MAINTENANCE AND OPERATION
INSTRUCTION MANUAL

DVB Explorer

Advanced DVB-T/T2/C/S/S2 Analyzer

DVB T/T2 TERRESTRIAL   **DVB C** CABLE   **DVB S/S2** SATELLITE

DB DEVA® BROADCAST

Contents

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Introduction

DEVA Broadcast Ltd. is an international communications and high-technology manufacturing organization, its corporate headquarters and facility located in Burgas, Bulgaria. The company serves the broadcast and corporate markets worldwide – from consumers and small businesses to the largest global organizations. It is dedicated to the research, design, development and provision of advanced products, systems and services. DEVA Broadcast launched its own brand back in 1997 and has nowadays evolved to become known as a market leader and internationally reputed manufacturer of user-friendly, cost-effective and innovative broadcast products.

Creativity and innovation are deeply woven into DEVA Broadcast corporate culture. Through successful engineering, marketing and management our team of dedicated professionals creates future-oriented solutions to improve customers' performance. You may rely that all issues communicated to our crew would be addressed accordingly. We pride ourselves on our pre and post-sales support and purchase services, which along with the outstanding quality of our radio gear have won us due respect and the market authority position.

DEVA Broadcast best-of-breed solutions have become the best sellers for our partners. The strategic partnerships which have been formed with industry leaders during all these years that we have been operating on the broadcasting market, have proved us a reliable business partner and a valuable asset, as our dealers worldwide would confirm. In constant pursuit of precision and long-term satisfaction, DEVA Broadcast enhances the reputation of our partners and clients alike. Furthermore, we have already a proven merit as a credible partner provider.

Our portfolio offers complete line of high quality and competitive products for FM and Digital Radio, Radio Networks, Telecommunication Operators and regulation authorities. For almost two decades of intensive software and hardware development, we have achieved a unique price-performance and endurance of our product lines. Our company's multitude of equipment and services is in line with the latest technologies and key trends. The most recognizable characteristics attributed to DEVA Broadcast products are their clear-cut, streamlined design, easiness of use and cost-effectiveness: simplicity of forms but multiplicity of functions.

For us there is no stage when we deem that we have reached the most satisfactory level in our work. Our engineers are in constant pursuit of new ideas and technologies to be captured in DEVA Broadcast solutions. Simultaneously, a strict control is being exercised at each step of any new development. Experience and hard work are our fundament but the continuous improving process is what we never leave aside. DEVA Broadcast participates on a regular basis in all landmark broadcasting events, not only to promote its products, but to exchange valuable know-how and experience. We are also engaged in international large-scale projects involving radio and audio solutions which makes us even more competitive on the global market.

All DEVA Broadcast products are developed and produced in accordance with the latest ISO 9001 quality control standards.

Typographic conventions

The following table describes important conventions used in the manual.

Convention and Style	Description	Examples
Menu > Sub Menu > Menu Command	A menu item(s) and menu command that you need to click in sequence	Click *Settings > General*
[Button]	Interface Interactive buttons	Press [OK] to save the changes
NOTE	Important notes and recommendations	**NOTE:** The notification will appear only once
"Reference Name" on Page XXX	References and links	refer to "New Connection" (see "Monitoring" on page 56)
Example	Used when example text is cited	Example for E-mail Notification: Date: 04 Nov 2013, 07:31:11

General Information

DVB Explorer is a new-generation portable analyzer that provides detailed DVB component information. It is perfect for use in the field but what really makes this product one of a kind is the fact that it covers all DVB standards - T/T2, C and S/S2. It can receive live DVB T/T2, DVB C and DVB S/S2 signals and ensures complete and advanced MPEG decoding, ETSI TR 101 290 Layers 1,2 & 3 and multi-PLP analysis including PLP allocation, PLP extraction, T2 timestamp, T2/L1 pre- and post-signaling, BB frame, PID and EIT Tables.

It also supports MPEG transport stream analysis, plus MPEG-2 TS record and playback and MPEG-2 TS over IP forward. Powerful, practical and efficient, it has a compact and elegant design coupled with great features which include a selectable wide range IF filter bandwidth, a spectrum analyzer allowing checks of the RF carrier, constellation and Echo diagram display and precise measuring of RF, SNR, BER, CBER, PER, MER, SSI, SQI, C/N, Freq offset. All RF measurements can be stored into a log file for further analysis. This product lets users select between a predefined DVB channels scan or manual tune. PCR graphs and advanced EIT display are also available.

The device supports all modulation schemes from QPSK to 64QAM for DVB-T, QPS to 256QAM for DVB-T2, QAMQPSK to 32APSK for DVB-S/S2 and from 16QAM to 256QAM for DVB-C. File-based offline analysis is provided as well. The product offers an audio/video player supporting H.265/HEVC, H.264/MPEG-4 AVC, MPEG-1/2, AAC, MP3, etc. It also provides multistream support for DVB-S2, as well as support for DVB-T, DVB-T/T2 & T2 Lite.

DVB Explorer is a solution that has no parallel on the market. Easy to power up via the USB port of your Windows laptop and available at an affordable price, which further increases its appeal, this versatile multi-standard product is your must-have portable analyzer.

Product Features

- DVB-T/T2/C/S/S2 Compliant Receiver
- High-end Frequency Agile Digital Tuner
- Up to 110 dBµV direct RF Antenna Input
- Advanced MPEG Monitoring and PID Alarms
- Detailed DVB-T/T2 component information
- TR 101 290 Monitoring, Priority 1, 2 and 3
- Predefined DVB channels scan or manual tune
- RF Spectrum & Constellation display
- PLP extraction and TS PLP analysis
- Advanced QPSK & QAM Analyzer
- BandScanner and RF Spectrum Analyzer
- SAE - Service Availability Error
- SDE - Service Degradation Error
- Very Intuitive Navigational Menu
- Levels measurement with data history
- Spectrum analyzer allowing checking of the RF Carrier
- Service Availability Error & Service Degradation Error
- Protected access to the device settings
- Firmware updates will ensure improved operation
- Easy Installation and Setup

TECHNICAL SPECIFICATIONS

| RF INPUT DVB-T/T2/C	
Tuning Range	Frequency Agile 40-1000 MHz
Tuning Step	10kHz
Tuner Sensitivity	30 dBμV
Antenna Port	BNC Connector, Female, 50Ω
RF input level	up to 120 dBμV
Supported Standards	DVB-T – ETSI EN 300 744; DVB-T2 & T2 Lite – ETSI EN 302 755 v1.3.1, ETSI TS 102 831; T2-MI – ETSI TS 102 773; DVB-C - 16/64/128/256/1024/4096QAM
DVB-T/T2/C MEASUREMENTS AND ACCURACY	
RF input level	30-110 dBμV ±1 dB
MER	0 to 40 dB (±1 dB)
SNR	0 to 40 dB (±1 dB)
BER Before-Viterbi(DVB-T)	1×10^{-2} to 1×10^{-5}
BER Post-Viterbi(DVB-T)	1×10^{-2} to 1×10^{-8}
BER (DVB-T2)	Before/Post-LDPC, Post-BCH
Signal Lock	Lock/Unlock
Modulation parameters	L1 signaling in DVB-T2, TPS in DVB-T
SFN Monitor	Channel Impulse Response (CIR); Echoes Delay and Power Level alarms
ETSI TR 101 290 Monitor	ETSI TR 101 290 Priority 1, 2 and 3; MPEG-2 TS Monitor, TS (with MIP packet) Network Delay
T2-MI Monitor	Single/Multi-PLP support; ETSI TR 101 290 T2-MI packet, L1 pre/post signaling; T2-MI Network Delay; PLP extraction and TS PLP analysis (ETR 101 290)
QoS	SAE (Service Availability Error), SDE (Service Degradation Error)
Round-Robin Logger	Monitor sequentially multiple channel frequencies or PLPs
RF Spectrum Display	RF Spectrum with SPAN 10 MHz
Constellation Display	QPSK, 16QAM, 64QAM, 256QAM
Other Features	Audio/Video Freeze Detection, DOCSIS Monitoring
RF INPUT DVB-S/S2	
Tuning Range	950 to 2150 MHz (LNB down conversion required)
Antenna Port	F Connector, Female, 75Ω
Supported Standards	DVB-S, DVB-S2
DVB-S	QPSK, code rates: 1/2, 2/3, 3/4, 5/6, 7/8
DVB-S2	CCM, VCM and ACM Modes Support; QPSK code rates: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10; 8PSK code rates: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10; 16APSK code rates: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10; 32APSK code rates: 3/4, 4/5, 5/6, 8/9, 9/10
Symbol rates	DVB-S 65Msps QPSK; DVB-S2 65Msps QPSK , 60Msps 8PSK, 45Msps 16APSK

DVB-S/S2 MEASUREMENTS AND ACCURACY	
RF input level	30-110 dBμV ±1 dB
MER	0 to 40 dB (±1 dB)
CNR	up to 40 dB ±0.5 dB
BER (DVB-S)	Pre-Viterbi, Post-Viterbi
BER (DVB-S2)	Pre-LDPC, Post-LDPC, PER; Eb/N0, link margin, modulation parameters; MultiStream support, PLS support
Signal Lock	Lock/Unlock
Modulation parameters	L1 part 2 signaling in DVB-C
ETSI TR 101 290 Monitor	ETSI TR 101 290 Priority 1, 2 and 3; MPEG-2 TS Monitor
T2-MI Monitor	Single/Multi-PLP support; PLP extraction and TS PLP analysis (ETR 101 290); SAE (Service Availability Error), SDE (Service Degradation Error); Monitor sequentially multiple channel frequencies or PLPs
QoS Monitor	ETSI TR 101 290 SAE, SDE
Round-Robin Logger	up to 40 channels
RF Spectrum Display	RF Spectrum with SPAN 10 MHz
Constellation Display	QPSK
Other Features	Audio/Video Freeze Detection, DOCSIS Monitoring
MEASUREMENT STORAGE	
Storage	Database
Data formats	Microsoft Excel compatible format (csv)
USER INTERFACE	
Indicators	4 LEDs, front panel
OPERATING CONDITIONS	
Equipment operational between	-10° and 40°C
EMC immunity	6V/m
COMMUNICATION	
Type	USB 2.0 compatible
Connector	Mini USB, front panel
POWER REQUIREMENT	
Power supply	USB powered
Connector	Mini USB, front panel
SIZE AND WEIGHT	
Dimensions (W;H;D)	86 x 25 x 125 mm
Shipping Weight	230 x 70 x 172 mm / 0.533 kg
HS Code	8527212000

Panel Indicators and Connectors

FRONT PANEL
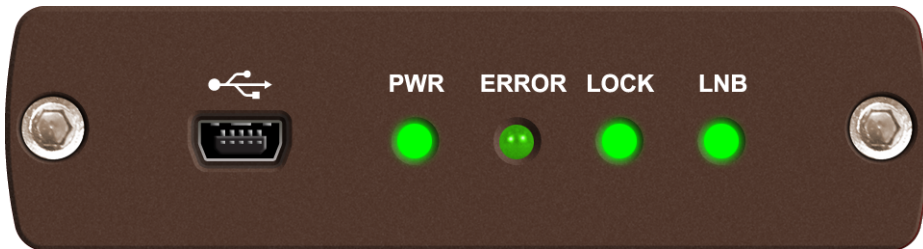
- Mini USB Power Supply - connector Mini-B 5 pins

PWR – The LED will be lit if the unit is connected to a PC trough USB.

ERROR – The LED will light up if an error occurs in the transmission of the transport stream or the device is not initialized.

LOCK – The LED will light up if the selected TV tuner is locked.

LNB – LNB Error. The LED will light up if LNB is not used.

