MAINTENANCE AND OPERATION
INSTRUCTION MANUAL

DB94-RX

Compact MPX over IP Decoder

DB94-SFN

Compact MPX over IP Decoder
with MicroMPX and SFN Support

DEVA® BROADCAST

Publish Date: 14-Sep-2026

Contents

Introduction **6**
Typographic conventions **7**
DB94-RX General Information **8**
DB94-RX Compact MPX over IP Decoder *8*
DB94-RX Product Features *9*
DB94-RX Technical Specifications *9*
DB94-SFN General Information **11**
DB94-SFN Compact MPX over IP Decoder with µMPX and SFN Support *11*
DB94-SFN Product Features *12*
DB94-SFN Technical Specifications *12*
Panel Indicators and Appointments **14**
Front Panel *14*
Rear Panel *15*
The Pinout of an AES192 Connector *16*
Pin Assignment *16*
Connection *16*
The Pinout of a DB15 HD GPIO / GPS Connector *17*
GPI Example Connections *18*
GPO Example Connections *19*
Internal Connections of the GPIO Port *20*
Block diagram **21**
Safety Warning **22**
Operating Recommendations **23**
Unpacking and inspection **24**
Mounting **24**
Rack Requirements 1U *24*
Rack Requirements Compact Units *24*
Stand-Alone Devices *24*
Overview **25**
Getting Started **26**
Connection *26*
Network Settings *26*
Network Security Recommendations *26*
LAN Port *26*
Network Discovery **27**
DEVA Ethernet Setup Tool *27*
Download latest version *27*
Using the tool *27*
MicroMPX Decoder Configuration **30**
Connecting to a FM Transmitter & Calibrating *30*
About the MicroMPX Codec **31**
A Distinction from L/R signals *31*
Use Cases & Applications **32**
Simple STL: Use with Any FM Processor *32*
One Processor to Many Transmitters *33*
Use with private networks and IP radios *34*
Redundant Paths and Backup Scenarios *35*
Single Encoder & Decoder, Dual Networks *35*

Dual Encoder, Single Decoder *36*
Dual Encoder, Dual Decoder *37*
SFN + GPS *38*
Technical Notes **39**
MicroMPX Codec Setup Tips and Best Practices *39*
Packet Jitter *39*
Packet Loss *39*
Firewall and Security *39*
Tilt Correction *40*
Cooling *40*
WEB Interface **41**
Access *41*
Stream *42*
Backup player *42*
MPX Output Level *43*
Adjusting the Output Level *43*
Important Level Considerations *43*
Stream Receiver Configuration *43*
Changing the Port Number *43*
FM Outputs *44*
Demodulated Output *44*
Test Signal Generator *45*
Signal Capabilities *45*
Setting Frequency *45*
Decoder Dashboard *46*
Stream Display *46*
Packet Loss and Dropouts *46*
Waveform Display *47*
MPX Display *47*
Security *48*
GPS *49*
Decoder *49*
Connecting a third party GPS receiver *50*
Understanding the MicroMPX Decoder stream info display *52*
User accounts *53*
as Administrator *53*
as User *53*
System *54*
Account *54*
RDS *54*

APPENDIX A - Possible problems and solutions **55**
Peak control is not perfect *55*
APPENDIX B - Recovery mode **56**
How to enter Recovery mode? *56*
Firmware update *57*
LOGs *59*
Recovery menu *59*
APPENDIX C **60**
Battery Replacement Procedure *60*
Replacement *60*
Reassembly *60*
Verification *60*
WARRANTY TERMS AND CONDITIONS **61**
Product Registration Card **62**

THIS PAGE
IS INTENTIONALLY
LEFT BLANK

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.

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

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`

DB94-RX General Information

DB94-RX COMPACT MPX OVER IP DECODER

The DB94 is a high-performance, compact MPX over IP Encoder tailored to meet the modern demands of broadcast audio transmission. At its core is the innovative MicroMPX (µMPX) algorithm developed by Thimeo, a purpose-built codec specifically designed for FM MPX transport. This technology ensures efficient use of network bandwidth, down to as little as 320 kbps while preserving excellent audio quality and maintaining full stereo and RDS integrity. The DB94 enables robust, low-latency streaming over public or private IP networks, making it an ideal solution for both regional and nationwide broadcasting scenarios.

Despite its streamlined design, the DB94 integrates effortlessly into existing setups. LED indicators on the front panel offer immediate insight into operational status, while configuration and monitoring are made simple through DEVA's intuitive HTML5-based web interface. This web control panel is accessible via any modern browser on PC, tablet, or smartphone, ensuring flexible management whether locally or from remote locations.

As part of DEVA's growing portfolio of IP audio solutions, the DB94 is engineered with precision and built using top-tier components, including high-grade ADCs for maximum signal fidelity. It supports both Analog MPX and Digital AES192 outputs, ensuring broad compatibility across different transmitter systems and network architectures. Whether deployed for a single transmitter site or integrated into a larger network, the DB94 delivers consistent, high-quality audio over IP.

Combining DEVA's proven reliability with cutting-edge MicroMPX technology, the DB94 offers broadcasters a cost-effective, future-ready encoder that meets the demands of modern FM transmission. It is the perfect choice for professionals seeking dependable, bandwidth-efficient MPX distribution without compromising audio performance.

By choosing DEVA's DB94, broadcasters benefit from the company's tradition of innovation, quality, and support—hallmarks that continue to define DEVA's role as a leader in broadcast technology.

DB94-RX PRODUCT FEATURES

- High quality FM MPX encoding function
- High end ADC converter for optimal quality
- Ultra low latency, all-digital DSP based design
- Remotely upgradable firmware to ensure improved operation
- Headphone audio output
- Very Intuitive Embedded WEB server for interactive supervision
- Full online remote control of all parameters via IP
- Configuration via web user interface for easy setup
- Quick view status page for a fast overview
- Forward Error Correction to reduce bit errors in data stream
- USB flash drive for Audio Backup Storage
- Apple and Android devices support
- SNTP for automatic synchronization of the built-in clock
- Protected access to the device settings
- LAN port for full TCP/IP remote control and monitoring
- Attractive price and very good price-performance ratio
- Proved and reliable hardware for 24/7/365 operating
- Compact and Robust Aluminum Case for high RF immunity
- Easy Installation and Setup

DB94-RX TECHNICAL SPECIFICATIONS

AUDIO DECODER	
Codec	µMPX or raw PCM
Sample rates	192 kHz and 216 kHz, 24 bits
Signal Processing	24 Bit AD/DA conversion
PCM	
Bit depth	12 - 16, 20, 24 bit
FEC	RIST, ProMPEG FEC #3, release 2
Bandwidth	2.4 - 4.6 Mbps (no FEC)
µMPX	
Bitrates	320, 384, 448, 576, 800 kbit/s
FEC	µMPX FEC, RIST, Pro-MPEG FEC #3 release 2
Bandwidth	320 - 800 kbps (no FEC)
ANALOG MPX OUTPUT	
Connector	BNC
Type	Unbalanced
Level	+14 dBu (max. +16 dBu)
Sample rate	192 kHz and 216 kHz, 24 bits
Dynamic range	121 dB
DIGITAL MPX AES192 OUTPUT	
Connector	RJ-45, balanced, EMI suppressed
Standard	AES3
Sampling Rate	up to 192kHz, 24 bits

GPS PORT	
Connector	DB15, Male
Protocol	NMEA 0183, 9600bps
Sync	1 PPS, Square Wave, TTL Compatible
FRONT PANEL	
Status Indicators	4 LEDs
Headphones	1/8” (3.5mm) phones jack
USB	Type A for Backup audio player
USER INTERFACE	
Web interface	Full control and Status information
NETWORK	
Connector	RJ-45
Type	Ethernet, 1000Mbps
Device discovery	UPnP support
OPERATING CONDITIONS	
Temperature	-15°C to 55°C
Humidity	< 95%, non-condensing
Altitude	0 to 5000m above sea level
POWER	
Voltage	12V DC, 1A; External PSU, wall-mount 100-264 V
Power Consumption	10VA
Connector	Power Jack 5.5mm
SIZE AND WEIGHT	
Dimensions (W;H;D)	125 x 31 x 160 mm
Shipping Weight	270 x 54 x 230 mm / 1.1kg

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

DB94-SFN General Information

DB94-SFN COMPACT MPX OVER IP DECODER WITH µMPX AND SFN SUPPORT

The DB94-SFN is a next-generation, compact MPX over IP Decoder engineered to deliver reliable and efficient audio transmission for professional FM broadcasting. Utilizing the purpose-built µMPX (MicroMPX) algorithm developed by Thimeo, the DB94-SFN ensures high-quality audio reproduction with remarkably low network bandwidth starting from just 320 kbps. Designed specifically for FM MPX transport, µMPX preserves the integrity of the stereo signal and RDS data while significantly reducing IP requirements, making the DB94-SFN ideal for applications over narrowband or public IP links.

In addition to its advanced decoding capabilities, the DB94-SFN introduces full Single Frequency Network (SFN) support, enabled through ultra-precise GPS timing synchronization. By aligning audio and MPX output timing with sub-microsecond accuracy, the unit ensures perfectly phase-coherent transmissions across multiple synchronized transmitters. This eliminates interference in overlap regions and guarantees seamless coverage extension, an essential requirement for modern SFN-based broadcast networks. The GPS-locked timing reference allows the DB94-SFN to deliver deterministic delay, stable long-term synchronization, and highly reliable operation, even in complex multi-transmitter deployments.

Compact yet powerful, the DB94-SFN fits seamlessly into any broadcast infrastructure. LED indicators on the front panel provide instant system status, while an intuitive HTML5-based web interface allows complete configuration and monitoring from any desktop or mobile browser.

Engineered with DEVA's hallmark attention to detail and reliability, the DB94-SFN delivers pristine audio quality thanks to top-grade DAC components and precision signal processing. It supports both Digital AES192 and Analog MPX outputs, ensuring compatibility with a wide range of FM transmitters and studio setups. Whether deployed at a single transmission point or within a larger network, the DB94-SFN guarantees low-latency, uninterrupted signal decoding across all environments.

The DB94-SFN stands as a testament to DEVA's commitment to innovation and customer-driven design, offering an advanced, cost-effective solution for MPX over IP distribution. Its support for µMPX sets it apart as a future-ready decoder that meets the growing need for efficient, high-performance broadcast tools.

Choosing DEVA's DB94-SFN means choosing reliability, flexibility, and the confidence that comes with decades of expertise in broadcast technology.

DB94-SFN PRODUCT FEATURES

- High quality FM MPX decoding function
- High end DAC converter for optimal quality
- Ultra low latency, all-digital DSP based design
- Remotely upgradable firmware to ensure improved operation
- Headphone audio output
- Very Intuitive Embedded WEB server for interactive supervision
- Full online remote control of all parameters via IP
- Configuration via web user interface for easy setup
- Quick view status page for a fast overview
- Forward Error Correction to reduce bit errors in data stream
- USB flash drive for Audio Backup Storage
- Apple and Android devices support
- SNTP for automatic synchronization of the built-in clock
- Protected access to the device settings
- LAN port for full TCP/IP remote control and monitoring
- Attractive price and very good price-performance ratio
- Proved and reliable hardware for 24/7/365 operating
- Compact and Robust Aluminum Case for high RF immunity
- Easy Installation and Setup

DB94-SFN TECHNICAL SPECIFICATIONS

AUDIO DECODER	
Codec	µMPX or raw PCM
Sample rates	192 kHz and 216 kHz, 24 bits
Signal Processing	24 Bit AD/DA conversion
PCM	
Bit depth	12 - 16, 20, 24 bit
FEC	RIST, ProMPEG FEC #3, release 2
Bandwidth	2.4 - 4.6 Mbps (no FEC)
µMPX	
Bitrates	320, 384, 448, 576, 800 kbit/s
FEC	µMPX FEC, RIST, Pro-MPEG FEC #3 release 2
Bandwidth	320 - 800 kbps (no FEC)
ANALOG MPX OUTPUT	
Connector	BNC
Type	Unbalanced
Level	+14 dBu (max. +16 dBu)
Sample rate	192 kHz and 216 kHz, 24 bits
Dynamic range	121 dB
DIGITAL MPX AES192 OUTPUT	
Connector	RJ-45, balanced, EMI suppressed
Standard	AES3
Sampling Rate	up to 192kHz, 24 bits

GPS PORT	
Connector	DB15, Male
Protocol	NMEA 0183, 9600bps
Sync	1 PPS, Square Wave, TTL Compatible
FRONT PANEL	
Status Indicators	4 LEDs
Headphones	1/8” (3.5mm) phones jack
USB	Type A for Backup audio player
USER INTERFACE	
Web interface	Full control and Status information
NETWORK	
Connector	RJ-45
Type	Ethernet, 1000Mbps
Device discovery	UPnP support
OPERATING CONDITIONS	
Temperature	-15°C to 55°C
Humidity	< 95%, non-condensing
Altitude	0 to 5000m above sea level
POWER	
Voltage	12V DC, 1A; External PSU, wall-mount 100-264 V
Power Consumption	10VA
Connector	Power Jack 5.5mm
SIZE AND WEIGHT	
Dimensions (W;H;D)	125 x 31 x 160 mm
Shipping Weight	270 x 54 x 230 mm / 1.1kg

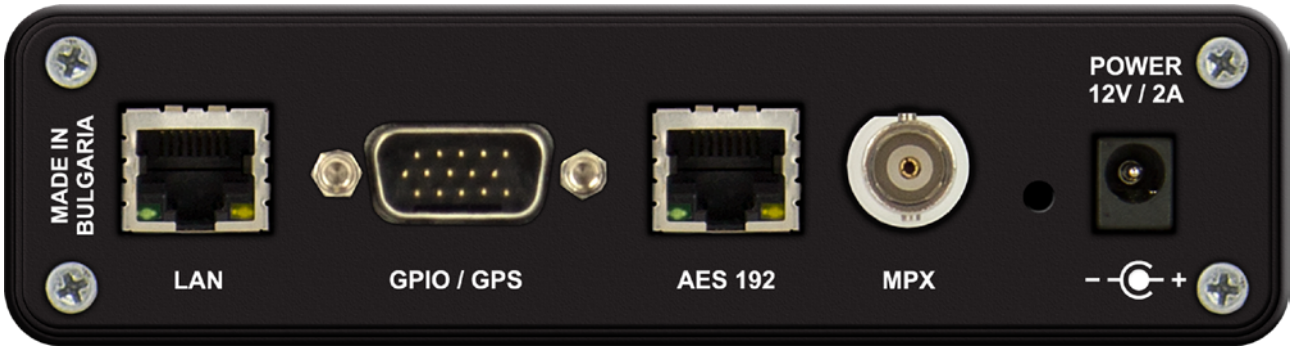
65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

