MAINTENANCE AND OPERATION
INSTRUCTION MANUAL

DB44

Compact FM Radio Monitoring Receiver
and Basic Modulation Analyzer

R·D·S
RADIO DATA SYSTEM

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

Typographic conventions

This manual uses the following typographic conventions:

Style	Used for
NOTE	Important notes and recommendations
`Example`	Used when example text is cited
"Menu" on page XX.	References
[OK]	Interface Interactive buttons.
Settings	Menu paths are represented as follows: ***Settings> General> Backup***

General Information

Compact, Robust, Reliable and Clever - This is just a small part of all the benefits of our DB44 FM Radio Monitoring Receiver and Basic Modulation Analyzer. Based on the latest technology, the DB44 core is DSP based digital design for 24/7/365 operation.

After demodulating the FM signal, the MPX signal is digitalized and all signal processing is then made through calculations. Digitizing in this way, at the input gives the equipment measurement reproducibility over time. Digital filters' accuracy, used in this equipment, enables the FM multiplex signal's components to be accurately and repeatedly reproduced from one device to another, i.e. same signal applied to two devices will give the same result. The processing power in this equipment enables all measurements to be refreshed simultaneously and synchronously, thereby allowing for detailed readings of all the Multiplex FM signal components.

DB44 allows you through its TCP/IP and GSM Connectivity to monitor all the RDS and some other signal parameters from anywhere. You can easily receive the channel status or listen to the audio from anywhere, using your mobile phone. With the built-in Audio Streamer you can even listen to, skim and record the audio from any station. DB44 is our most cost effective unit for permanent monitoring of the quality and continuity FM Radio Stations or Radio Networks.

Product Features

- Fully DSP based core
- Built-in Oscilloscope allowing Left, Right and MPX display
- MPX Power measurement with data history
- MPX Spectrum analyzer for Left, Right and MPX measurements
- Scope with Cloud Lissajous and Star Stereo Signal Representation
- Selectable De-emphasis – 50µs and 75µs
- Built-in Stereo Decoder; Stereo Presence Detection
- Date & Time Settings for manual or automatic synchronization
- LAN port for full TCP/IP remote control and monitoring
- SNMP remote monitoring and configuration
- Up to 90dBµV direct RF Antenna Input
- Adjustable alarms for RF, Deviation, Audio, Pilot, RDS Signal and RGS Groups
- Firmware update for future-proof operation
- Parameters Factory Restore Option
- FM Band 87 - 108 MHz Basic Spectrum Analyzer
- MPX, PILOT & RDS deviation meters
- LEFT and RIGHT demodulated audio level meters
- Headphones audio output
- RDS and RBDS decoder with BER meter
- Alarm dispatch via E-mail, SMS, SNMP
- Channel status reporting via SMS
- RF and RDS Measurements
- Remote Listening via optional GSM modem
- Real Time Audio Program Streaming
- Dual level access - Administrator and User accounts
- Attractive price and very good price-performance ratio
- Very Intuitive Embedded WEB server for interactive supervision
- Proved and reliable hardware for 24/7/365 operating
- Easy Installation and Setup
- SNTP for automatic synchronization of the built-in clock
- Compact and Robust Aluminum Case for high RF immunity

TECHNICAL SPECIFICATIONS

RF INPUT	
Frequency Range	87.0 to 108.0 MHz, Frequency Agile
Step Increment	50 kHz
Antenna Input	50Ω, BNC Connector, 10 dBμV sensitivity
Internal Attenuator	0, 10, 20 and 30dB, auto
Dynamic Range	0 dBμV to 100 dBμV
S/N	57dB, RF > 60dBμV, 30dB, RF > 10dBμV
METERING RESOLUTION & ACCURACY	
RF Level	0 to 95 dBμV; resolution - 0.1 dBμV; accuracy - ±1 dB (10 to 85 dBμV)
Multipath	0 to 100%; accuracy - ±1%
MPX Deviation	±120 kHz; resolution - 0.1kHz; accuracy - ±10%, ±5% typically
MPX Power	±12 dBr; resolution - 0.1dBr, 10 sec. integration; accuracy - ±0.2 dBr
Audio Level	-50 to +5dB; resolution - 0.1dB; accuracy - ±5%
Pilot Level	0 to 12 kHz; resolution - 0.1 kHz; accuracy - ±0.5 kHz, 1 to 12 kHz
RDS Level	0 to 9 kHz; resolution - 0.1 kHz; accuracy - ±10% typical and not guaranteed
AUDIO, MPX, PILOT, RDS LEVELS	
Validity	RF level preferably > 50dBμV
Multiplex Level	Peak level, 256 ksamples over 1 sec.
Audio Level	Peak level, 64 ksamples over 1 sec.
Pilot Level	Mean peak level, 256 ksamples over 1 sec.
RDS Level	Mean peak level, 256 ksamples over 1 sec.
STEREO DECODER	
Stereo Separation	>25dB, typical >30dB
De-emphasis	50 or 75μs, Selectable
THD	0.5%
OUTPUTS	
Audio stream	Icecast/Shoutcast compatible audio stream
Alarms	SMS, E-mail, SNMP
Headphone	1/8" (3.5mm) Phone Jack
GSM Modem	15-pin Male D-Sub Connector

RDS DATA DECODING	
Standards	European RDS CENELEC; United States RBDS NRSC
Error Correction & Counting	Yes
AF Decoding	Yes
CT (Time/Date)	Yes
PI, PTY, DI, MS	Yes
TA/TP	Yes
RT (Radio Text)	Yes
PS (Program Service name)	Yes
PIN	Yes
RT+	Yes
TMC	Yes
FFT SPECTRUM ANALYSIS	
Input	Composite MPX, Audio
Dynamic Range	80 dB
FFT Length	1024
Sampling Rate	256 kHz - Composite, 64 kHz - Audio
SCOPE ANALYSIS	
Input	Composite MPX, Audio
Trigger Mode	Auto, Fall
Dynamic Range	±120 kHz
Sampling Rate	256 kHz - Composite, 64 kHz - Audio
USER INTERFACE	
Web interface	Full monitoring and control; Interactive and easy to use
Indicators	3 LEDs (on front panel)
Headphone Output	1/8" (3.5mm) phone jack (on front panel)
TCP/IP COMMUNICATION	
Type	Ethernet 10/100M Base-T Port
Connector	RJ45 (on rear panel)
OPERATING CONDITIONS	
Temperature	10° to 60°C
EMC Immunity	6V/m
POWER REQUIREMENTS	
Power Supply	External, 12V/1A
SIZE AND WEIGHT	
Dimensions (W x H x D)	(125 x 31 x 160mm), (5" x 1.2" x 6.3")
Shipping Weight	1,5 kg

BLOCK DIAGRAM

A simplified block diagram of DB44 is shown below
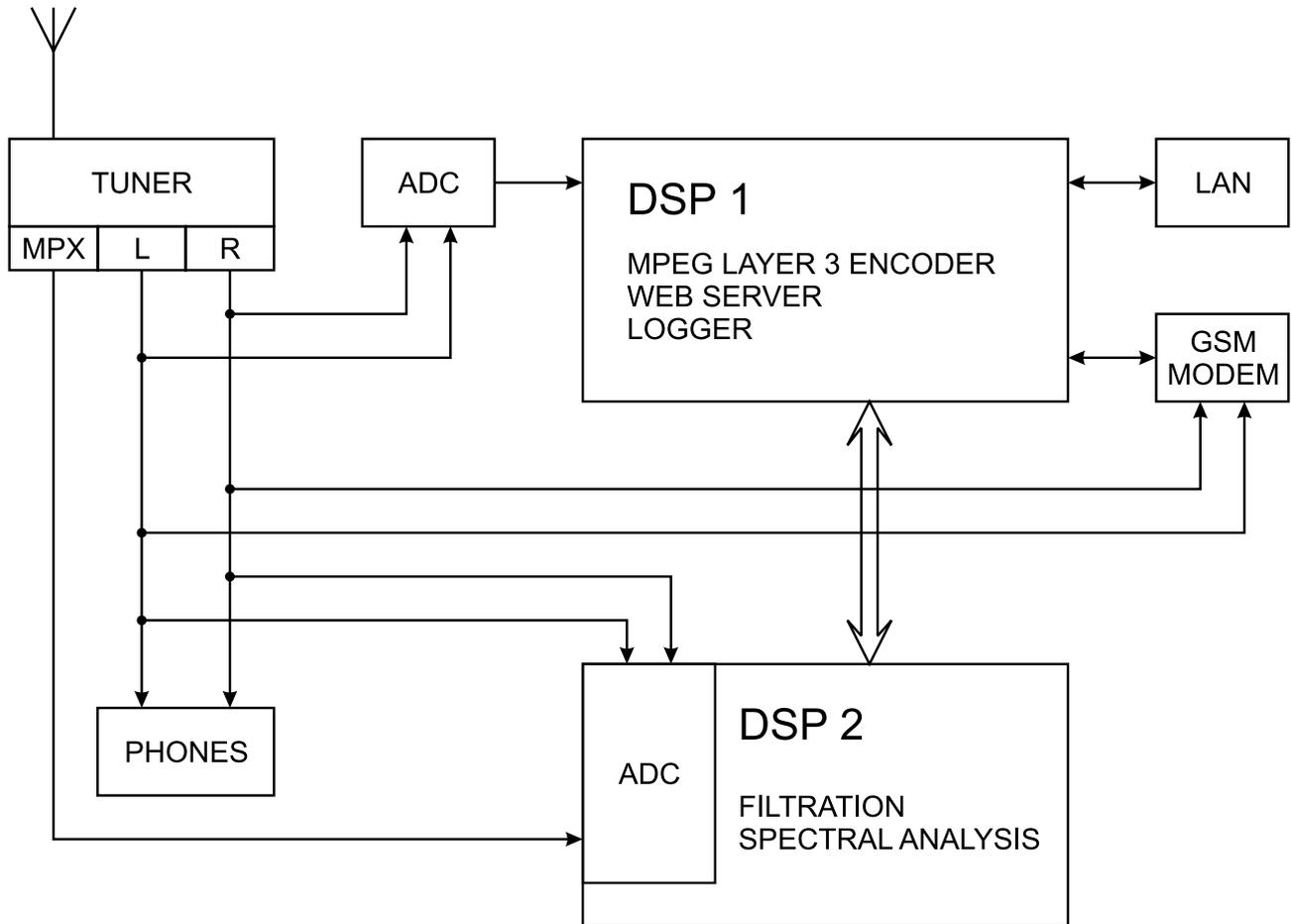
Because of the all-digital, minimalist-discrete-component nature of device circuitry, we have not provided schematic diagrams of the DB44 in this Manual. Please, note that:

<p style="color:red; text-align:center; font-weight:bold;">NO USER-SERVICEABLE COMPONENTS INSIDE.
REFER ALL SERVICING TO
QUALIFIED TECHNICAL PERSONNEL.</p>

Factory Default Settings

NETWORK SETTINGS

IP	192.168.1.2
Gateway	192.168.1.1
Subnet Mask	255.255.255.0
DNS	192.168.1.1
DHCP	Disabled

WEB SERVER

HTTP Port		80
Admin	Username	user
	Password	pass
User	Username	user
	Password	pass

E-MAIL

E-mail 1	*blank*
E-mail 2	*blank*
Sender	*blank*
Server	*blank*
Port	25

AUDIO

Stream Port	5000
Name	DB44 - FM Radio Monitoring Tool
Quality	128 kbps

GSM MODEM

Number 1	*blank*
Number 2	*blank*
Number 3	*blank*
Number 4	*blank*
Baudrate	9600

SNMP SETTINGS

Agent	Enabled
Agent ID	1
Agent Port	161
Read Community	DEVA44
Write Community	DEVA44
Manager IP	192.168.1.1
Manager Port	162

MANAGEMENT SETTINGS

Attenuator	Auto
De-emphasis	50 μs
Internet Time	Enabled
Internet Time Server	pool.ntp.org
Internet Time Server Port	123
Time Zone	UTC (+00:00)
Web session timeout	3 minutes
SNMP session timeout	1 minute

CHANNEL PRESETS DEFAULT SETTINGS

Parameter	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6
Scheduling	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Frequency	98 kHz	98 kHz	98 kHz	98 kHz	98 kHz	98 kHz
Alarms Control	All Disabled	All Disabled	All Disabled	All Disabled	All Disabled	All Disabled
Trigger Time	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes
Release Time	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes
RF Alarm Low Threshold	40 dBμV	40 dBμV	40 dBμV	40 dBμV	40 dBμV	40 dBμV
RF Alarm High Threshold	60 dBμV	60 dBμV	60 dBμV	60 dBμV	60 dBμV	60 dBμV
MPX Alarm Low Threshold	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz
MPX Alarm High Threshold	90 kHz	90 kHz	90 kHz	90 kHz	90 kHz	90 kHz
MPX Power Alarm Low Threshold	-8 dBr	-8 dBr	-8 dBr	-8 dBr	-8 dBr	-8 dBr
MPX Power Alarm High Threshold	6 dBr	6 dBr	6 dBr	6 dBr	6 dBr	6 dBr
Left Alarm Low Threshold	-30 dB	-30 dB	-30 dB	-30 dB	-30 dB	-30 dB
Left Alarm High Threshold	3 dB	3 dB	3 dB	3 dB	3 dB	3 dB
Right Alarm Low Threshold	-30 dB	-30 dB	-30 dB	-30 dB	-30 dB	-30 dB
Right Alarm High Threshold	3 dB	3 dB	3 dB	3 dB	3 dB	3 dB
Pilot Alarm Low Threshold	5 kHz	5 kHz	5 kHz	5 kHz	5 kHz	5 kHz
Pilot Alarm High Threshold	9 kHz	9 kHz	9 kHz	9 kHz	9 kHz	9 kHz
RDS Alarm Low Threshold	2 kHz	2 kHz	2 kHz	2 kHz	2 kHz	2 kHz
RDS Alarm High Threshold	7 kHz	7 kHz	7 kHz	7 kHz	7 kHz	7 kHz
RDS Group Alarm	All Disabled	All Disabled	All Disabled	All Disabled	All Disabled	All Disabled

HOW TO RESET THE DB44 TO ITS FACTORY DEFAULTS WITH-OUT HAVING ACCESS TO THE WEB INTERFACE?

To start a Hardware Reset, disconnect the power supply cable from the unit. Then locate the RESET button on Rear panel (labeled in red on the picture), press and hold it.
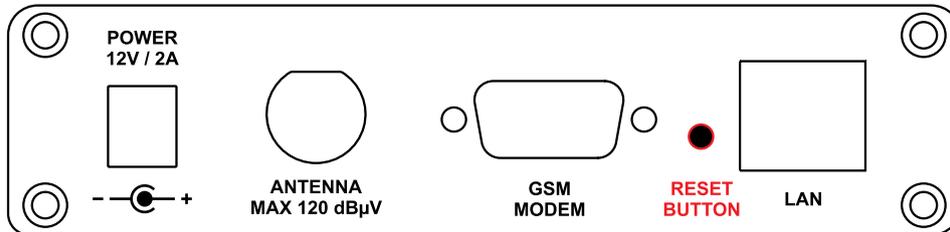
Afterwards, connect the power supply cable to the unit and keep the RESET button hold until the POWER led starts blinking. Release the RESET button and wait for DB44 to reboot with the factory default settings.

Safety Precautions

IMPORTANT: *Carefully read this paragraph as it contains important instructions concerning operator safety and directions regarding the installation, operation and maintenance of the equipment. Failure to observe the safety instructions and information given in this manual constitutes an infringement of the safety rules and design specifications provided for this piece of equipment. DEVA Broadcast Ltd. declines all responsibility if any one of the safety rules given herein is not observed. DEVA Broadcast Ltd. declines all responsibility if the end-user resells the product. The equipment is to be used by people capable of operating it in a trouble-free manner and it is assumed that they are aware of the following safety rules.*

◊ Keep this manual with the utmost care and close at hand so that it can be consulted whenever needed

◊ After unpacking the equipment, check its condition.

◊ Avoid banging the equipment.

◊ The packing material (plastic bags, polystyrene, nails, etc.) must never be left within reach of children, as these items are potential sources of danger.

◊ Do not use the equipment in places where the temperature is not within the recommended range, as specified by the manufacturer.

◊ Before connecting the equipment, make sure the nameplate specifications correspond to the mains electricity supply (the nameplate is located on the equipment enclosure).

◊ Do not remove the sticker from the equipment as it contains important specifications and the relevant serial number.

◊ To join the equipment to the mains supply, use the power cord purchased with the equipment.

◊ The equipment must be used only for the purposes it was designed for.

◊ Abuse or misuse of the equipment is extremely dangerous for people, pets and property. The manufacturer declines all responsibility for damage and injury resulting from improper use and mishandling.

◊ Certain basic safety rules must be observed when using electrical equipment, in particular:
  - Never touch the equipment with wet and/or damp hands or other parts of the body.
  - Keep the equipment away from drops of water or sprinkling systems.
  - Never use the equipment near high heat sources or explosive material.
  - Do not introduce any extraneous matter into the equipment.
  - Do not allow children or untrained people to use the equipment.

◊ Before cleaning or servicing the equipment outside, disconnect its power supply and wait at least 2 seconds before working on it, as recommended by current safety regulations.

◊ In the event of faults and/or improper operation, turn off the equipment, shut off the electrical power and call your dealer.

◊ Do not attempt to make repairs and/or adjustments when covers/guards or circuit boards are to be removed.

◊ Call your dealer for any repairs and be certain original spare parts are used. Failure to observe this rule may adversely affect the safety level of your equipment.

◊ The equipment is to be connected to the mains supply and provided with adequate and efficient earth conductors.

◊ When installing, leave a clearance of at least 1 cm around the equipment to allow air to pass freely.

Panel Indicators and Appointments

FRONT VIEW
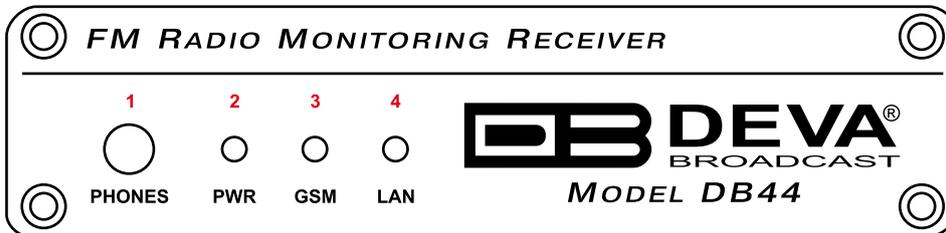
1 - Phones Output - Audio signal from the tuned frequency.

2 - Power LED Indicator

3 - GSM LED Indicator. This LED can in one of the following states:

      Off - no GSM Modem;

      Fast Blinking – GSM Modem initialization;

      Slow Blinking – GSM Modem present and operating;

4 - LAN LED Indicator. This LED can be in one of the following states:

      Off - No User Connected, Logger is active;

      Blinking – User is connected, Logger is inactive;

REAR VIEW
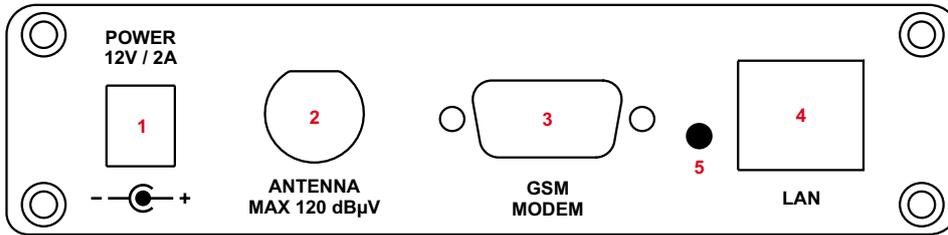
1 - Power Supply (12V, 2A);
2 - Antenna Input - BNC connector for FM Antenna;
3 - GSM Modem Connector - DB-15 male;
4 - LAN Port / Internet Input – standard RJ-45 port;
5 - Factory Defaults reset button

Getting Started

For the normal operation of DB44, you will need the following conditions:
- Standard Ethernet 10/100M connection;
- Correct assigned Network configuration and device settings;

To provide all these conditions please, follow the instructions below.

CONNECTION

- Install the unit on its operation place;
- Connect the unit to the power supply network using the power cable provided with the unit;
- Connect the antenna cable to the RF antenna input connector located on the rear panel of the device;
- Connect DB44 to the TCP/IP network using direct network cable;
- Connect the optional GSM modem via the connection cable provided with the GSM modem. Please, locate and select proper place of the GSM antenna for achieving better GSM network coverage.