REAR PANEL
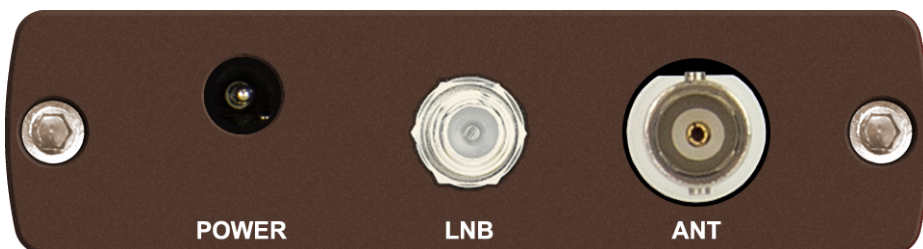
POWER – Power Supply (12V, 2A); used to power LNB.

LNB – LNB input - consumer-standard F connector; used for DVB-S/S2 standard.

ANT – Antenna Input - BNC connector; used for DVB-T/T2/C standard.

Before you start

TECHNICAL MATTERS

The DVB Explorer is simple and small. It utilizes surface-mounted (SMD) components, some of which are 'application-specific'. Moreover, certain chips require 'firmware' programming. To a large extent this precludes servicing the unit in the field. For these reasons, and also because of the small format of this Manual, we have elected to dispense with the schematic diagram, servicing instructions and a parts listing. Because it is so small and light (and because it is not in the program signal path!), returning a product such as the DVB Explorer for factory servicing is an option that we encourage. DEVA Broadcast Ltd. has never considered factory repair charges as a significant source of revenue; you would be astonished at how reasonable our rates actually are! Having said all that, our policy has always been one of 'full disclosure.' We feel that, unless you are doing something nefarious, there should be no reason to hide anything. With a clear conscience we will cheerfully provide additional documentation and divulge any secrets concerning the DVB Explorer upon request.

UNPACKING AND INSPECTION

Upon receipt, the equipment should be inspected for possible shipping damages. If such are found or suspected, notify the carrier at once and contact DEVA Broadcast Ltd. The original shipping carton box and packing materials should be kept for possible reuse, in case of return for Warranty repair, for example. Shipping damages as a result of improper packing for return may invalidate the Warranty!

IT IS VERY IMPORTANT that the "Product Registration Card" included in the Manual be completed accurately and returned. This will assure coverage of the terms of the Warranty and it will provide a means of trace in case of lost or stolen equipment. In addition, the user will automatically receive SERVICE OR MODIFICATION INSTRUCTIONS from DEVA Broadcast Ltd.

Loading and Running The Software

MINIMAL SYSTEM REQUIREMENTS

Windows® 10 and above
60 MB free hard drive space
4 GB RAM
Recommended 1920 by 1080 pixels screen resolution
Recommended Screen DPI setting to 96 dpi
Universal Serial Bus 2.0 port

NOTE: To avoid hardware conflicts and connection problems, install the software before attempting to connect the DVB Explorer device to the computer.
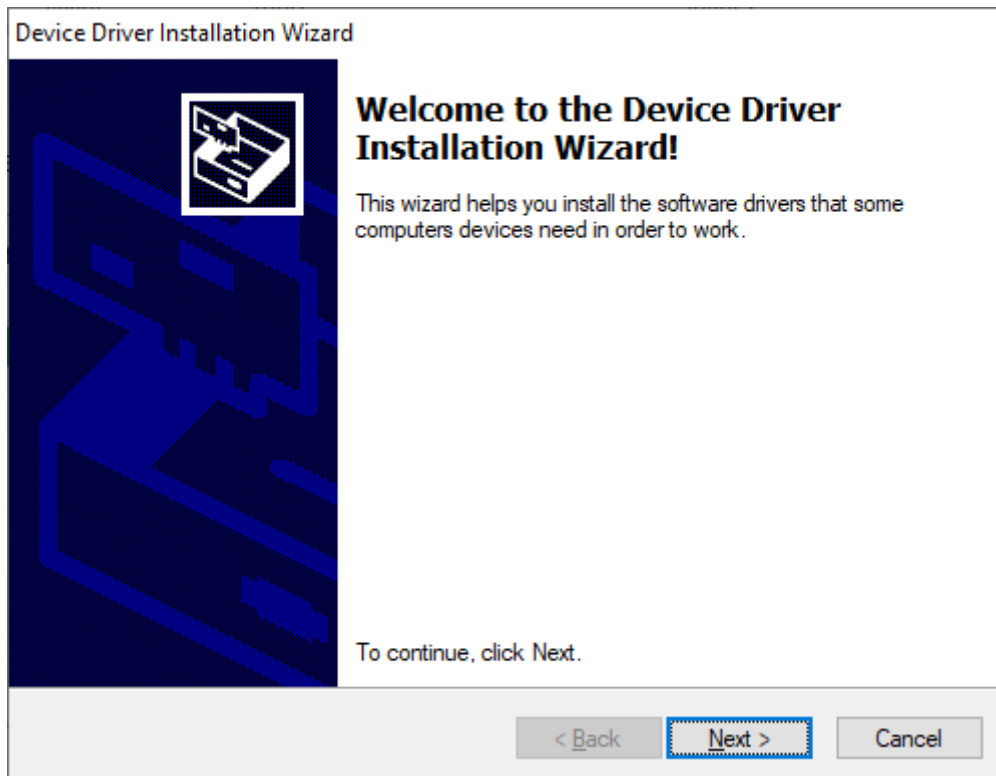
INSTALLING THE SOFTWARE & DRIVERS

1. Use the Installation file downloaded from www.devabroadcast.com/downloads.
2. Find the DVB Explorer installation file, double click on the file to launch the Wizard.
3. Accept the default recommendations and click on [Next] at the end of each step.
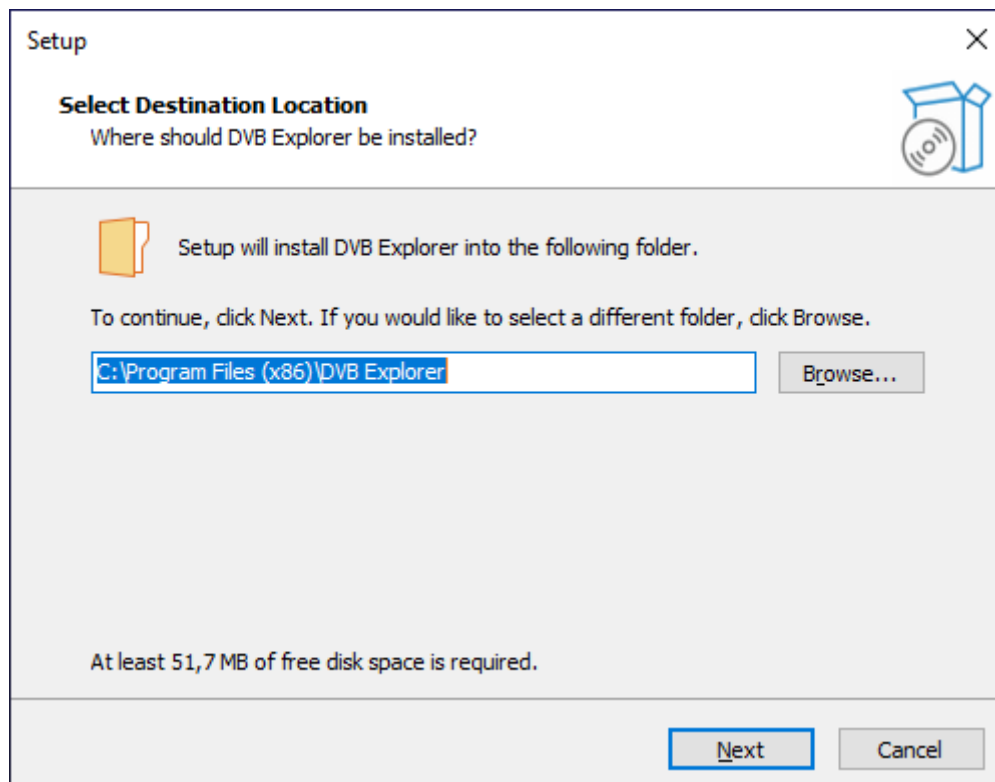
4. In succession, the folder where the unit will be installed and the name of the folder created in the Start Menu are set. Then the [Install] button is selected to start the installation process itself.

Setup   ✕

Select Start Menu Folder
Where should Setup place the program's shortcuts?

Setup will create the program's shortcuts in the following Start Menu folder.

To continue, click Next. If you would like to select a different folder, click Browse.

`DVB Explorer`   Browse...

Back   Next   Cancel

Setup   ✕

Ready to Install
Setup is now ready to begin installing DVB Explorer on your computer.

Click Install to continue with the installation, or click Back if you want to review or change any settings.

Destination location:
    C:\Program Files (x86)\DVB Explorer

Start Menu folder:
    DVB Explorer

Back   Install   Cancel

5. Next comes the process of installing the DVB Explorer USB drivers. In the started Device Driver Installation Wizard, the [Next] button is selected to start the operation.

Device Driver Installation Wizard

Welcome to the Device Driver Installation Wizard!

This wizard helps you install the software drivers that some computers devices need in order to work.

To continue, click Next.

< Back   Next >   Cancel

Device Driver Installation Wizard

The drivers are now installing...

Please wait while the drivers install. This may take some time to complete.

< Back   Next >   Cancel

Once the USB drivers registration process finishes, a screen is displayed showing the result of the operation itself.
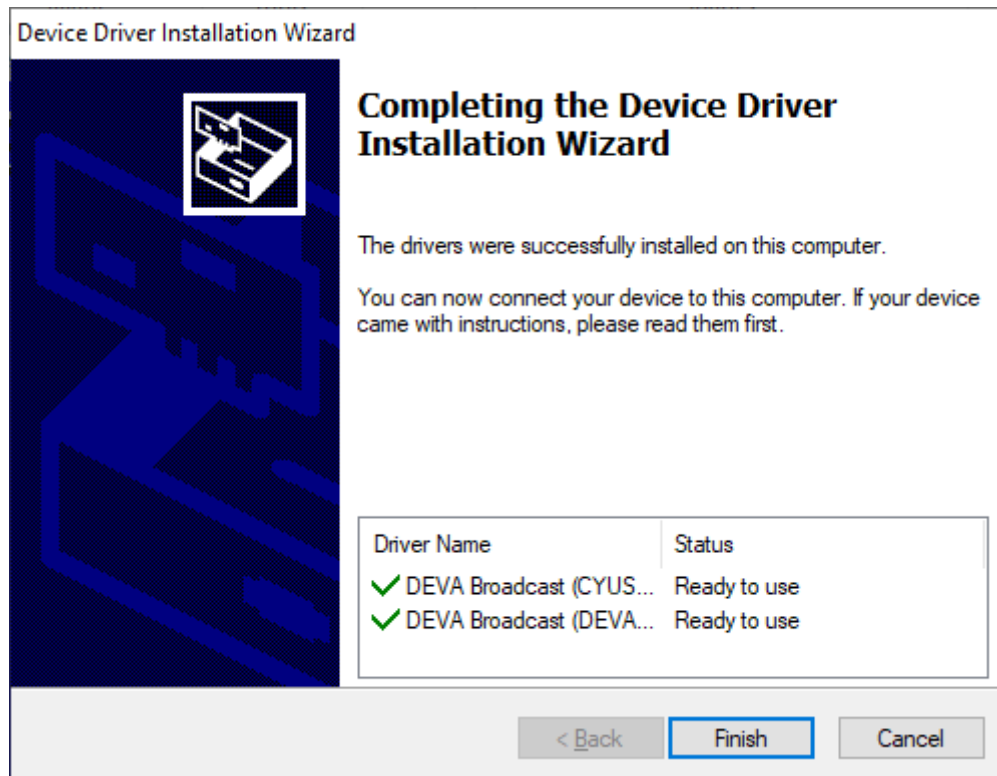
6. Click [Finish] to complete the installation.

After the installation process is completed, a shortcut to the software will appear on the desktop of your PC. Double click on the shortcut to run the Software.
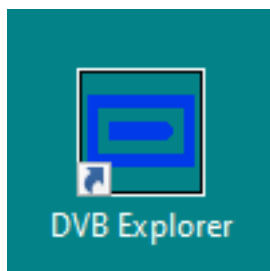
You can launch the program using this shortcut or using *Start> DVB Explorer> DVB Explorer*.

