** all services or group filtering, audio levels, subtitles, penalty box
- Configurable alarming thresholds: general and daily alarm profiles
- **NMS integration:** SNMPv2 support for alarm traps
- Monitoring information available via an open API (HTTP/JSON API)

ABR

QoE monitoring for Contribution/Encoding/Packaging



QoS & QoE Monitor: hundreds of services monitored in parallel ABR playlist integrity, ETR 101 290, audio silence, video freeze/black screen

Live Thumbnail Mosaic: all services, groups, penalty box, audio level, subtitles



TECHNICAL CHARACTERISTICS

- **SW solution:** Linux OS, VM for hypervisor type 1 (ESXi >6.0)
- Off the shelf server, 1RU or 2RU (for large number of RF receivers)
- CPU, RAM, HDD: depending on number of streams to monitor
- One or Multiple **IP Data:** 1Gbps, 10Gbps support
- One or Multiple **RF input(s)** F-type 75 Ω: **DVB-T/T2, DVB-S/S2, DVB-C (J.83 A,B,C)** receiver – demodulation for TS extraction
 - RF front end module: up to 4x RF inputs (8x RF channels tuning)
- One or Multiple **ASI input(s):** TS extraction

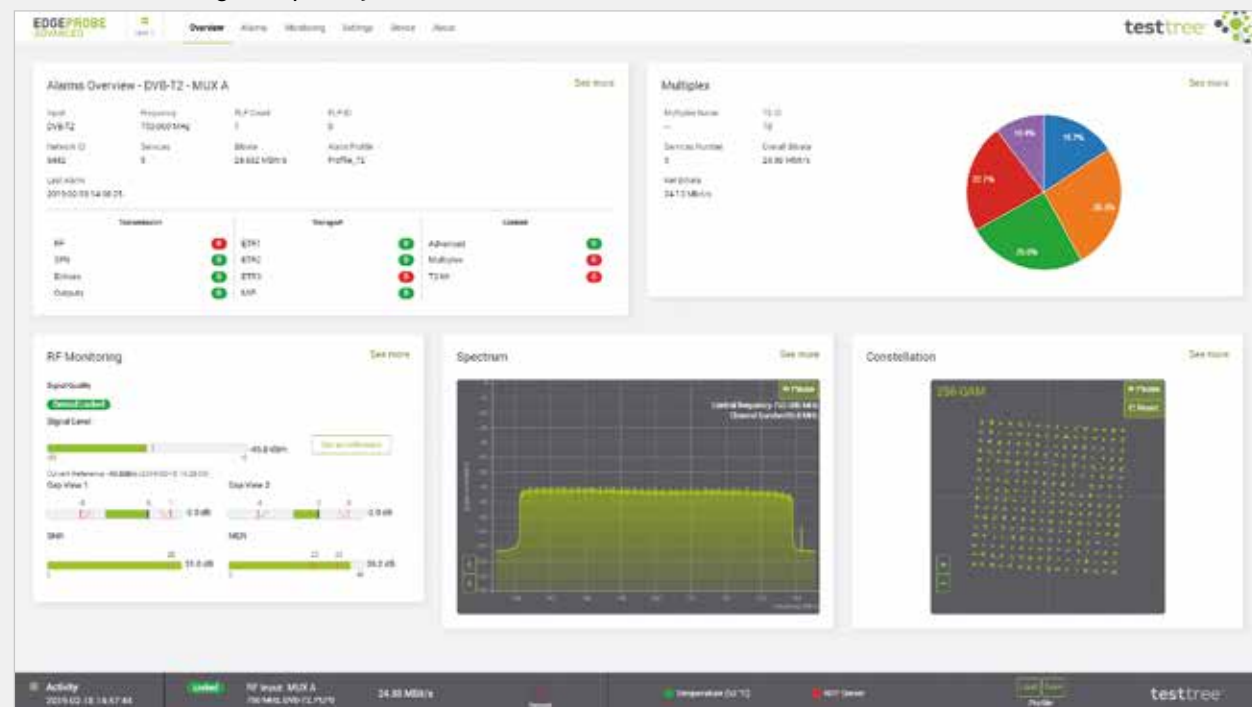
ORDERING CODES

StreamProbe IPTV		Perpetual software license for TS monitoring probe
Bitrate	Capacity bitrate to monitor per probe: 100Mbps, 300Mbps, 600Mbps, 1Gbps, 1.5Gbps, 2Gbps, 4Gbps, 7Gbps or custom	
Included	QoS Monitor TS	
SW Options	QoE Monitor HEVC & 4K QoE Compliance Recording On-error Recording Video Streaming CA Monitor CA Transition Monitor	Audio, Video monitoring and decoding, Live Thumbnail Mosaic; Formats: MPEG-2, H264 4K format support for QoE Monitor 24/7 recording of all streams/services - per 7-day depth periods On-error recording on all streams/services, 24/7 recording of 5 services (7-day depth) Live video streaming via the web GUI - per number of services streamed simultaneously EMM/ECM decoding Free-to-Air (FTA) <-> Scrambled transition timing monitoring
HW Options	RF Module	DVB-T/T2 or DVB-S/S2 or DVB-C (J.83 A,B,C) RF front end receiver
StreamProbe OTT HLS or StreamProbe OTT DASH		Perpetual software license for OTT- ABR monitoring probe
Bitrate	Capacity bitrate to monitor per probe: 100Mbps, 300Mbps, 600Mbps, 1Gbps, 1.5Gbps, 2Gbps, 4Gbps, 7Gbps or custom	
Included	QoS Monitor ABR	
SW Options	QoE Monitor HEVC & 4K QoE Round-Robin	Audio, Video monitoring and decoding, Live Thumbnail Mosaic; Formats: MPEG-2, H264 4K format support for QoE Monitor Split the list of URLs to monitor in sub-lists, monitor sequentially the sub-lists