Panel Indicators and Appointments

FRONT PANEL

1. Phones Output
2. Power LED Indicator
3. LAN LED Indicator
4. Memory LED indicator
5. LINK LED indicator
6. USB port

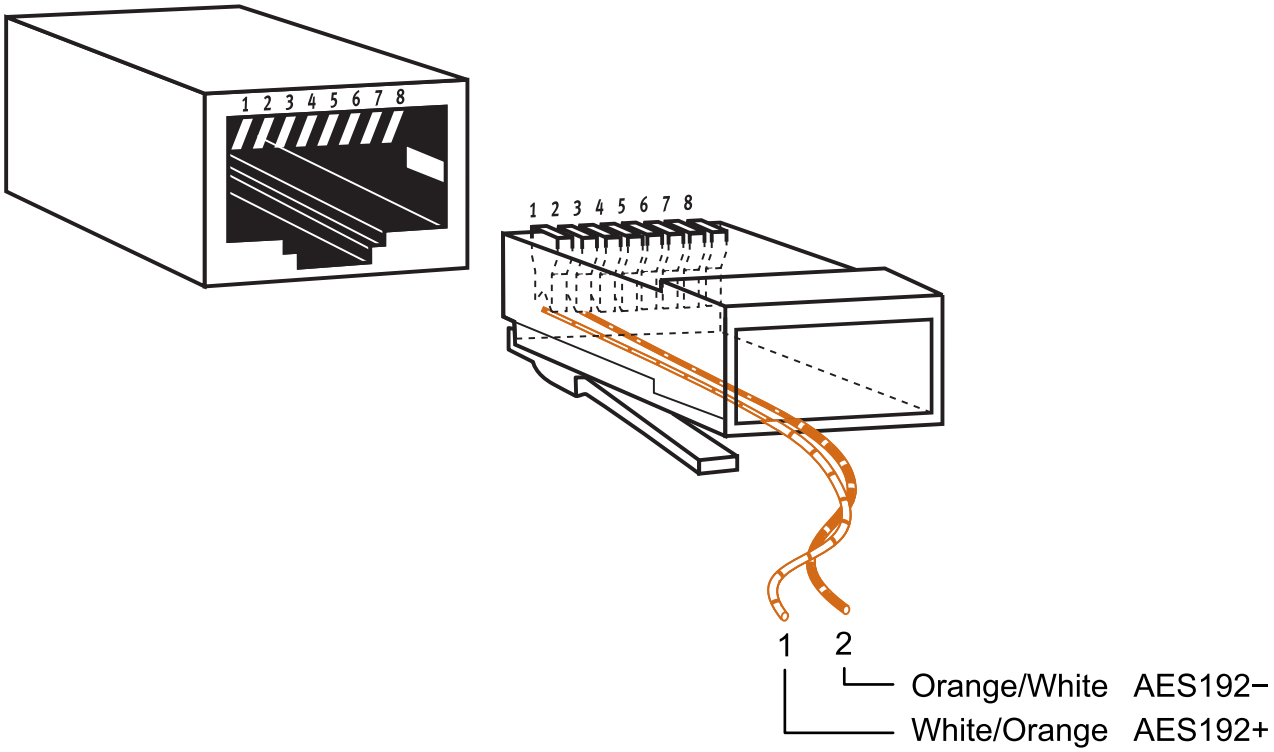
REAR PANEL



1. LAN Port / Internet Input – standard RJ-45 port
2. Network Activity LED Indicator (RJ-45 built-in)
3. Network Availability LED indicator (RJ-45 built-in)
4. GPIO / GPS Port – DB15 HD, Male
5. AES 192 – RJ-45, Digital MPX Output
6. MPX – BNC, Analog MPX Output
7. Factory Defaults Reset button
8. Power Supply (12 V, 2A)

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

THE PINOUT OF AN AES192 CONNECTOR



Pin Assignment

Pin 1: White/Orange – AES192+
Pin 2: Orange/White – AES192−

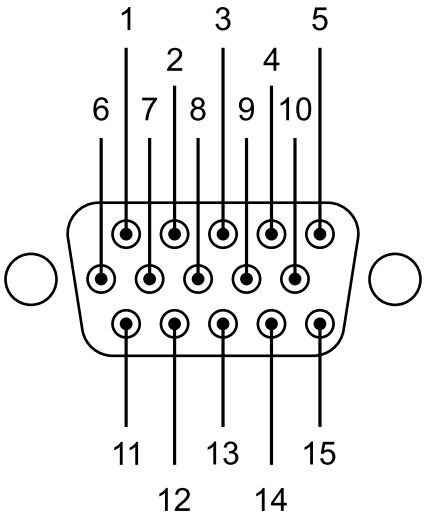
Connection

Any StudioHub cable or self-made audio cable may be used to connect to the DB94 AES192 port. Although AES192 operates at a 192 kHz sample rate with 24-bit resolution, the signal can be distributed reliably over standard Cat-5 or Cat-6 structured cabling infrastructure.

The Digital MPX signal is transmitted as a differential signal on pins 1 and 2 (AES192+ and AES192−).

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

THE PINOUT OF A DB15 HD GPIO / GPS CONNECTOR



DB15 HD, Male

Pin	Function	Direction
1	GPI2	Opto isolated Input
2	GPS RX	GPS Communication Output
3	5V GPS	GPS +5V, Fuse protected (0.5A)
4	GPO3	Solid State Relay
5	GPO1	Solid State Relay
6	GPI3	Opto isolated Input
7	GPI1	Opto isolated Input
8	GPS TX	GPS Communication Input
9	PPS IN	GPS PPS (Pulse Per Second) Input
10	GPO2	Solid State Relay
11	GPICOM	Common GPO rail
12	GP5V	+5V (Out), Fuse protected (0.5A)
13	GPS GND	GPS Ground
14	GPGND	GPIO Ground
15	GPOCOM	Common GPO rail

GPI EXAMPLE CONNECTIONS

To activate one Input, GPI pin would be pulled to ground , with a voltage applied on the GPICOM pin (Common to all GPI).

Using external power supply is the recommended method in order to avoid possible ground loops between equipment, as shown in Figure 1-1. The maximum allowed external power supply for logic control is 48 volts DC.

NOTE the presence of Current Limiting Resistors per GPI pin. The intention is to limit the current to 20mA for each GPI pin. Use the table below to choose the suitable Resistor's value.

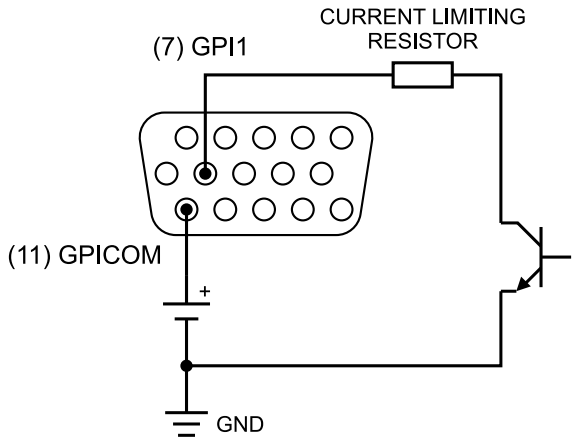


Figure 1-1 - External Power Supply

If the equipment being controlled is electrically isolated, then the use of the GPIO port's power supply is acceptable. The easiest way is shown on Figure 1-2.

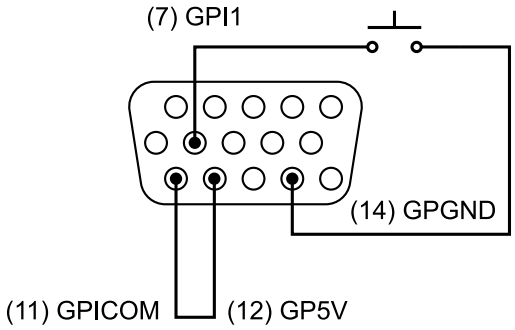


Figure 1-2 - GPIO Port's Power Supply

CAUTION: The use of current limiting resistor per GPI pin is required for some voltages, see table (each input has an internal 330ohms protection).

NOT PROTECTING THE GPI COULD DAMAGE YOUR DEVICE.

VDC	External Resistor
5	0
6	0
12	680 / 0.25Watt
24	1.8k / 0.5Watt
48	3.9k / 1Watt

GPO EXAMPLE CONNECTIONS

The GPO portion of the GPIO port are Solid State Relays. Current should be limited to 100 mA per GPO pin of a port. Maximum allowed voltage is 48 volts. The following diagram shows the recommended connections for outputs with the use of an external power supply.

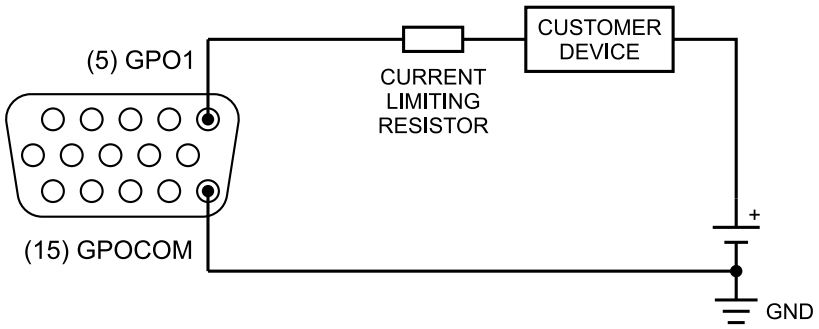


Figure 2-1 - External Power Supply

If necessary, a Current Limiting Resistors must be used to limit the current to 100mA for each GPO pin.

NOT PROTECTING THE GPO COULD DAMAGE YOUR DEVICE.

If the device being controlled is electrically isolated, than the internal GP5V supply can be used, maintaining a 100mA limit on current drawn.

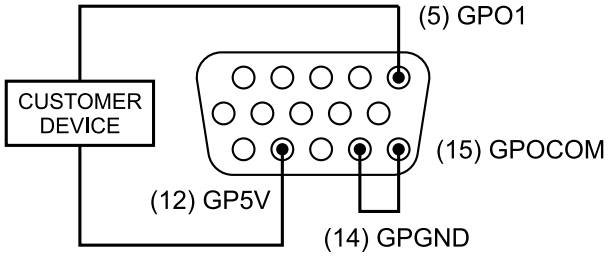


Figure 2-2 - GPIO Port's Power Supply

NOTE: GPO pins and GPOCOM are not polarized, current can flow both directions.

INTERNAL CONNECTIONS OF THE GPIO PORT

GPIO port provides 3 GPI (opto isolated inputs) and 3 GPO (solid state relays). Port is capable of driving a combined current of 100mA. Each GPI pin should be limited to 20mA of current.

Figure 3 shows a simplified diagram of the internal wiring behind the connector. The EMI Filters' parts are omitted for the sake of simplicity.

All of the inputs and all of the outputs on the GPIO port are grouped together. The 3 GPOutputs are on 3 separate output pins, but they share the same "Common Return" connection GPOCOM on pin 15. Similarly, the 3 GPInput pins share one high-side rail GPICOM, connected to pin 11.

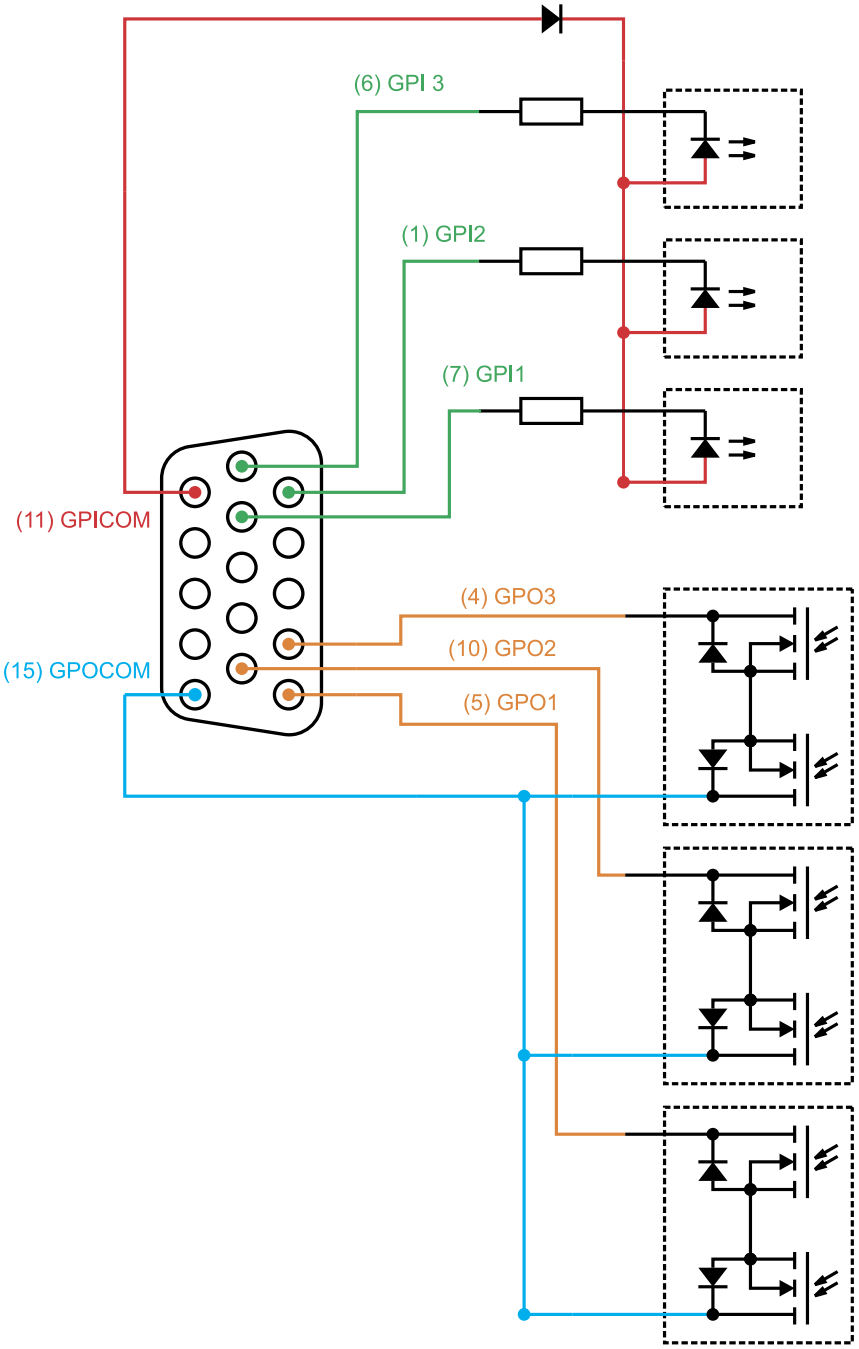
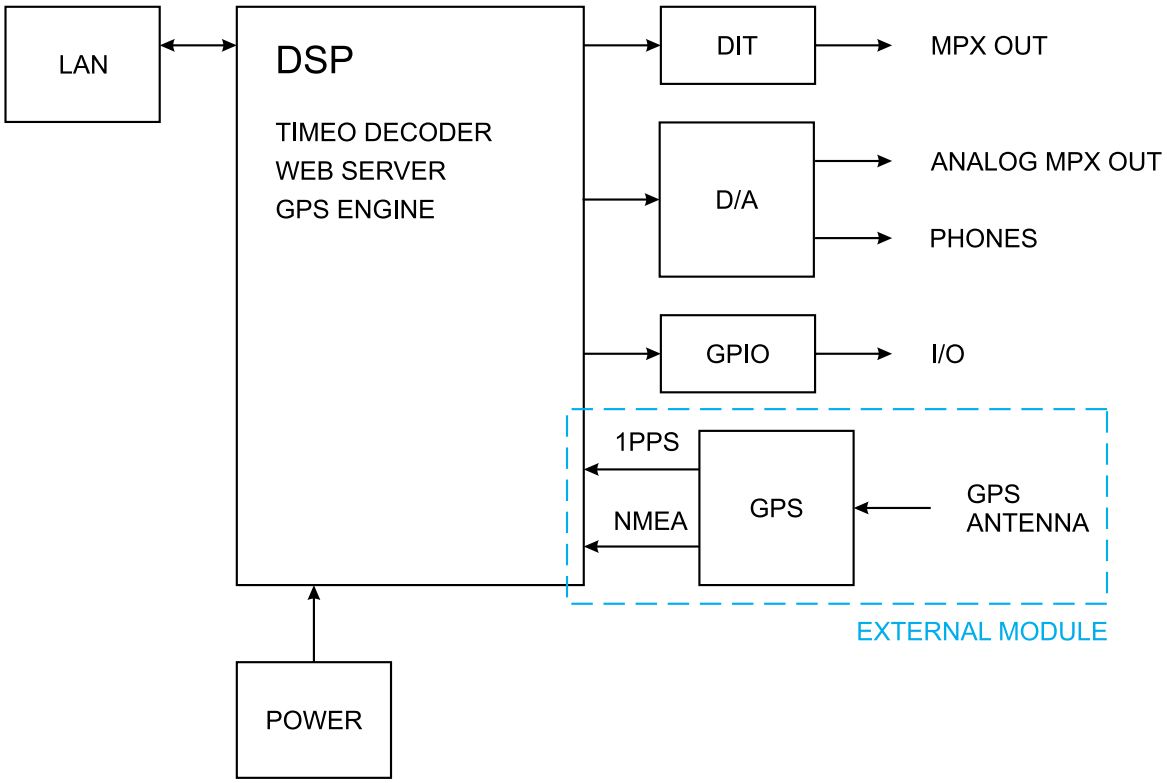


Figure 3

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

Block diagram

A simplified block diagram of DB94-RX / DB94-SFN is shown below:



NO USER-SERVICEABLE COMPONENTS INSIDE.
REFER ALL SERVICING TO QUALIFIED TECHNICAL PERSONNEL

Safety Warning

ALWAYS OBSERVE THE SAFETY PRECAUTIONS.