Working with DVB explorer

Before launching the software, you must connect the DVB Explorer to one of the free USB ports of a PC. At least one of the inputs of the ANT or LNB device must be connected to a DVB signal source. When the software starts, it checks all USB ports for the device and upon finding it, initializes it.

Selecting a Configuration

First, the Select Configuration window appears. On the right is the information about the available device, software and status of the USB connection. Right under them is a button to start the selected configuration.

This manual will use the term configuration to refer to a group of television channels, which are multiplexed with the aim of broadcasting and are demultiplexed by the receiver. The most widely used term in Europe is multiplex (MUX), but in France Bouquet is also used. The USA and Canada use channel with virtual sub-channels.
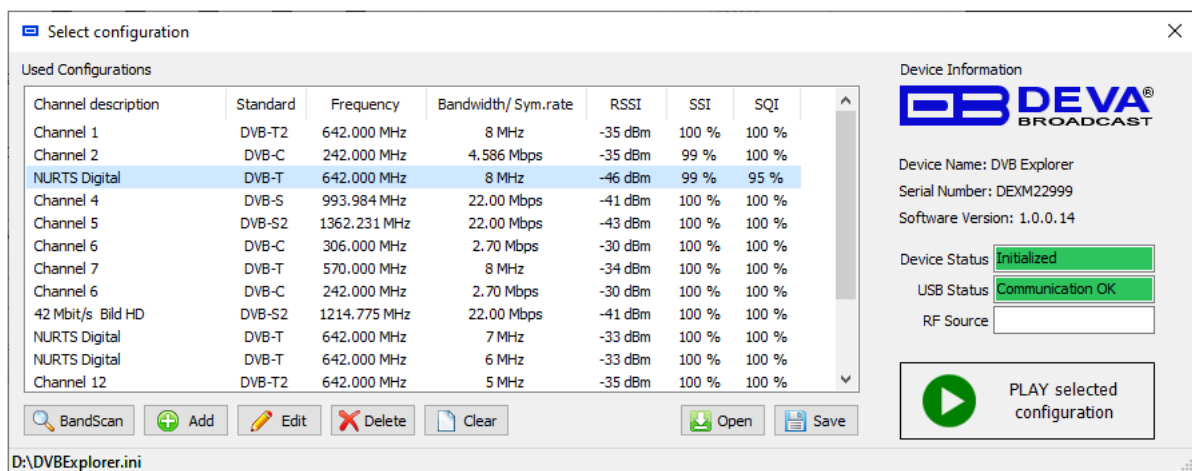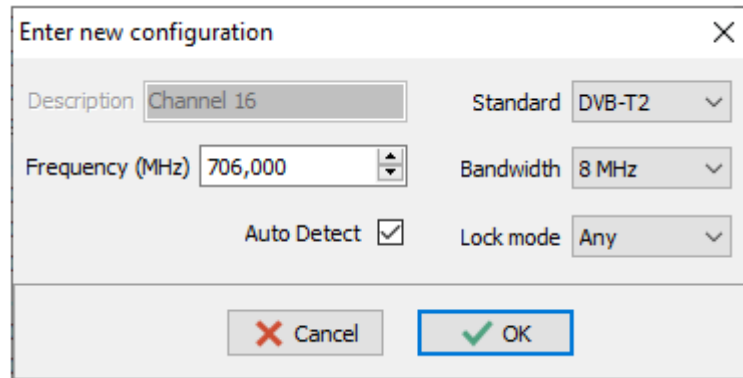
On the left of the window, the scanning parameters must be selected in succession, after which the [Start BandScan] button is pressed and the scanning starts. The scanning process can be stopped by clicking on the [Abort] button. During that process, each newly-found channel is added to the list of channels in the lower section of the window.

Once the automatic scanning process finishes, each channel can be selected or rejected by clicking in the checkbox next to it. Clicking on the [OK] button adds the selected channels to the end of the configurations list.
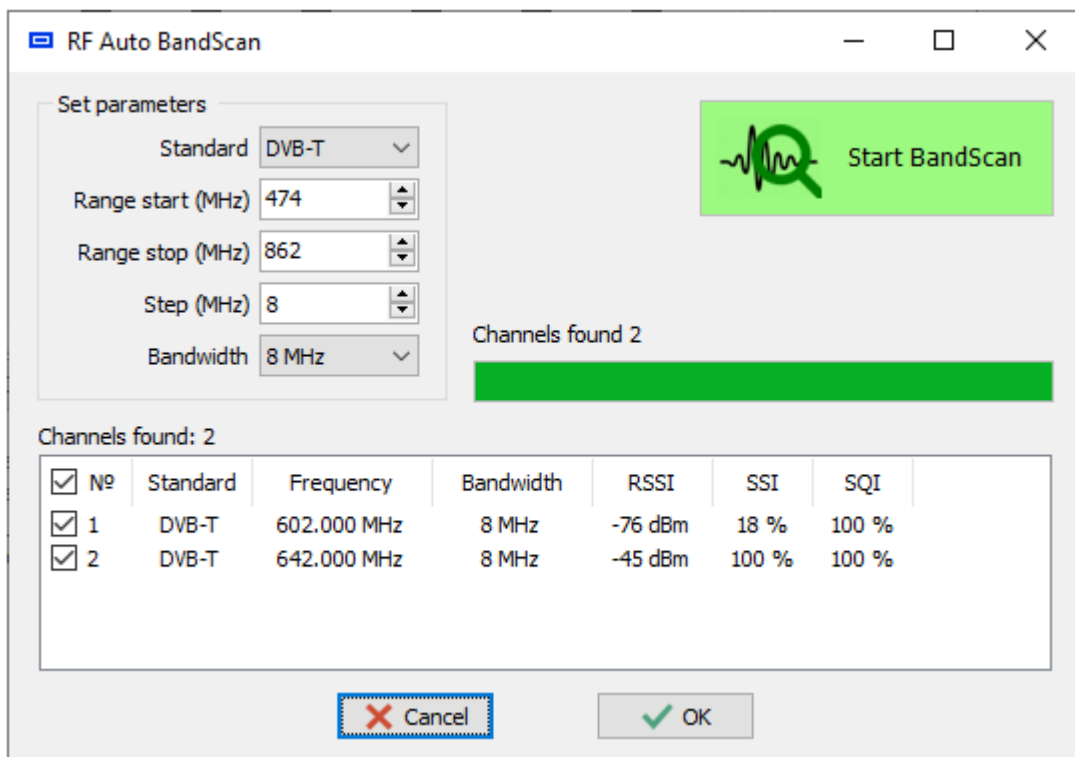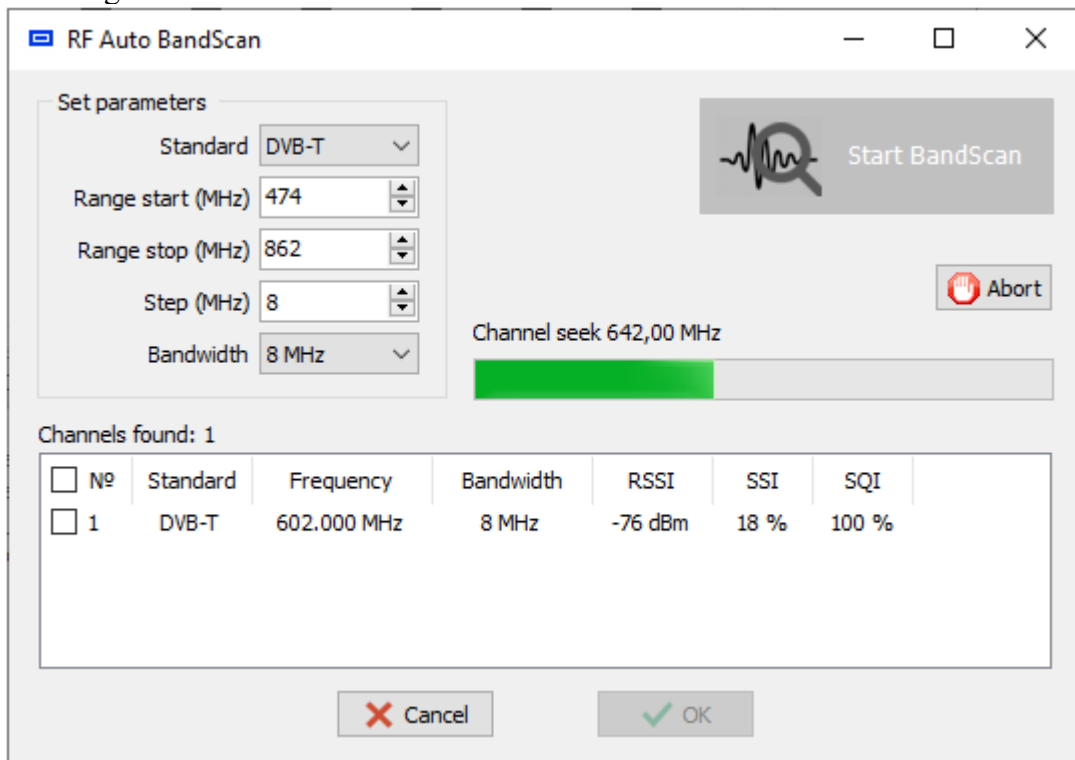
The [Add] button is used to add a configuration whose parameters are known in advance.
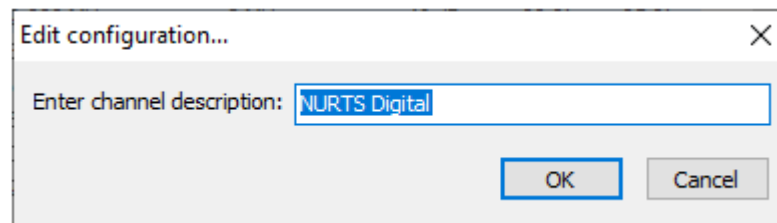
The [Edit] button is used to edit the description of the selected configuration.

The [Delete] button deletes the selected configuration, while the [Clear] button will clear all configurations from the list and create a new empty list.

The software allows for working with multiple lists of configurations. Each configurations list is a separate file. The [Open] button is used to select a file of previously created configurations, which will be added to the list.

The [Save] button is used to save the changes in the selected list of configurations.

It is quite useful, especially when scanning in the DVB-S/DVB-S2 standard, where there are multiple channels, to clear the list in advance with the Clear button and then save the newly-found channels in a file with the selected polarization and band.

To continue to the main software screen, select the [Play selected configuration] button. This button is active only when a configuration has been selected from the list, a DVB Explorer unit has been found and the communication with it is error-free, i.e. the Device status and USB status fields are green.