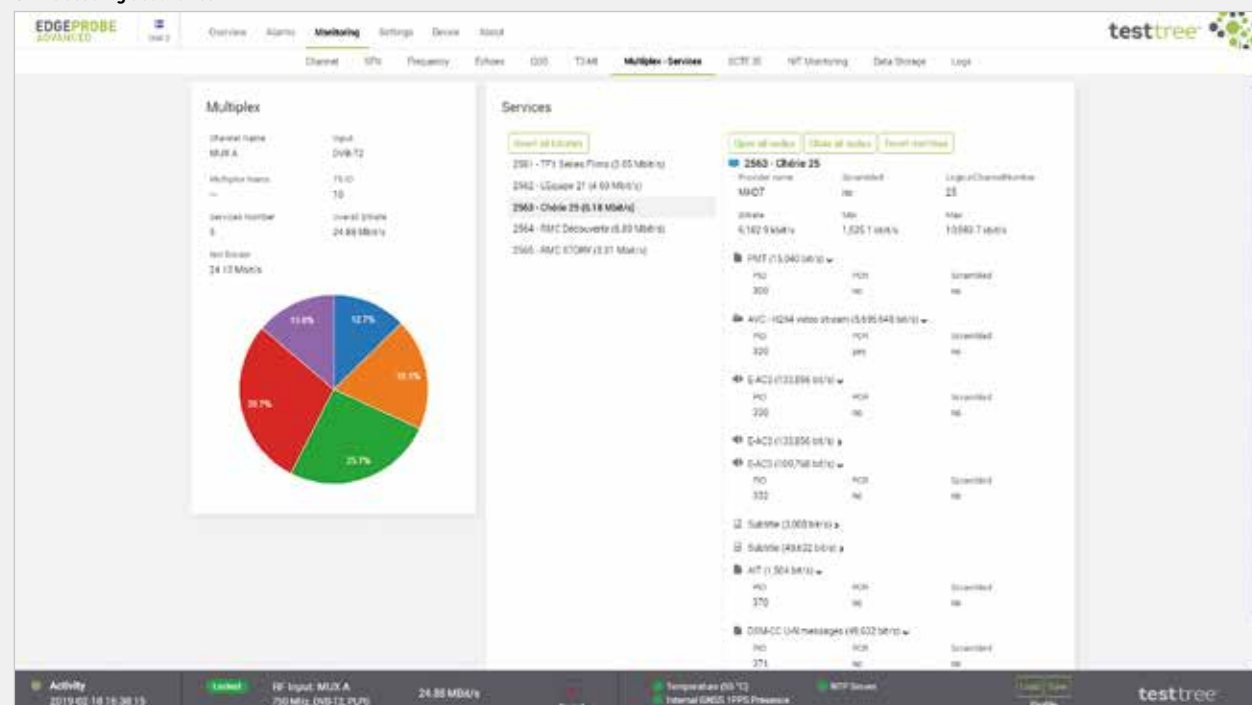
EDGEPROBE

RF & QoS monitoring for Broadcast Distribution & Transmission

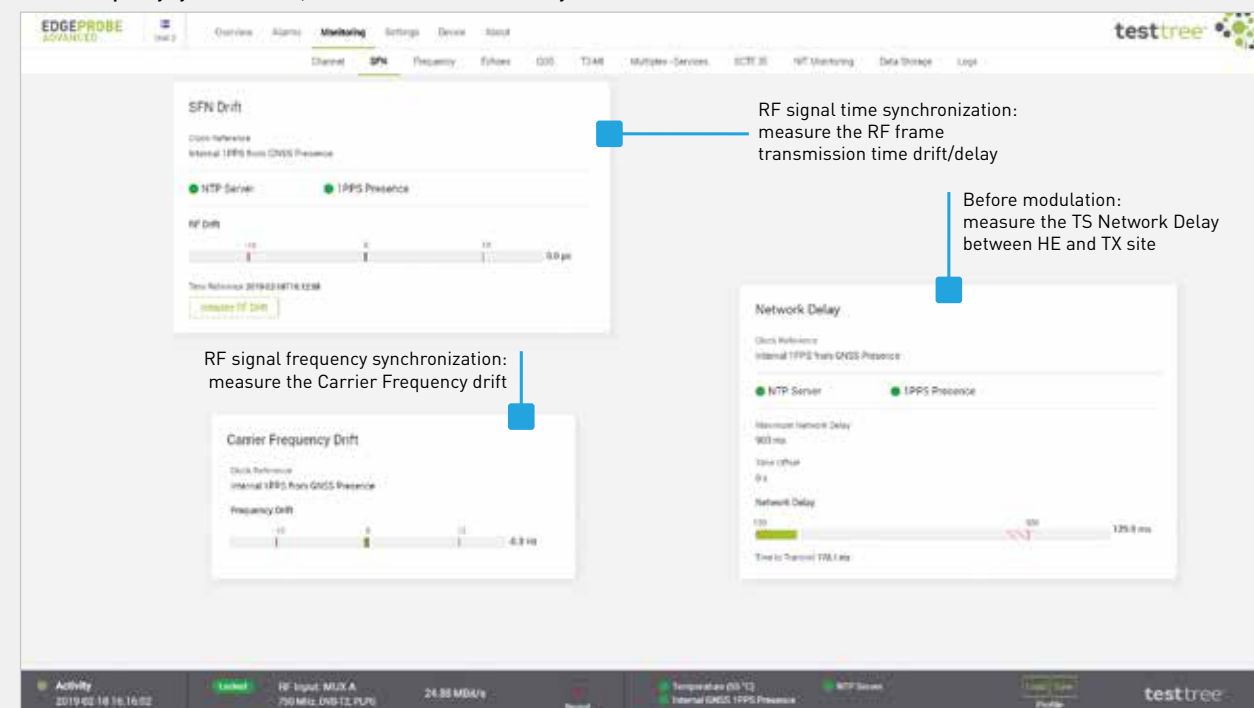
Accurate RF signal quality measures



ETR 101 290 compliance
STB decoding assurance

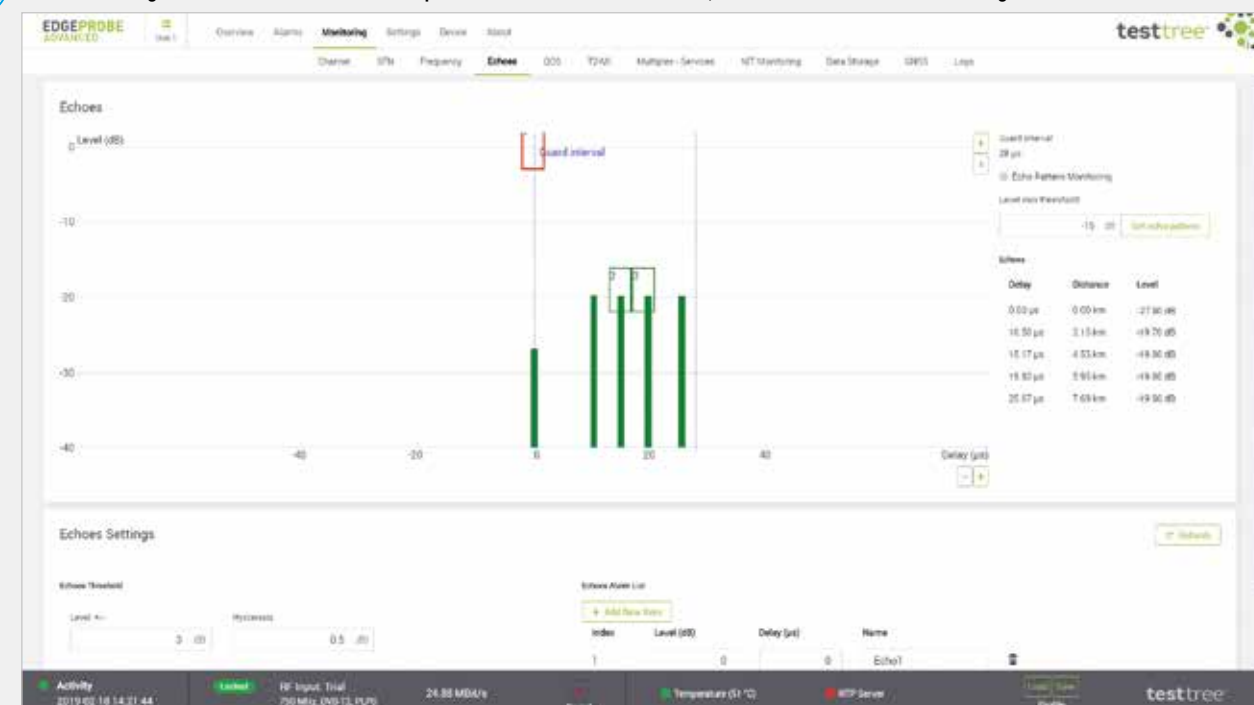


Reference SFN Monitoring – Transmission site
Time & frequency synchronization, distribution link Network Delay



Reference SFN Monitoring – Reception site

Echo monitoring with Echo Pattern mode – more precise echo in error identification, even if the main echo suffers changes!



EDGEPROBE ADVANCED

HE & SFN TX Site



DVB-T/T2 DVB-S/S2 ISDB-T/Tb DVB-C J.83 A, C

ATSC 3.0/1.0
See Page 23

dab+
See Page 25



KEY FEATURES

- **DTT & CATV RF** accurate measurements: **signal level, SNR, MER, BER**
- **DTT RF spectrum and constellation** display, **shoulders** measurements
- **DTT SFN synchronization** monitoring:
 - RF Frame Time Drift, Carrier Frequency Drift
 - **Channel Impulse Response** with **unique Echo Pattern** mode: reliable echo in error identification when main echo suffers changes
 - **Network Delay**: TS/T2-MI over IP/ASI input
- **Satellite RF** accurate measurements :
 - Signal level, CNR, link margin, Eb/N0, BER
 - Multi-stream support, PLS support (root/gold)
 - LNB power and control
- **IP Distribution** link monitoring:
 - FEC support (packets recovered/lost), **IP jitter** (Inter-Packet Arrival Time)
- **TS ETSI TR 101 290** validation: Priority 1, 2, 3
 - Optional QoS SAE (Service Availability Error), SDE (Service Degradation Error)
- **Service Plan** monitoring: multiplex structure, bitrate and regionalization check
- **T2-MI** monitoring: L1 pre/post signaling, ETSI TR 101 290 T2-MI alarms, PLP TS extraction, Network Delay
- **OneBeam/Single Illumination** monitoring: T2-MI marker, In-Band PIDs
- **BTS** monitoring: IIP, TMCC packets
- **Service streaming** over **low bandwidth links** (compression down to 500Kbps) (See Page 21)
- Demodulated **TS streaming** over control **IP out**, or **retransmission** over **ASI out**
- **Smart Retransmission** Receiver (DVB-T/T2): **mute the TS retransmission** over ASI out upon RF signal degradation
- Trigger RF signal capture on RF-Catcher (See Page 30)



EdgeProbe Advanced is the ideal tool to achieve accurate & cost-effective monitoring of the quality actually delivered to all points of a DTV broadcast network.

APPLICATIONS

- **24/7 Monitoring and Maintenance of both Head-End and TX sites: DTV/CATV RF transmission (SFN/MFN), Satellite RF distribution, ASI/IP Baseband distribution**
- **Generation of Service Availability reports for Service Level Agreements**
- **Rebroadcasting receiver: RF to ASI or IP**
- **Live transmission recorder**

KEY BENEFITS

- **Standalone, easy to use and configure, fast deployment, SNMP compatible**
- **Reduce TX sites maintenance cost by anticipating and identifying issues**
- **Increase customer satisfaction by detecting & preventing DTV network degradations before your customers do**
- **Remotely accessible, compatible with low bandwidth control networks (GPRS/3G/4G)**
- **Low power consumption 25W**

TECHNICAL CHARACTERISTICS

EdgeProbe Advanced models: **DVB-T/T2, DVB-S/S2, ISDB-T/Tb, DVB-C (J.83 A,C), DAB/DAB+** (See Page 25), **ATSC 3.0/1.0** (See Page 23) or **any combination of two of these standards in 1RU**

Up to **4x [RF in, ASI in/out, IP Data in/out (VLAN support)]** in **1RU**

1 or 2x IP Control for low bandwidth remote Web GUI

Up to **4x 32 GB storage** for TS record and 6 months logs & trends

1PPS: external or internal from **GNSS** receiver (GPS, GLONASS), **10MHz**

2x **DVB-CI** slots (decrypt up to two CA systems in parallel)*

Up to 4x HDMI outputs* / 1x ETH in/out (alarm dry contact)* / Dual Power Supply

ORDERING CODES

EdgeProbe Advanced	DTV Advanced Monitoring Probe	
EdgeProbe Advanced CHASSIS is composed of 2 BOARDS, each board supporting 2 parallel MONITORING UNITS		
Select your standard BOARD 1	ATSC 3.0/1.0 or DVB-T/T2 or DVB-S/S2 or ISDB-T/Tb or DVB-C (J.83 A,C) or DAB/DAB+	
Select your standard BOARD 2	ATSC 3.0/1.0 or DVB-T/T2 or DVB-S/S2 or ISDB-T/Tb or DVB-C (J.83 A,C) or DAB/DAB+	
Included	1 active Monitoring Unit, RF + SFN + CIR + Frequency Drift monitoring, TS over ASI/IP input support, VLAN, RF to ASI/IP TS retransmission	
CHASSIS HW Options	Dual Power Supply Internal GNSS TRANSBOX	100-240 VAC redundant power supply Internal GNSS receiver (GPS, GLONASS) for internal 1PPS generation Stream 1 or 2 compressed service(s) (See Page 21)
Select your options per DTV BOARD (See Page 25 for DAB+ EdgeProbe Advanced model)		
SW Options	Dual ADV TS Monitor Base TS Monitor Advanced QoS Monitor Service Plan T2-MI Monitor BTS Monitor OneBeam/Single Illumination IP Monitor Scanning	Activate 2 nd Monitoring Unit: total of 2x (RF + ASI + IP Data) ETR290 Priority 1, 2 monitoring ETR290 Priority 3 monitoring SAE, SDE monitoring Multiplex Service/PID monitoring T2-MI monitoring IIP & TMCC packets monitoring T2-MI marker & In-Band PIDs monitoring Jitter, RTP/FEC, Packet Loss/Recovery monitoring Multiple channels (RF, ASI, IP) sequential round-robin monitoring
HW Options	Extended Memory DVB-CI* HDMI*	32 GB internal storage: trends, logs, TS record Dual CAM slot HDMI output