Careful observance of the safety precautions will help prevent physical injury, damage of the equipment, and extend the equipment life.

- The servicing of electronic equipment should be performed only by qualified personnel;
- Before removing the covers the unit must be switched off and the mains cable unplugged;
- When the equipment is open, the power supply capacitors should be discharged using a suitable resistor;
- Never touch the wires or the electrical circuits;
- Use insulated tools only;
- Never touch the metal semiconductor. They might carry high voltages;
- For removing and installing electronic components, follow the recommendations for handling MOS components.
- Do not remove the factory sticker from the equipment. It contains information as regards the name, serial number and MAC address of the device.
- To join the equipment to the mains supply, use the power cord purchased with the equipment.

ATTENTION: The device has an internal Lithium battery for RTC timekeeping. Do not try to re-charge this battery!

NOTE: A depleted RTC battery may cause the device to start with an incorrect or random time and date. For the RTC battery replacement procedure, refer to APPENDIX "Battery Replacement Procedure" on page 60.

Operating Recommendations

To ensure normal operation of the DEVA unit, we recommend following the instructions listed below.

- Install the unit in places with good air conditioning. The unit is designed to operate within the ambient temperature range of 10 to 50°C. The equipment rack should be ventilated in order for the device to keep its internal temperature below the maximum ambient temperatures;
- We do not recommend installation in rooms with high humidity, dusty places or other aggressive conditions;
- Although the device is intended to be installed closed to exciters or transmitters, we do recommend the device to be located away from abnormally high RF fields.
- Use only checked power supply cables. We strongly recommend the usage of shielded cables;
- Connect the DEVA unit to reliable power supply sources only. In case of unstable power supply, please use Uninterruptible Power Supply (UPS);
- Use the device only with its top cover on to avoid electromagnetic anomalies. Otherwise, this may cause problems with the normal functionality of the unit;
- To ensure normal remote operation of the unit, make sure to connect the device to a good quality Internet connection;
- For the normal operation of your DEVA device, check if the network settings past through all the required data traffic.

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!

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

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.

Mounting

RACK REQUIREMENTS 1U

The unit mounts in a standard 19-inch equipment rack and requires only 1¾ inches (1U) of vertical rack space. In order the painted finish around the mounting holes to be protected, the use of plastic washers is recommended.

RACK REQUIREMENTS COMPACT UNITS

Our customized 1U 19-inch rack accessory provides a professional mounting option for up to three compact size DEVA units. It is made of milled aluminum and finished in black powder coat. Two extra blanking panels and set of mounting screws are provided with each rack bracket kit.

STAND-ALONE DEVICES

DEVA's stand-alone units (Radio Explorer series, BandScanner series, DVB Explorer) do not require additional tools or installation brackets.

Overview

MicroMPX or µMPX is a codec that transfers a full FM composite or MPX signal, meaning audio plus stereo pilot and RDS, over a low bitrate connection. It currently supports bitrates from 320 upto 800 kbit/s, and bitrates down to 176 kbit/s if you're using MicroMPX+ mode.

MicroMPX was developed specifically for use on FM, and even though the bitrates are low, it does not introduce typical lossy compression artifacts such as pre- and postringing or watery sounds. It also maintains peak control. If you use a composite clipper, the extra loudness that composite clipping generates also survives the MicroMPX codec. So for all relevant purposes, there's no real difference between connecting the direct composite output of a processor to the FM transmitter and connecting the MicroMPX decoder output to that same transmitter. (It is a lossy codec so the signal is not identical, which can become relevant when using a Single Frequency Network – more about that later.)

MicroMPX only needs one-way communication (from the encoder to the decoder, typically from the studio site to the transmitter site). This means that it can be sent over connections such as satellite links. It has several redundancy mechanisms to handle network or IP link problems: it can add recovery data to recover lost packets and send the same data over multiple connections so that as long as one of the connections works, the signal keeps playing. It is also possible to use multiple encoders that send their data to one decoder, to handle problems on the encoder end.

One encoder can feed any number of decoders (depending on the available bandwidth), and network multicasting or broadcasting is possible.

With MicroMPX, you can encode the full MPX signal in one location, and just spread it from there to all your transmitters, which will all get the same signal at the same time.

WARNING: Sending MicroMPX over an unreliable connection such as the public internet may work perfectly fine, but it can also cause dropouts. If possible, use a reliable connection, or redundant connections.

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

Getting Started

The DB94 series are provided with preliminary settled µMPX licenses.

In order for the normal operation of the DB94 to be guaranteed, you will need fulfill the following conditions:

1. Standard Ethernet 10/100M connection;
2. Correctly assigned Network configuration and device settings.

To make sure that all the conditions are fulfilled please, follow the instructions below.

CONNECTION

1. Install the unit on its operation place;
2. Using the provided power cable, connect the unit to the power supply network;
3. Connect the antenna cable to the RF antenna input connector located on the rear panel of the device;
4. Connect the DB94 to the TCP/IP network using direct network cable.

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:

DHCP	Enabled	**Gateway**	Assigned by DHCP
IP	Assigned by DHCP	**DNS**	Assigned by DHCP
Netmask	Assigned by DHCP	**HTTP Port**	80

NETWORK SECURITY RECOMMENDATIONS

1. It is not recommended the DB94 to be directly connected to the Internet. This may lead to unregulated access and/or problematic operation of the device. To ensure secure connection, we recommend the device to be installed behind a router with an active firewall.
2. If remote access to the device is needed, we recommend using VPN to the router or the port of the relevant service (WEB, SNMP, Application, etc.) to be properly NAT forwarded.
3. If NAT forward is used, it is highly recommended random ports of your choice to be used. Not the standard ones (80 for WEB, 161 for SNMP, etc.).
4. Using DMZ connection is not recommended.
5. Make sure to change the standard access credentials (usernames and passwords, SNMP communities).

For detailed information as regards the recommendations listed above or need of further instructions, please contact your network administrator.

LAN PORT

For normal operation it is necessary the device to be connected to a local network or Internet by cable with RJ-45 connector.

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

Network Discovery

DEVA ETHERNET SETUP TOOL

The DEVA Ethernet Setup Tool is designed to detect and configure networked DEVA products that lack front-panel IP configuration or UPnP support. It simplifies network setup by identifying the device's current IP address and allowing changes.

Once the device is connected to a local network or to the Internet by the applied LAN cable, download and install the DEVA Ethernet Setup Tool.

DOWNLOAD LATEST VERSION

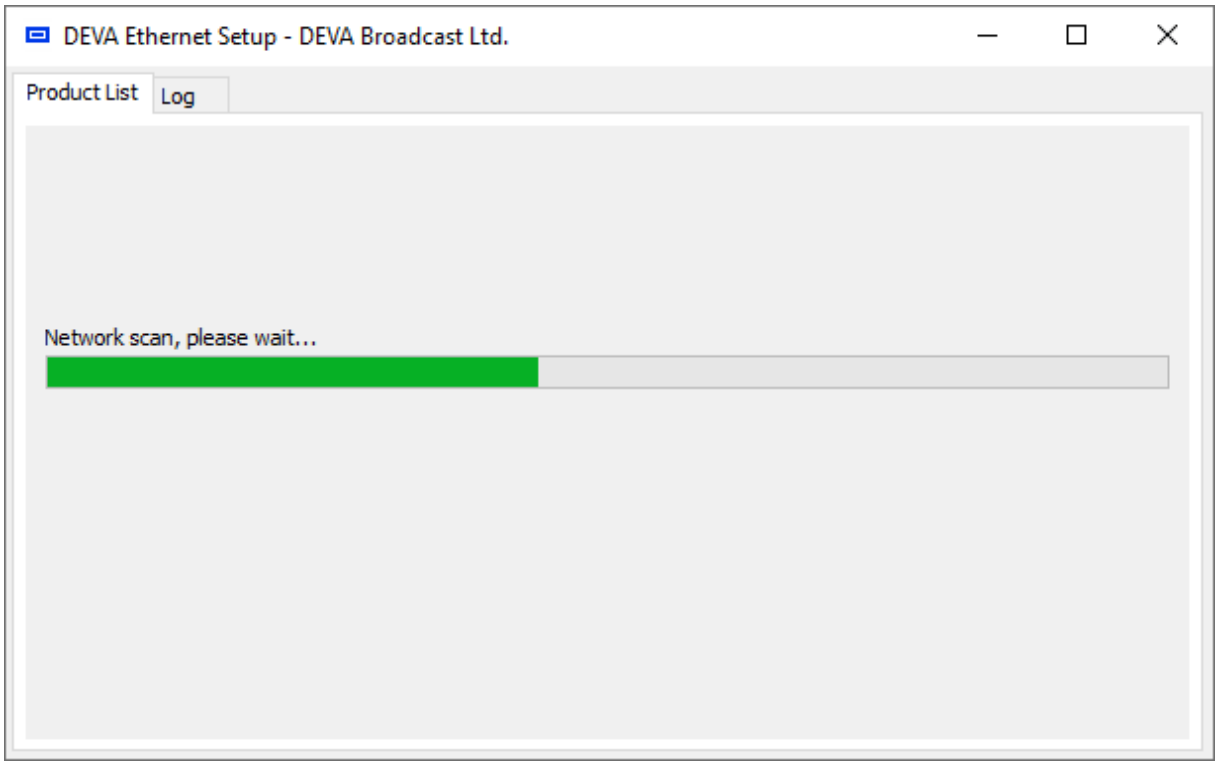
The latest version of DEVA Ethernet Setup Software can be found on our website: http://www.devabroadcast.com/downloads

IMPORTANT: This software requires the installation of third-party software called WinPcap (https://winpcap.org) if it is not installed already.

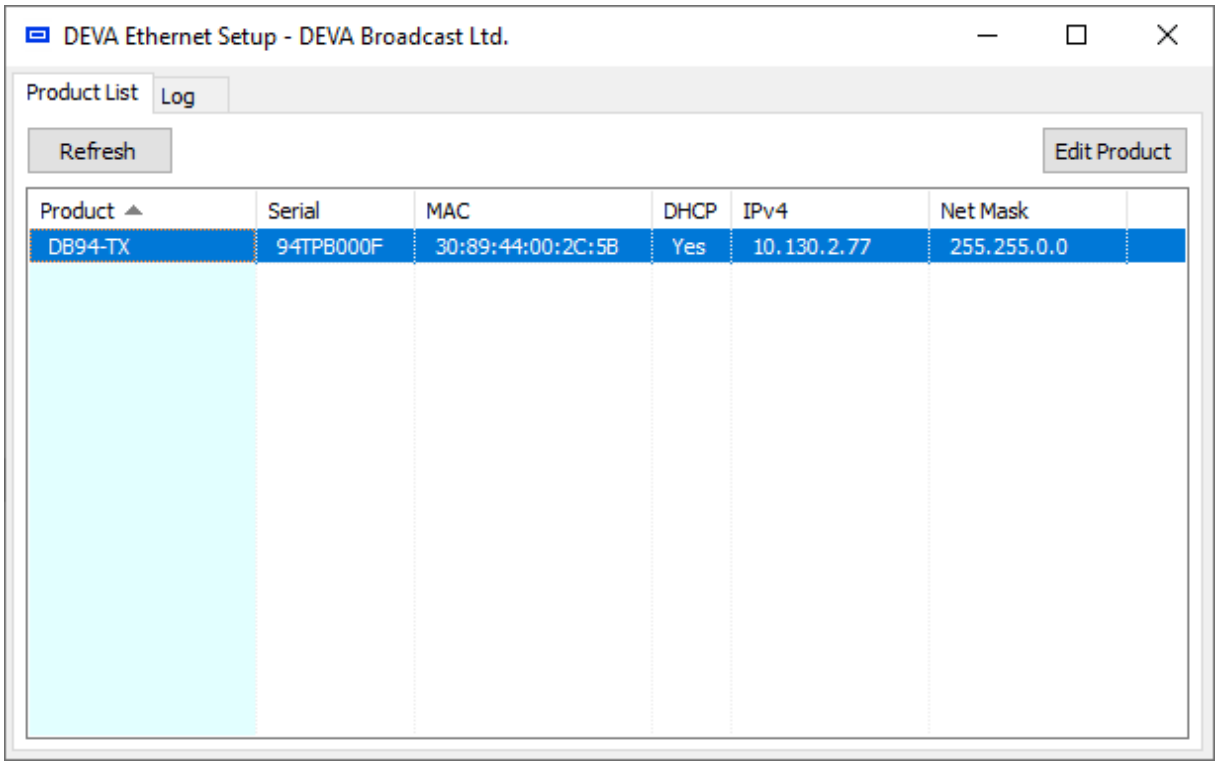
USING THE TOOL

In order for the tool to be able to find the device during the network scan, please make sure that the unit is connected to the power supply chain and Ethernet network. Then, open the DEVA Ethernet Setup Tool and follow the instructions listed below:

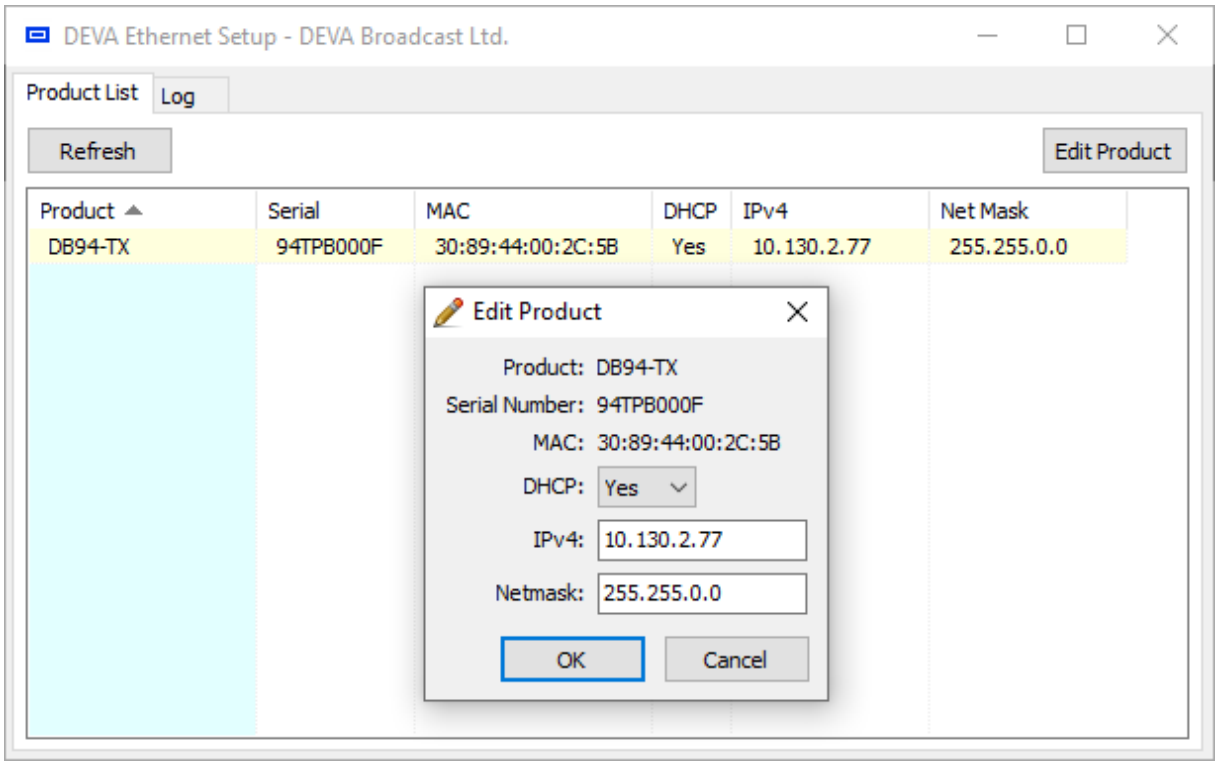
1. Once the program window opens, an automatic network scan process will be started.



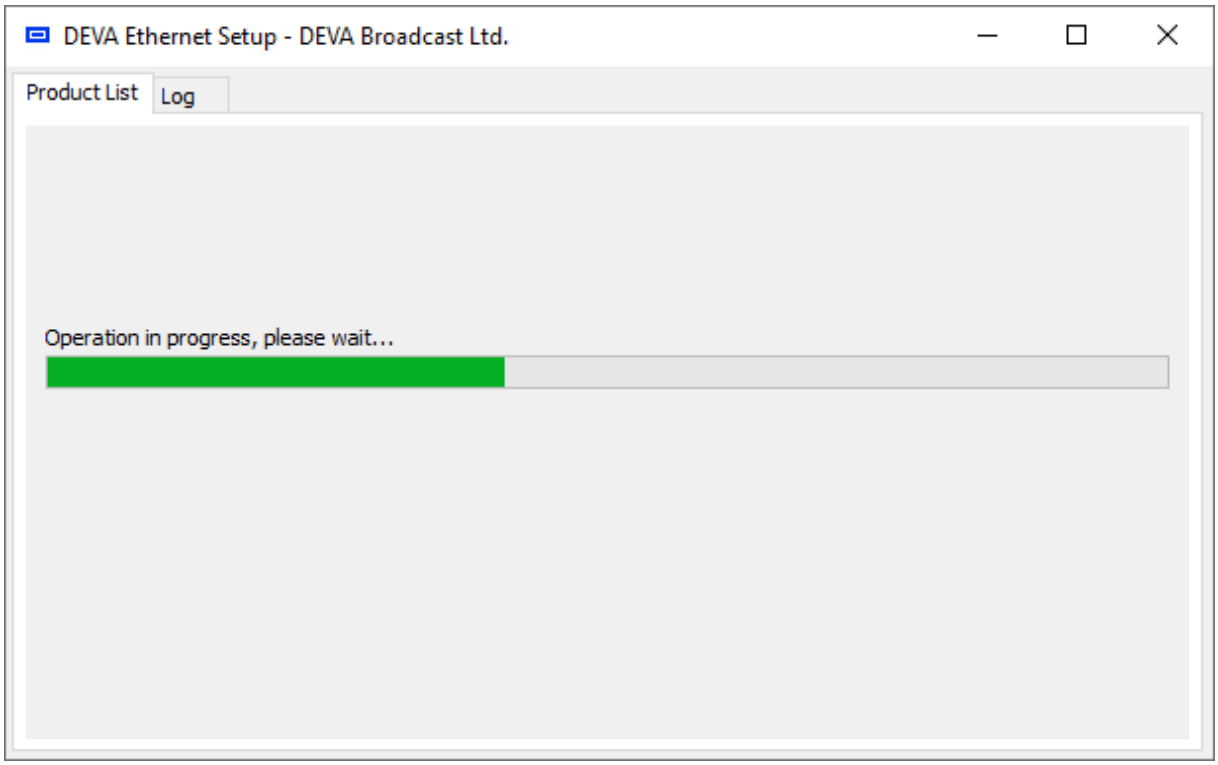
2. Once the network scanning process is completed, the collected data will be depicted in section Product List:



3. To change the parameters, select the product and press [Edit Product]. A new window will appear:



4. Enter the needed changes and press [OK]. Make sure to write down the IP address as it will be needed in order for the device to be accessed via WEB or Software interfaces.



5. A new network scan process will be performed automatically to confirm that the applied settings are accepted.

If you are experiencing any difficulties, or due to any reason the setup process fails, please contact us at support@devabroadcast.com.

MicroMPX Decoder Configuration

CONNECTING TO A FM TRANSMITTER & CALIBRATING

How to connect the decoder to the transmitter depends on several things. If the transmitter has a digital MPX input (MPX over AES/EBU), that is the preferred way of connecting it. And most of the steps below can be skipped in that case.

For analog MPX connections, transmitters typically provide either an XLR MPX input or a BNC MPX input. The DB94 provides an unbalanced MPX output, therefore it must be connected to the transmitter's unbalanced BNC MPX input.

After connecting it, you need to adjust the level such that the output of the transmitter complies to your local laws (75 kHz modulation – or sometimes a bit more, mainly). MicroMPX has a test tone generator, both for sine waves that can be used to setup the level and if needed boost the high frequencies a bit if there is some high frequency rolloff, and a square wave generator that can be used to compensate for tilt in low frequencies, typically caused by a highpass filter (DC removing filter) in many sound cards, and sometimes even in older transmitters.

Step 1: Select an approx. 1000 Hz tone, and adjust the level (either the MicroMPX output level or the transmitter input gain) to match the maximum allowed modulation.

Step 2: Switch to a 30 Hz or so square wave, and adjust the RC slider until the modulation is as close as possible to that same maximum level. Go down to 15 or 10 Hz to adjust it more accurately. Normally, you should be within at most 1-2 kHz of the allowed maximum once this is done, more than that indicates some issue.

Step 3: Check how much the level drops at for example 50 or 60 kHz. And adjust the Highs RC slider – CAREFULLY because it's very easy to overdo it. Having too little highs causes no real problems except some loss in stereo separation and RDS level, but having too much can cause overshoots.

IMPORTANT: when using the tilt correction or Highs RC correction in the MicroMPX decoder, its output level MUST be set below 0dB, or digital clipping could occur. Check the waveform display to make sure the waveform never exceeds the lines on top and bottom.

About the MicroMPX Codec

The DB94 supports MicroMPX, a custom-developed audio codec created specifically for FM broadcasting. It enables the transmission of high-quality FM multiplex signals over IP using UDP while requiring only 320 kbps of bandwidth. In contrast, some manufacturers offer full-bandwidth, uncompressed MPX over IP solutions, but these demand significantly more dedicated capacity-often 2 Mbps or higher.

By comparison, MicroMPX reduces the required bandwidth by nearly 84%, bringing it down to just 320 kbps. This dramatic reduction makes it practical and cost-effective to send high-quality multiplexed audio from virtually any audio processor over an IP network directly to an exciter.

Unlike conventional codecs such as MP3 or AAC, which are optimized for stereo audio, MicroMPX is engineered specifically for composite FM signals. It uses an innovative perceptual masking technique that takes advantage of the inherent characteristics of FM multiplex signals. When used for STL applications, this design offers two key advantages over traditional stereo codecs:

- Artifacts generated by stereo codecs typically require additional downstream processing to correct overshoots and other issues before stereo generation.
- Any artifacts produced by MicroMPX encoding appear as normal FM noise and are effectively imperceptible.

With MicroMPX, broadcasters can now carry MPX signals over lower-bandwidth IP links and narrowband STL paths. This technology opens up new possibilities for audio distribution while reducing both equipment requirements and overall costs by capitalizing on the continued expansion of global IP infrastructure. Sound quality also improves as this specialized codec is deployed more widely. As with any transformative technology, the range of applications for MicroMPX is expected to expand as innovative broadcast engineers explore its capabilities.

A DISTINCTION FROM L/R SIGNALS

It is essential for readers to recognize that the DB94 carries fully modulated FM composite signals rather than discrete left and right audio channels. This composite signal includes all elements required for an FM broadcast, including the L+R program audio, the 19 kHz stereo pilot tone, the L-R stereo information, and RDS/RBDS data on the first subcarrier.

When operating as an encoder, the DB94 converts an analog composite FM signal into IP data packets. In decoder mode, it performs the reverse function, transforming IP packets back into an analog composite FM signal. Consequently, the encoder must be connected to the output of an audio processor, while the decoder is designed to drive the analog composite input of an FM transmitter.

In practical terms, DB94 functions much like a modem for FM broadcasts. For clarity, referring to an FM composite signal diagram can be helpful.

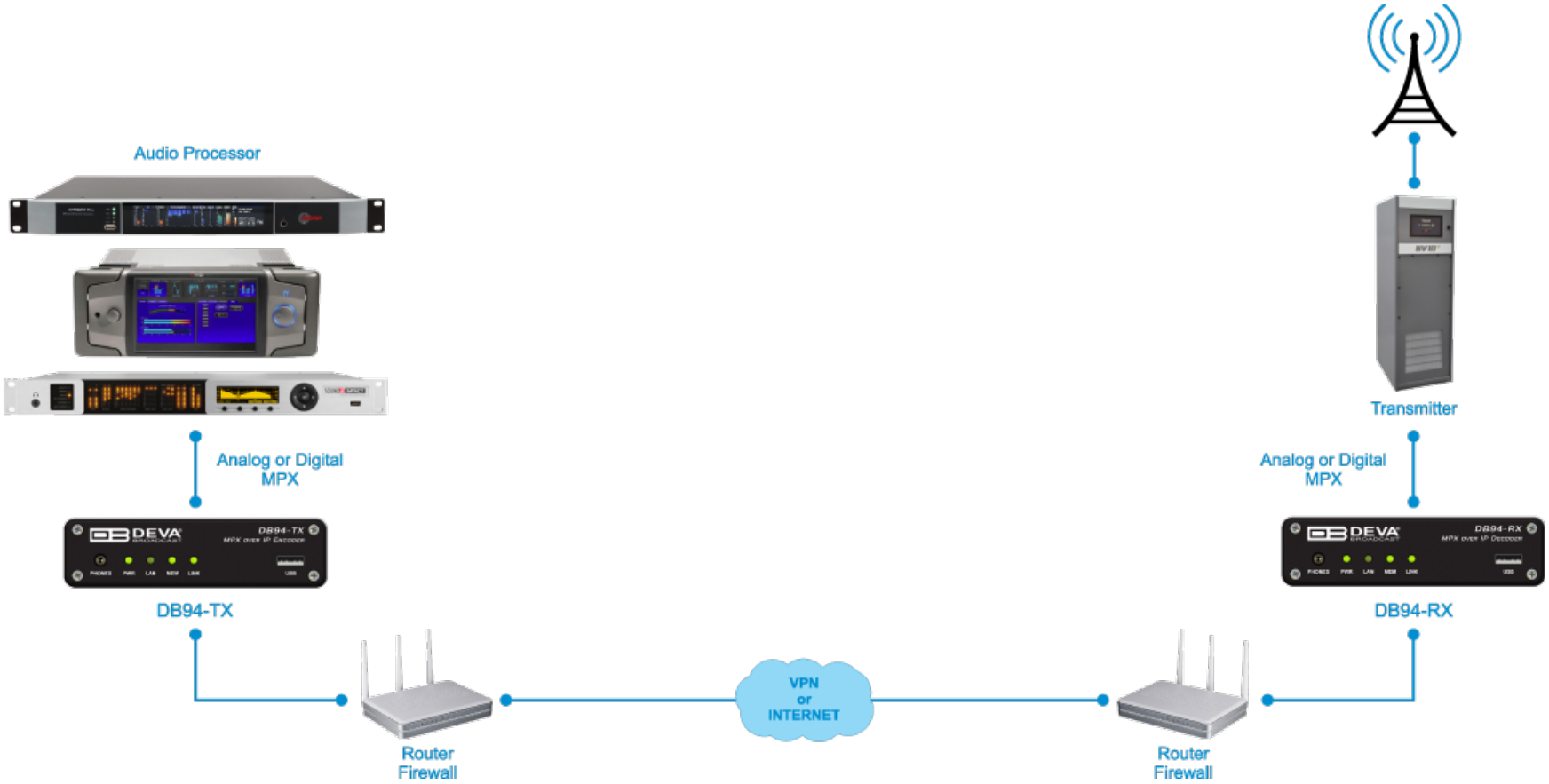
65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

Use Cases & Applications

The diagrams depicted below represent only a few samples of the applications made possible by this modular technology. By using the DB94, transmitter rack layouts can be simplified, removing the need for additional processing or stereo generation at the transmitter site.

SIMPLE STL: USE WITH ANY FM PROCESSOR

The DB94 is processor agnostic. Composite output of ANY brand of FM processor feeds an MPX Encoder, while the Decoder feeds the transmitter .