NOTE: The GSM antenna must be far enough from the monitoring devices. The GSM modem radiate RF signal that may cause spurious emissions that will make troubles with the accuracy of the measurements.

NETWORK SETTINGS

After connecting the network cable the Led 'LAN' located on the rear panel must be ON or flashing. The next and most important step for configuration is the adjustment procedure of the Network Communication. The settings shown below are Default Network Settings:

```
IP              : 192.168.1.2
Mask            : 255.255.255.0
Gateway         : 192.168.1.1
DNS             : 192.168.1.1
DHCP            : Disabled
HTTP Port       : 80
Stream Port     : 5000
SNMP Agent Port      : 161
SNMP Manager IP      : 192.168.1.1
SNMP Manager Port    : 162
```

DB44 is controlled through the built-in web server and a standard web browser can be used to monitor its status or make some adjustments. To connect to the device you need to know its IP address and follow the next steps:
- Open a WEB Browser.
- Enter the device IP address in the browser's address field.

NOTE: If the port is different than the default one (80), it is necessary to specify it, e.g. http://192.168.1.2:9000
- Press <ENTER>.

If you do not know the IP address you can access DB44 by using UPnP discovery in local networks .

ATTENTION: Depending on Internet Protocol Settings, assigned IP address may not be visible outside your local network, thus device may be accessed only within that network. Consult with your network administrator for the appropriate IP settings.

LOGIN

ATTENTION: Upon Login the DB44 Logger will stop and will start again automatically after Logout.

DB44 serves only one user at a time, thus Username and Password will be requested when connecting. Default values are *user* and *pass*.
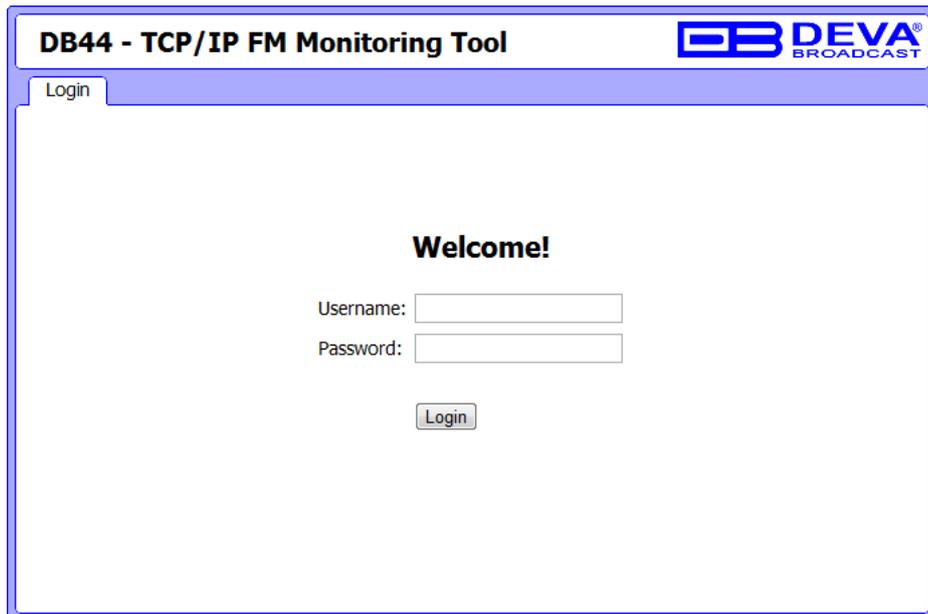
Enter your credentials and press Login button to continue to Main screen.

If DB44 is already in use you will be prompted shortly:

NOTE: DB44 will Logout automatically the current session after the defined WEB session timeout. (see "Management Screen" on page 39)

Device Control Interface

Control interface is visually divided into three parts:
- Top – Navigational Menu;
- Middle – specific contextual readings;
- Bottom – the "dashboard" of the device - General Tuner and Channel readings, functional buttons.

NOTE: Bottom section of the Control Interface is persistent regardless of the current screen, allowing immediate tuner interactions.
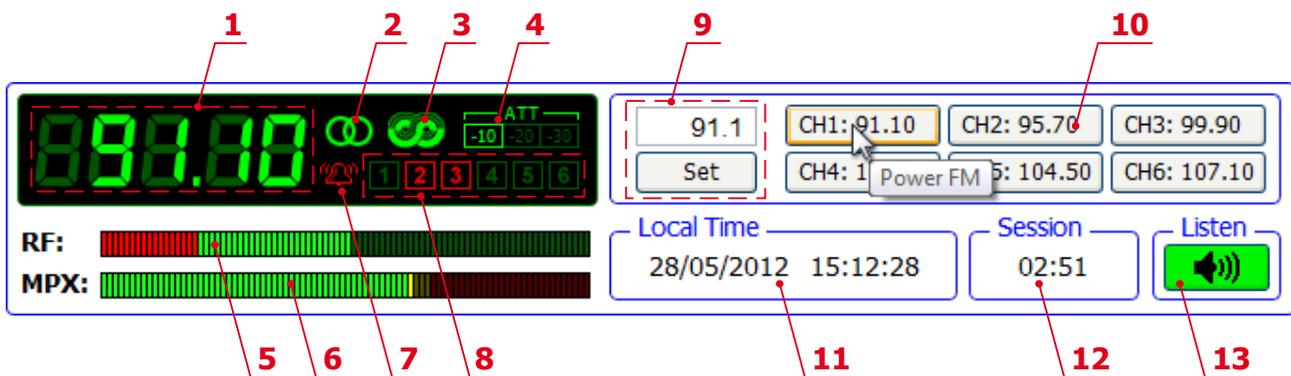
1. Frequency indicator showing currently tuned frequency;
2. Stereo indicator;
3. RDS/RBDS presence indicator;
4. RF Attenuator Status;
5. RF Level indicator. The red zone (low level) indicates RF level below 20 dBμV;
6. MPX Level indicator;
7. Alarm presence indicator – will be lit in red when an alarm on at least one channel is detected;
8. Channel Alarms indicator – will be lit in red when the Scheduler has detected an alarm on channel. (see "Channel Settings Screen" on page 34);
9. Frequency set buttons;
10. Channel Preset Buttons – when one of the buttons is pressed, the Tuner will be set to the predefined frequency. Upon hovering with the mouse over a preset button, the name of the channel will be displayed;
11. Device Time ("Management Screen" on page 39);
12. Session remaining time;
13. Listen Button – Button with double usage used to Play/Stop the current audio stream (an audio device will be required).

MAIN SCREEN
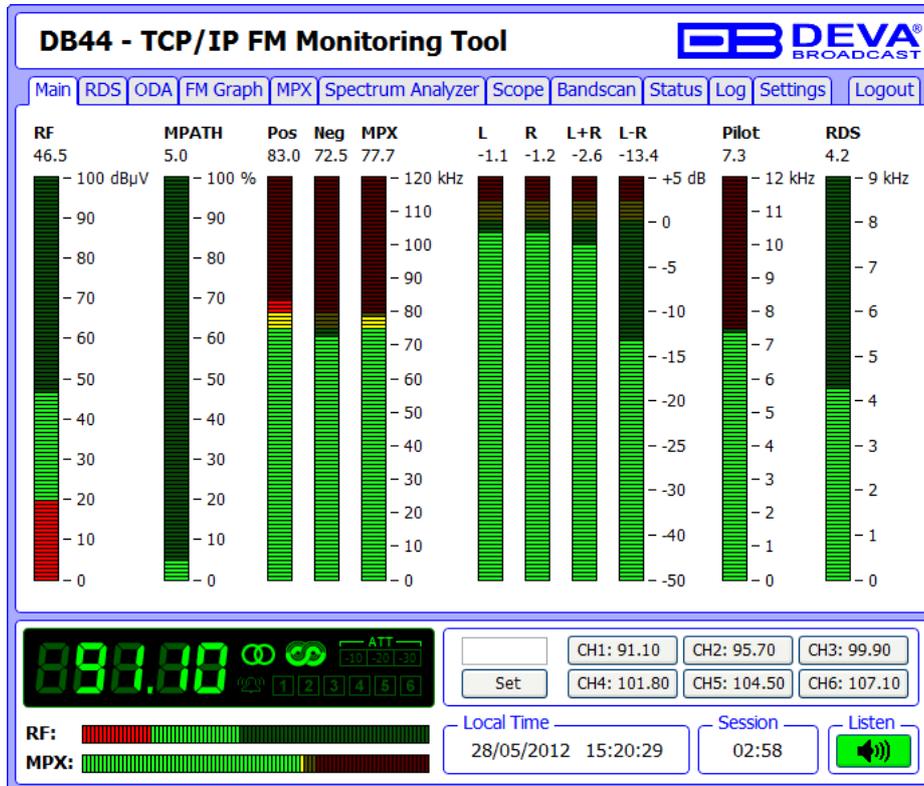
The main page shows meters for RF level, measured multipath level, baseband modulation (positive and negative peaks), audio levels, PILOT and RDS/RBDS levels.