Main Window
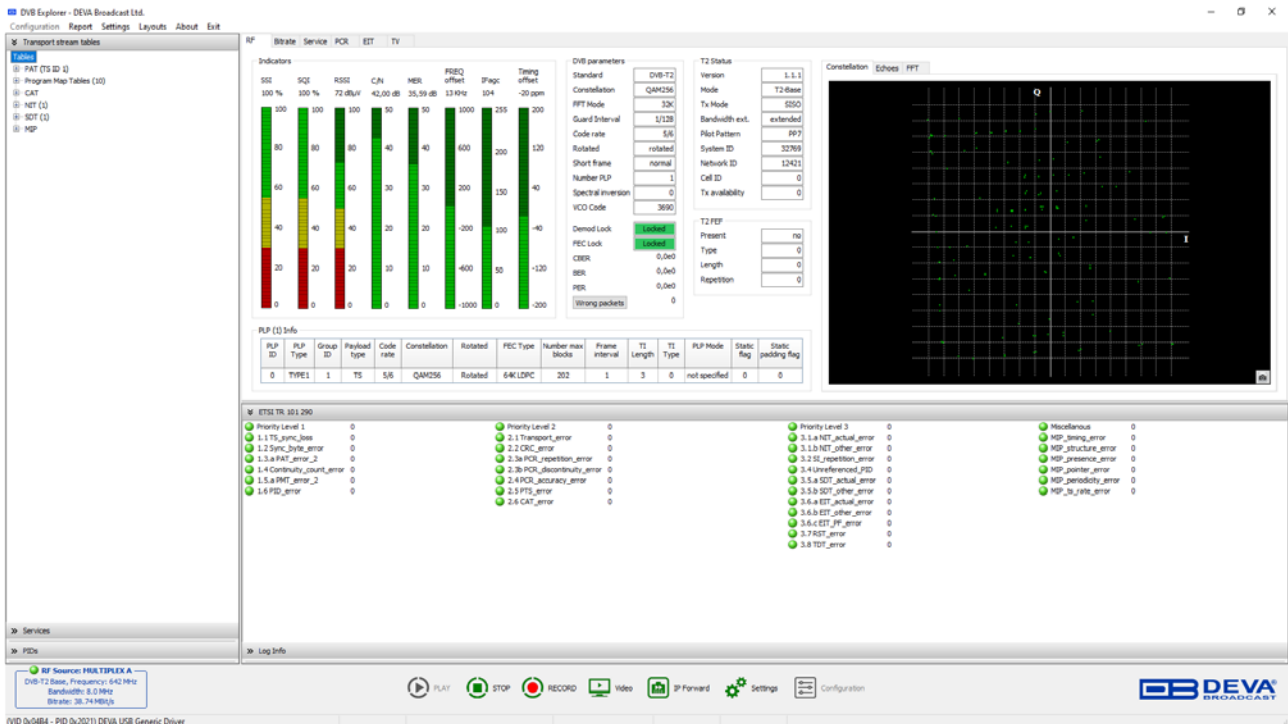
The main DVB Explorer screen is functionally divided into four parts.

On the left are three sections containing information derived directly from the transport stream packets. They are presented as tree structures - Transport stream tables, Services, PIDs. Each section is selected by a left click of the mouse on the section title. The sections are also automatically activated upon selecting the tabs - RF, Bitrate and Service. A detailed description of the functionality of each section can be found further on in this Manual.

To the right of the tree section are six tabs: RF, Bitrate, Service, PCR, EIT and TV. The tabs are activated by selecting the tab title with the mouse. Each tab provides specific information about the selected configuration. A detailed description of the functionality of each tab can be found further on in this Manual.

The space under the tabs is divided into two sections - ETSI TR 101 290 and Log Info. The first section provides clear information about measurement errors and DVB transport streams analysis in accordance with the ETSI TR 101 290 standard. Log Info brings up specific information from events during the operation of the software.

The lower section of the main screen contains information about the currently selected configuration and the buttons to manage the DVB Explorer.
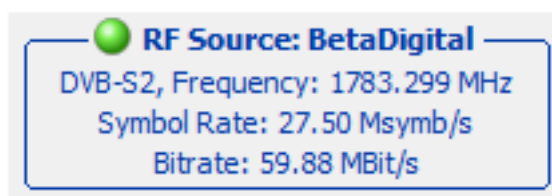
Management Buttons
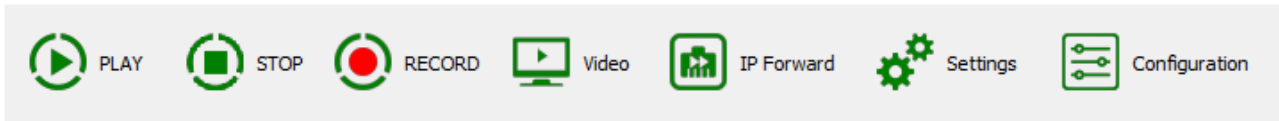
[PLAY] – This is the button that starts the measurements and the analysis of the input signal from the selected configuration.

[STOP] – Stops all actions related to the analysis of the selected configuration. The same configuration can be started again using [PLAY]. The Configuration button is used to select another configuration, if a change is needed.

[RECORD] – Used to record the transport stream (TS) of the selected configuration into a file.
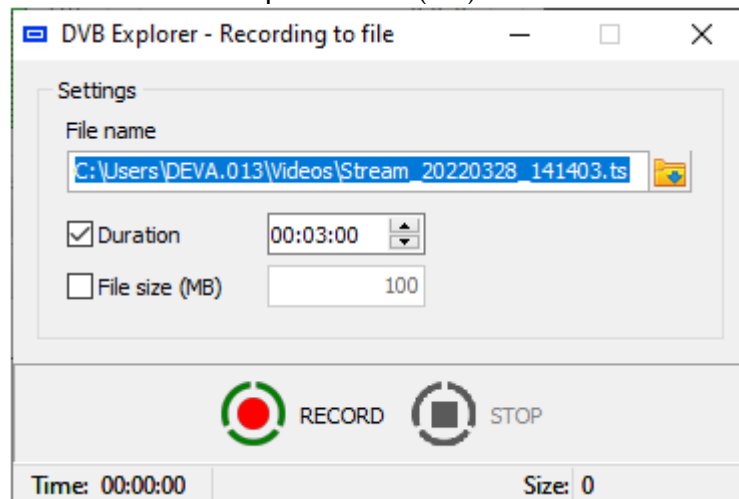
The path and the file name can be set directly or selected by clicking on the yellow folder button after the file name field. The parameters for duration and size of the file are optional but if they are selected, the record will stop upon fulfilling the first condition.

[Video] – Used for local streaming of the input data from TS to external UDP video players – VLC, Windows Media Player, etc.
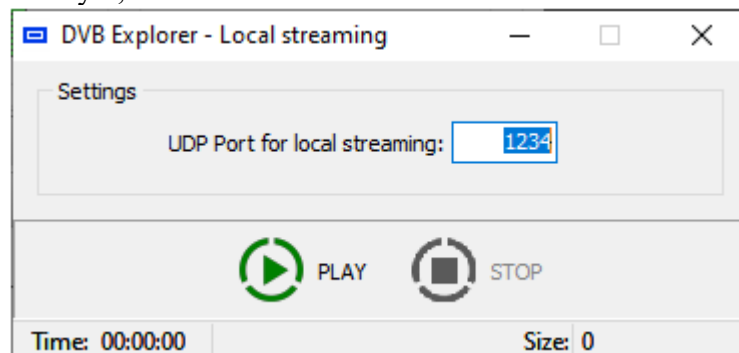
The DVB Explorer settings allow for specifying the path to VLC and the optional parameters upon starting it (see "Streaming Settings" on page 23). If VLC is installed and its settings are correct, VLC will start automatically.

[IP Forward] – Sends the input data from TS to a specific IP address.
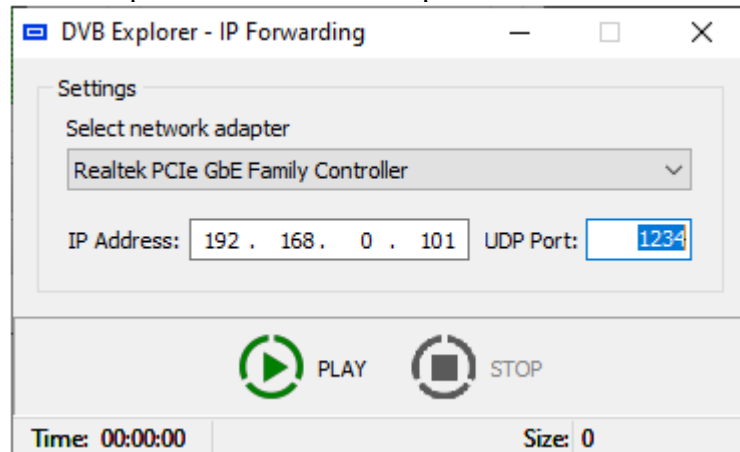
The Ethernet controller of the PC to be used must be specified, as well as IP address and UDP port to forwarding (see "Streaming Settings" on page 23). For this function to be applied, DVB Explorer may have to be connected to Windows Firewall.

[Settings] – This button brings up a form in which the most necessary software settings can be applied (see "Settings" on page 22). The button is conveniently available in the main menu as well.

[Configuration] – This button brings up the form for selecting a configuration (see "Selecting a Configuration" on page 16). The button is conveniently available in the main menu as well.

Settings

GENERAL SETTINGS
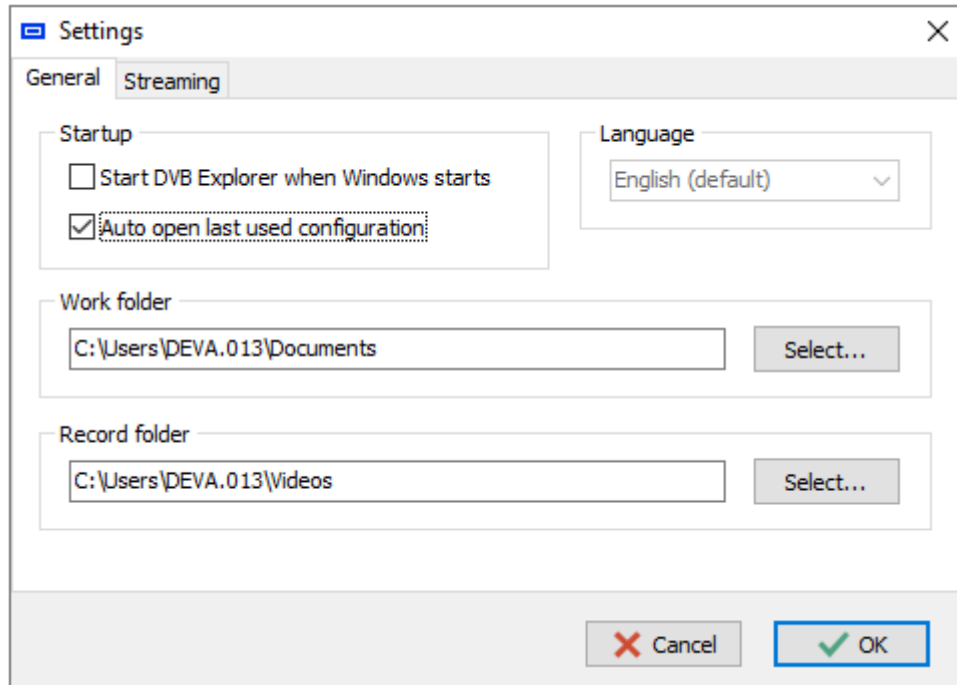
Start DVB Explorer when Windows Starts – if the box is checked, the Software will be automatically loaded once Windows is started.

Auto open last used configuration – if the box is checked, upon starting the software, it will automatically select and open the last used configuration.

Work folder – selecting a folder in which files will be saved by default.

Record folder – selecting a folder in which TS files will be saved by default.

STREAMING SETTINGS

Local group box

VLC executable file location – a complete path to the location of VLC player.
Additional parameters – additional parameters when starting VLC player.
UDP Port – local UDP port number.

IP Forwarding group box

Select network adapter – an available network adapter must be selected from the PC (when more than one), to be used for transmitting TS via the UDP port.
Remote IP Address – recipient IP address.
UDP Port – UDP port number.

Transport Steam Tree View

Each of the three sections contains information derived and decoded from the transport stream packets.

TRANSPORT STREAM TABLES

The first section contains all tables involved in TS and their structure, data and descriptors. Each value is available both as a decimal and as a hexadecimal number.