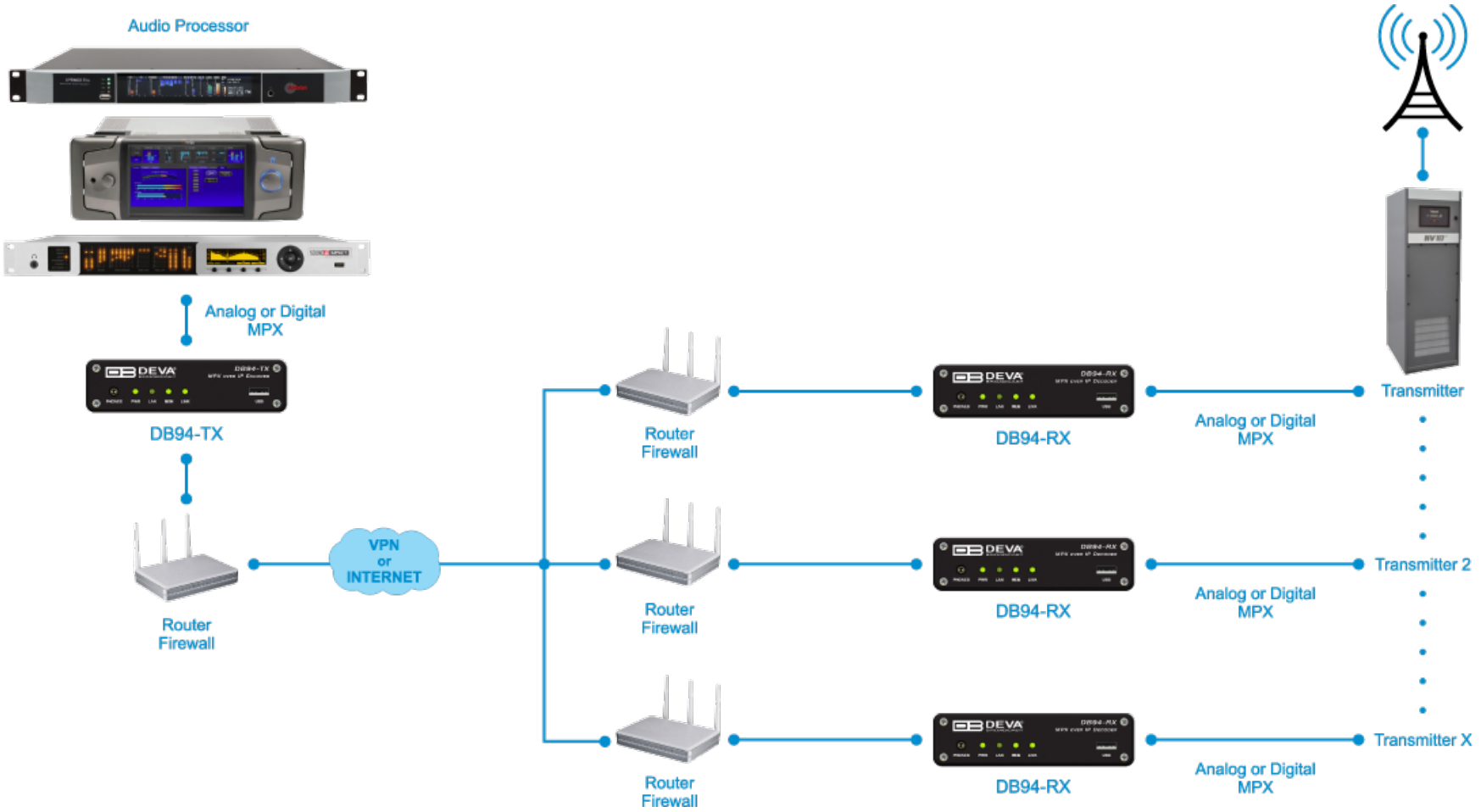
65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

ONE PROCESSOR TO MANY TRANSMITTERS

This diagram highlights one of the key advantages of transporting MPX over IP: every decoder produces an identical replica of the primary processor output.

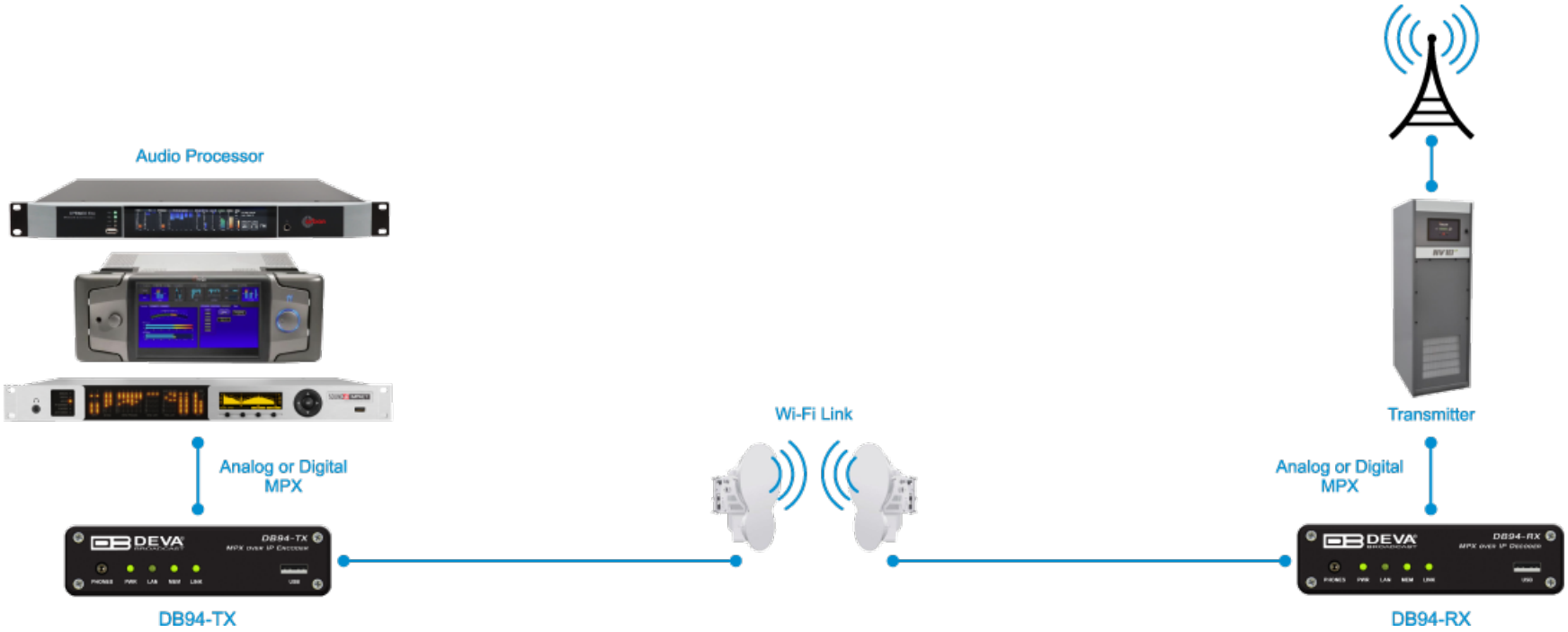
Whether at the main transmitter, backup facility, or repeater site, each location receives the same signal.

This approach maximizes the benefit of your highest-quality processor, ensures consistent sound across all transmission sites, and eliminates the need for individual tuning and adjustment of each transmission chain.



USE WITH PRIVATE NETWORKS AND IP RADIOS

MicroMPX allows lower bandwidth IP connections and narrow band STL channels to be used for MPX signals transport.

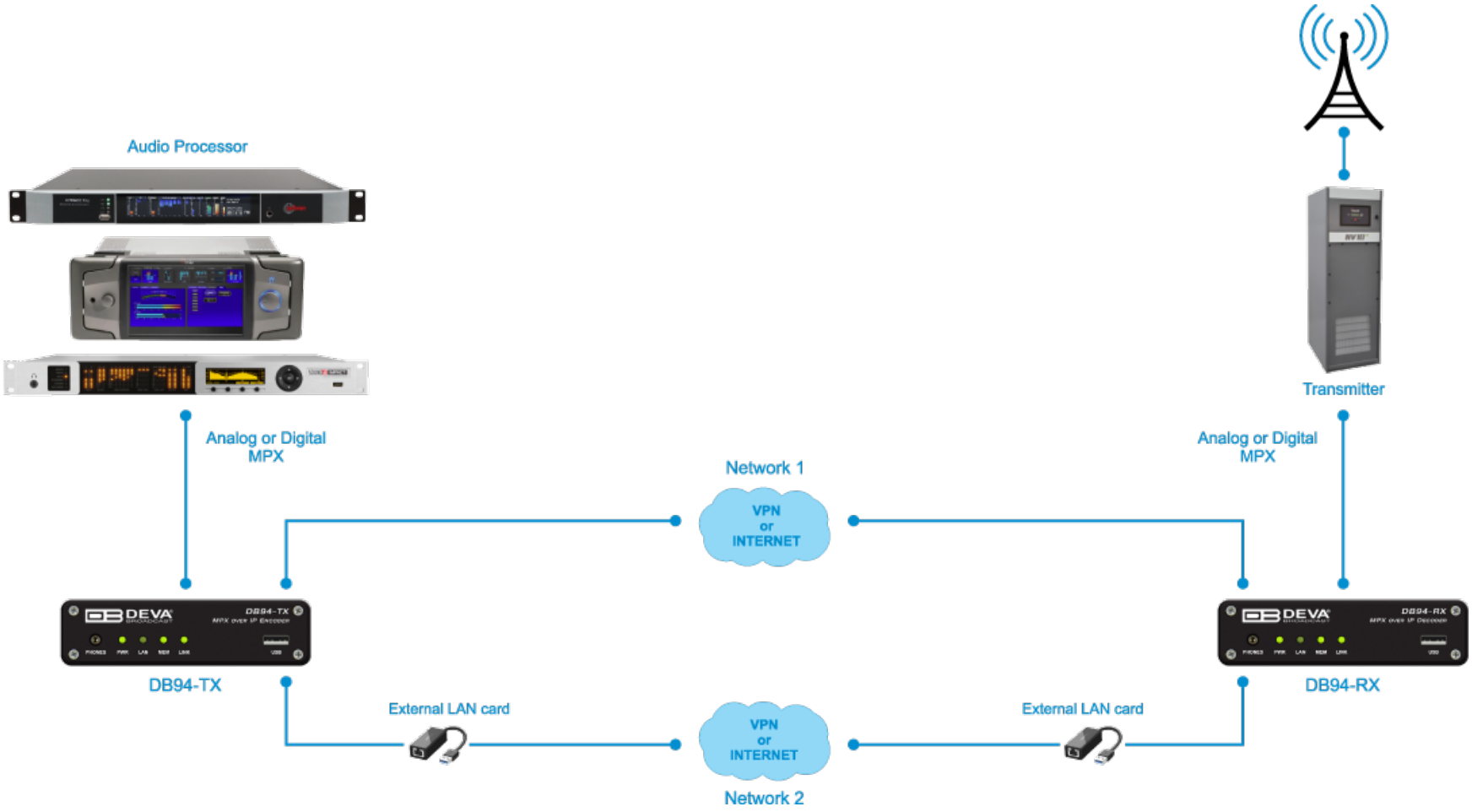


65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

REDUNDANT PATHS AND BACKUP SCENARIOS

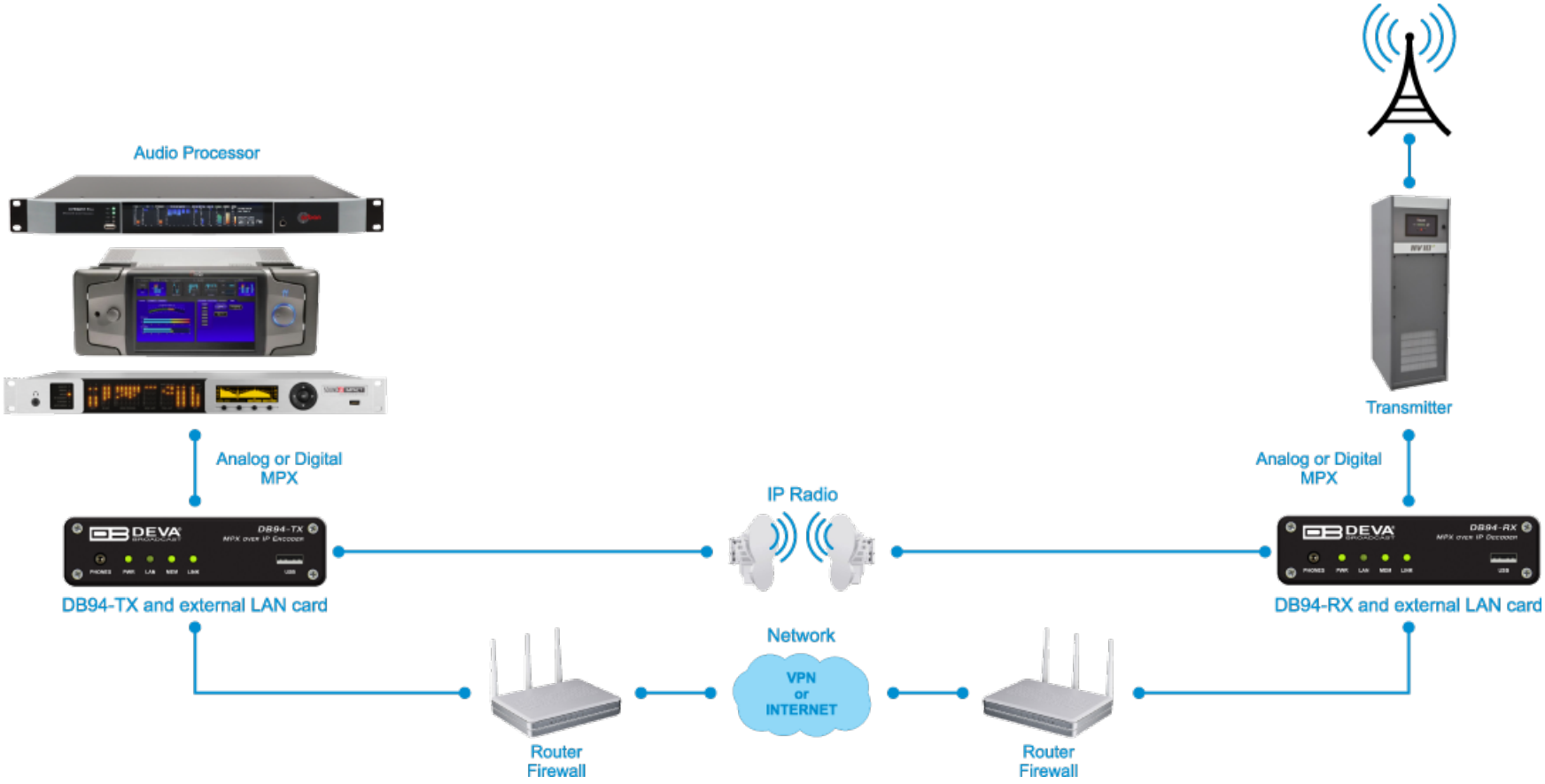
Single Encoder & Decoder, Dual Networks

In this configuration, Network 1 and Network 2 ports feed two entirely separate network paths. If packets are lost on one path, the Decoder grabs them from the other and seamlessly re-assembles the stream.