RDS/RBDS SCREEN
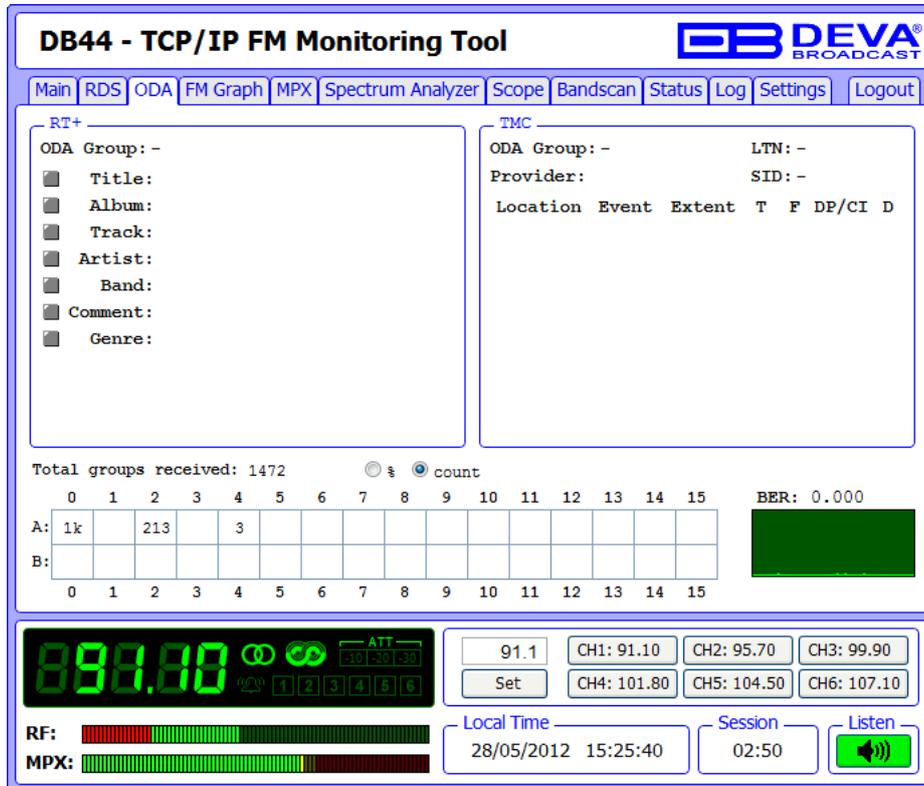

One of our core competencies lies in the RDS/RBDS. The RDS/RBDS page is very comprehensive, with a display of the RadioText (RTA and RTB), basic RDS/RBDS fields and a table of all decoded RDS/RBDS groups with a percentage measurement based on the overall RDS/RBDS data stream or group count. A very useful graph on this display is the rolling RDS/RBDS bit error rate (BER) display.

Total groups Indicator – all received groups are systematized into a table, representing the percentage/quantity of the groups in the received RDS/RBDS signal. The user selects how the "Total groups received" data should be displayed: as Percents (%) or Count, by selecting the corresponding button.

NOTE: The bit error rate or bit error ratio (BER) is the number of bit errors divided by the total number of transferred bits during a studied time interval. Result closer or equal to 0 indicates that no bit errors are detected and vice versa result closer or equal to 1 indicates that the received transferred bits are only errors.
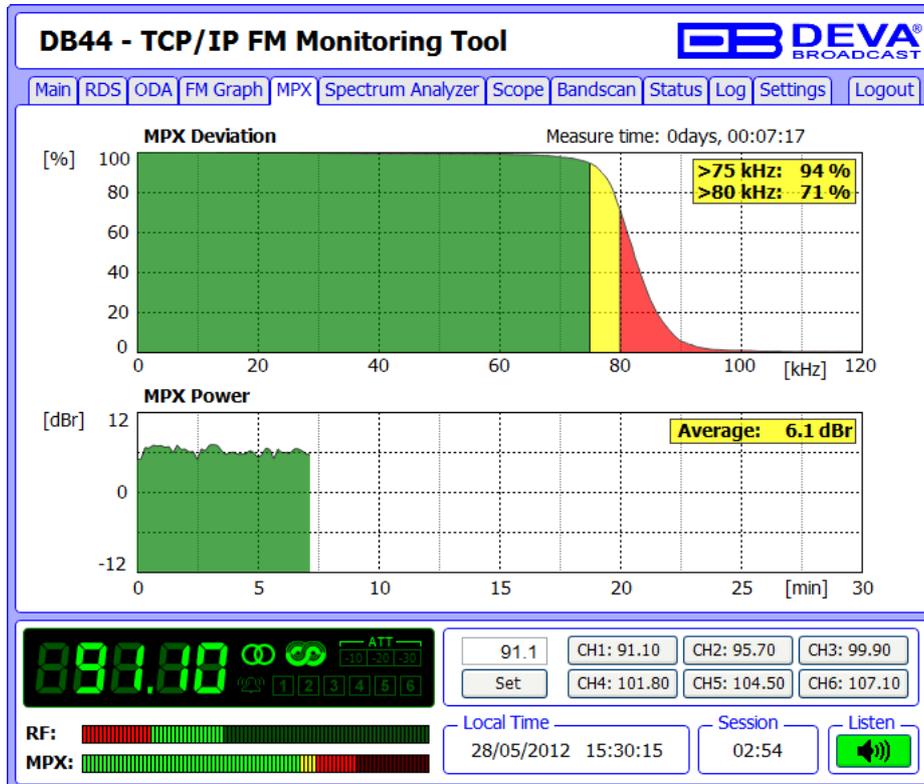
ODA SCREEN

If the selected station transmits RadioText+ (RT+) or TMC – here will be displayed the information from the supported ODA Groups.

A BER Indicator with graphics is placed at the right bottom part of the screen, showing 60 sec history of the BER quantities.

FM GRAPH SCREEN

The FM graph is a multi-colored plot of MPX, Pilot, Left and Right audio levels. These mandatory parameters are represented in the time slice of 2 minutes, ensuring reading at a glimpse all significant parameters of the analog signal. Each parameter has its own color representation and measurement units, which are indicated on the right-side of the graph. When RDS mode is selected, the MPX and PILOT readings are in kHz. When RBDS mode is selected, the readings are in %.

MPX SCREEN

The MPX page shows the baseband MPX deviation as a function of deviation in kHz over the observation period. The graph immediately shows modulation density.

There is also a rolling 30-minute graph of the MPX power with average indicator, measured in dBr. The MPX Power is calculated continuously with an integration window of 60 seconds and a new sample every 10 seconds. Therefore, the first sample is available 60 seconds after tuning.

The rule of MPX Power provides to measure the modulation power which is seen equal to modulate signal electric power, for one minute time period and to compare it to a sinusoidal modulating signal one which deviates ±19kHz. The result, expressed in dB, must be lower or equal to zero to comply with the rule.

SPECTRUM ANALYZER SCREEN
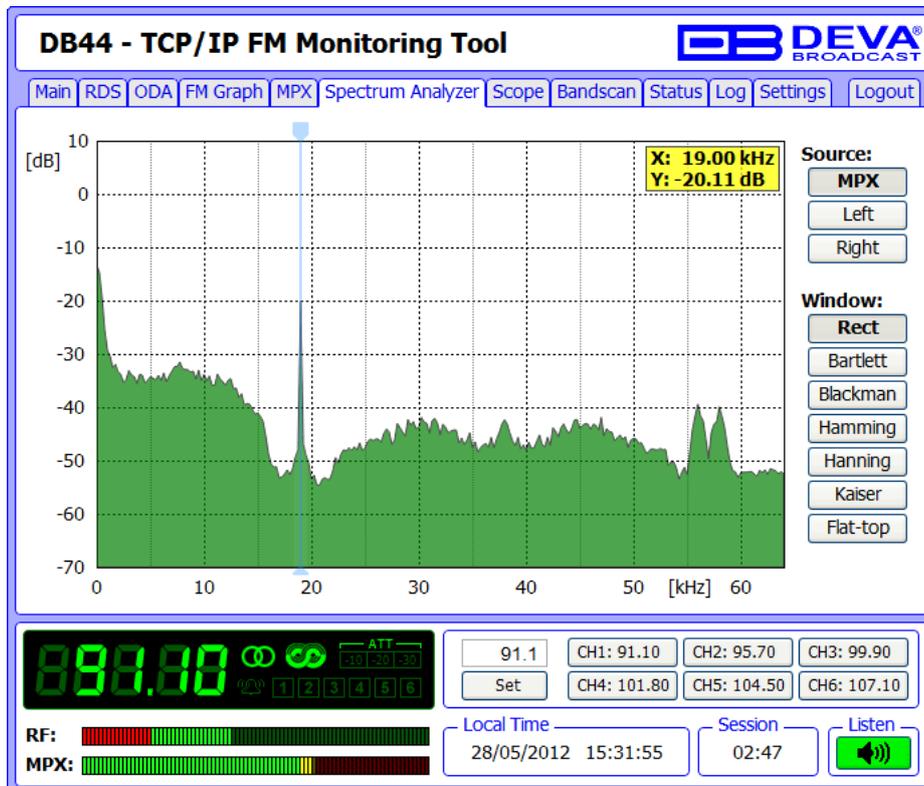
The spectrum analyzer tab is a very useful feature: It is a MPX and audio spectrum display. Initially it shows the MPX from 0-65kHz so that the readings of the currently selected source (composite MPX or stereo Left/Right) to be clearly visible. The signal source to be calculated and visualized is chosen from the Source section placed on the right part of the screen. Spectral components of the selected signal are determined on the base of Fast Fourier Transform.

The window function can be selected through the relevant menu with interactive buttons. The available windows and their features are given below. This table can be used to choose the best windowing function for each application.

Window	Best type for these Signal Types	Frequency Resolution	Spectral Leakage	Amplitude Accuracy
Rectangle	Transient & Synchronous Sampling	Best	Poor	Poor
Barlett	Random	Good	Fair	Fair
Blackman	Random or mixed	Poor	Best	Good
Hamming	Random	Good	Fair	Fair
Von Hann	Random	Good	Good	Fair
Kaiser	Random	Fair	Good	Good
Flat-top	Sinusoids	Poor	Good	Best

User-defined frequency of the spectrum can be selected by moving vertical marker along the horizontal scale. Values at the cross-point will be shown at the top right corner of the graph.