* Contact us for availability

EDGEPROBE ADVANCED for HDc



DVB-T/T2 model of EdgeProbe Advanced comes in the form of an independent module (HDmE), for High Density chassis (HDc) 19" 1RU, which provides:

DENSITY	MODULAR	HOT PLUG	SCALABLE	RELIABLE
HIGH DENSITY Up to 6 products in the same chassis	MODULARITY Combine DVB-T/T2 EdgeProbe Advanced with different type of ENENSYS products (T2Edge, T2Edge-DTH, ASIIPGuard, NetMod) in the same chassis	STRAIGHT FORWARD MAINTENANCE All products are hot swappable and may be automatically configured	SCALABILITY Start with one product and upgrade with additional products later	RELIABILITY Hot plug and independent products with redundant power supply in 220V or 48V

ORDERING CODES

HDc-Multi-220V	High Density chassis with 220V input	
HDc-Multi-48V	High Density chassis with 48V input	
CHASSIS HW options	HDcMulti-In220VRedundant HDcMulti-In48VRedundant	110V/220V redundant power supply 48V DC redundant power supply
Up to x6 monitoring modules	HDmE	High Density module EdgeProbe Advanced for DVB-T/T2
HDmE SW Options	See above for DVB-T/T2 EdgeProbe Advanced SW options	

EDGEPROBE RF NANO

MFN TX Site

Reception Site

DVB-T/T2 ISDB-T/Tb DVB-C J.83 A, B, C

EdgeProbe RF is the ideal & most cost-effective high-quality solution for controlling remotely the signal transmission of your low/mid power TX & relay sites that are sometimes difficult to reach.

EdgeProbe Nano is the most tiny and compact RF probe with no compromise on quality!



APPLICATIONS RF

- 24/7 Monitoring and Maintenance of DTV live transmission
- Cost-effective Monitoring of transmitters and relay sites
- Generation of Service Availability reports for Service Level Agreements
- Rebroadcasting receiver: RF to ASI or IP (including MUTE feature)
- Live transmission recorder

APPLICATIONS NANO

- Network operators:
 - automate the tests of new transmitters
 - temporary monitoring/investigation tool
 - rebroadcasting receiver: RF to ASI or IP
- Broadcasters: off-air monitoring probe to validate the on-air content
- TV/STB producers: automated tests against a professional receiver
- Labs: easy & simple access to live DTV sources via RF

KEY BENEFITS

- Standalone, easy to use and configure, fast deployment, SNMP compatible
- Increase customer satisfaction by detecting & preventing DTV network degradations before your customers do
- Reduce TX sites maintenance cost by anticipating and identifying issues
- Remotely accessible, compatible with low band width control networks (GPRS/3G/4G)
- Low power consumption 8W
- Enables SNMP test automation

KEY FEATURES

- RF accurate measurements: signal level, SNR, MER, BER
- Channel Impulse Response monitoring with unique Echo Pattern mode: reliable echo in error identification when main echo suffers changes
- TS ETSI TR 101 290 validation: Priority 1, 2, 3 and optional QoS SAE/SDE
- BTS monitoring: IIP, TMCC packets
- Service Plan monitoring: multiplex structure, bitrate and regionalization check
- Service Streaming over low bandwidth links (compression down to 500Kbps) *(See page 21)*



- Demodulated TS streaming over control IP out, or retransmission over ASI out
- Smart Retransmission Receiver (DVB-T/T2): mute the TS retransmission over ASI out upon RF input signal degradation
- Automated & Secure Deployment for small to large networks:
 - SNMPv2 support: alarm traps, monitoring information polling, monitoring settings control
 - FTP connection: log file retrieval, automatic firmware and configuration update
- Trigger RF signal capture on RF-Catcher *(See Page 30)*

TECHNICAL CHARACTERISTICS

EdgeProbe RF & Nano models: DVB-T/T2/T2 Lite, ISDB-T/Tb, DVB-C (J.83 A,B,C)

1x RF in, 1x ASI out, 1x IP Control/Data in/out (VLAN support)

32 GB storage for TS record and 6 months logs & trends

ORDERING CODES

EdgeProbe Nano or EdgeProbe RF DTV RF Monitoring Probe

Select your standard	DVB-T/T2/T2 Lite or DVB-C/C2 or ISDB-T/Tb	
Included	RF + CIR monitoring, TS over IP input support, VLAN, RF to ASI/IP TS retransmission	
SW Options	Scanning TS Monitor Base TS Monitor Advanced QoS Monitor Service Plan BTS Monitor Extended Memory	Multiple RF channels sequential monitoring over 1 RF input ETR290 Priority 1, 2 monitoring ETR290 Priority 3 SAE, SDE monitoring Multiplex Service/PID monitoring IIP & TMCC packet monitoring 32 GB storage: trends, logs, TS record
HW Options	TRANSBOX Tropicalization	Stream 1 or 2 compressed service(s) <i>(See below)</i> Preserve the HW from corrosion



TRANSBOX

Confidence monitoring: live service streaming over low bandwidth network links!

Controlled by one EdgeProbe unit (Advanced, RF, Nano), the TRANSBOX provides real-time:

- Service extraction from the input TS (SPTS or MPTS received from the EdgeProbe)
- Service compression (audio/video transcoding, including subtitles): down to 500 Kbps
- Streaming the compressed SPTS over low bandwidth IP Data to third party systems



TECHNICAL CHARACTERISTICS

1 or 2 Transcoding Units (TU) in 1 RU (1 or 2 services transcoded simultaneously: up to 10 min)

1 TU is controlled by with 1 EdgeProbe Unit

1x IP Data in/out (GbE) and 1x IP Control (100 Mbps) per TU

Unicast, VLAN support for IP Data in/out

40 Mbps maximum input bitrate

500 Kbps to 10 Mbps output bitrate

Audio/Video input/output formats *(Contact us for details)*

Output video resolution: CIF, DCIF, 2CIF, 4CIF

Output audio bitrate: 32 kbps to 192 kbps

HbbTV, subtitles, private data supported

APPLICATIONS

- Confidence monitoring: live transmission check
- Validate regional service and/or ad insertion
- Service (audio/video) compression & streaming

KEY BENEFITS

- Easy to use and configure: transcoding controlled via the master EdgeProbe unit, SNMP compatible
- Compatible with low bandwidth data networks: down to 500 Kbps compressed streams
- Low power consumption 5W

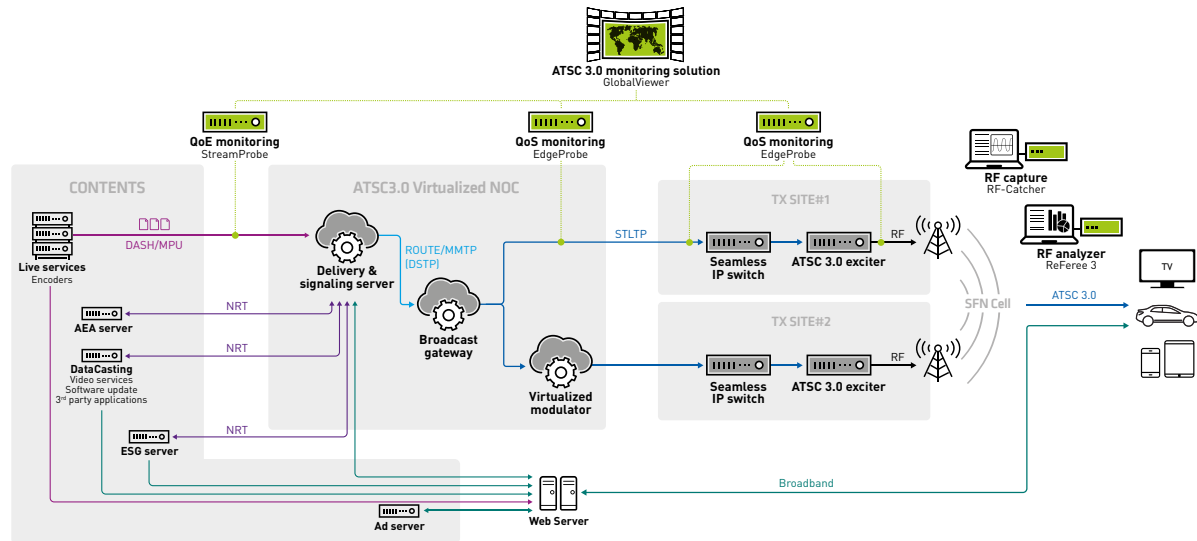
ORDERING CODES

TRANSBOX Transcoding Unit for EdgeProbe

HW Option	Dual	Two parallel transcoding units in 1 RU
-----------	------	--

ATSC 3.0 BROADCAST NETWORKS

RELIABLE END-TO-END SOLUTION PROVIDED BY ENENSYS TestTree



Centralized Network Quality & Service Availability

→ **GLOBALVIEWER** See Page 12



Full-software monitoring for virtualized Head-End

→ **STREAMPROBE** See Page 14



World-renowned SFN Monitoring (TX/RX)

→ **EDGEPROBE** See Page 23



Efficient Lab & Field operation with world-deployed analyzers & recorders

→ **RF-CATCHER**

See Page 30



→ **REFEREE 3**

See Page 35



EDGEPROBE ADVANCED

HE & SFN TX Site
Reception Site



ATSC 3.0/1.0

EdgeProbe Advanced ATSC is the ideal tool to achieve accurate & cost-effective monitoring of the quality actually delivered to all points of an ATSC 3.0/1.0 network.