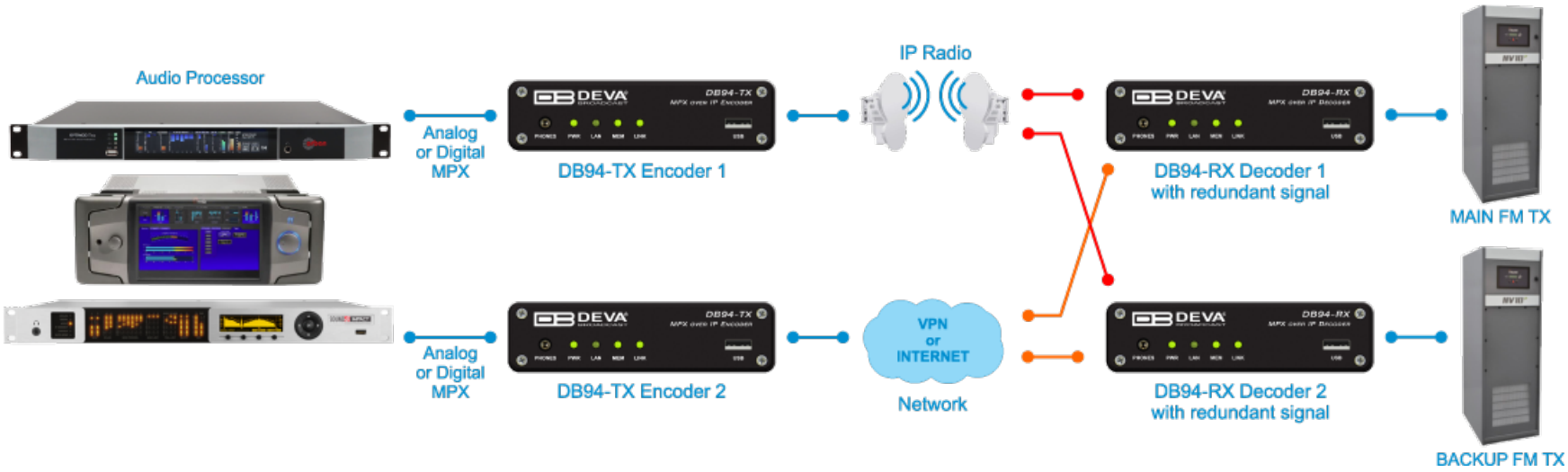
Dual Encoder, Single Decoder

A processor (or 2 processors located at different sites) feeds two Encoders. Both Encoders send the same signal over UDP to a single Decoder at the same IP and port address. If one of the links fails, the Decoder picks up the stream from the other Encoder after a brief failover period. (An external router may be required, depending on your link design).



Dual Encoder, Dual Decoder

In this option, a second Decoder is added to the previous usage diagram so that both - the Main and Backup transmitters are both fed with signals served by separate network paths. (Depending on your link design, an external router may be required).



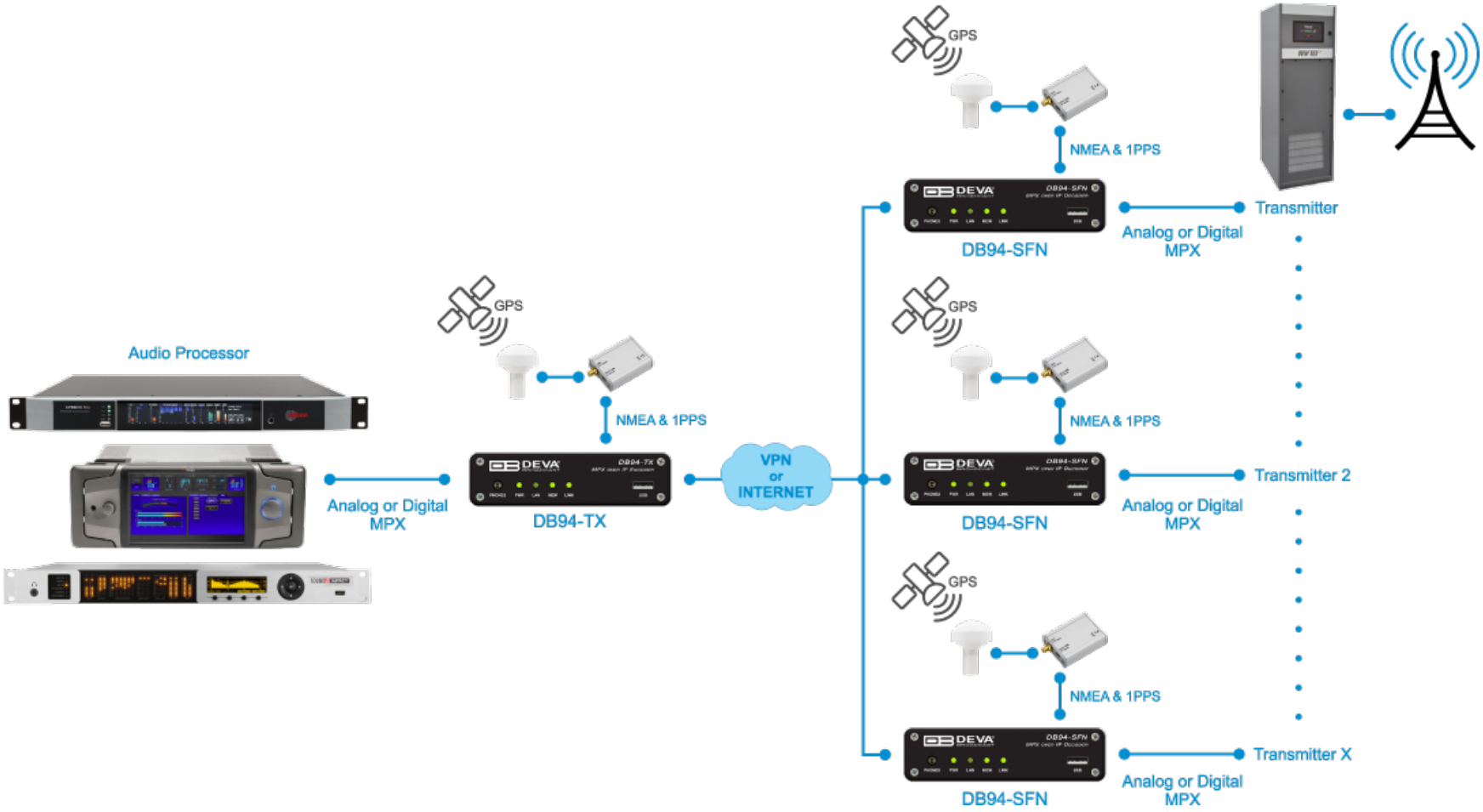
65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

SFN + GPS

Connect the GPS receiver to the encoder's GPIO/GPS port. In general, any GPS receiver capable of sending an NMEA signal to the device's COM port should work.

Place the GPS receiver in a location where it can receive a strong GPS signal, such as near a window.

Each decoder requires a GPS receiver with PPS (Pulse Per Second) support.



Technical Notes

MICROMPX CODEC SETUP TIPS AND BEST PRACTICES

In order for optimal performance to be guaranteed, the MicroMPX encoder and decoder should be configured to match the quality of the IP connection linking them.

If the encoder and decoder are not set up with sufficient protection against impairments in the data stream, the MPX signal quality can deteriorate suddenly and severely. In such cases, the decoder may mute its output for several hundred milliseconds. Proper configuration depends largely on the characteristics of the IP link-particularly packet jitter and packet loss.

PACKET JITTER

Packet jitter occurs when packets arrive at the receiver at irregular intervals. Some may arrive earlier or later than expected, and in some cases packets may even get reordered.

TIP: To compensate for higher jitter levels, increase the decoder's **Stream Delay** buffer

PACKET LOSS

Packet loss happens when data packets fail to reach the receiver. This can be caused by limited IP bandwidth or by packet corruption during transmission.

TIP: To compensate for packet loss, increase the encoder's error correction settings by adjusting the **Stream Error Correction "Size/Delay"** and **"Overhead"** parameters.

EXAMPLE: If **Size/Delay** is set to 20 and **Overhead** is set to 3, the system can recover up to three lost packets within a block of 20 packets without any audible impact.

As a general rule:

- If packet loss occurs in occasional bursts, increase both **Size/Delay** and **Overhead**, ensuring that **Overhead** does not exceed **Size/Delay**.
- If one or two packets are lost more frequently, use smaller values for both parameters.

Be aware that higher **Overhead** values and lower **Size/Delay** values increase the data rate. For instance, with **Size/Delay** set to 20 and Overhead set to 3, every 20 packets generate 3 additional error-correction packets. This raises the total packet count from 20 to 23, increasing the data rate by approximately 15%.

FIREWALL AND SECURITY

The DB94 includes a basic built-in firewall intended to protect the unit from certain network scans and intrusion attempts. This internal protection is not a substitute for a comprehensive external firewall or security strategy and applies only to the DB94.

The internal firewall blocks selected incoming ports to prevent system services from becoming potential entry points into your network. For optimal security, the use of a properly configured external firewall is strongly recommended.

TILT CORRECTION

DB94 operates with a flat response and assumes the incoming signal does not require tilt correction. If tilt correction is needed anywhere in the signal chain, it must be applied externally to the DB94.

To determine whether tilt correction is required, send a square wave through the audio processor into the DB94 and confirm that a square wave is displayed on the DB94's meters.

COOLING

DB94 is designed to dissipate heat through its chassis and exchange it with the surrounding air. To ensure proper cooling, do not obstruct the ventilation openings on the top or sides of the unit, and maintain rack ambient temperatures below 40°C.

As with all electronic equipment, excessive heat accelerates component aging. Maintaining a cooler operating environment will help extend the service life of the unit.

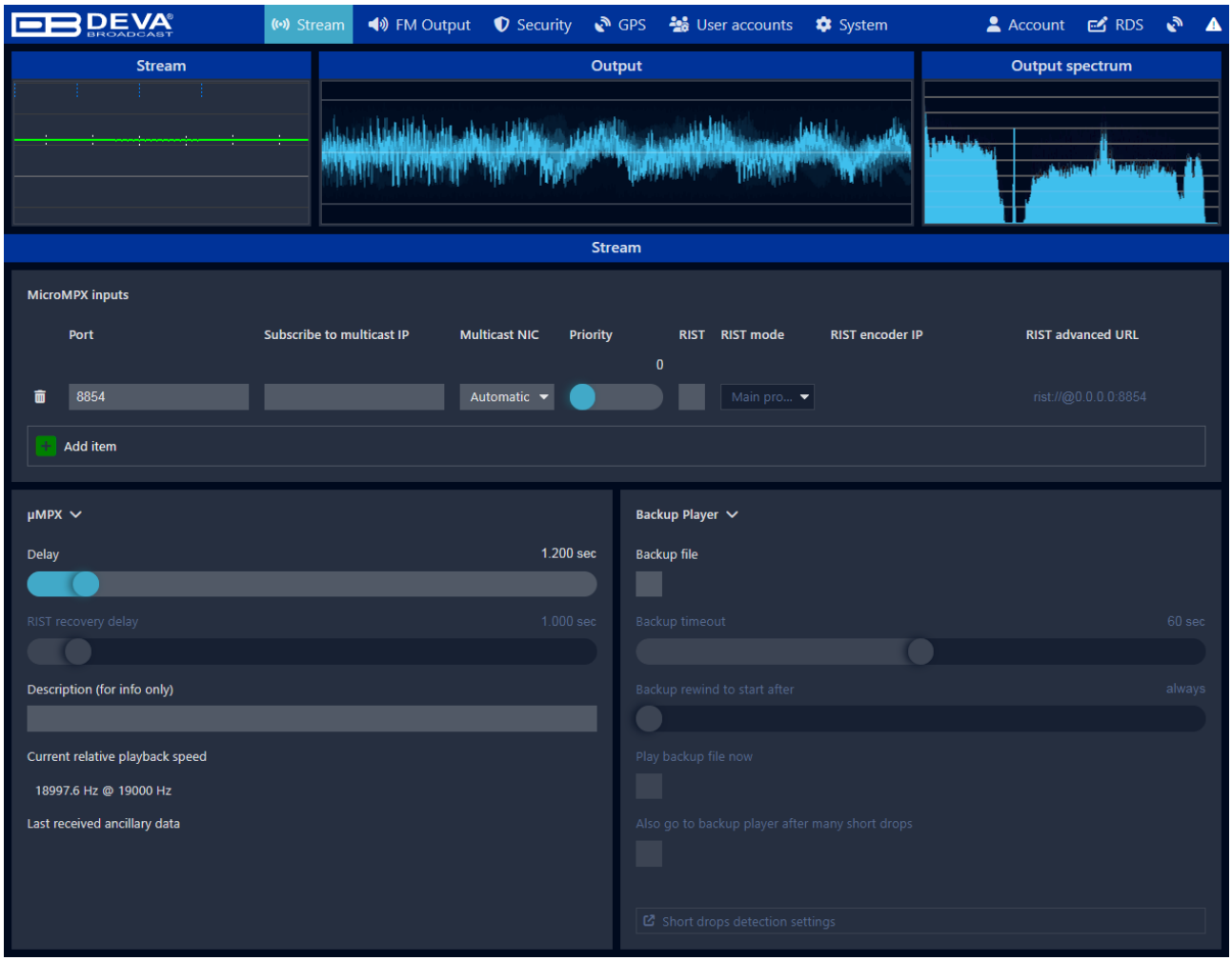
WEB Interface

DB94-RX / DB94-SFN is controlled trough a build in WEB Server and a standard web browser can be used to monitor its status or to make some adjustments. To operate the device you need to know its IP Address. In case you are not aware of it use the "DEVA Ethernet Setup Tool". Then open a new WEB Browser and enter the device IP address and port in the address field then press [Enter].

ACCESS

DB94 provides you with a protected access to the device settings. To make the necessary adjustments to the device, please log in as an ADMINISTRATOR. The default values being username: **admin**, password: **pass**.

STREAM



Upon opening the WEB interface, the main Stream window will appear. The page contains information on the MicroMPX Inputs as well as visual interpretation of the Stream, Output and Output spectrum.

You can prepare a file with emergency audio to be played in case you have a connection drop out.

The MicroMPX decoder expects a 192 kHz mono file that contains MPX data, normalized to 0dB, in WAV or FLAC format. The file is transmitted as-is, so it needs to be pre-emphasized and it must contain stereo and RDS signals.

MPX files can be generated by recording the output of an FM processor (or even the received signal from a tuner that doesn't demodulate the MPX signal). Or you can use a program like Thimeo WatchCat (https://www.thimeo.com/watchcat/) to generate an MPX file from an audio file.

Backup player

- Through this screen are applied all needed settings to the alternative sources.

The backup player will start only after Backup timeout time of no usable MicroMPX data elapses. If a few packets arrive and then the signal disappears again, it will continue the backup file playback where it left off, unless the backup player hasn't been used in Backup rewind to start after time. In that case it will start at the beginning. If you always want it to start at the beginning (for example if you have a loop of jingles as backup file), you can set that time to 0.

MPX Output Level

The **MPX Output Level** slider controls the composite output level of the decoder.

- The factory default setting is 0.00 dB (100.0%).
- Under normal operation, this setting should remain at 0.00 dB.

Adjusting the Output Level

To reduce the composite output level feeding the transmitter:

1. Click and drag the **MPX Output Level** slider to the left.
2. Release the slider to apply the new setting.
3. A green "Updated" confirmation message will appear in the upper-right corner of the screen.

The selected level is automatically saved upon adjustment.