The following MPEG-2 PSI (Program Specific Information) tables are included: Program Association Table (PAT), Conditional Access Table (CAT), Program Map Table (PMT), Network Information Table (NIT). Besides the mandatory tables, the software also finds and decodes Bouquet Association Table (BAT), Service Description Table (SDT), Event Information Table (EIT), Time and Date Table (TDT), Time Offset Table (TOT), Stuffing Table (ST).
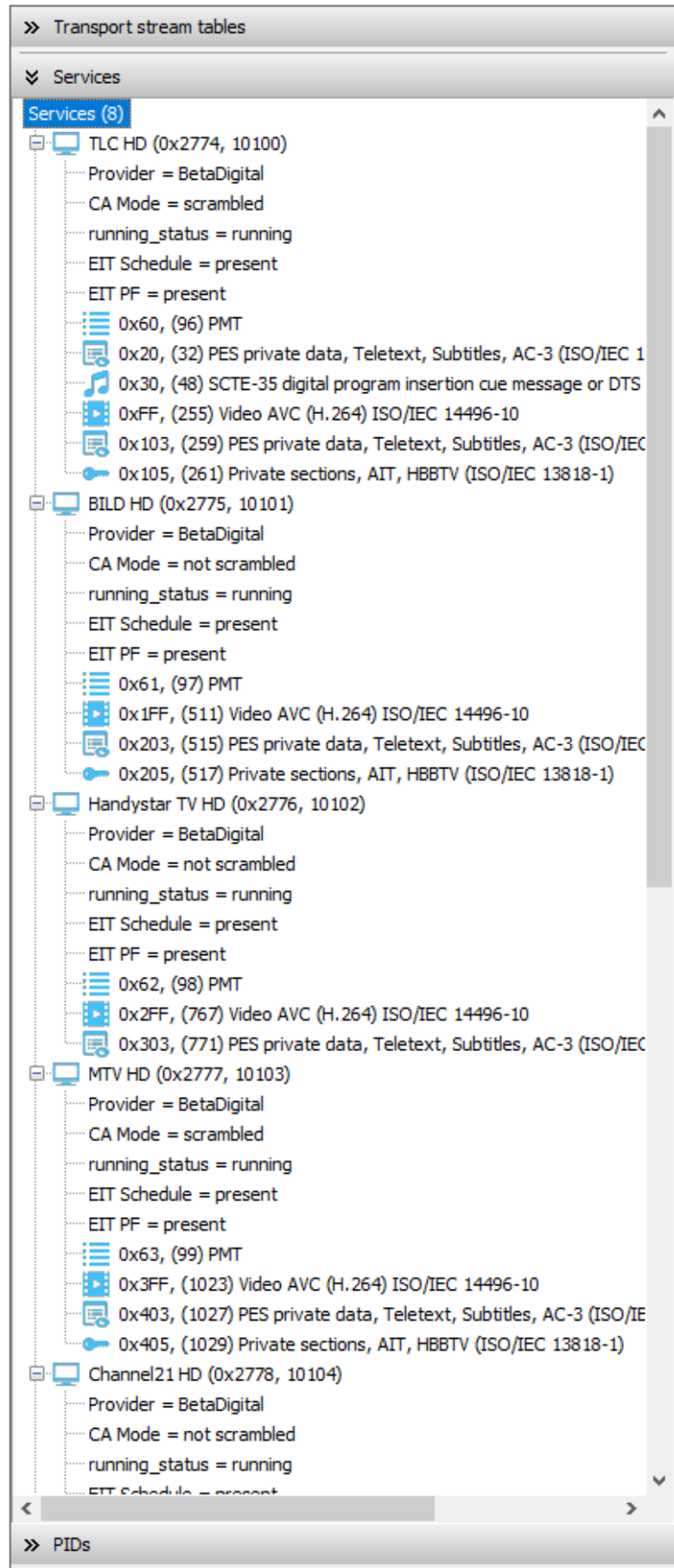
The separate tables and descriptors are opened and closed with a left click of the mouse on the [+] and [–] squares. If you select a record with [+] or [–]and right-click on the mouse, a menu appears from which you a full expansion or a full collapse of the data can be selected.
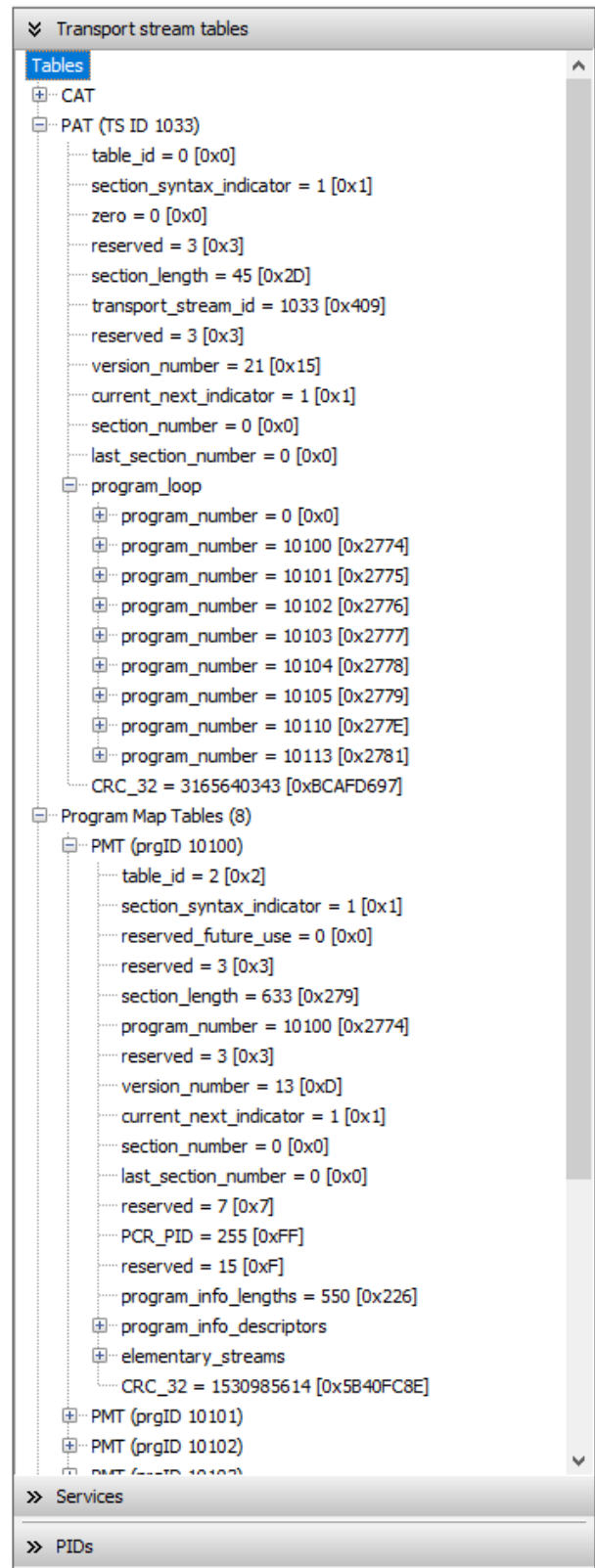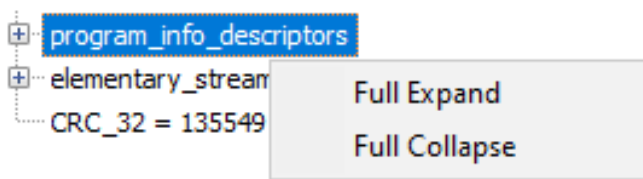
SERVICES

This section shows the services offered by TS – TV, radio, data broadcast, etc. Information is brought up about the name of the service, provider, whether the service is coded, whether there is EPG, etc. ES (Elementary Stream) which are part of the service are also brought up, along with information about their type.

```
» Transport stream tables

¥ Services

Services (8)
├─ TLC HD (0x2774, 10100)
│   ├─ Provider = BetaDigital
│   ├─ CA Mode = scrambled
│   ├─ running_status = running
│   ├─ EIT Schedule = present
│   ├─ EIT PF = present
│   ├─ 0x60, (96) PMT
│   ├─ 0x20, (32) PES private data, Teletext, Subtitles, AC-3 (ISO/IEC 1
│   ├─ 0x30, (48) SCTE-35 digital program insertion cue message or DTS
│   ├─ 0xFF, (255) Video AVC (H.264) ISO/IEC 14496-10
│   ├─ 0x103, (259) PES private data, Teletext, Subtitles, AC-3 (ISO/IEC
│   └─ 0x105, (261) Private sections, AIT, HBBTV (ISO/IEC 13818-1)
├─ BILD HD (0x2775, 10101)
│   ├─ Provider = BetaDigital
│   ├─ CA Mode = not scrambled
│   ├─ running_status = running
│   ├─ EIT Schedule = present
│   ├─ EIT PF = present
│   ├─ 0x61, (97) PMT
│   ├─ 0x1FF, (511) Video AVC (H.264) ISO/IEC 14496-10
│   ├─ 0x203, (515) PES private data, Teletext, Subtitles, AC-3 (ISO/IEC
│   └─ 0x205, (517) Private sections, AIT, HBBTV (ISO/IEC 13818-1)
├─ Handystar TV HD (0x2776, 10102)
│   ├─ Provider = BetaDigital
│   ├─ CA Mode = not scrambled
│   ├─ running_status = running
│   ├─ EIT Schedule = present
│   ├─ EIT PF = present
│   ├─ 0x62, (98) PMT
│   ├─ 0x2FF, (767) Video AVC (H.264) ISO/IEC 14496-10
│   └─ 0x303, (771) PES private data, Teletext, Subtitles, AC-3 (ISO/IEC
├─ MTV HD (0x2777, 10103)
│   ├─ Provider = BetaDigital
│   ├─ CA Mode = scrambled
│   ├─ running_status = running
│   ├─ EIT Schedule = present
│   ├─ EIT PF = present
│   ├─ 0x63, (99) PMT
│   ├─ 0x3FF, (1023) Video AVC (H.264) ISO/IEC 14496-10
│   ├─ 0x403, (1027) PES private data, Teletext, Subtitles, AC-3 (ISO/IE
│   └─ 0x405, (1029) Private sections, AIT, HBBTV (ISO/IEC 13818-1)
├─ Channel21 HD (0x2778, 10104)
│   ├─ Provider = BetaDigital
│   ├─ CA Mode = not scrambled
│   ├─ running_status = running
│   └─ EIT Schedule = present

» PIDs
```

PIDS

This section contains, sorted by PID (Packet IDentifier), all tables and streams involved in TS, along with brief information about their type and the speed of their transmission.

```
» Transport stream tables
» Services
» PIDs

PID (28)
  0x0000 (0) - 3.19 kbit/s
      Type: PAT
  0x0001 (1) - 3.17 kbit/s
  0x0010 (16) - 200.90 bit/s
      Type: NIT
  0x0011 (17) - 773.63 bit/s
  0x0012 (18) - 206.14 kbit/s
  0x0014 (20) - 162.68 bit/s
  0x0015 (21) - 2.49 kbit/s
  0x004A (74) - 0.00 bit/s
  0x0DEC (3564) - 0.00 bit/s
      Type: Unreferenced
  0x141F (5151) - 3.18 kbit/s
  0x1420 (5152) - 3.24 Mbit/s
      With PCR
      With PTS
      Type: Video AVC (H.264) ISO/IEC 14496-10
  0x1421 (5153) - 169.20 kbit/s
      With PTS
      Type: Audio MPEG-1 (ISO/IEC 11172-3)
  0x1429 (5161) - 3.18 kbit/s
      Type: PMT
  0x142A (5162) - 2.16 Mbit/s
  0x142B (5163) - 169.22 kbit/s
  0x1433 (5171) - 3.19 kbit/s
  0x1434 (5172) - 3.14 Mbit/s
  0x1435 (5173) - 169.20 kbit/s
  0x143D (5181) - 3.19 kbit/s
  0x143E (5182) - 3.62 Mbit/s
  0x143F (5183) - 169.21 kbit/s
  0x14D3 (5331) - 3.18 kbit/s
  0x14D4 (5332) - 2.28 Mbit/s
  0x14D5 (5333) - 169.21 kbit/s
  0x14DD (5341) - 3.19 kbit/s
  0x14DE (5342) - 3.76 Mbit/s
      With PCR
      With PTS
      Type: Video AVC (H.264) ISO/IEC 14496-10
  0x14DF (5343) - 169.21 kbit/s
      With PTS
      Type: Audio MPEG-1 (ISO/IEC 11172-3)
  0x1FFF (8191) - 567.75 kbit/s
      Type: Null packet
  Net Bitrate - 19.34 Mbit/s
  Overall Bitrate - 19.91 Mbit/s
```