KEY FEATURES

- RF accurate measurements: **signal level, SNR, MER, BER**
- RF spectrum and constellation display, **shoulders** measurements
- SFN synchronization monitoring:
 - TX ID detection and echo association
 - RF Frame Time Drift
 - **Channel Impulse Response** with **unique Echo Pattern** mode: reliable echo in error identification when main echo suffers changes
 - **Network Delay**: STLTP over IP input
- IP Distribution link monitoring:
 - FEC support (packets recovered/lost), **IP jitter** (Inter-Packet Arrival Time)
- ATSC 1.0 TS ETSI TR 101 290 validation: Priority 1, 2, 3
 - Optional QoS SAE (Service Availability Error), SDE (Service Degradation Error)
- **Service Plan** monitoring: multiplex structure, bitrate and regionalization check
- STLTP integrity, Network Delay
- ATSC 1.0 **Service streaming over low bandwidth links** (compression down to 500Kbps) [See Page 21]
- Demodulated ATSC 1.0 TS streaming over control IP out, or retransmission over ASI out
- Trigger RF signal capture on RF-Catcher [See Page 30]



TECHNICAL CHARACTERISTICS

EdgeProbe Advanced models: **DAB/DAB+, DVB-S/S2, DVB-T/T2, DVB-C/C2, ISDB-T/Tb, ATSC 3.0/1.0** or any combination of two of these standards [See Page 18 for DVB-T/T2, DVB-C/C2, ISDB-T/Tb, DVB-S/S2, ATSC 3.0/1.0]

Up to 4x [RF in, ETI in/out (NI, NA), IP Data in/out (VLAN support)] in 1 RU

Up to 2x IP Control for low bandwidth remote Web GUI

Up to 4x **32 GB storage** for 6 months logs & trends

1PPS: external or internal from **GNSS** receiver (GPS, GLONASS), **10MHz**

ORDERING CODES

EdgeProbe Advanced ATSC 3.0/1.0 Advanced Monitoring Probe

EdgeProbe Advanced CHASSIS is composed of 2 BOARDS, each board supporting 2 parallel MONITORING UNITS

Select your standard BOARD 1	ATSC 3.0/1.0 or DVB-T/T2 or DVB-S/S2 or ISDB-T/Tb or DVB-C (J.83 A,C) or DAB/DAB+
Select your standard BOARD 2	ATSC 3.0/1.0 or DVB-T/T2 or DVB-S/S2 or ISDB-T/Tb or DVB-C (J.83 A,C) or DAB/DAB+
Included	2 active Monitoring Units, RF + SFN + CIR + ATSC 1.0 TS over ASI/IP input support, VLAN Scanning, Extended Memory
CHASSIS HW Options	Dual Power Supply, Internal GNSS
Select your options per DTV BOARD	[See Page 25 for DAB+ EdgeProbe Advanced model]
SW Options	RF Monitor ATSC 3.0/1.0, ATSC 1.0 TS Monitoring, ATSC 3.0 STLTP Monitoring, IP Monitoring

Multiple channels (RF, ASI, IP) sequential round-robin monitoring
32 GB internal storage: trends, logs, TS record

100-240 VAC redundant power supply
Internal GNSS receiver (GPS, GLONASS) for internal 1PPS generation

RF transmission, spectrum, constellation, CIR and SFN Time Drift
ETR 101 290 priority 1, 2, 3 and Multiplex Service Plan over ASI/IP
STLTP Network Delay and integrity
Jitter, RTP/FEC, Packet Loss/Recovery monitoring

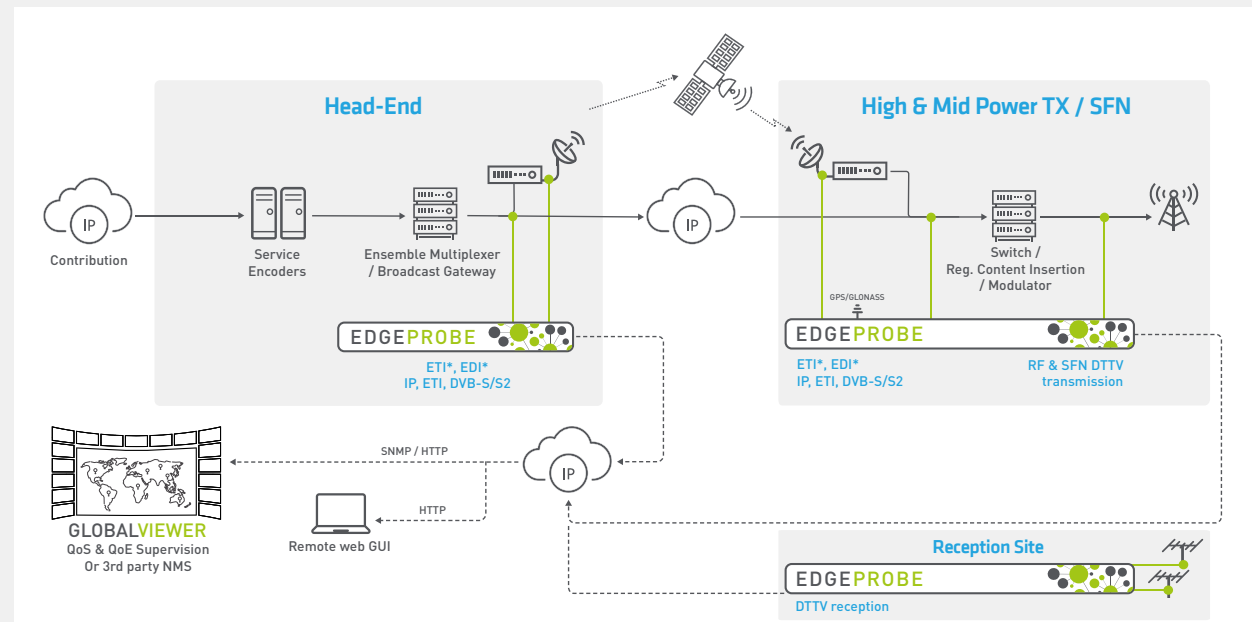
APPLICATIONS

- **24/7 Monitoring and Maintenance** of both **Head-End and TX sites**: RF transmission (SFN/MFN), **Satellite RF distribution, IP Baseband distribution**
- **Generation of Service Availability reports** for Service Level Agreements
- **SFN Monitoring in Reception Areas**: put yourself in the customer shoes

KEY BENEFITS

- **ATSC 1.0 compatible** for repack monitoring
- **Standalone, easy to use and configure, fast deployment, SNMP compatible**
- **Reduce TX sites maintenance cost** by anticipating and identifying issues
- **Increase customer satisfaction** by detecting & preventing DTV network degradations before your customers do
- **Remotely accessible, compatible with low bandwidth control networks (GPRS/3G/4G)**
- **Low power consumption 25W**

DIGITAL RADIO NETWORKS

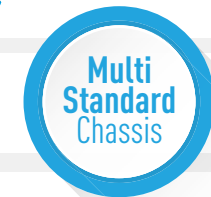


* Contact us for availability



EDGEPROBE ADVANCED

SFN & MFN TX Site
Reception Site



EdgeProbe Advanced DAB/ DAB+ is the ideal tool to achieve accurate & cost-effective monitoring of the quality actually delivered to all points of a Digital Radio network.

KEY FEATURES

- DAB/DAB+ support, compatible Band III VHF (168 to 240 MHz)
- Mode I, II support: automatic detection
- RF accurate measurements: **signal level, SNR, MER, FIB BER, MSC BER (per subchannel)**
- RF spectrum, shoulder monitoring, constellation
- SFN Time Drift monitoring
- Channel Impulse Response:
 - Echoes delay & level alarms
 - **Echo Pattern monitor**: reliable echo in error identification when main echo suffers changes
 - TII decoding and presence detection



DAB transport monitoring: FIC, CU occupation, sub-channel structure
 Ensemble Service Plan: check ensemble structure
 Service information (SI), PAD (DLS, MOT/SLS)
 Audio processing: silence detection, audio recording and streaming
 ETI, EDI input analysis

TECHNICAL CHARACTERISTICS

EdgeProbe Advanced models: **DAB/DAB+, DVB-S/S2, DVB-T/T2, DVB-C/C2, ISDB-T/Tb, ATSC 3.0/1.0** or any combination of two of these standards (See Page 18 for DVB-T/T2, DVB-C/C2, ISDB-T/Tb, DVB-S/S2, ATSC 3.0/1.0)

Up to 4x [RF in, ETI in/out (NI, NA), IP Data in/out (VLAN support)] in 1 RU

Up to 2x IP Control for low bandwidth remote Web GUI

Up to 4x **32 GB storage** for 6 months logs & trends

1PPS: external or internal from **GNSS** receiver (GPS, GLONASS), **10MHz**

Up to 4 **analog audio output** TRS 3.5mm

1x ETH in/out (alarm dry contact)*

Dual Power Supply

ORDERING CODES

EdgeProbe Advanced Digital Radio Advanced Monitoring Probe

EdgeProbe Advanced CHASSIS is composed of 2 BOARDS, each board supporting 2 parallel MONITORING UNITS

Select your standard BOARD 1	DAB/DAB+ or DTV (DVB-S/S2 or DVB-T/T2 or DVB-C/C2 or ISDB-T/Tb or ATSC 3.0/1.0)
Select your standard BOARD 2	DAB/DAB+ or DTV (DVB-S/S2 or DVB-T/T2 or DVB-C/C2 or ISDB-T/Tb or ATSC 3.0/1.0)
Included	1 active Monitoring Unit, RF + ETI + IP Data, 32 GB internal storage per Unit, sequential round-robin monitoring, analog audio output

CHASSIS HW Options	Dual Power Supply	100-240 VAC redundant power supply
	Internal GNSS	Internal GNSS receiver (GPS, GLONASS) for internal 1PPS generation
Select your options per Digital Radio BOARD (See Page 18 for DTV EdgeProbe Advanced model)		
SW Options	Dual ADV	Activate 2 nd Monitoring Unit: total of 2x (RF + EDI + IP Data)
	RF DAB Monitor	RF signal quality, CIR - Echoes, SFN monitoring
	Transport Ensemble Service	FIC, MSC, Ensemble Services monitoring, silence detection*, audio streaming*
	ETI/EDI Monitor*	ETI/EDI input monitoring
HW Options	RF N-type connector	Equip the RF inputs with N-type female 50 Ω connectors (by default F-type female 75 Ω)