Important Level Considerations

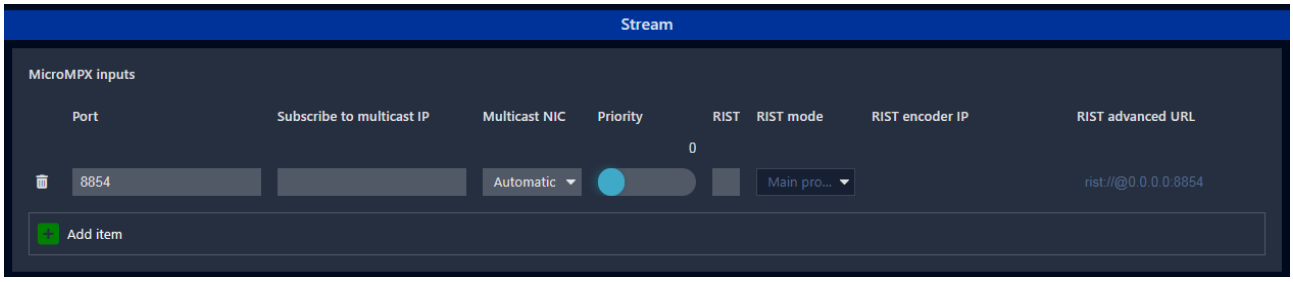
Signal levels must be properly optimized at the **Encoder**.

While the output level may be reduced at the Decoder:

- If the incoming MicroMPX signal is clipped or distorted due to excessive encoding levels,
- Adjusting the MPX Output Level at the Decoder will not correct distortion introduced at the source.

Proper level management must be performed at the Encoder.

Stream Receiver Configuration



The DB94 provides Main and Alternate port addresses for receiving inbound streams.

- Factory Default Port: 8854
- The configured port must match the port number used by the transmitting Encoder.

Changing the Port Number

Ports may only be changed when:

- The selected port is **inactive**, or
- The **Decoder is set to Off**

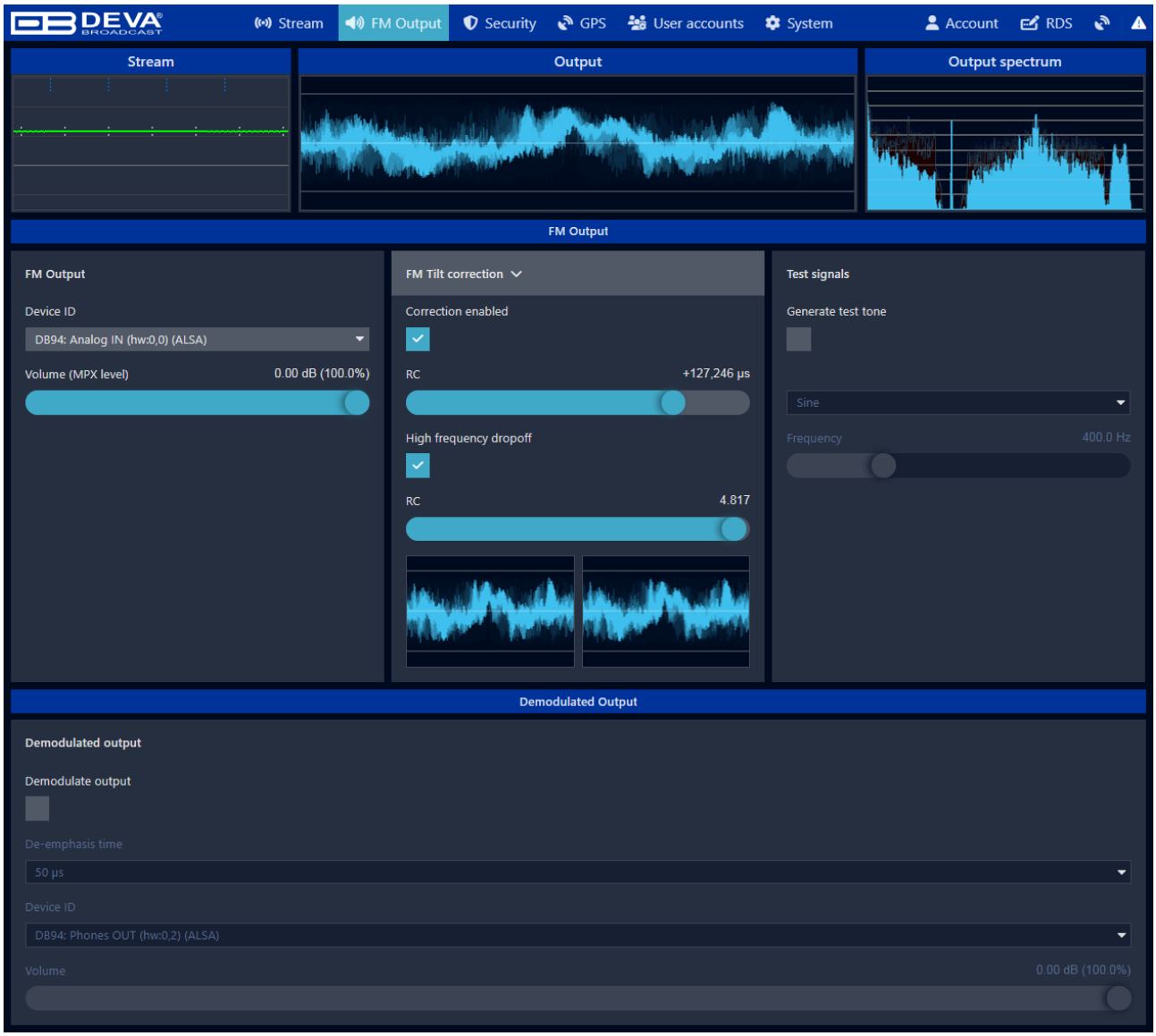
To change the port number:

1. Double-click the **Port Number** field.
2. Enter the desired port number.
3. Click **Save** to apply changes.

Ports may also be switched via **GPI control**. Port switching may require one to two seconds to complete, depending on the interval between keyframes in the incoming stream. Switching is not instantaneous and may not be completely seamless.

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

FM OUTPUTS



FM Output and Demodulated output settings are applied in this section of the WEB Interface.

For FM Output, you can change **Device ID**, **MPX level volume**, **FM Tilt correction**, **RC High frequency dropoff** and **RC**.

You can also generate a test tone. To enable the mode: Select the “Test tone Mode” to activate it. Then configure tone settings.

Demodulated Output

- These settings provide all the needed adjustments to the algorithm which DB94 demodulates and manipulates the signal.

Test Signal Generator

A built-in Test Signal Generator is provided for setup, alignment, and calibration purposes.

IMPORTANT NOTE:

Enabling the Test Signal will interrupt normal program audio.

Signal Capabilities

- Sine wave generation range: 1 Hz to 80 kHz
- Output replaces the incoming program audio while active

Setting Frequency

The test frequency may be adjusted using one of the following methods:

Method 1 - Slider Adjustment

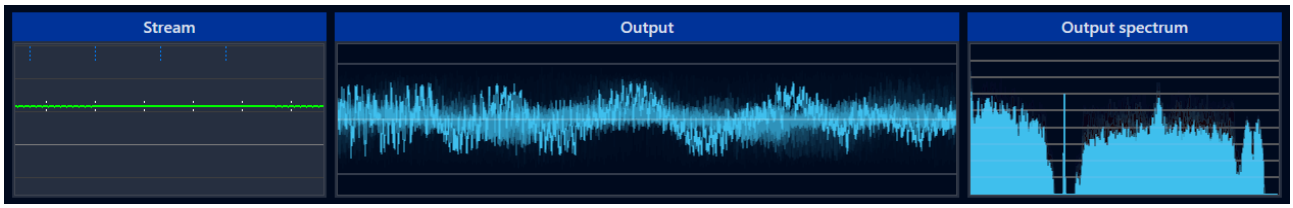
1. Use the Frequency slider for coarse adjustment.

Method 2 - Direct Entry

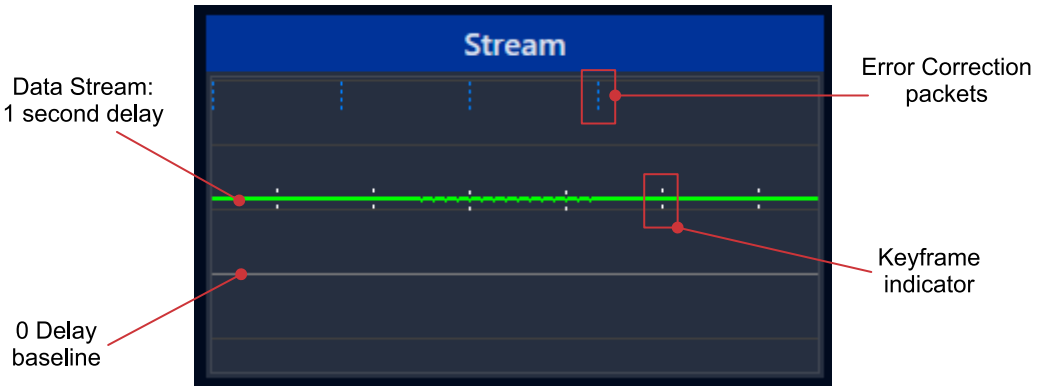
1. Click on the Frequency numeric field.
2. Enter the desired frequency value.
3. Confirm the entry.

The Test Signal may be turned On or Off via GPI control.

DECODER DASHBOARD



Stream Display



The Stream Display provides a visual health indication of the incoming MicroMPX data stream. Adjustments made in the Encoder's **Error Correction** settings directly influence this display.

The Stream Display contains the following visual indicators:

– Bold horizontal gray line - Represents **0 time delay**.

– Horizontal green line - Represents the **incoming data stream**. (Example: A display showing the green line above the zero reference may indicate 1 second of Decoder delay.)

– Short white vertical marks intersecting the green line - Represent **Keyframes**.

– Blue vertical lines - Represent **Error Correction packets**.

- The density of blue lines increases as Error Correction is increased at the Encoder.
- Higher levels of error correction require additional Decoder delay to allow proper buffering.

– Red vertical lines - Represent **lost packets** or **transmission errors**.

Packet Loss and Dropouts

Frequent red indicators may result in audible dropouts. If packet loss occurs regularly:

– Adjust Encoder Error Correction settings.

– Reduce the MicroMPX bitrate.

– Increase Decoder delay to improve buffering.

– Verify network stability and configuration.

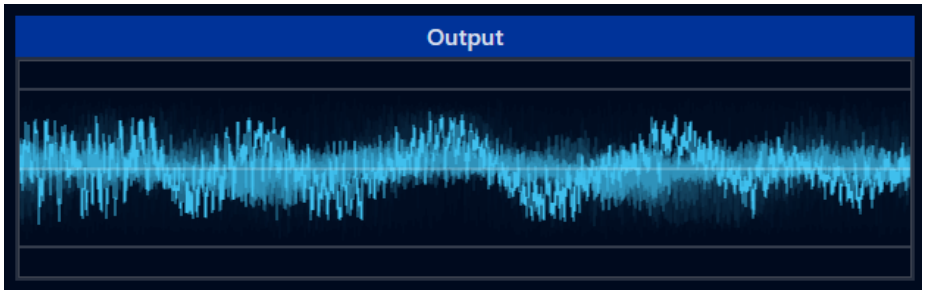
– Inspect:

- External network QoS settings
- Routers and switches
- ISP connection quality
- Other external network components

If persistent dropouts cannot be resolved:

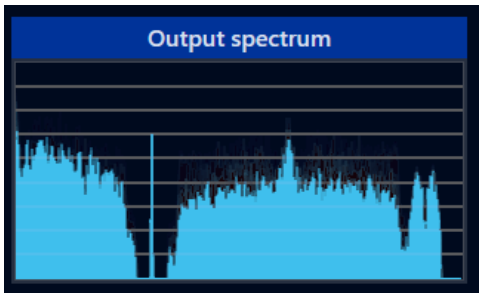
– Consider implementing redundant streams over two independent networks (see "Redundant Paths and Backup Scenarios" on page 35).

Waveform Display



The Waveform Display provides a real-time visual representation of the program signal.
– Silence, steady tones, and dense program material (e.g., music) are visually distinguishable.
– Useful for quick confirmation of signal presence and modulation activity.

MPX Display

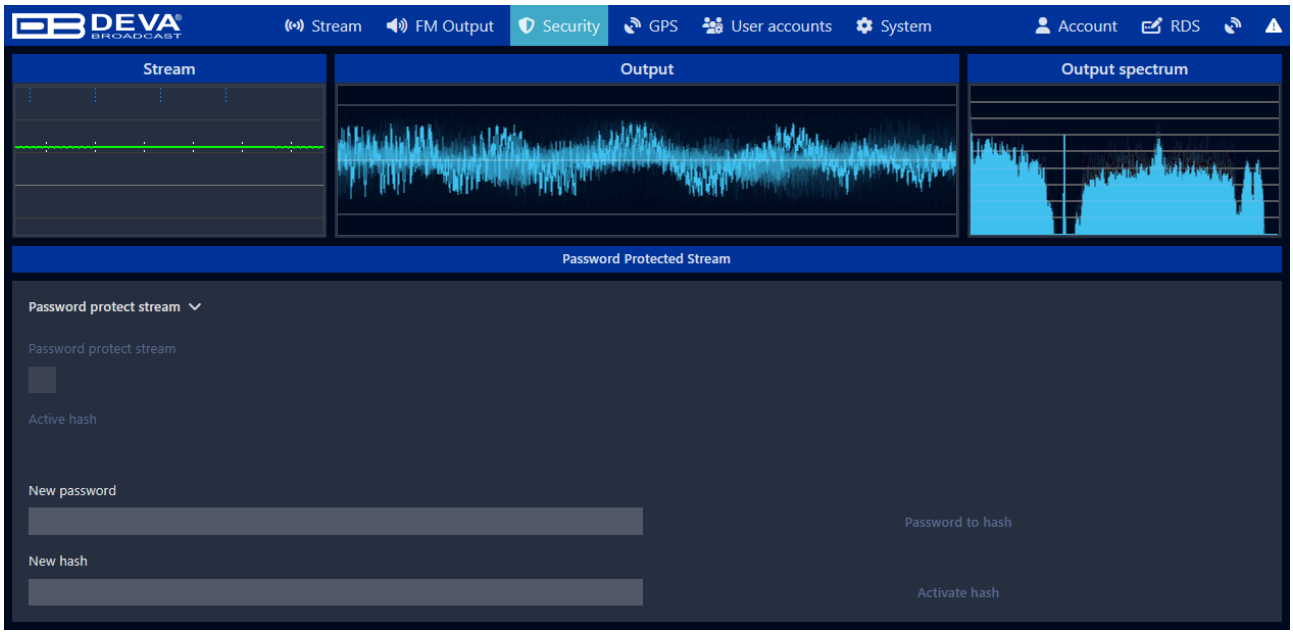


The MPX Display provides a composite-level view of the FM baseband signal, including:
– L+R (Main Audio)
– 19 kHz Stereo Pilot
– L-R (Stereo Difference Signal)
– RDS Subcarrier

IMPORTANT: The Waveform and MPX displays are captured before the MPX Output Level control.

Adjusting the MPX Output Level slider affects the signal sent to the transmitter, but does not change the graphical displays shown on the Dashboard.

SECURITY



Allows you to password protect the stream.

IMPORTANT: If you're streaming over a public internet connection and other people could potentially send data to the same IP:PORT combination, they could overrule your stream.