RF Screen
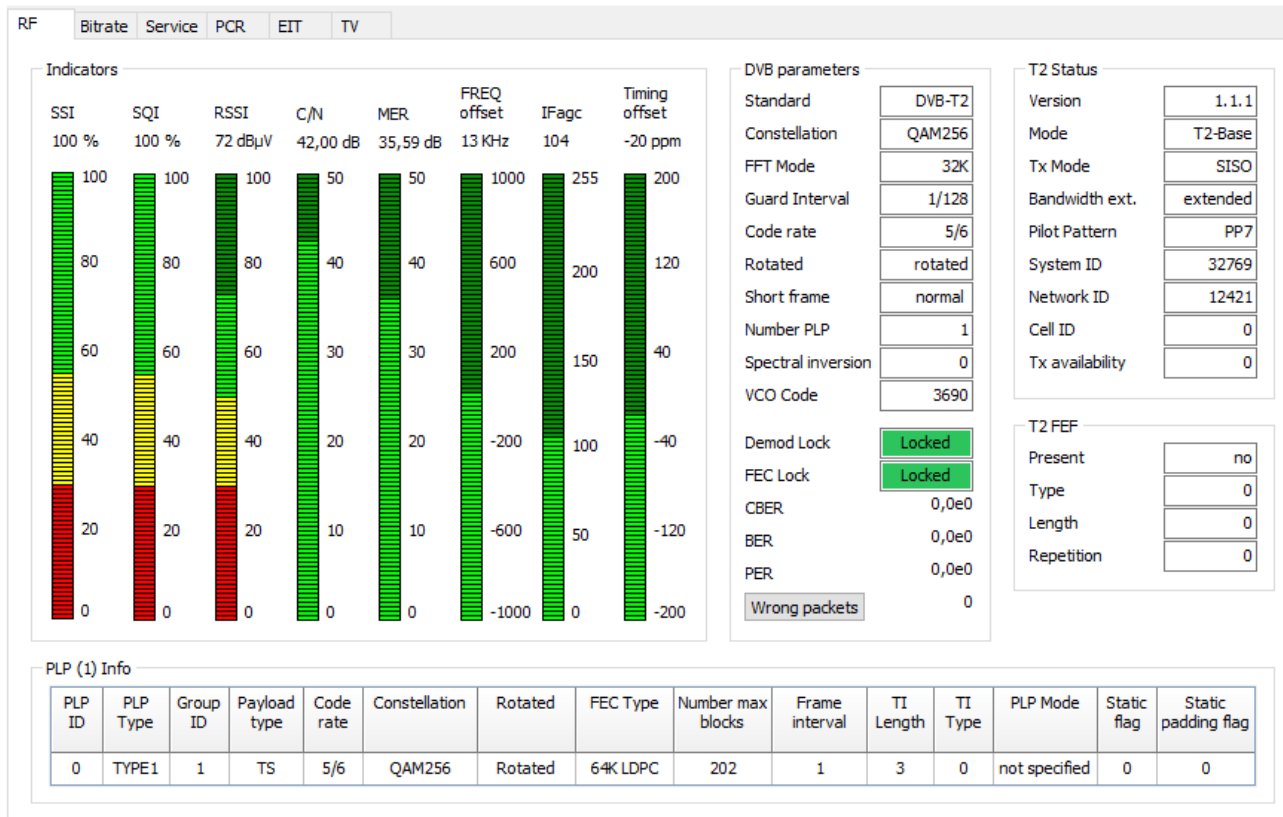
The start of a new configuration always activates the RF screen. It shows the indicators with the most important and dynamically changing signals and parameters. To the right of and below the indicators, various specific parameters and values are shown depending on the selected DVB standard.

INDICATORS

SSI – Signal strength indicator. The value for the SSI shall be referred to as the RF signal input. The signal strength indicator shall have a relative value within a range from 0% to 100% and with a resolution of 1%. The signal strength indicator shall be updated regularly once per second.

SQI – Signal quality indicator. The value for the SQI shall be referred to as the RF signal input. For DVB-T2 signals the value for the SQI shall be referred to as a PLP. The signal quality indicator shall have a relative value within a range from 0% to 100% and with a resolution of 1%. The signal quality indicator shall be updated regularly once per second.

RSSI – Received signal strength indicator. The value for the RSSI refers to the transmitter power output as received by a reference antenna. This indicator is used to measure the power level and quality of the RF input signal.

C/N – Carrier to Noise ratio. C/N is a measure of the received carrier strength relative to the strength of the received noise. High C/N ratios provide better quality of reception, and generally higher communications accuracy and reliability.

MER – Modulation error ratio. MER is the measure of the quality of digitally modulated signals.

FREQ offset – Frequency offset of input RF Signal.

IFagc – The effect that the AGC (Automatic Gain Control) module has on the RF input signal.

Timing offset – Timing offset of input RF Signal.

On the right of the RF screen are charts of measurements in real time with the current data coming from the device.

Constellation
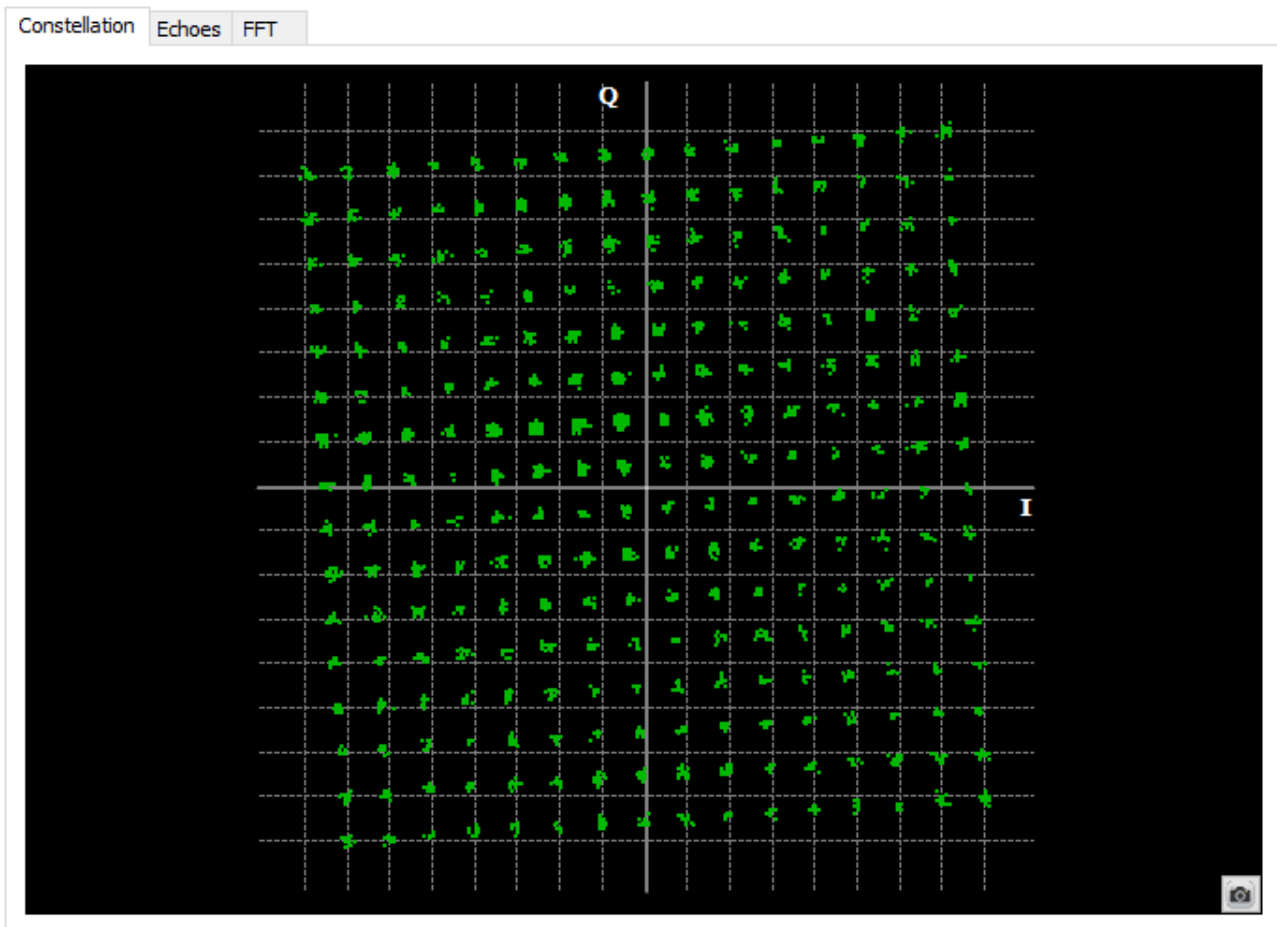
The constellation diagram is a graphic representation (I/Q) of the digital symbols received over a period of time. There are different types of constellation diagrams for the different modulation modes. In the case of an ideal transmission channel, free of noise and interferences, all symbols are recognised by the demodulator without mistakes. In this case, they are represented in the constellation diagram as well defined points hitting in the same area and forming a clear dot.

Noise and impairments cause the demodulator to not always read the symbols correctly. In this case the hits disperse and create different shapes that at the end will allow to determine at a glance the type of noise in the signal.

For example, the modulation error rate (MER) is a generalized parameter in which all interfering signals affecting a digitally modulated signal are mapped. Any disturbing event or impact can be described by an error vector that pushes the point of the constellation out of the ideal center of the decision field. In addition, the constellation diagram itself is displayed graphically and can then be assessed visually.

Echoes

Only for DVB-T and DVB-T2 standards.

	Max	First	Last	Max2	Max3	Max4
Location	-53	-55		-55	-55	
Amplitude	83	5		5	0	

Echoes, i.e. multipath reception, lead to frequency-selective fading. Coded orthogonal frequency division multiplex (COFDM) is a transmission method which, instead of one carrier, uses a large number of subcarriers in one transmission channel. It is especially designed for the characteristics of a terrestrial transmission channel containing multiple echoes. The information to be transmitted is provided with error protection (COFDM) and distributed over all these subcarriers. The subcarriers are vector modulated and in each case transmit a part of the information. COFDM produces longer symbols than single-carrier transmission and, as a result, and with the aid of a guard interval, intersymbol interference due to echoes can be eliminated. Due to the error protection and the fact that the information is distributed over the many subcarriers, it is possible to recover the original data stream free of errors in spite of any fading due to echoes.

Equalizer

Only for DVB-C, DVB-S and DVB-S2 standards.
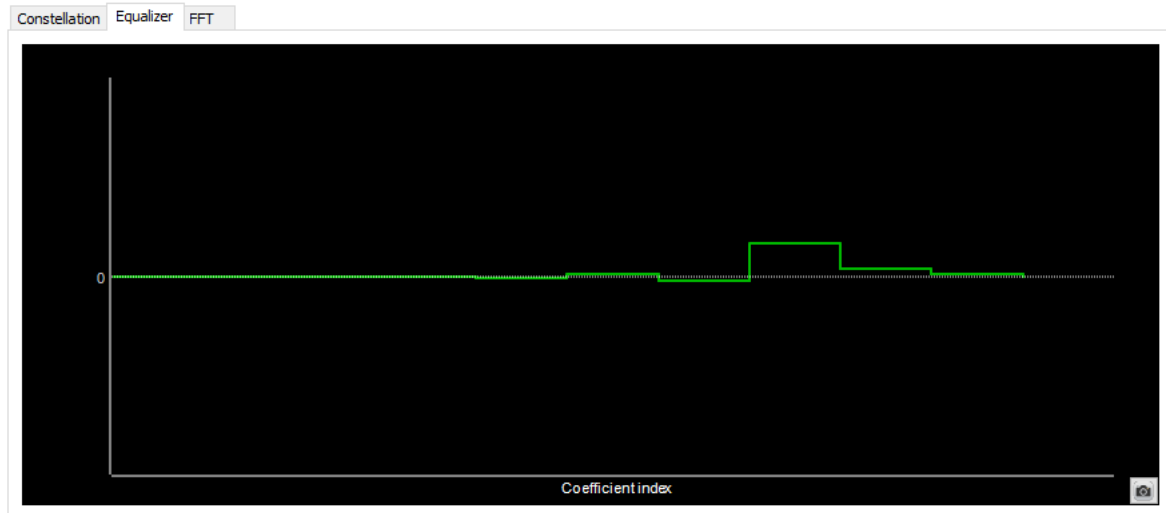
    The digital channel equalizer serves to correct transmission errors. The channel equalizer block also includes a matched filter which performs roll-off filtering.