* Contact us for availability



TEST TOOLS FOR LAB & FIELD

RF CAPTURE/PLAYBACK & GENERATE

70 MHz – 6 GHz frequency range with down conversion for Ku/C band

RF-Catcher Starter Kit RF record, playback and spectrum analysis	30
Application Suite for RF-Catcher	32
ATSC 3.0 LabMod STL Gateway approved Modulator for Labs	33
RF-LiveSim Real-time RF Channel Simulator	34

ANALYZE RF & BASEBAND

Multi-standard (ATSC 3.0/1.0, DVB-T/T2, DVB-C/C2, DVB-S/S2, ISDB-T/Tb) professional measurement receivers and pocket-size analyzers, recorders and players; connected via USB to a Windows PC running the DiviSuite analysis software

ReFeree 3 <small>NEW</small>	35
DiviSuite™	36
DiviSuite Base	
DiviSuite options: RF Scope, TS Analyzer, T2-MI Analyzer, Drive Test Coverage	
Hardware products used with the DiviSuite	41
ReFeree II	
DiviCatch RF Series	
DiviDual ASI + SPI (LVDS or TTL)	
DiviDual ETI	
Pure software application using the DiviSuite	45
DiviSuite-IP	



TEST TOOLS FOR LAB & FIELD DEVICE SELECTOR

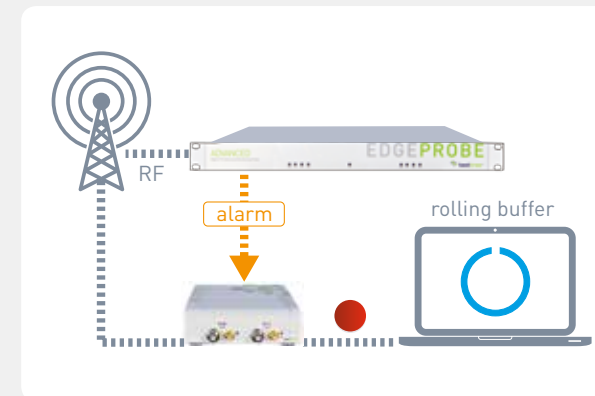
LIGHTWEIGHT DEVICES USB SELF-POWERED		RF Record & Playback	RF Spectrum Analysis	RF Demodulation	SFN Measurements	Baseband TS	T2-MI	STLTP	DAB+ ETI	GNSS Tracking	Factory Calibration
PORTABLE SPECTRUM ANALYZER											
	RF-Catcher	•	•							•	
MEASUREMENT RECEIVERS											
	ReFeree 3 <small>NEW</small>		•	ATSC 3.0/1.0	•			•		•	•
	ReFeree II			DVB-T DVB-T2 DVB-C DVB-C2	•	•	•			•	•
PROFESSIONAL RECEIVERS											
	DiviCatch RF-S/S2			DVB-S DVB-S2		•	•				
	DiviCatch RF-ISDB-T/TB			ISDB-T/Tb		•					
	DiviCatch RF-T/C T2/C2			DVB-T DVB-T2 DVB-C DVB-C2		•	•				
	DiviCatch RF-C			DVB-C ITU-J83 Annexes A, B, C		•					
BASEBAND ADAPTERS											
	DiviDual ASI+SPI					•	•				
	DiviDual ETI								•		
PURE SOFTWARE APPLICATION											
	DiviSuite IP			If Hardware Device connected		•	•				



In their «all options» package, our test devices can be shipped in max 48h

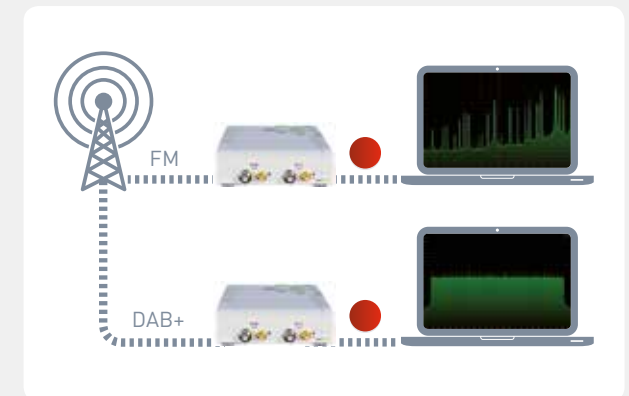
RF RECORDING & PLAYBACK

USE-CASES



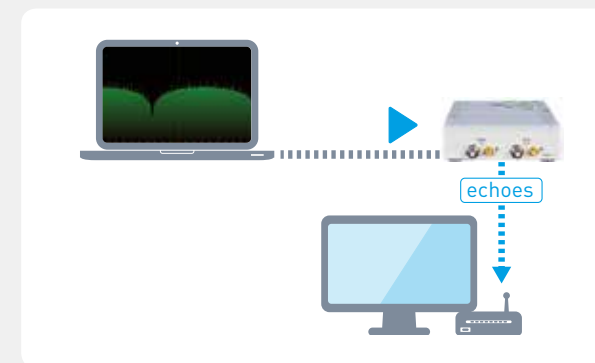
Interference Detection

RF record triggering with rolling buffer
Playback to analyze QoS artefacts
Setup: RF-Catcher + Event Trigger + EdgeProbe



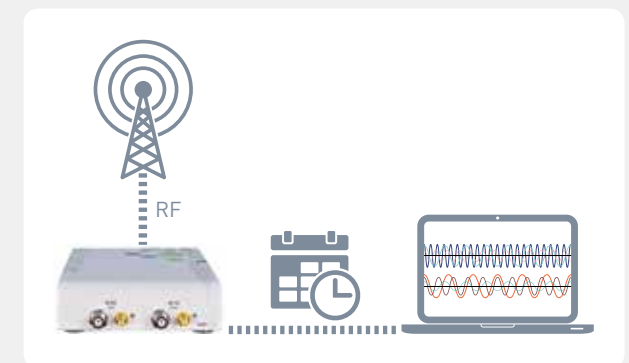
FM/DAB+ Switchover

Synchronized RF records and/or playbacks
Radio switchover testing from DAB+ to FM
(also compatible with other signals)
Setup: 2x RF-Catcher + Event Trigger (+ IQ Splitter)



TV/STB Validation

Receivers testing to the edge (echoes, noise)
Field configuration testing in the lab
Setup: RF-Catcher + RF TroubleMaker



Broadcast Stations Control

Power level monitoring in reception areas
Automated RF signal recording & playback
Setup: RF-Catcher + Task Scheduler

and also...

PORTABLE AND COMPACT

600g
163 x 115 x 27 mm

RF TROUBLESHOOTING

BRING THE WORLD WITH YOU

EASY TO USE NO NEED TO BE AN EXPERT

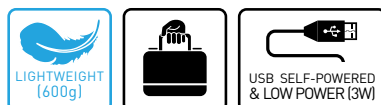


RF-CATCHER STARTER KIT

The Most Compact RF Capture & Playback device!

Covering a frequency range from 70 MHz up to 6 GHz, RF-Catcher can record and play real-time RF bandwidth up to 55 MHz.

RF-Catcher allows experimentation of a wide range of signals including Radio (FM, DAB...), TV broadcast (DVB-T/T2, C/C2, ISDB-T, etc...), cellular, Wi-Fi, up to satellite signals (DVB-S/S2). The RF-Catcher is equipped with LNB control for frequency down conversion of Ku/C bands. The integrated GNSS receiver provides precise location information; KML file, metadata, NMEA compatible.



The RF-Catcher is compact, robust, lightweight (600g) and cost-effective: your technicians and engineers can bring it everywhere in their hand bag.

TECHNICAL CHARACTERISTICS

2x RF inputs, 2x RF outputs for RF Capture & Playback (SMA/F connectors)*

Frequency range from 70 MHz up to 6 GHz, resolution 1kHz

Variable bandwidth from 1 up to 55 MHz

Automatic filtering: harmonic suppression for playback, out of band signal suppression for capture

RF reception:

- Status indicators: USB connection / IQ sample loss / In band saturation (ADC) / Out of band saturation (LNA)
- FFT display: Spectrum measurements: FFT resolution, FFT markers insertion / Averaging functions: RMS, min/max hold / FFT window functions: rectangular, Hamming, Blackman, Hann...
- Signal waterfall plot (three-dimensional spectrum)
- Power in band measurement per frequency marker

RF capture: variable gain, automatic gain setting (AGC), rolling buffer mode

RF playback: variable attenuation

Lightweight and compact 163 x 115 x 32 mm, 600 g, 3 W typical power consumption

Connected to PC via USB3.0 connectivity (SuperSpeed) (USB2 backward compatible, but with lower performances due to limited USB2 bitrate)

IQ files stored on the PC: 12 Msps sample rate, 170 min of record = 512GB

Nonproprietary IQ file format, compatible with Matlab software

Integrated GNSS (GPS, GLONASS) receiver: KML file, metadata, NMEA protocol

Compatible Windows 7, 8/8.1, 10 (x64 versions only)

*Both input/output connectors cannot be used at the same time

APPLICATIONS

- Chipset, STB/TV field test debugging (a great tool to support your pre-sales team)
- Easy & simple usage: no need for RF experts to capture field RF signals (ex: DAB/FM, TV broadcast, Satellite broadcast, Wi-Fi,...), your sales force can do it for you anywhere in the world
- Handy demonstration setup: bring real RF sources into your laptop
- RF sources stored on a PC: easy to duplicate/transfer between head-quarter and regional sites
- Radio/TV Broadcast/Telecom RF troubleshooting
- Test automation (command line tools)
- Telecommunications Regulation Agencies validation tool

Easy to use & Responsive GUI

High degree of parameterization for measures

Dedicated side panel for in-app options: Event Trigger and RF TroubleMaker

LNB configuration for Satellite capture

Auto-test control: evaluate the PC performance for RF capture/playback max bandwidth

AGC (Automatic Gain Control) for RF reception: static or dynamic

WATERFALL SECTION

Allows detection of bursts & transients (Wi-Fi, 4G, ...)