SCOPE SCREEN
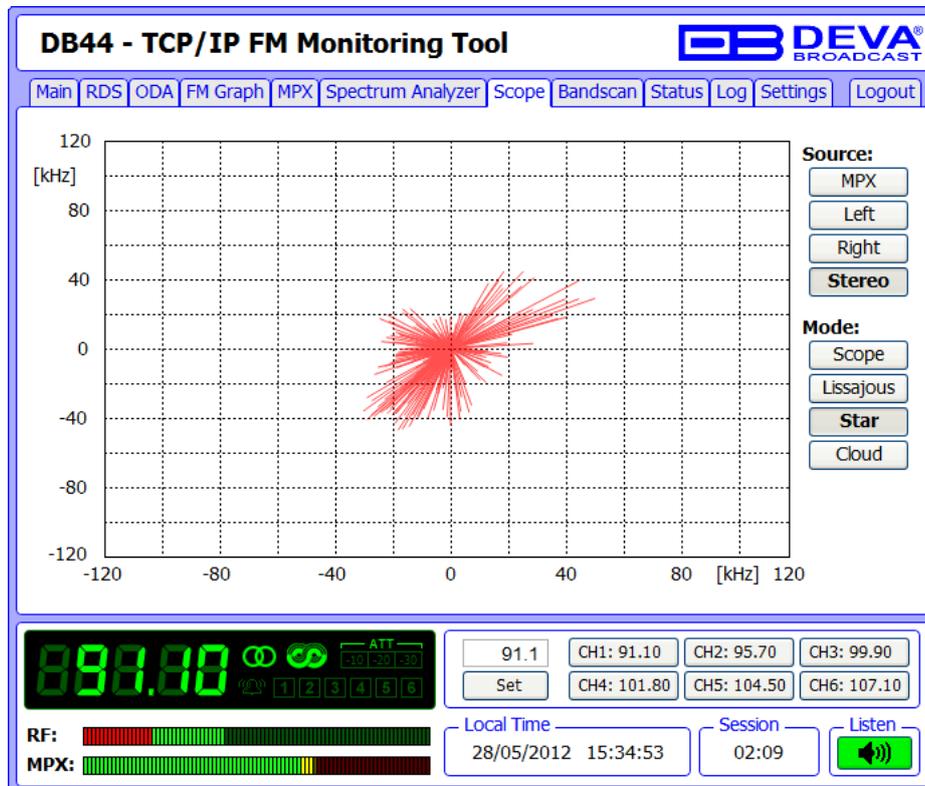
SCOPE screen represents the signals participating in the process of demodulating and stereo decoding over time. In order for the signal source to be changed, the corresponding button on the right-side of the graph should be pressed.

Once the Stereo source is selected, the following visualization modes are available:

- Scope – standard 2 channel oscilloscope:
- Lissajous – Lissajous figure representation of Left vs. Right channel;
- Star – Star-shaped representation of Left vs. Right channel;
- Cloud – Left vs. Right channel represented as cloud of points.

NOTE: Source "Stereo" visualizes the Left and Right signals at once.

BANDSCAN SCREEN
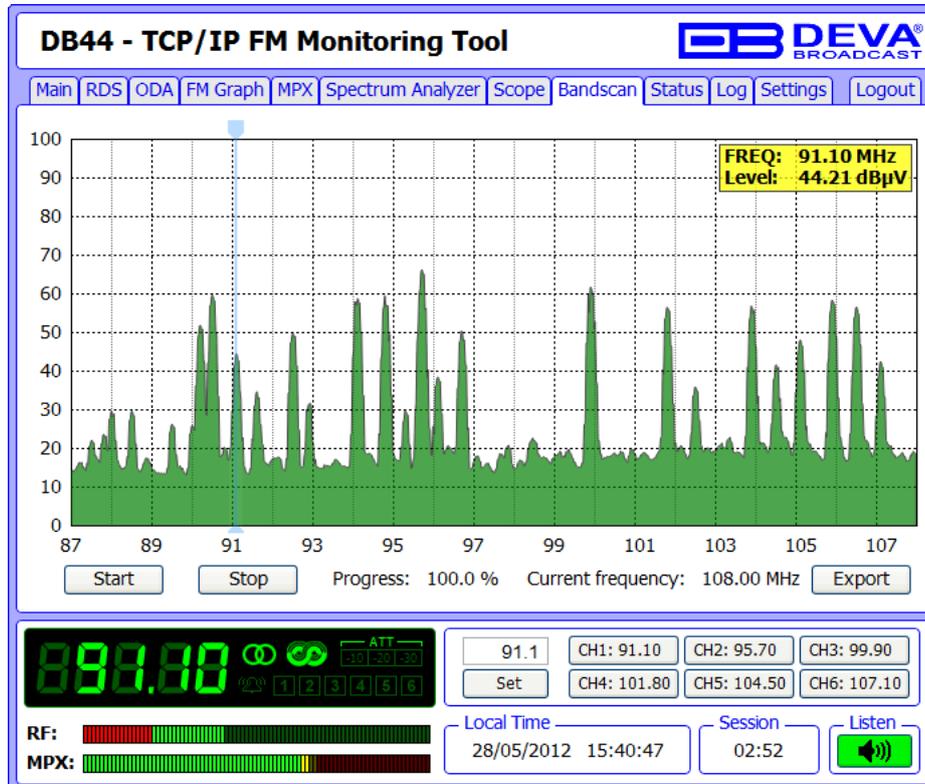
This Screen evaluates FM broadcast band congestion by sweeping the tuner across the FM band, logging every carrier and generating a spectrum display of carrier level vs. frequency.

In order for the Band scan process to be initiated, press the Start button and wait for the process to complete. The current scan could be stopped at any time by pressing the Stop button. To evaluate the RF level of specified frequency, move the vertical marker along the horizontal scale. Values at the cross-point will be shown at the top right corner of the graph.

All of the performed Band scans can be downloaded to your computer into CSV format using the "Export" button.

NOTE: While band scan is running, the Device Control Interface will be disabled.

STATUS SCREEN

The status tab shows the alarm status of each parameter of the preset frequencies, along with the basic device and network status (IP address, MAC, etc.).

The Channel parameters (RF, MPX, Pilot etc.) have several conditions:

- In range – green OK. ("Channel Settings Screen" on page 34)
- Out of range – red LO or HI;
- Signal monitoring is not enabled – n/a.

The status of the RDS/RBDS Groups Alarm is displayed on the bottom of the channels' section:

- Green – RDS/RBDS Group is received;
- Red – RDS/RBDS Group is not received and an alarm has been triggered;
- White (blank) – RDS/RBDS Group is not received and no alarm has been triggered.

LOG SCREEN

    This screen shows the Device Log, which shows the last 100 important events. Selecting/deselecting the corresponding check-boxes will filter the events by type.

SETTINGS SCREEN

WARNING: The applied changes will take effect upon pressing the **SAVE button**. All settings marked with ⚠ require Reboot hence the **Save & Reboot button** should be used. Navigation through the screens will revert to the last saved changes.

NOTE: The edited field will become red if the new value is invalid or out of range.

Main Settings Screen
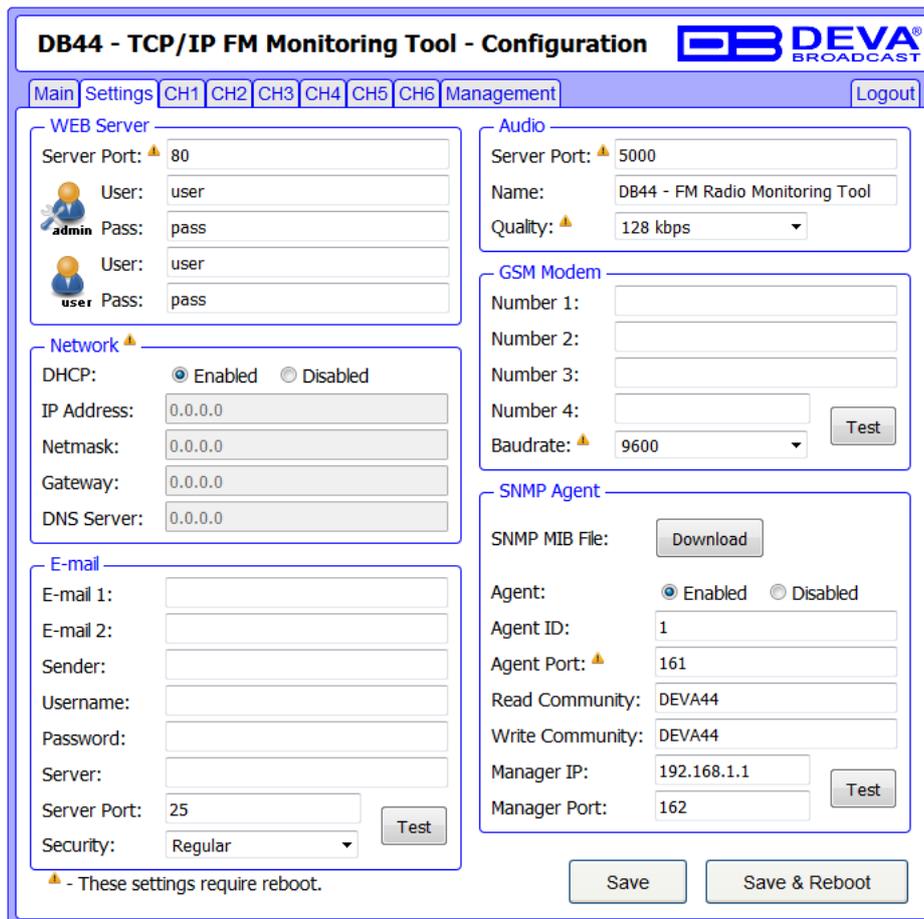
WEB Server

Enter desired WEB Server Port, Username and Password to be used when accessing the WEB Server. There are 2 levels of access. Admin can access all screens and change all settings. The user can access only the operational screens and has no access to the settings.

Network

The network addresses could be set manually (static IP) or automatically via the DHCP server. To set static IP, MASK, GATEWAY and DNS addresses, the DHCP should be disabled. In order for the built-in DHCP client to be activated, the function should be enabled. As a result, all network addresses will become read-only. When the DHCP client is activated, all assigned values will be shown in the relevant fields of the "Status Screen". If due to any reason, the DHCP procedure cannot be completed, DB44 will use AutoIP and will generate an IP Address.

E-mail

Enter desired alarm recipients into e-mail 1 and/or e-mail 2 fields. Fill in your e-mail account settings: Sender, Username and Password, Server and corresponding port. It is mandatory the type of connection with the server to be specified from Security - Regular, STARTTLS, SSL/TLS. The Server port will be changed accordingly. Please note that the most commonly used port will be entered in the field. If the port that is to be used is different, change it manually to the correct value.

We recommend you to use the 'Test' button and generate test e-mail, which upon success will be delivered to specified E-mail 1 and/or E-mail 2.

Example of Test E-mail Message:
```
DB44 Test Message.
Please do not reply to this e-mail.
```

Audio

Specify Port for audio Streaming, Name of the stream (which is used also for email sender name and web title) and Quality (64, 96, 128, 192 or 256 kbps). The Audio Stream could be heard using suitable audio player (MS Media Player or Winamp) or through a WEB interface by pressing the "Listen" button.

GSM Modem

Up to four numbers for SMS alarm notifications could be set. Baud Rate is mandatory for the proper operation of the GSM Modem.

We recommend a test SMS to be generated (via pressing the 'Test' button), once all needed settings are applied. Upon success, the SMS will be delivered to all specified GSM numbers.