    This equalizer operates in accordance with the maximum likelihood principle, i.e. it is intended to optimize the signal quality by "tweeking" digital "setscrews" which are the taps of the digital filter. The signal, thus optimized, passes into the demapper where the data stream is recovered.

FFT (Fast Fourier Transform)
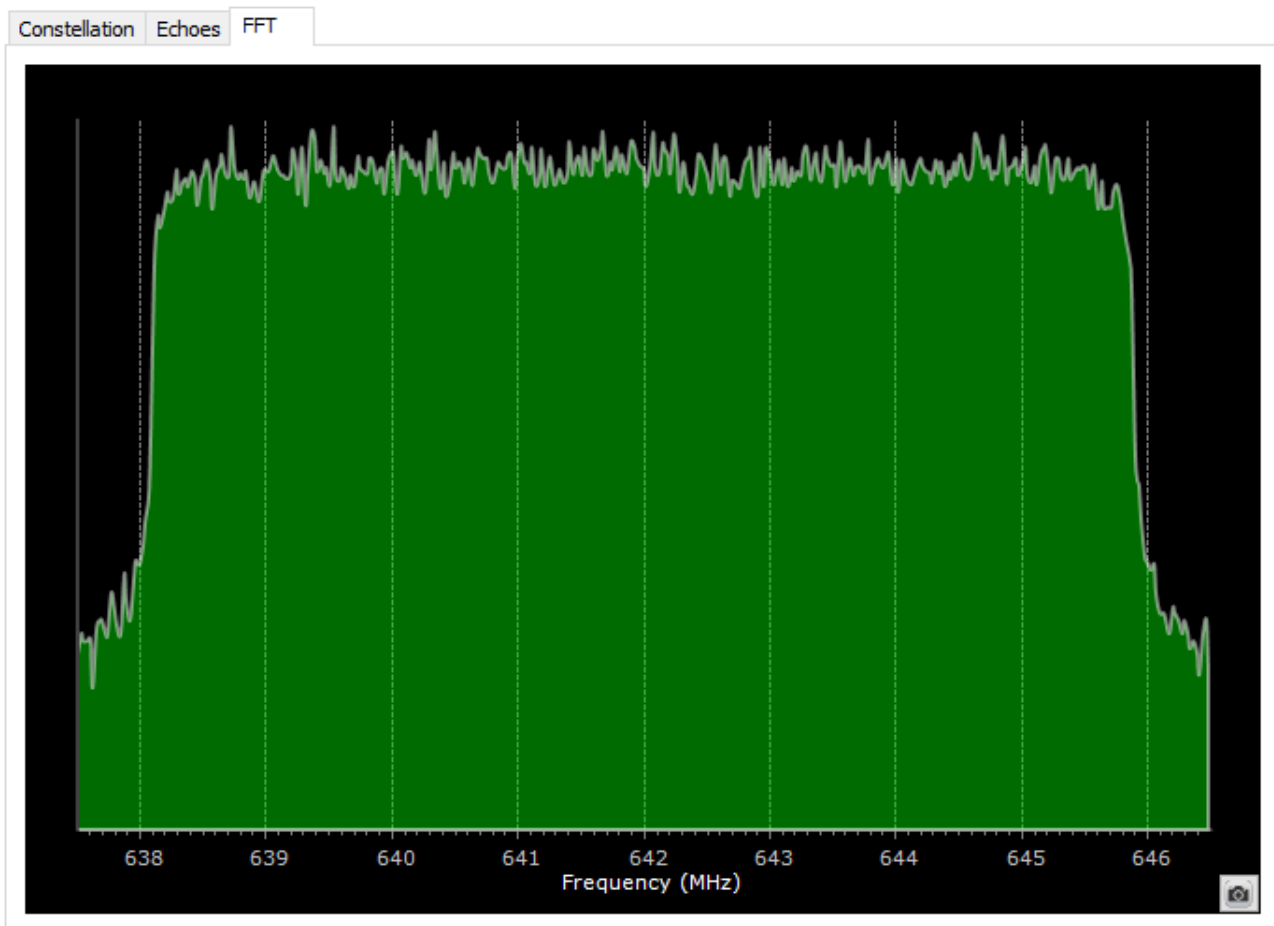
The Discrete Fourier Transform is a simple but fairly time-consuming algorithm. To obtain the precise result of the Fourier Transform, a time-domain signal would have to be observed for an infinitely long period of time. In the case of the Discrete Fourier Transform, however, a signal segment is only observed for a finite period of time and transformed. The result of the DFT or FFT, respectively, will thus always differ from that of the Fourier Transform.

It has been seen that, in principle, this analyzed time segment is converted into periodic signals in the DFT, i.e., the result of the DFT must be considered to be the Fourier Transform of this converted time segment.

The FFT signal processing block, the sampling window of which is controlled by the time synchronization, transforms the COFDM symbols back into the frequency domain. In short, Fast Fourier Transform (FFT) is a means of generating and demodulating a COFDM signal.

NOTE: In the lower right corner of each chart, there is a small button with which a shot of the current image can be made in Clipboard.

Bitrate Screen
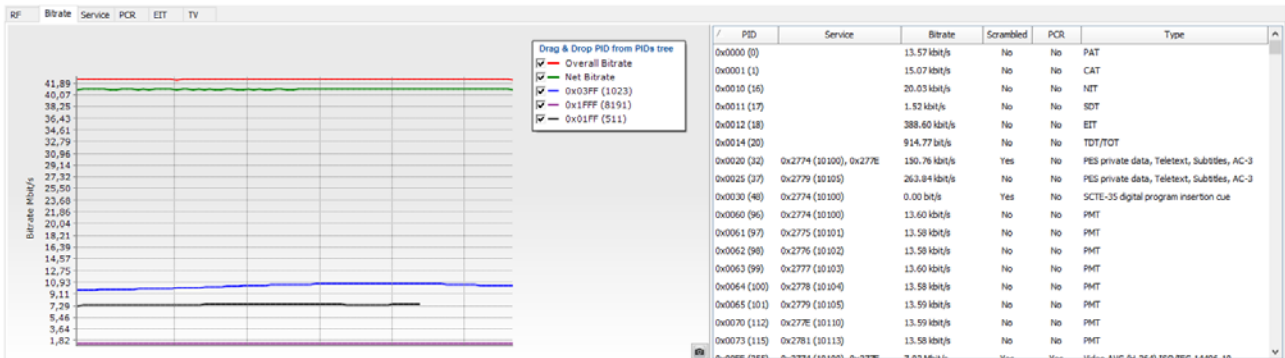
This screen provides a better visualization of the TS bitrate. The left part of the screen shows a chart with the bitrate data in real time. The chart generally shows only the Overall Bitrate and the Net Bitrate (Overall Bitrate-Null packets), but other PIDs can also be added via Drag & Drop from the PIDs Tree section. By keeping the mouse over a specific curved line on the chart, a small window is displayed with information about the time elapsed from the start of the configuration and the current bitrate.
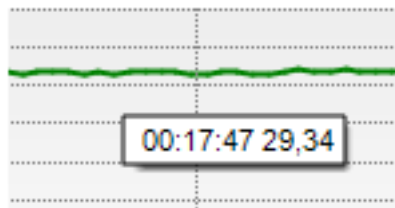
In the lower right corner of the chart, there is a small button with which a shot of the current image can be made in Clipboard.

The right-hand section of the tab shows a table with the PID (Packet IDentifier) of all tables and streams in TS. Separate columns contain data about the service they are part of, their current bitrate, whether they are coded or not, whether they contain PCR (Program Clock Reference) or not, as well as their type.

This screen is automatically activated when the PIDs Tree section is selected.

Service Screen
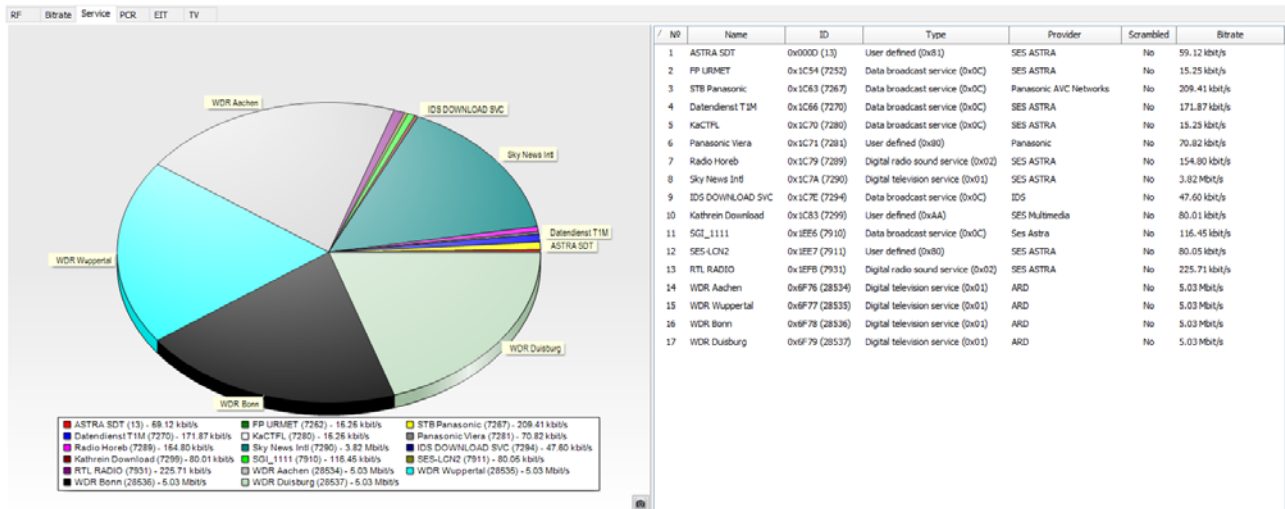
As with Bitrate Screen, the data regarding the services offered in TS are also presented here as a chart and as a table. The chart shows the current bitrate ratio of every service in TS in percentages. In the lower right corner of the chart, there is a small button with which a shot of the current image can be made in Clipboard.

The table contains information about the name of the service, service ID, the service type, the service provider, whether it is coded, as well as the current bitrate.

This screen is automatically activated when the Service Tree section is selected.

PCR Screen
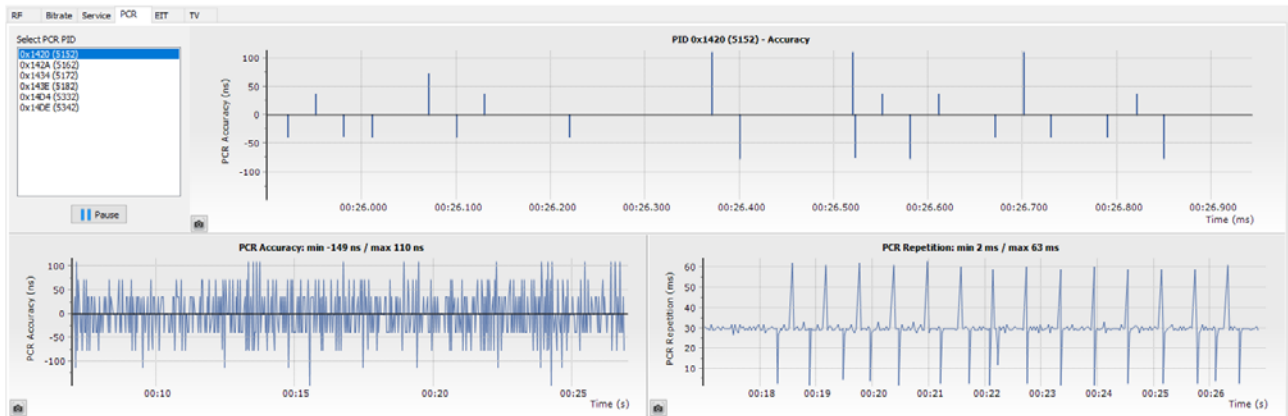
A transport stream is a multiplex of several TV programs and these may have originated from widely different locations. It is impractical to expect all the programs in a transport stream to be genlocked and so the stream is designed from the outset to allow unlocked programs. A decoder running from a transport stream has to genlock to the encoder and the transport stream has to have a mechanism to allow this to be done independently for each program. The synchronizing mechanism is called program clock reference (PCR).