RSSI (Received Signal Strength Indication)

SPECTRUM ANALYSIS

- Power in band
- Averaging functions
- FFT windows functions

IQ max power
IQ average power

Status indicators

- USB: connection (USB2 or USB3)
- LOSS: IQ sample loss
- IBS: in band saturation (ADC)
- OOBS: out of band saturation (LNA)

Frequency setting

for capture (RX) / playback (TX)
Range 70 MHz to 6 GHz
1 kHz resolution

RF Capture & Playback controls

Autostop recording

Sample rate up to 61.44 Msps

Variable acquisition bandwidth from 1 up to 55 MHz

Gain setting for capture
Attenuation setting for playback

RX/TX connector setting: F or SMA

Load and Save configuration files

Rolling Buffer mode for RF capture

Clock mode for 1PPS generation

RF capture file stored on PC:
170 min of 12 Msps bandwidth record = 512GB
NONPROPRIETARY IQ FILE FORMAT

ORDERING CODE

RF-Catcher Starter Kit

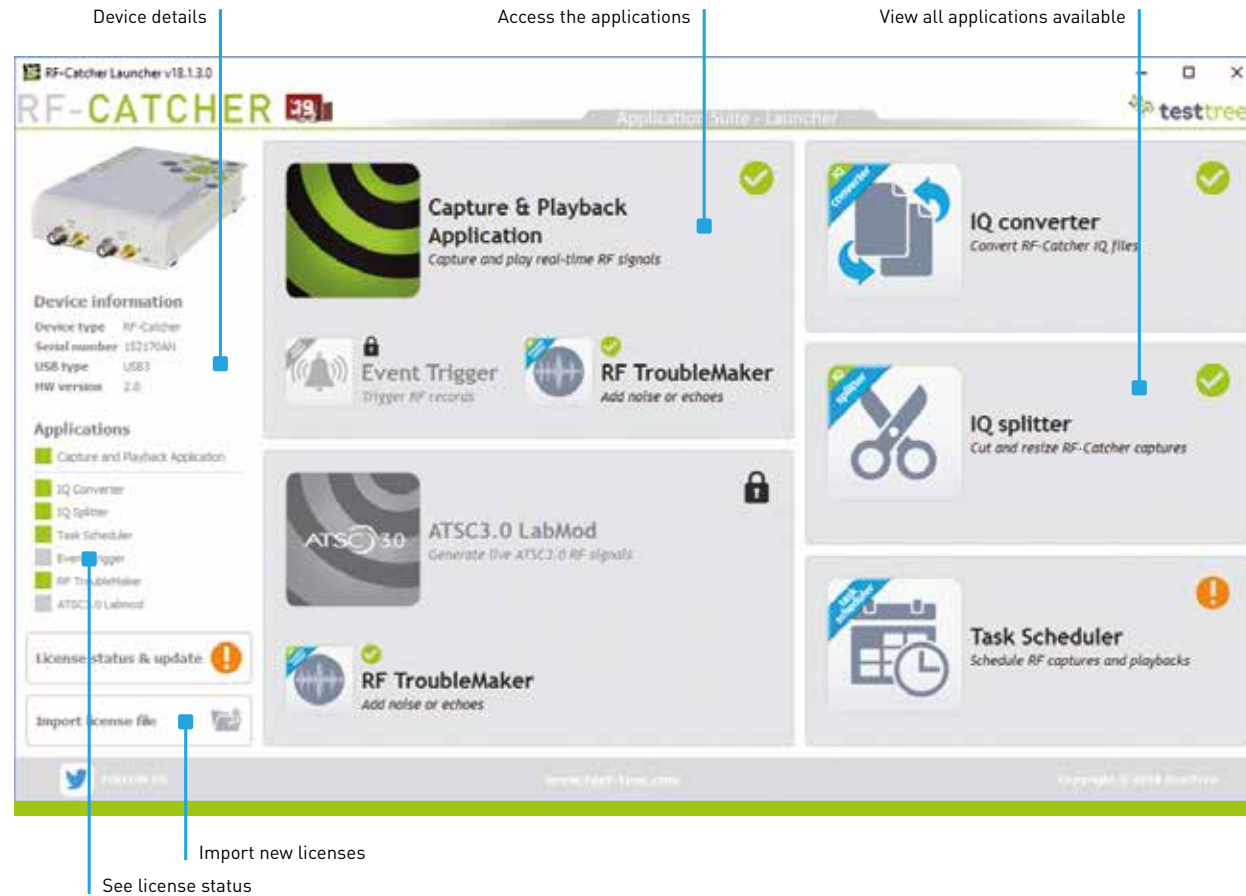
RF Capture & Playback

Shipped bundled with HW device, software application for Windows 7, 8/8.1, 10 (x64)



APPLICATION SUITE FOR RF-CATCHER

One Global Launcher for all applications
Quickly access the applications without missing any information



SUBSCRIPTION

- Complete Suite and future applications
- Software updates & privileged support
- Licenses for the subscription duration

PURCHASE

- Choose the applications from the Suite
- Optional software updates & support
- Permanent licenses

ORDERING CODE

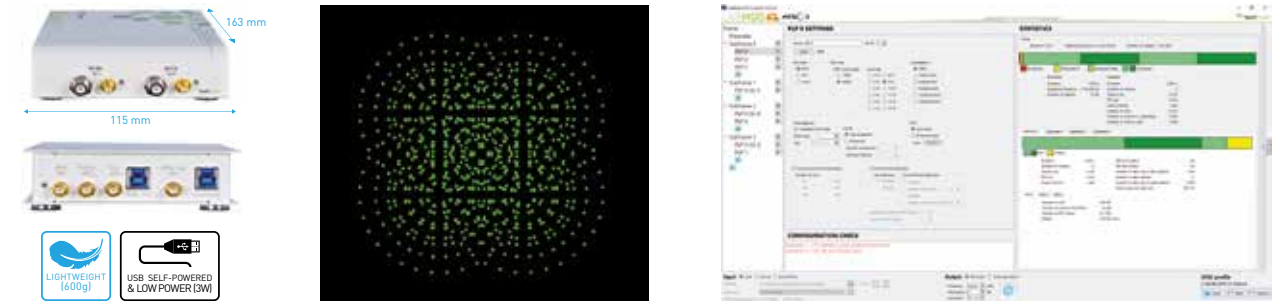
Application Suite for RF-Catcher Starter Kit	Software: IQ Converter, IQ Splitter, TaskScheduler, Event Trigger, RF TroubleMaker, ATSC 3.0 LabMod, DiviSuite-IP Compatible Windows 7, 8/8.1, 10 (x64)
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Licenses	Subscription All applications including Advance Software Support for the subscription period	Perpetual licenses One or several of the above applications with optional Advance Software Support
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ATSC 3.0 LABMOD

STL Gateway approved Modulator for Lab!

ATSC 3.0 Lab Modulator is the perfect modulator for discovering ATSC 3.0 standard: generate live ATSC 3.0 RF signals or IQ pattern files, record live ATSC 3.0 transmission in different places over the world and playback them to test your receiver.



TECHNICAL CHARACTERISTICS

Input interface	STLTP IP, STLTP PCAP File, PRBS, TS File 2x RF inputs (SMA-type female 50 Ω, F-type female 75 Ω) ATSC 3.0 live RF recording
Clock and synchronisation	Input: 10 MHz, 1 PPS, Built-in GNSS receiver Output: 10 MHz Internal clock: 10 MHz
GUI	Windows 7, 8/8.1, 10 (x64) application Easy to use, configuration validation engine Capability to save/load settings profiles
Output interface	2x RF outputs (SMA-type female 50 Ω, F-type female 75 Ω) ATSC 3.0 live RF playback and generate
Modulation	ATSC 3.0 constellation (NUC) L1: QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM Compatible with all L1 modes
LDM (Layered Division Multiplex)	Yes
Channel bandwidth	6, 7 or 8 MHz
Guard Interval	192, 384, 512, 768, 1024, 1536, 2048, 2432, 3072, 3648, 4096, 4864
FFT mode	8k, 16k, 32k (all Cred_coeff modes)
Code rate	2/15 up to 13/15
FEC	Inner: LDPC 16k and 64k, mode A or B Outer: BCH, CRC or no outer
Pilot pattern	SP3_2, SP3_4, SP4_2, SP4_4, SP6_2, SP6_4, SP8_2, SP8_4, SP12_2, SP12_4, SP16_2, SP16_4, SP24_2, SP24_4, SP32_2, SP32_4
TI (Time Interleaving) mode	CTI up to 1448 depth, HTI
Subframes	Multiple subframes: single/multiple PLP
TXID	Transmitter identification

APPLICATIONS

- ATSC 3.0 RF record & playback
- ATSC 3.0 reception validation
- R&D or factory tests and measurements
- Chipset development
- TV / Set Top Box development
- Demonstrations and roadshows

KEY BENEFITS

- 1st ATSC 3.0 modulator
- Compact (600g), USB self-powered
- 3-in-1 product: RF Record + Playback + Generate
- ATSC 3.0 PlugFest proven
- Intuitive & easy to use GUI
- Easy to configure: real-time Frame configuration validation engine
- All modulation schemes supported (from QPSK to 4096 QAM, LDM support)

ORDERING CODES

ATSC 3.0 LabMod	ATSC 3.0 Modulator for Lab Shipped bundled with HW device and ATSC 3.0 LabMod Application for Windows 7, 8/8.1, 10 (x64)
ATSC 3.0 LabMod Application	ATSC 3.0 Modulator Application for Lab Windows 7, 8/8.1, 10 (x64) software application for RF-Catcher Starter Kit
Software Option	RF Capture & Playback Software Application for RF transmission captures, playbacks and spectrum analysis

RF-LIVESIM

Real-time RF Channel Simulator

Covering a frequency range from 50 to 900 MHz, RF Live Simulator can emulate RF channels propagation modes for a signal bandwidth from 20 kHz to 20 MHz (gaussian noise, multipath, Doppler and frequency drift tools).