Example of Test SMS Message:
```
DB44 Test Message
```

NOTE: The current condition of the GSM Modem could be checked in the "Status Screen".

SNMP

Specify Agent ID, Agent Port, Read/Write Communities, Manager IP and Manager Port.
Agent - enables/disables SNMP Agent.

NOTE: Agent ID is used for identification of the device among others when an SNMP notification is sent.

Once all needed settings are applied, use Test button to generate a test notification, which upon success will be received by the SNMP Manager.

Press the 'Download' button to download the latest available DB44 SNMP MIB file.
NOTE: The MIB file may vary from one firmware revision to another. Downloading this file from the device guarantees that you have the proper MIB file.

Channel Settings Screen

The DB44 can monitor 6 FM Stations at regular intervals and send alarm notification via E-mail, SMS, SNMP. Every Channel consists of a group of settings (explained in details below), which are used when monitoring and alerting. Each preset has its own page where it is being configured. Measurement windows can be set for each of the six parameters: RF level, Left and Right audio levels, MPX (baseband) deviation, Pilot and RDS/RBDS deviation. Trigger and alarm release times can be set for each alarm.

Channel

- Enable – enables/disables channel monitoring and sending of warnings and alarms;
- Frequency – specify the frequency to be monitored;
- Name – channel alias;
- Observation – specify the observation time for the current station (before switching to the next channel).

NOTE: When MPX Power alarm is enabled the observation time must be more than 70 seconds.

Alarm Control

- Alarm – enables/disables the corresponding parameter alarm logging;
- Warning – enables/disables the corresponding parameter warning;
- E-mail – enables/disables E-mail notification;
- SMS – enables/disables SMS notification;
- SNMP – enables/disables SNMP notification.

NOTE: If the monitoring option is disabled, notifications will not be sent, nevertheless whether they are enabled or disabled. A click on the label (left or above) will enable/disable the entire column/row.

To ensure early notification in case of a potential or actual problem, the DB44 provides two-stage alarm notifications.

- Stage 1 – Warning for a potential problem. It has a narrower range;
- Stage 2 – Alarm for actual problem. It has a wider range.

Alarm

- Alarm Range – interactive slider used to adjust the Low & High thresholds at which an alarm will be generated;
- Warning range – interactive slider used to adjust the Low & High thresholds at which a warning for possible problem will be generated;
- Trigger Time – waiting time before Active Alarm/Warning is generated;
- Release Time – waiting time before Idle Alarm/Warning is generated;
- RDS/RBDS Group Alarm – alarm only for selected groups will be generated.

IMPORTANT NOTE: Alarms are generated only when the Logger mode is running. Until there is any user interaction, alarm will not be generated and send. The Logger starts running once the user logs out of the WEB interface.

The release time defines the time, which should elapse in order for the received signal to be defined as restored/OK. The release time is user-defined. What we recommend is the release time to be bigger than the trigger time.

NOTE: When setting Trigger and Release times, have in mind that 01:00 means 1 minute, and 00:01 means 1 second.
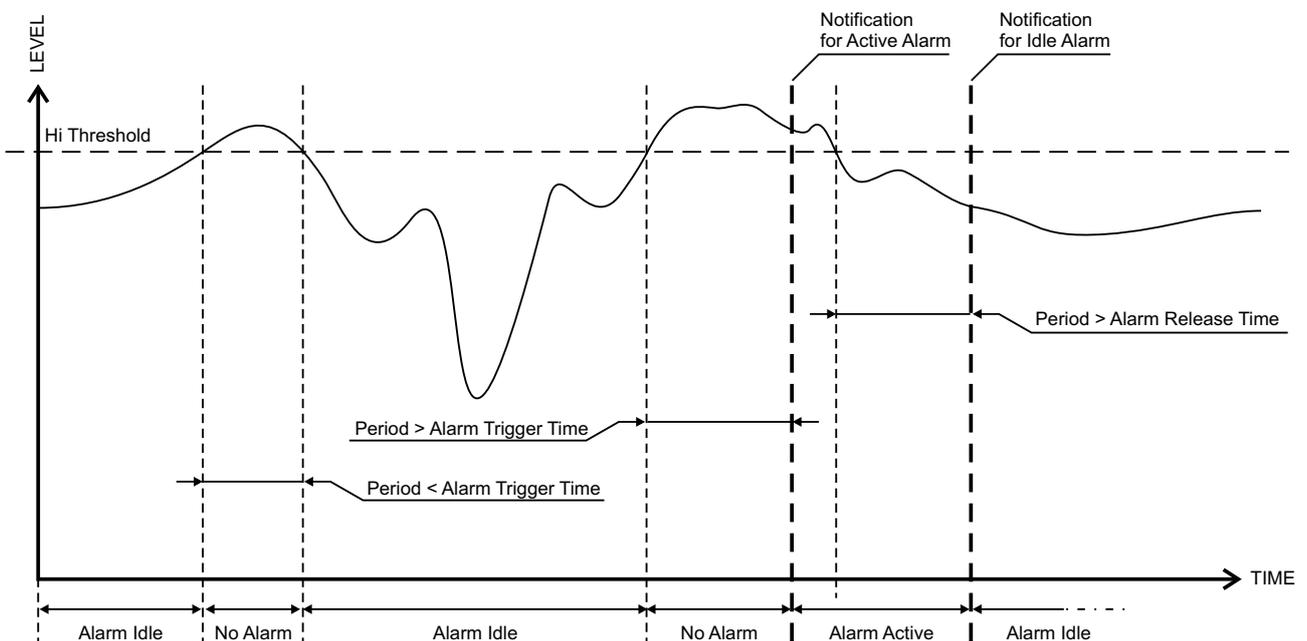
ALARM / WARNING TRIGGERS DEFINED

After collecting all the data the DB44 DSP core compares the values measured with the predefined by the user threshold levels for all the channels monitored. In case that any parameter is out of its limits or a potential problem has been detected, the device will initiate the sending of alarm/warning notification via the alarm type selected. All the alarms/warnings are stored in the device's log. You have to have in mind that, if there is a very short fault of the signal, with duration less than the 'channel trigger time', the device would not trigger an alarm/warning.

There are several Alarm/Warning Triggers for the following parameters: RF, MPX, MPX Power, Left/Right Audio, RDS and Pilot levels. There is an option for defining different limits for each of the parameters. All these values, the 'trigger time' and the 'release time' have to be assigned separately for each of the channels.
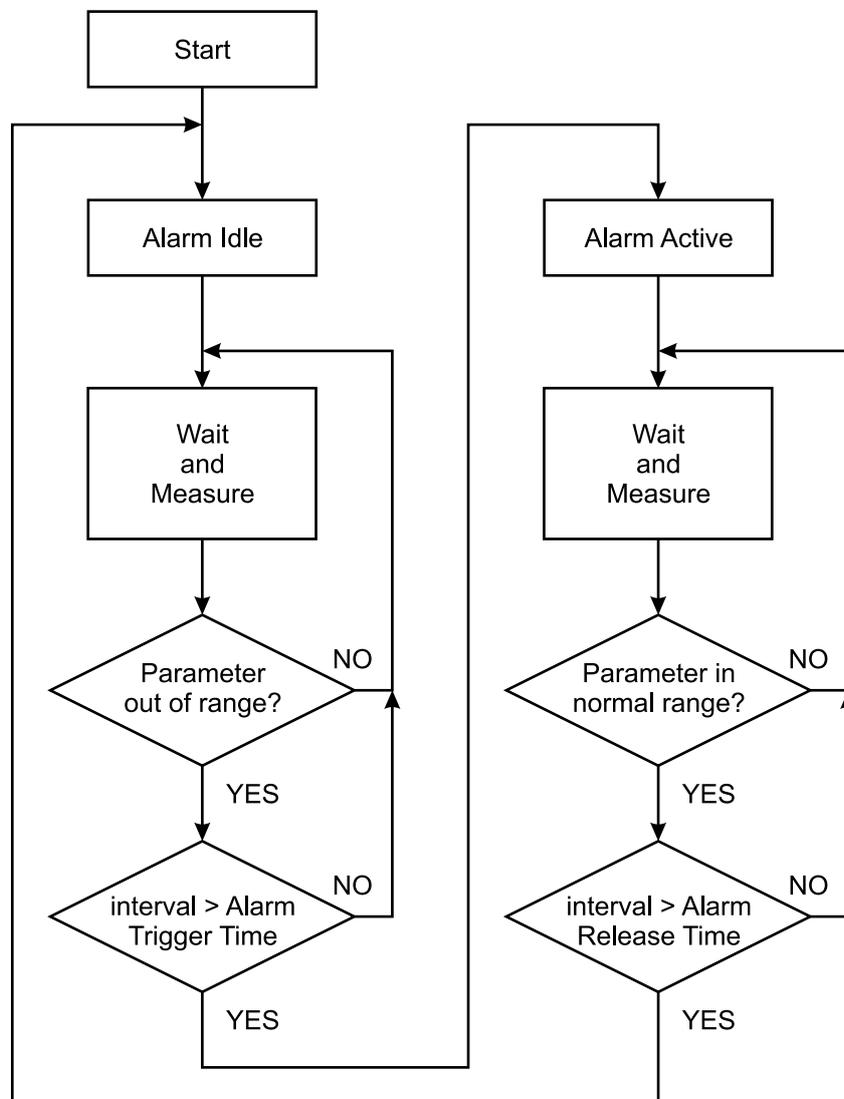
Block Diagram of Alarm Automata

Every time an observation event takes place, the Alarm/Warning Trigger's State of the channel refreshes (if necessary). For example: Let's suppose that the Alarm/Warning Trigger is in Idle state. Note, that an alarm is not triggered immediately when a parameter level passes over threshold (above High Threshold or under Low Threshold). If the parameter level becomes stable (within Thresholds) and Alarm/Warning Trigger Time is not elapsed, then Alarm/Warning Trigger remains in Idle state. If Alarm/Warning Trigger Time expires and the parameter level is still out of bounds, then Alarm/Warning Trigger changes its state to Active. This causes predefined actions - Alarm/Warning Notifications (E-mail, SMS, SNMP trap) and Save a Log Record. The state will not be immediately changed to Idle when the parameter stabilizes (within Threshold levels), but will wait until 'Alarm/Warning Release Time' is elapsed. Meanwhile if the parameter passes over again any Threshold, the Alarm/Warning Trigger will remain in Active state. If the parameter remains within Threshold levels and Alarm/Warning Release Time expires, Alarm/Warning Trigger switches to Idle state and again predefined actions are initiated (as when entering Active state).