This screen gives information about the available PCR PIDs in TS through time. When selecting a PCR PID from the table, the charts show graphical information followed in the ETSI TR 101 290 standard.

PCR Accuracy – This error can occur when the PCR accuracy of the selected program is outside the range of ±500 ns.

PCR Repetition – This error occurs when the time interval between two consecutive PCR values is more than 100 ms.

In the lower right corner of each chart, there is a small button with which a shot of the current image can be made in Clipboard.

The [Start / Pause] button starts/stops the filling out of data in the charts.

EIT Screen

The EIT (Event Information Table) contains data concerning events or programmes such as event name, start time, duration, etc. The use of different descriptors allows the transmission of different kinds of event information, e.g. for different service types.

This information is similar to EPG (Electronic Program Guide). The EIT Screen consists of two sections. From the **Select service** combobox, the required program is selected. The table above shows EIT present/following information about the selected program, if there is one. It shows only two events – the current one and the one that follows.

The table below displays EIT schedule information. This information is much more extensive and can cover the events for several days ahead.

With the [Export] EIT button, the data from the selected program can be exported into a text file in TXT or CSV format.

TV Screen

This screen has a built-in audio-video player, with which the TS service containing radio and TV can be reviewed. The required program is selected from the **Programs** dropdown menu. Encrypted services are not included in the list. The buttons to the right of the list have the following designations: First program, Previous program, Play/Pause, Next program, Last program.
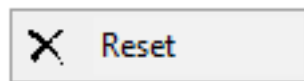
An option to mute the sound is included – **Mute**. The feed can also be displayed in full screen – **Full screen**. This can also be achieved by a double click with the mouse on the player screen. To exit the full screen mode, the [ESC] button can be used or once again a double click with the mouse on the screen.
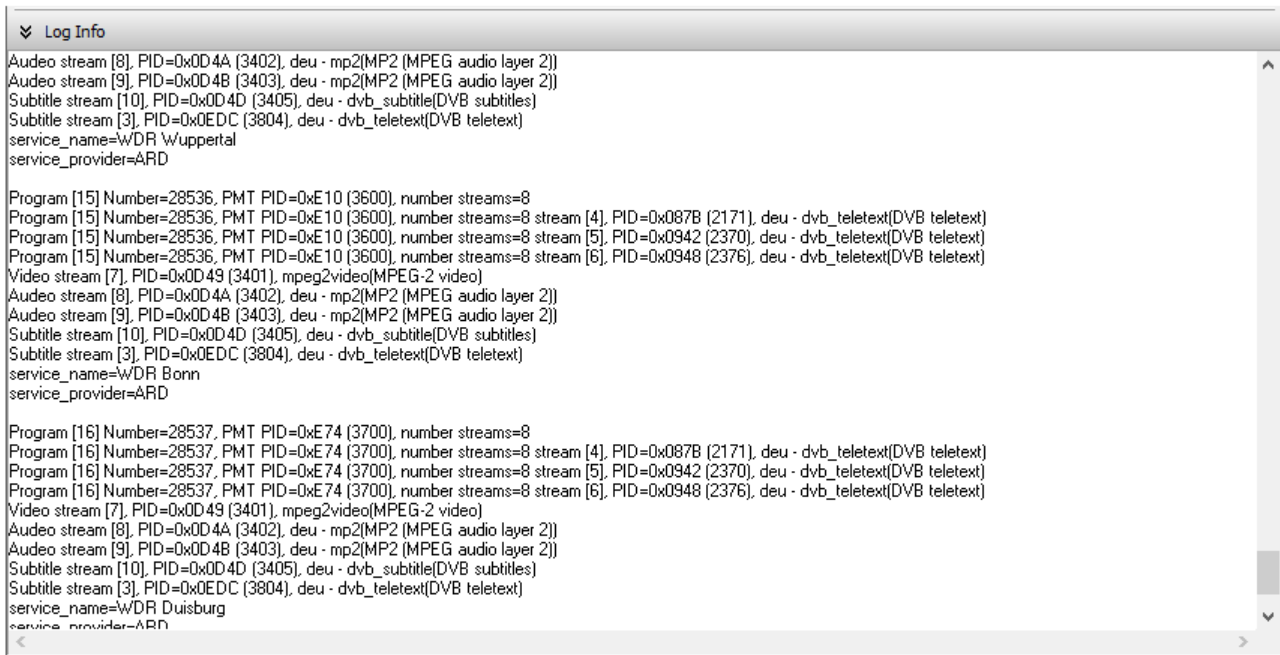
ETSI TR 101 290 Screen

ETSI TR 101 290							
Priority Level 1	1	Priority Level 2	2	Priority Level 3	0	Miscellanous	0
1.1 TS_sync_loss	0	2.1 Transport_error	0	3.1.a NIT_actual_error	0	MIP_timing_error	0
1.2 Sync_byte_error	0	2.2 CRC_error	0	3.1.b NIT_other_error	0	MIP_structure_error	0
1.3.a PAT_error_2	0	2.3a PCR_repetition_error	0	3.2 SI_repetition_error	0	MIP_presence_error	0
1.4 Continuity_count_error	1	2.3b PCR_discontinuity_error	0	3.4 Unreferenced_PID	0	MIP_pointer_error	0
1.5.a PMT_error_2	0	2.4 PCR_accuracy_error	2	3.5.a SDT_actual_error	0	MIP_periodicity_error	0
1.6 PID_error	0	2.5 PTS_error	0	3.5.b SDT_other_error	0	MIP_ts_rate_error	0
		2.6 CAT_error	0	3.6.a EIT_actual_error	0		
				3.6.b EIT_other_error	0		
				3.6.c EIT_PF_error	0		
				3.7 RST_error	0		
				3.8 TDT_error	0		

The ETSI TR 101 290 standard describes how to measure signal parameters in digital broadcasting. The classification of measurement methods is made according to the severity of the consequences caused by certain errors and equipment failures. It also provides a convenient mechanism for test validity of a transport stream. DVB Explorer also provides ETSI TR 101 290 consistency check of the MPEG 2 transport stream. Errors are assigned a priority depending on severity: 1, 2 and 3.

The ETSI TR 101 290 monitoring window displays errors for the entire content of the transport stream. The first position contains all errors on the respective level. Each error has a separate counter. When an error occurs, its counter increases and the screen indicator turns red. To clear the errors during operation of the software, right-click with the mouse in the section. **Reset** must be selected from the activated popup menu.
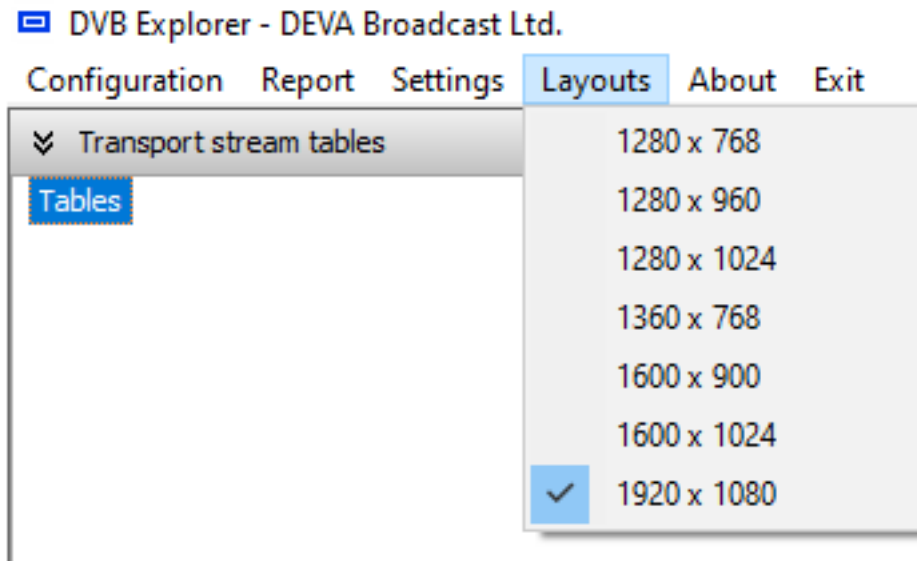
Log Info Screen

During operation, DVB Explorer generates in Log Info information about the current operating processes.

Layouts

The software allows for the use of previously defined layouts of the components and forms used, in accordance with the standard monitor resolutions. This is achieved by selecting Layouts from the main menu.

Generate Report
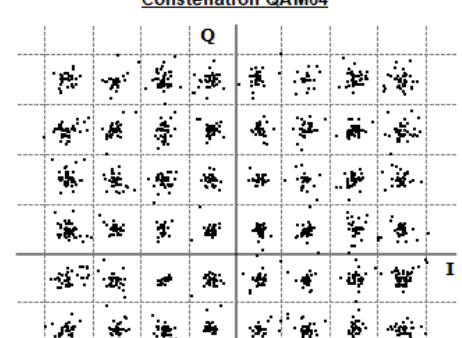
Generating a report starts from the main DVB Explorer menu. This element is disabled in the first five seconds of starting a new configuration, so that the necessary data for the graphics can be gathered and some parameters calculated.

The generated report can be reviewed and printed out. There is also a button for exporting the data in PDF format.

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I. TERMS OF SALE: DEVA Broadcast Ltd. products are sold with an understanding of "full satisfaction"; that is, full credit or refund will be issued for products sold as new if returned to the point of purchase within 30 days following their receipt, provided that they are returned complete and in an "as received" condition.

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B. This Warranty applies only to products sold "as new." It is extended only to the original end-user and may not be transferred or assigned without prior written approval by DEVA Broadcast Ltd.

C. This Warranty does not apply to damage caused by improper mains settings and/or power supply.

D. This Warranty does not apply to damage caused by misuse, abuse, accident or neglect. This Warranty is voided by unauthorized attempts at repair or modification, or if the serial identification label has been removed or altered.

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A. Any discrepancies noted within TWO YEARS of the date of delivery will be repaired free of charge, or the equipment will be replaced with a new or remanufactured product at DEVA Broadcast Ltd. option.

B. Parts and labor for factory repair required after the two-year Warranty period will be billed at prevailing prices and rates.

IV. RETURNING GOODS FOR FACTORY REPAIR:

A. Equipment will not be accepted for Warranty or other repair without a Return Material Authorization (RMA) number issued by DEVA Broadcast Ltd. prior to its return. An RMA number may be obtained by calling the factory. The number should be prominently marked on the outside of the shipping carton.

B. Equipment must be shipped prepaid to DEVA Broadcast Ltd. Shipping charges will be reimbursed for valid Warranty claims. Damage sustained as a result of improper packing for return to the factory is not covered under terms of the Warranty and may occasion additional charges.

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• All fields are required, or warranty registration is invalid and void

Your Company Name_____

Contact_____

Address Line 1_____

Address Line 2_____

City_____

State/Province_____   ZIP/Postal Code_____

Country_____

E-mail_____   Phone_____   Fax_____

Which DEVA Broadcast Ltd. product did you purchase?_____

_____

_____

Product Serial #_____

Purchase date_____/_____/_____   Installation date_____/_____/_____

_____
Your signature*

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