RF-LiveSim is a cost effective solution for intense automatic non regression tests at the physical layer level.



TECHNICAL CHARACTERISTICS

- Standalone unit with PS/2 & VGA interfaces for screen-keyboard-mouse control
- 1x RF in, 1x RF out (isofrequency)
- 1x Ethernet port for remote control
- Full remote control via SCPI (Standard Commands for Programmable Instruments) protocol
- Signal level: output from -110 to -20 dBm without any interruption
- Frequency range from 50 to 900 MHz, resolution 1 Hz
- Variable bandwidth from 20 kHz to 20 MHz, resolution 1 kHz
- Channel Propagation Profile: 20 independent paths adjustable (amplitude, delay, phase, Doppler)
- Doppler profiles: -70 000 to +70 000 Hz (step 1 Hz), Amplitude distributions (Pure, Flat, Gaussian, Rayleigh, Rice)
- Frequency drift & hopping without losing receiver synchronization
- Preset configurations: terrestrial broadcast profiles such as TU6, rural, indoor/outdoor for fixed/portable devices as well as profiles for physical layers for WiMAX / LTE
- AWGN Generator: Signal+Noise, Burst noise, Impulsive noise, Noise only
- 1x TRIG, 1x 10MHz in & 1x 10MHz out
- 1U rack form (450x500x44)

APPLICATIONS

- **Chipset designers: complete modulator/demodulator testing**
- **Receivers manufacturers: operating limit testing and robustness**
- **R&D Laboratories: intensive non-regression testing, design/product verification**

KEY BENEFITS

- **Real-time channel profile simulations**
- **Up to 20 adjustable independent terrestrial paths**
- **Several preset configurations available**
- **Remotely accessible**
- **Easy to use and configure**
- **Test automation (SCPI compliant)**

ORDERING CODE

RF-LiveSim RF Live Channel Simulator - 50-900 MHz input/output - 1U rack

ATSC 3.0 REFEREE 3

The 1st ATSC 3.0 analyzer designed for the field !

NEW

ATSC 3.0/1.0 DVBS/S2* DVBT/T2* DVBC/C2* ISDB-T/Tb*

ReFeree 3 is the first ATSC 3.0 analyzer designed to be used on the field to generate maps including measurements of the field quality of service, enabling identification of reception issues and efficient troubleshooting.



TECHNICAL CHARACTERISTICS

- 1x RF input for ATSC 3.0/1.0 ; 1x RF input for Satellite (reserved for future use)
- 2x IP Data inputs/outputs (Ethernet, SFP)
- 1x 1PPS & 1x 10MHz inputs for SFN delay measurements
- 1x GPS/GLONASS input for coverage tests
- Spectrum & Constellation display
- RF measurements: Signal level, MER, SNR, BER
- SFN Drift, Network Delay, Channel Impulse Response (CIR/echoes)
- ATSC 3.0 Frame analysis: frame decoding, structure display, service list, bitrate monitoring
- Logs & Reports files generation (CSV, KML formats)
- Audio/Video decoding for unencrypted programs
- DASH (ROUTE/MMTP) reception
- STLTP analysis: QoS monitoring (jitter, FEC), bitrate monitoring (inner, outer, by PLP/Service)
- Road test & Field coverage: Internal GPS receiver
- Google-compliant report files including RF measurements
- USB self-powered (2x USB 3.0 connectors)
- 210 x 120 x 35 mm ; 730g

APPLICATIONS

- **Coverage & Drive Tests** for ATSC 3.0 & ATSC 1.0
- **Installation & Maintenance Test Tool**
- **RF Reception Qualification**
- **Head-End/TX site/off-air measurements**
- **ATSC 3.0/1.0 Network Troubleshoot**
- **R&D Test & Measurements**

KEY BENEFITS

- **The 1st analyzer designed for field measurements**
- **Easy to use and configure**
- **Compact (730 g), USB self-powered**
- **Complete product: RF + STLTP analysis**
- **Analyze/Validate ATSC 3.0 signals in real-time down to the frame structure**
- **Control audio/video content decoded in real-time**

ORDERING CODES

ReFeree 3	ATSC 3.0 Field Analyzer
	Shipped bundled with ReFeree 3 software for Windows 7, 8/8.1, 10
Software Option	<ul style="list-style-type: none"> Video decoding ATSC 3.0 STLTP ATSC 3.0 NRT
	ATSC 3.0 ROUTE/MMTP live video decoding, ATSC 1.0 live video decoding, STLTP analysis, Network Delay, IP Jitter, FEC (enables HW RJ45 connector), ESG, AEA, Data Casting analysis

* Contact us for availability



DIVISUITE BASE

DiviSuite Base

TS Recorder

- Bitrate, Log Files

TS Player over ASI

- H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...

TS Player over IP

A/V Output

RF Scan

Common Features coming as a default package!

Stream Overview

Bitrate graphs
Drag & Drop PID or Service

Bitrate Alarms
Drag & Drop PID

Schedule the analyzed TS recording to file format

Forward the analyzed TS over the PC's IP interface to unicast/multicast

Offline Analysis
Report & Log files

Live Audio/Video decoding
H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...

Counters management at file analysis loop: no false alarm (CC, PCR, PTS, DTS)

Play the analyzed TS over the ASI output (188/204 framing, null packets removal, raw player mode)

RF Scan
Scan for available frequencies and import them for analysis (DVB-T/T2, DVB-C/C2)

Command Line Mode
Automate your tests

DIVISUITE SOFTWARE OPTION

RF Scope

- Signal Quality: level, SNR, MER, BER
- Graphs, Report Files
- Modulation Parameters
- Constellation
- Channel Impulse Response
- SFN Synchronisation

Test the field RF Quality
TX Echoes diagram

Validate the Modulator/TX RF Quality
Signal Quality measurement: level, SNR, MER, BER
Modulation parameters
Constellation
DVB-T2 L1 signaling

Validate SFN synchronization
SFN Drift
1 PPS & 10 MHz inputs

Modulator/TX endurance tests
Log & Report files
Save events and trend measurements



DIVISUITE SOFTWARE OPTION



- TS Standard: MPEG, DVB, ATSC 1.0, ISDB-T/Tb (BTS)
- PSI/SI Tables Decoding
- ETSI TR 101 290
- PCR Graphs
- ASI Network Delay

Transport Stream complete Analysis!

Validate PSI/SI Tables
Supported TS: MPEG, DVB, ATSC 1.0, ISDB-T/Tb
Add your own table analysis specification

Validate ETSI TR 101 290 measurements
ETSI TR 101 290 Priority 1,2,3
Customized alarm thresholds
Log files

Check regionalization Service Plan

Check PCR
Drag & Drop PID containing PCR
PCR accuracy graphs

Advanced Service Analysis
Component type & structure
Component bitrates

DIVISUITE SOFTWARE OPTION



- T2 L1 pre/post signaling, PLP allocation (BB frame, TS, padding/overflow)
- Single & Multi-PLP, PLP extraction
- T2 timestamp, BB frame header, ISSY field
- T2-MI Network Delay

Validate your DVB-T2 Gateway!

PLP extraction/filter

Check T2-MI streams
T2 L1 pre/post signaling
ETSI TR 101 290 T2-MI alarms

Check T2 Frames
BB frame header
ISSY field
T2 timestamp

ASI IP



DIVISUITE SOFTWARE OPTION

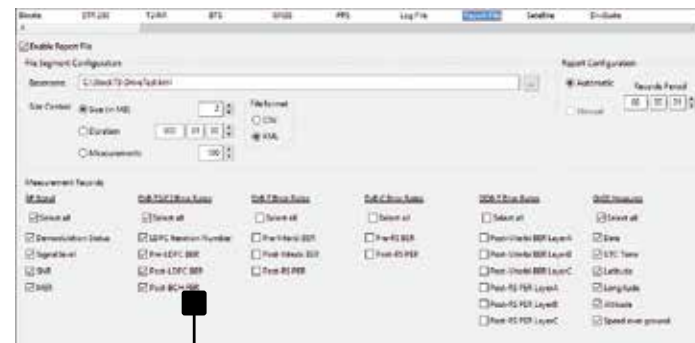
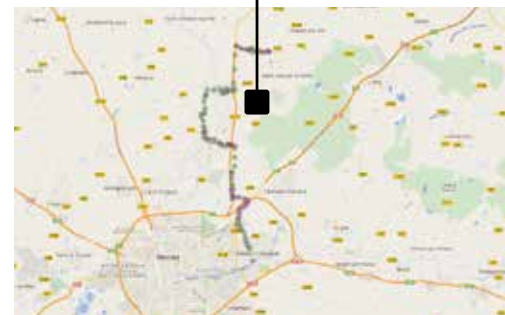


- GNSS Receiver (GPS/GLONASS)
- Test Reports (Google Earth compliant)
- Internal 1PPS source

Test the field coverage!



Display results in Google Earth or Google Fusion Tables applications



Generate Google Earth compliant files (KML)
Customize measured parameters

* Option delivered with a magnet mount GNSS L1 Antenna

REFEREE II

TERRESTRIAL TV
CABLE TV



DVB-T/T2 DVB-C/C2

ReFeree II is a high performance, compact and portable measurement receiver for Terrestrial and Cable TV, cumulating single and multi-PLP live reception with real-time TS analysis and recording.



TECHNICAL CHARACTERISTICS

1x RF input for DVB-T/DVB-T2 (T2 Lite supported) & DVB-C/DVB-C2

ITU-J83 Annexes A, C (roll-off 0.15) supported

1x ASI input and 1x ASI output

1x IP Data input/output

1x 1PPS & 1x 10MHz inputs for SFN delay measurement

1x GPS/GLONASS connector for coverage tests

RF Scanning (DVB-T/T2, DVB-C/C2)

RF measurements: signal level, SNR, MER, BER, graphical constellation

SFN Drift, Network Delay, Channel Impulse Response display

Single and multi-PLP support

T2-MI analysis: L1 pre & post signaling, T2 frame statistics, BB frame header, ISSY field, T2 timestamp

DVB-C2 specific analysis: L1, C2 frame, BB frame, Data Slice...