If RDS Group has not been received for more than Alarm/Warning Trigger Time state is changed to Active. If state is Active and Release Time has elapsed and the RDS Group is received state is changed to Idle. If the RDS Group is received before the Release Time is elapsed state remains Active.

ALARM NOTIFICATIONS

Alarm/Warning Notifications (E-mail, SMS, SNMP trap) consist of DB44 Alias (see "Main Settings Screen" on page 32), date and time of Alarm/Warning triggered, channel number, frequency and information for Alarm/Warning activation or deactivation. The basic signal parameters are evaluated and included as well.

Because of the SMS length limitations, only most important parameters are included, when sending SMS Notifications.

Example for E-mal Notification:

```
Date: 27 Sep 2011, 09:05:09

DB44 - FM Radio Monitoring Tool reports ACTIVE alarm on 95.70MHz -
BG Radio (CH2)

Alarm: RF < 40dBuV

Signal parameters:
RF Level: 64.6 dBuV
MPX: 65.8 kHz
Left: -1.6 dB
Right: -1.9 dB
Pilot: 7.95 kHz
RDS: 4.47 kHz
Multipath: 3.3 %
```

Example for SMS Notification:

```
ACTIVE ALARN:CH#2
27.09.2011 09:08:34
FREQ:95.7MHz
RF:35.0dBuV *L*
MPX:60.3kHz
Left:-2.8dB
Right:-3.1dB
Pilot:7.92kHz
RDS:4.12kHz
```
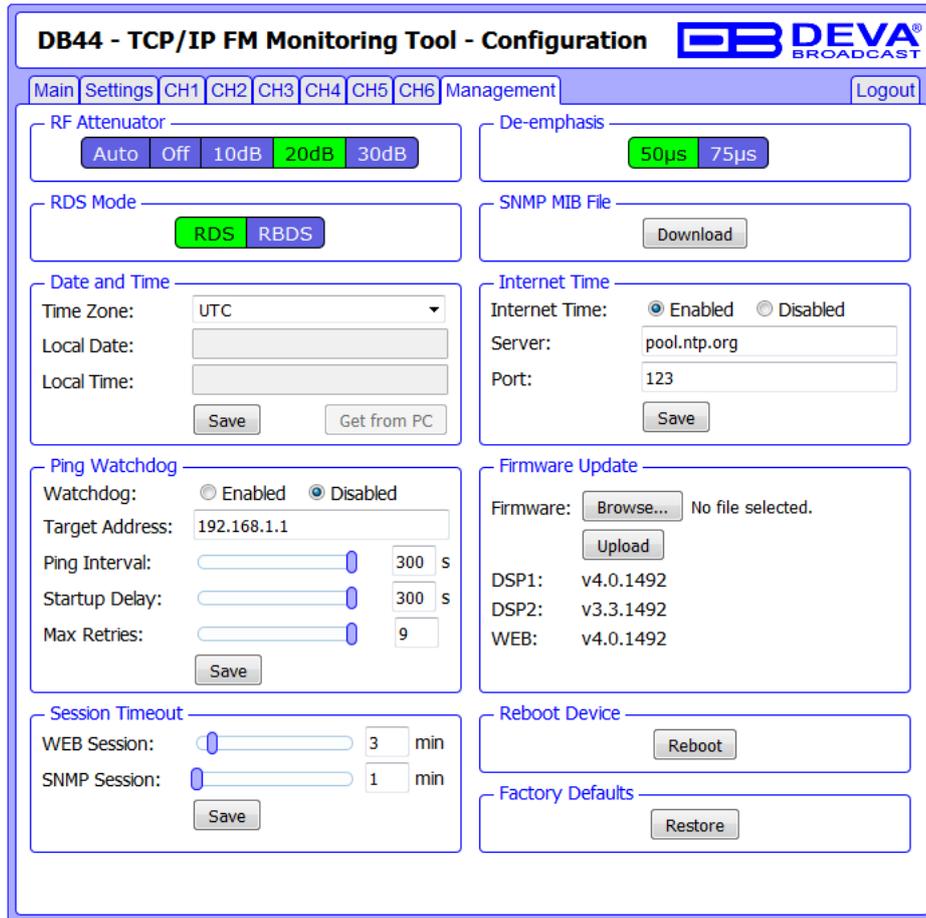
NOTE: *L* for LOW (below threshold), *H* for HIGH (above threshold)

MANAGEMENT SCREEN

DB44 - TCP/IP FM Monitoring Tool - Configuration

Main | Settings | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | Management   Logout

RF Attenuator
Auto | Off | 10dB | 20dB | 30dB

De-emphasis
50µs | 75µs

RDS Mode
RDS | RBDS

SNMP MIB File
Download

Date and Time
Time Zone: UTC
Local Date:
Local Time:
Save   Get from PC

Internet Time
Internet Time: ◉ Enabled   ○ Disabled
Server: pool.ntp.org
Port: 123
Save

Ping Watchdog
Watchdog: ○ Enabled   ◉ Disabled
Target Address: 192.168.1.1
Ping Interval: 300 s
Startup Delay: 300 s
Max Retries: 9
Save

Firmware Update
Firmware: Browse...   No file selected.
Upload
DSP1:   v4.0.1492
DSP2:   v3.3.1492
WEB: v4.0.1492

Session Timeout
WEB Session: 3 min
SNMP Session: 1 min
Save

Reboot Device
Reboot

Factory Defaults
Restore

RF Attenuator

Indicates the Antenna Input Attenuator's setting. Attenuation level can be selected by pressing on the preferred value. When AUTO is selected, DB44 will adjust automatically the Attenuator's position.

De-emphasis

Indicates currently selected de-emphasis.

Date and Time / Internet Time

When Internet Time is enabled, DB44 will automatically adjust its internal clock through the Internet. When Internet Time is disabled, Date and Time should be entered manually into corresponding fields or filled from PC Clock by pressing the 'Get From PC' button.

Ping Watchdog

The idea of this feature is a connection to DB44 over the Internet to be established if the device is connected behind a mobile router. If there is no connection with the Internet, some mobile routers disconnect their radios and the DB44 will become inaccessible. The Ping Watchdog will make enough traffic for the router to stay connected to the network. Reboot is needed because there are some routers that nevertheless the ping, will disconnect. Reconnection will be made only if there is a disconnect and connect at the LAN port.

The Ping Watchdog will ping the specified IP address for connection status. If the remote IP address does not respond to Ping for the specified number of times (Max Retries), the DB44 will power reboot. Please note that the 'Ping Watchdog' is disabled by default.

Firmware Update

If needed, DB44's firmware could be updated. Updating the firmware will ensure:
- New function(s);
- Improved performance;
- Eliminated bugs (if any).

To update the device firmware, please follow the steps listed below:
- Press the 'Browse'/'Choose File' button and select the new firmware file;
- Press the "Upload" button;
- Wait for the process to complete.

NOTE: Checking for updates regularly will ensure that the device is functioning correctly, and avoid potential problems.

Reboot Device

Pressing Reboot button will initiate a 'hardware reset' as if you have switched off and on the device. The previously applied/saved settings will not be deleted.

Factory Defaults

DB44 could be restored to Factory Defaults from its non-volatile memory. The procedure is quite simple - Press the 'Restore Button' and confirm the procedure.

WARNING: Before returning DB44 to its factory defaults, all remote users should be informed that they may cease to communicate with the device.

Session Timeout

Set WEB and SNMP sessions timeout. Please NOTE that during session, the Logger mode is not active, thus no Alarms are generated.

SNMP MIB File

Press the 'Download' button to download the latest available DB44 SNMP MIB file.

NOTE: The MIB file may vary from one firmware revision to another. Downloading this file from the device guarantees that you have the proper MIB file.

EXTERNAL GSM MODEM SETTINGS

To fulfill the Remote Monitoring Functions via GMS it is necessarily to connect an external GSM modem to DB44. To do this, connect the GSM Modem to the rear panel DB-15 male connector through the cable provided together with GSM Modem. A GSM Antenna must be supplied and connected to the connector of the GSM Modem.

IMPORTANT: Position the GSM Antenna as far as possible from the DB44's FM Antenna.

WARNING: Please check SIM Card PIN request to be disabled. Otherwise DB44 can not operate the modem.

The GSM Modem must be configured with the following settings:
Baud rate: equal to DB44 setting (see "Main Settings Screen" on page 32)
Data bits: 8
Stop bit: 1
Parity: None
Hardware Flow Control: None

NOTE: The GSM Modems provided by DEVA Broadcast Ltd. are pre-configured. In case of using different modems, please comply with the settings above.

To ensure proper installation of the GSM Modem, please observe the following sequence:
1. Install and connect the GSM Antenna according to the above recommendations.
2. Insert the SIM card into the holder. Card must be with deactivated PIN request.
3. Connect the GSM Modem and DB44 with the communication cable.
4. Power-up the GSM Modem.
5. Power-up DB44.

If the installation is proper, the GSM Modem will immediately startup. This will be noticed by the fast blinking of the 'GSM' Led on the DB44's front panel. The status of the GSM Modem will also be exposed on "Status Screen". Few seconds are usually necessary for the GSM Modem to initialize and to register into the GSM Network. When the GSM Modem is Ready the 'GSM' Led will start blinking slowly. The GSM Opeartor's Logo and the Field Strength will be also shown on the "Status Screen".

It is important to notice the call duration, which is 1 minute, otherwise the GSM connection may turn overused. 'Call Duration' defines the maximum outgoing call duration, which will be hanged-up by DB44 when it reaches the defined value (1 minute).

Only authorized GSM numbers can request remote notifications and remote listening. To register up to four GSM numbers use Main Settings Screen.

It is important to enter the GSM numbers properly, using the correct prefix for the country. For example: +359898123456

NOTE: The GSM Modem may be connected to DB44 without shutting down the device - so called 'Hot Plug'. When disconnected or powered down, the GSM Modem can be reconnected after the 'GSM' Led stops blinking (about 5 seconds). To prevent possible problems, we recommend, when possible, not to use 'Hot Plug'.

'Status Request' Command Format:
```
Status FFF.FF
```

'Remote Audio Listening' Command Format:
```
Listen FFF.FF
```

Where FFF.FF is the frequency to Tune in the range of 87 to 108 MHz.
For example: "Status 102.55" or "Listen 88.80".