PSI/SI and PIDs parsing, PCR graphs

ETSI TR 101 290 validation (priority 1, 2, 3)

Services decoding: H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...

TS record scheduling (PLP extraction)

TS playback over ASI (loop counters management : CC, PCR, PTS/DTS)

TS over IP forward (PC's Ethernet interface selection)

Command Line mode

Compatible Windows 7, 8/8.1, 10

USB self-powered, 660 g

APPLICATIONS

- R&D Test & Measurement
- Baseband Signal Generation
- RF Reception Quality Measurement
- Terrestrial & Cable Network Troubleshoot
- Head-End/TX site/off-air measurements
- Installation & Maintenance Test Tool
- Test automation (command line mode)
- Coverage & Drive Tests for DVB-T & DVB-T2

KEY BENEFITS

- Easy to use and configure
- Compact (660 g), USB self-powered
- Complete product: RF + baseband (ASI, IP, File) analysis, baseband record & playback
- All modulation schemes supported (from QPSK to 256 QAM, Normal & Rotated for Terrestrial, from 16 QAM to 4096 QAM for Cable)
- Adapted format for Drive Tests

ORDERING CODES

ReFeree II	DVB-T/T2/T2 Lite & DVB-C/C2 Measurement Receiver	
	Shipped bundled with DiviSuite Base software for Windows 7, 8/8.1, 10	
Software Options	RF Scope TS Analyzer T2-MI Analyzer Drive Test Coverage	RF Analysis TS Analysis T2-MI Analysis GPS/GLONASS location information
	Bundle	

48HMAX SHIPMENT

All Options Bundle (RF + TS + T2-MI + Drive Test Coverage)



DIVICATCH RF Series



The DiviCatch RF devices are pocket analyzers cumulating RF live reception with Transport Stream real-time analysis, recording and stream playing.



APPLICATIONS

- R&D Streams or Signal Analysis
- RF Broadcast Troubleshoot
- Installation & Maintenance Test Tools
- Test automation (command line mode)
- Portable Demonstration Setup

KEY BENEFITS

- 4-in-1 products: **RF + Baseband + Recorders + Players**
- **Compact** (pocket size, 160 g) and **USB self-powered**
- **Analyze/Validate TS/T2-MI/BTS Layer in real-time**
- **All modulation schemes supported**
- **Must-have Lab Tools**

PRODUCTS HIGHLIGHTS

	<p>DVB-S/S2 Receive DTH streams and all modes of satellite distribution links All modulation schemes supported (from QPSK to 32APSK) Allows antenna LNB powering & configuration</p>
	<p>ISDB-T/Tb All modulation schemes supported (DQPSK, from QPSK to 64QAM) Complete BTS analysis: IIP packet parsing, TMCC alarms and information</p>
	<p>DVB-T/T2 DVB-C/C2 All modulation schemes supported (from QPSK to 256QAM, 4096QAM for DVB-C2) ITU-J83 Annexes A, C (roll-off 0.15) supported</p>
	<p>DVB-C All modulation schemes supported (from QPSK to 256QAM) ITU-J83 Annexes A, B, C supported</p>

TECHNICAL CHARACTERISTICS

DIVICATCH RF-S/S2	1x RF input for DVB-S/S2 RF measurements: signal level, SNR, BER, PER, CNR, Eb/NO, link margin Stream ID selection LNB powering & configuration
DIVICATCH RF-ISDB-T/Tb	1x RF input for ISDB-T/Tb RF measurements: signal level, SNR, MER, BER per Layer A/B/C Stream ID selection LNB powering & configuration
DIVICATCH RF-T/C T2/C2	1x RF input for DVB-T/T2/T2 Lite & DVB-C/C2 ITU-J83 Annexes A, C (roll-off 0.15) supported RF Scanning (DVB-T/T2, DVB-C/C2) RF measurements: signal level, SNR, MER, BER
DIVICATCH RF-C	1x RF input for Digital Cable 1x RF loop output ITU-J83 Annexes A, B, C supported RF measurements: signal level, SNR, MER, BER, EVM
1x ASI input/output	
IP source analysis (from PC)	
Graphical constellation, Channel Impulse Response display	
PID and PSI/SI parsing, PCR graphs	
ETSI TR 101 290 validation (priority 1, 2, 3)	
Audio/Video player (H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...)	
TS record scheduling (PLP extraction)	
TS playback over ASI (loop counters management : CC, PCR, PTS/DTS)	
TS over IP forward (PC's Ethernet interface selection)	
Command Line mode	
Compatible Windows 7, 8/8.1, 10	
USB self-powered, 160 g	

ORDERING CODES

DiviCatch RF-S/S2	DVB-S/S2 Pocket Analyzer
DiviCatch RF-ISDB-T/Tb	ISDB-T/Tb Pocket Analyzer
DiviCatch RF-T/C T2/C2	DVB-T/T2/T2 Lite & DVB-C/C2 Pocket Analyzer
DiviCatch RF-C	DVB-C Pocket Analyzer
Shipped bundled with DiviSuite Base software for Windows 7, 8/8.1, 10 and RF Scope option	

Software Options	RF Scope (included)	RF Analysis
	TS Analyzer	Transport Stream Analysis
	T2-MI Analyzer	T2-MI Analysis (for DiviCatch RF-S/S2 and DiviCatch RF-T/C T2/C2 only)

48HMAX SHIPMENT	All Options Bundle (RF + TS + T2-MI)
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DIVIDUAL ASI+SPI (LVDS or TTL)

Baseband TS Analyzer



The DiviDual ASI + SPI is a pocket analyzer providing Transport Stream (MPEG-2 TS, T2-MI, BTS) real-time analysis, recording and stream playing, on both DVB-ASI and DVB-SPI (LVDS or TTL) connectors.

TECHNICAL CHARACTERISTICS

- 1x ASI input and 1x ASI output
- 1x SPI input/output (LVDS or TTL , optional)
- IP source analysis (from PC)
- PIDs and PSI/SI parsing, PCR graphs
- T2-MI analysis: L1 pre & post signaling, T2 frame statistics, BB frame header, ISSY field, T2 timestamp
- BTS analysis: IIP Packet parsing, TMCC alarms, TMCC next information
- ETSI TR 101 290 validation (priority 1, 2, 3)
- Audio/Video player (H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...)
- TS record scheduling (PLP extraction)
- TS playback over ASI (loop counters management : CC, PCR, PTS/DTS) & Raw player
- TS over IP forward (PC's Ethernet interface selection)
- Command Line mode
- Compatible Windows 7, 8/8.1, 10
- USB self-powered, 140 g



ORDERING CODES

DiviDual ASI + SPI		TS over DVB-ASI and DVB-SPI (LVDS or TTL) Analyzer, Recorder, Player Shipped bundled with DiviSuite software for Windows 7, 8/8.1, 10
Software Options	TS Analyzer T2-MI Analyzer	TS Analysis T2-MI Analysis

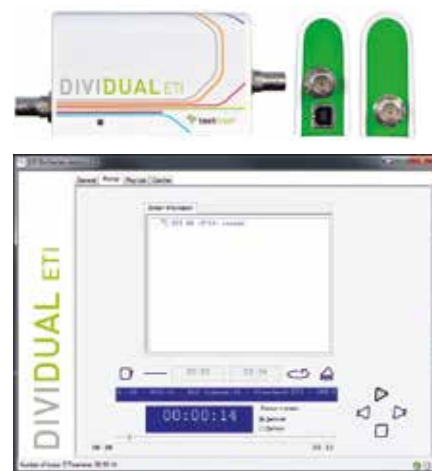
DIVIDUAL ETI

DAB dab+ T-DMB

The DiviDual ETI is a real-time ETI Stream recorder and player in a pocket-sized and robust device.

TECHNICAL CHARACTERISTICS

- 1x ASI input and 1x ASI output for DAB/DAB+/T-DMB
- ETI NI (G703) supported
- ETI NA5592 & NA5376 (G704) supported
- Playlist/segment/loop play mode
- Scheduled recording
- Player/Recorder command line software
- Compatible Windows XP/Vista/7
- USB self-powered, 140 g



ORDERING CODE

DiviDual ETI	DAB, DAB+, T-DMB Recorder, Player Shipped bundled with DiviSuite ETI software for Windows XP/Vista/7
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DIVISUITE-IP



Pure Software Application

The most complete analyzer software application for baseband TS/T2-MI/BTS streams. No need to plug HW device (ReFreee, DiviDual, DiviCatch) to the PC: DiviSuite-IP can analyze TS over IP or file-based input streams.

Two licensing models: Fixed PC License or Floating Server License.

DiviSuite Base	TS Recorder Bitrate, Log Files H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3...	TS IP Forward	A/V Output
TS Analyzer	TS Standard: MPEG, DVB, ATSC 1.0, ISDB-T/Tb (BTS) PSI/SI Tables Decoding ETSI TR 101 290 PCR Graphs ASI Network Delay	T2-MI Analyzer	T2 L1 pre/post signaling, PLP allocation (BB frame, TS, padding/overflow) T2 timestamp, BB frame, ISSY field Single & Multi-PLP, PLP extraction

Fixed PC License Model

Install & use the DiviSuite-IP on N independent PCs. One license key attached to one physical machine.

Floating Server License Model

Enables N PCs (connected in the same LAN) to use the DiviSuite-IP simultaneously. The floating license token distribution is handled by one PC in the LAN, assigned with the Server role.

Detach license token for temporary use outside of the LAN

ORDERING CODES

DiviSuite-IP	DiviSuite-IP software for Windows 7, 8/8.1, 10
License	PC Fixed: Choose the number of PCs → one license key delivered per PC Floating Server: Choose the number of simultaneous use for the default package (DS Base + TS Analyzer) and for the software option (T2-MI Analyzer) → one unique license key delivered, to be activated on one PC in the LAN (Server role)
Included	DiviSuite Base, TS Analyzer
Software Option	T2-MI Analyzer



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