IMPORTANT: Do not include leading zeroes such as "Listen 089.90". Fill in with trailing zeroes up to two digits after the decimal symbol. Decimal symbol must be "." (dot)

If DB44 receives an authorized 'Status Request' command, after a short interval (about 5 seconds), in which DB44 has to retune and collect summarized data, the Caller will receive a SMS response. For Example:
```
STATUS:
27.09.2011 09:08:34
FREQ:102.50MHz
RF:32.7dBuV
MPX:103.2kHz
Left:-4.8dB
Right:-4.9dB
Pilot:7.5kHz
RDS:18.5kHz
```

'Remote Audio Listening' command will generate (only if the calling number is authorized) a response call from DB44 to the command sender. DB44 will wait for answer, and will hang-up after 30 seconds, if there is no incoming answer. When a call is accepted, the duration of 'listening' is determinate by 'Call Duration' interval or until the call is ended.

# UPnP and DB44 discovery in Local Networks

DB44 implements UPnP which lets you easily find it in your local network. For this purpose your system should have UPnP enabled (see "UPnP Activation" on page 44). To discover the device follow the next steps:

- Connect the device to the local network.
- Open "My Network Places" on your computer.
- Find the decoder's icon.
- Double click it to open the DB44 web interface.
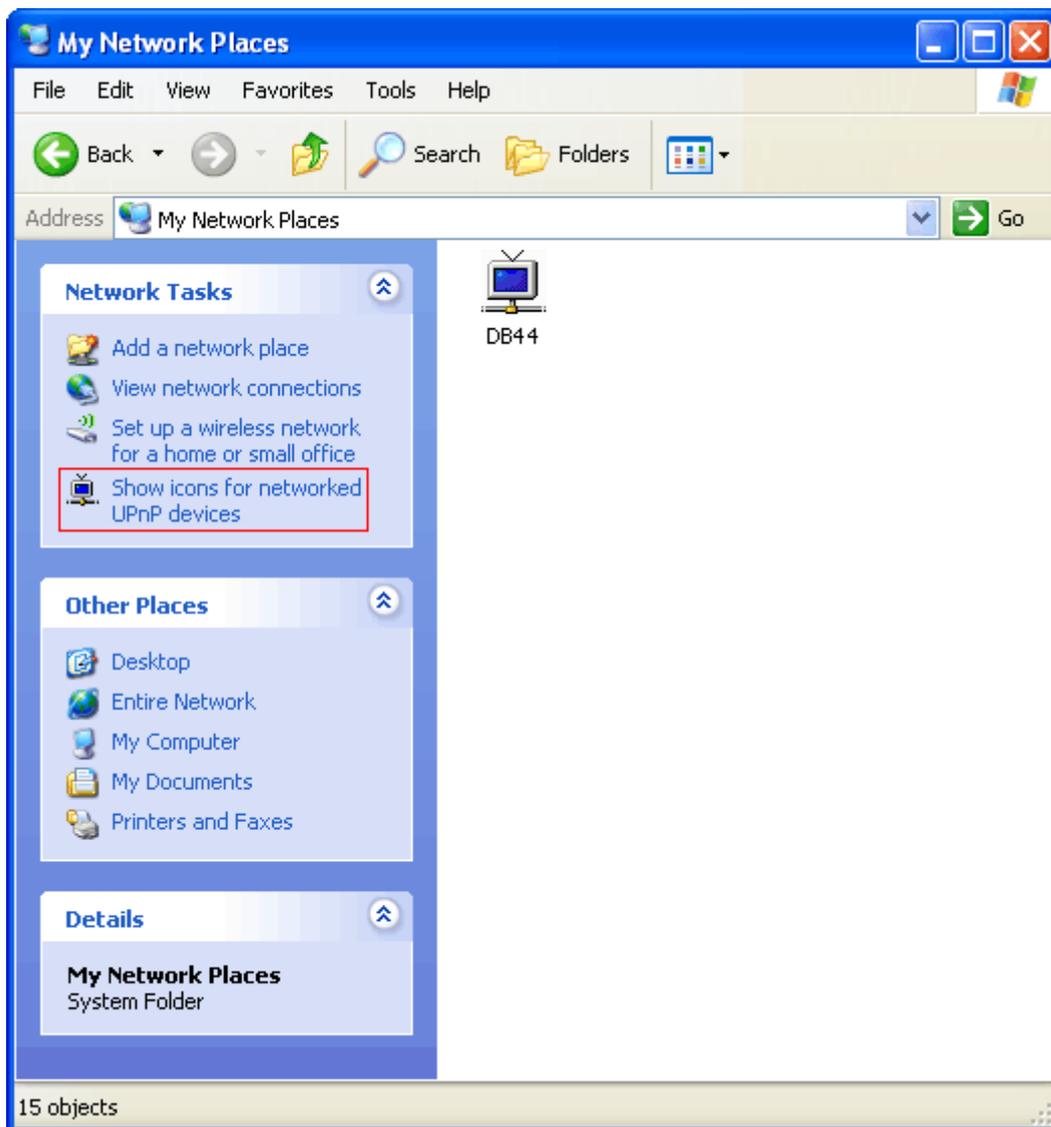
# UPnP Activation

**NOTE:** The following explanations apply to Windows XP SP2 or SP3! If you use another operating system, please contact your system administrator.

Open "My Network Places". If you have the caption displayed in the picture below, click on it. Then click "Yes" and wait for the process to complete. Now you should see the device. If you still have troubles finding the device, please see
http://support.microsoft.com/kb/941206 or contact your system administrator.
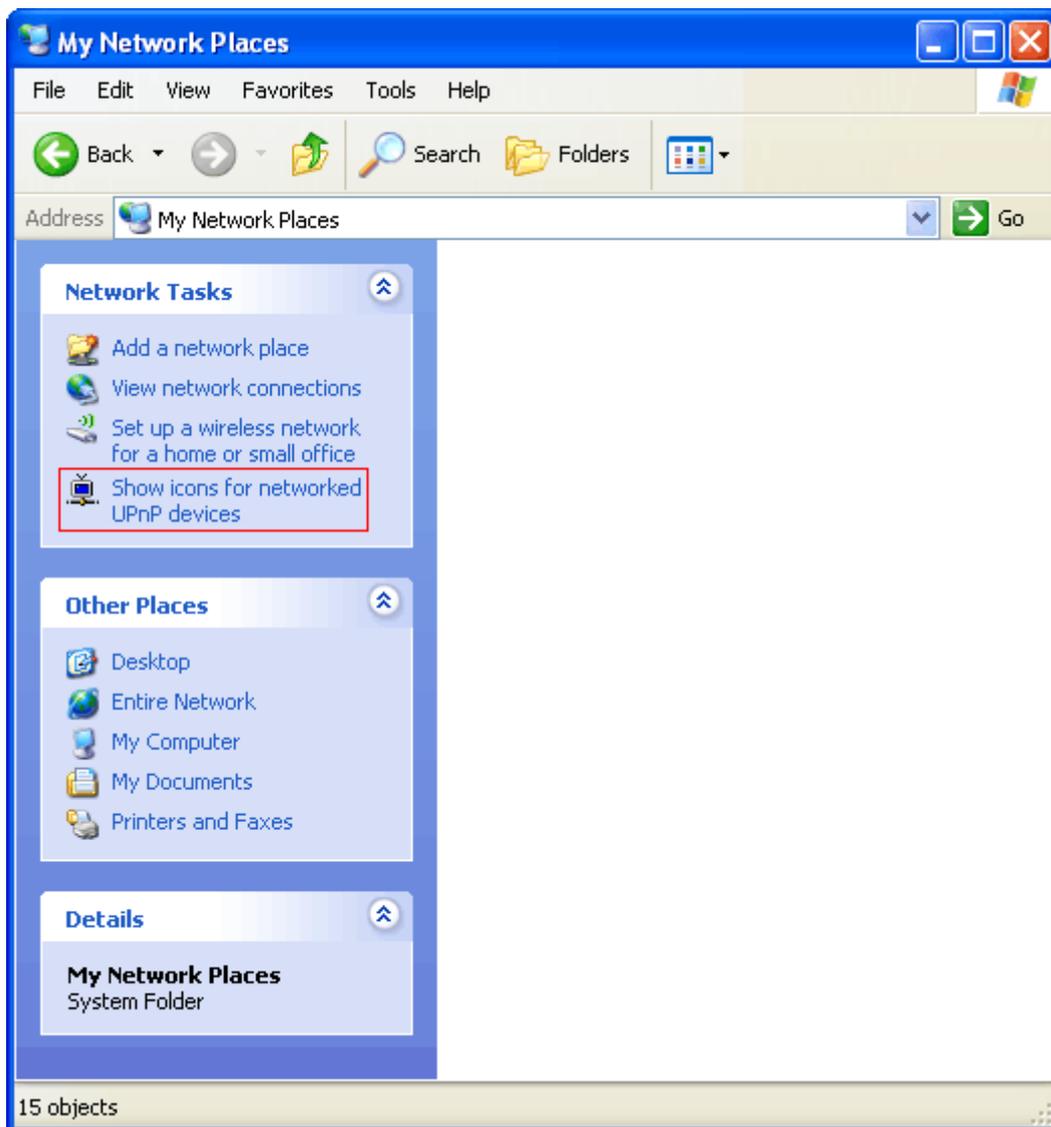
# WARRANTY TERMS AND CONDITIONS

**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.

**II. CONDITIONS OF WARRANTY:** The following terms apply unless amended in writing by DEVA Broadcast Ltd.

**A.** The Warranty Registration Card supplied with this product must be completed and returned to DEVA Broadcast Ltd. within 10 days of delivery.

**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.

**III. TERMS OF WARRANTY:** DEVA Broadcast Ltd. products are warranted to be free from defects in materials and workmanship.

**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 Authorization (RA) number issued by DEVA Broadcast Ltd. prior to its return. An RA 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.

# PRODUCT REGISTRATION CARD

• 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*

*Signing this warranty registration form you are stating that all the information provided to DEVA Broadcast Ltd. are truth and correct.
DEVA Broadcast Ltd. declines any responsibility for the provided information that could result in an immediate loss of warranty for
the above specified product(s).

**Privacy statement: DEVA Broadcast Ltd. will not share the personal information you provide on this card with any other parties.**