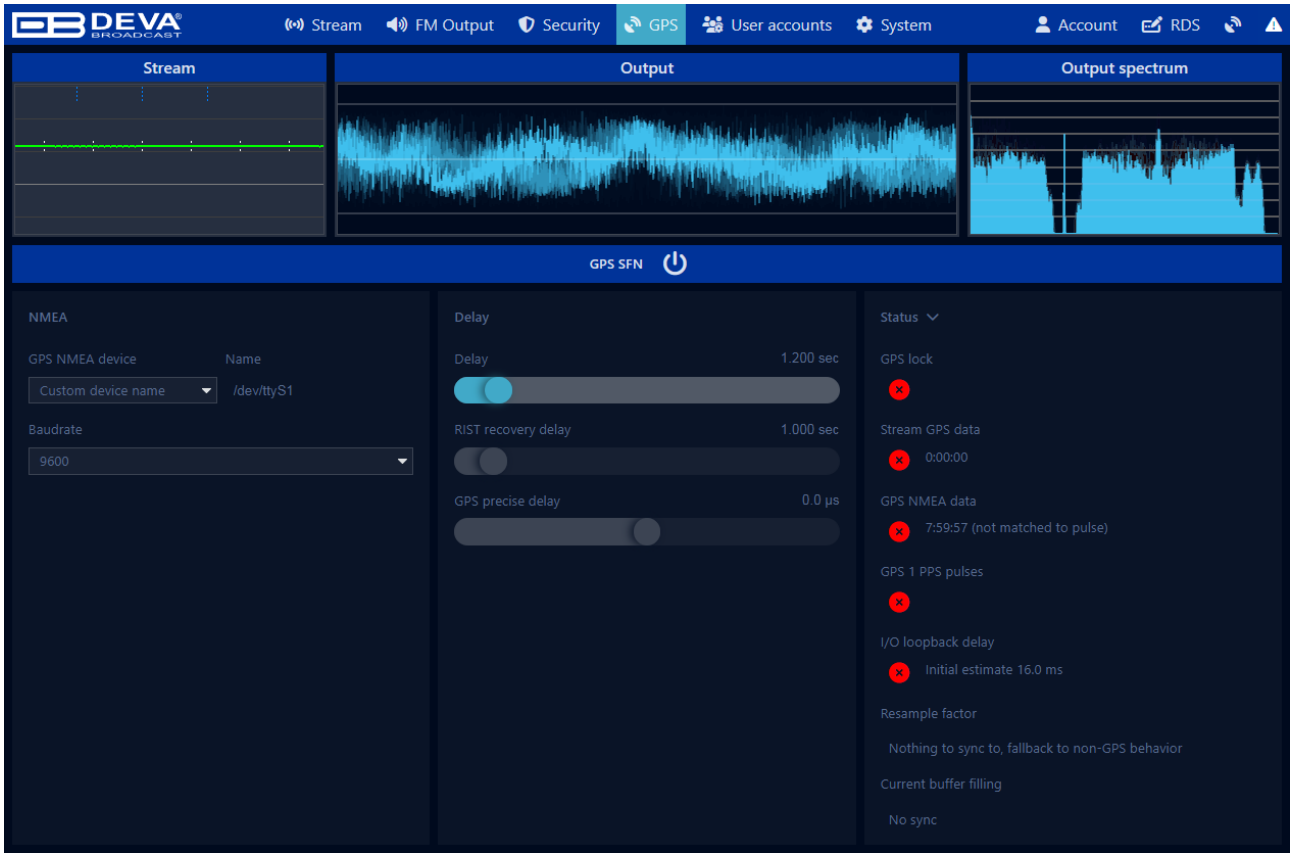
You can use a hashcode to protect against that. Only streams coming from an encoder which uses the same hashcode will decode as valid audio. A hashcode can be typed in directly, or generated from a "password". Note that if someone has access to the web interface, they can copy the hashcode and override your stream (but they could do that anyway if they have access).

The hashcode must be identical in the encoder and all the decoders, any mismatch will cause the decoder to go silent, and you'll get lots of error messages because the packages that arrive will be decoded incorrectly and contain garbage. So if you turn this on, it must be enabled in both the encoder and all the decoders.

You can either generate the hash from a password (which can be easy to remember, so you can type it in on all units and hit "Password to hash"), or you can copy the hash itself, which is probably more difficult to remember, but it also means that if you forget the password and you have a network of 200 decoders and you want to add one, you don't need to set a new password on the other 200 units.

GPS

APPLICABLE FOR THE DB94-SFN MODEL ONLY



MicroMPX will normally keep your decoders in sync within a few milliseconds, which is good enough for seemless RDS AF switching. But if you have a Single Frequency Network (multiple transmitters at the same frequency with overlapping reception areas) and you want to control exactly where the signals add up instead of interfere with each other, you need accurate timing. Typically, a precision of less than a microsecond is required (one millionth of a second).

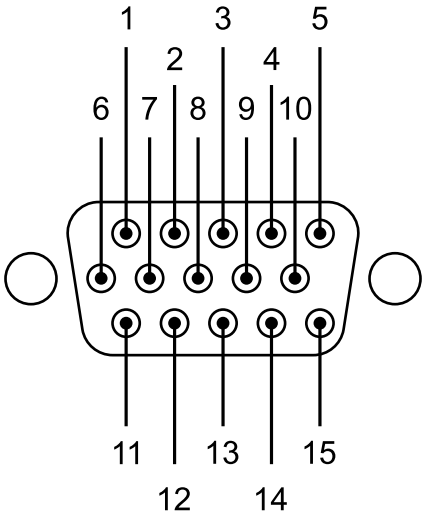
To do this, the MicroMPX encoder needs to add timestamps to the audio, and all the decoders need to precisely synchronize when they play the audio using a GPS clock.

For each decoder, you need a GPS receiver with PPS (Pulse Per Second), NMEA support.

Decoder

For the decoder, we sell a GPS receiver that is fully compatible with the DB94 series. Alternatively, you can use your own – the GPS receiver must be able to send NMEA data to a COM port and a 1PPS pulse signal to the DB94 device.

Connecting a third party GPS receiver



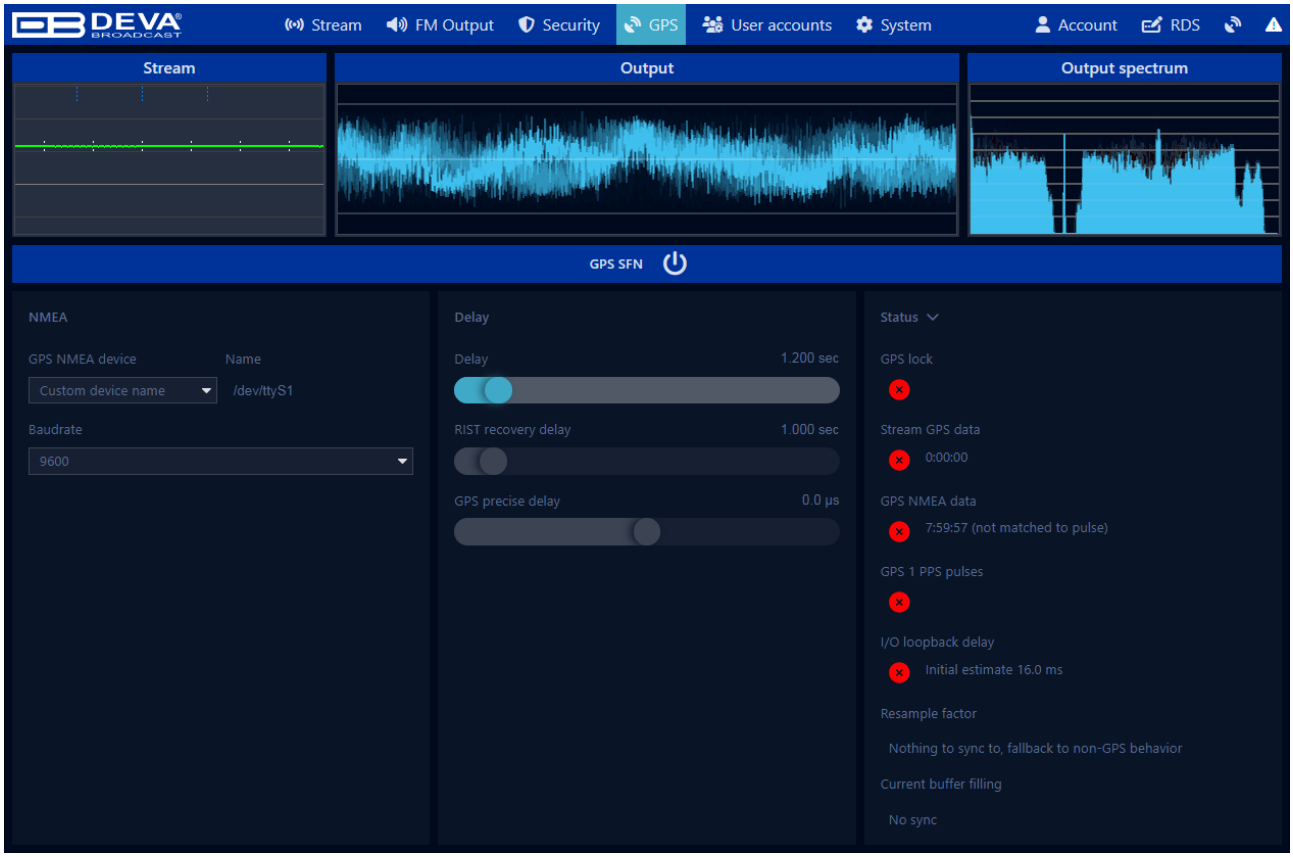
DB15 HD, Male

Pin	Function	Direction
1	GPI2	Opto isolated Input
2	**GPS RX**	**GPS Communication Output**
3	**5V GPS**	**GPS +5V, Fuse protected (0.5A)**
4	GPO3	Solid State Relay
5	GPO1	Solid State Relay
6	GPI3	Opto isolated Input
7	GPI1	Opto isolated Input
8	**GPS TX**	**GPS Communication Input**
9	**PPS IN**	**GPS PPS (Pulse Per Second) Input**
10	GPO2	Solid State Relay
11	GPICOM	Common GPO rail
12	GP5V	+5V (Out), Fuse protected (0.5A)
13	**GPS GND**	**GPS Ground**
14	GPGND	GPIO Ground
15	GPOCOM	Common GPO rail

5V GPS & **GPS GND** – power supply for the GPS module. **NOT TO BE USED FOR GPIO**.
GPS TX – Input - RS232 NMEA0183 serial communication with the GPS module.
GPS RX – Output - RS232 NMEA0183 serial communication c GPS module
PPS IN – Input - PPS (Pulse Per Second) signal from the GPS module

Connect the GPS receiver to the DB94-SFN. Then connect the DB94 with the GPS receiver cable provided with the DEVA GPS Receiver set.

Then, go to GPS in the decoder web interface and enable the SFN synchronization:



Initially, the GPS timestamps from the encoder, the timestamps of the GPS receiver on the decoder and the time (in samples) between 1PPS pulses will be displayed. If enabled, the I/O loopback delay will show an estimated delay time in milliseconds.

If the 1PPS pulses and loopback delay values don't appear after a few seconds or if they jump wildly, you may have swapped the left and right channels, so try swapping them. The right output channel (the one that contains the audio used for loopback delay measurements) sounds like a constant beep, so if you hear that where you expect your MPX signal, the output channels are probably swapped.

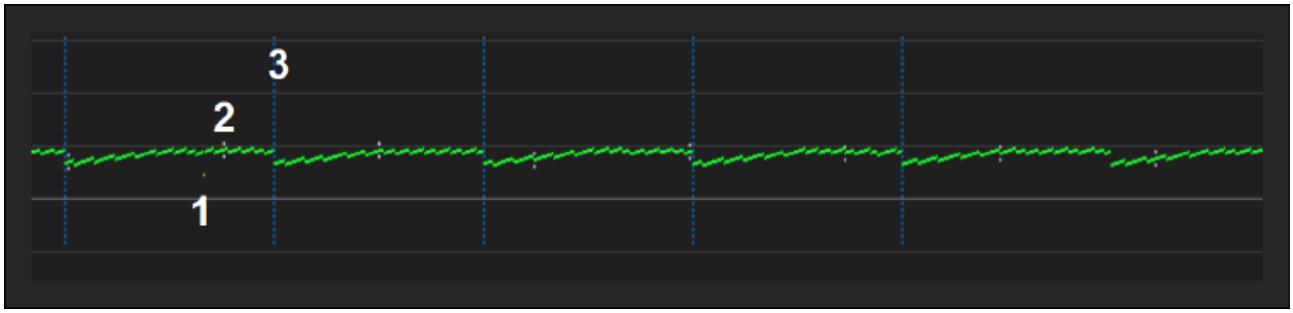
After about 30 seconds, the I/O loopback delay will light up and show an exact time (the measurment is accurate with a precision of 0.01 microseconds).

As soon as the GPS signal is recognized and synchronized to the signal from the encoder (so make sure that the encoder is sending GPS timestamps), the GPS lock icon will light up as it did in the encoder. As soon as that's the case, usually within 2 minutes, if you have multiple decoders that are configured identically and show a GPS lock, the audio is synchronized. The offset in the delays of the decoders should now be constant within about 0.5 microseconds.

To fine-tune where the signals interfere and where they boost each other, you can use the "GPS precise delay" slider. Make sure though that the main "Delay" slider is set to the same setting for all decoders.

Understanding the MicroMPX Decoder stream info display

The MicroMPX Decoder web interface has a display that shows a lot of information about incoming stream packets.



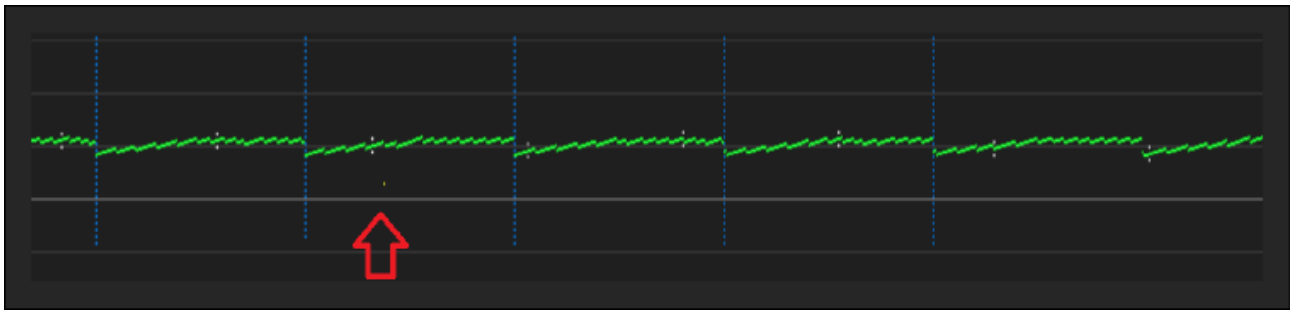
The green pixels indicate that a packet was received without issues. The distance between each green pixel and the brightest horizontal line indicates how much time was left when the packet was decoded, before a drop would have been caused. The thinner horizontal lines indicate seconds, so all the green packets here arrive between about 0.6 and 1.0 seconds before it's too late – which corresponds with a Delay setting of about 1 second.

Yellow pixels **(1)** indicate a packet that was restored using recovery packets (drawn in blue, **3**). In this case a single packet was lost, so as soon as the first recovery packet has arrived it could be reconstructed and decoded. At that point, based on where the yellow dot is drawn, about 0.4 seconds of time were remaining for decoding it in time.

As you can see here, after a sequence of blue (recovery) packets, the green pixels have a bigger delay, which is caused by the rate limiter: Because it takes some time to send all the recovery packets, the packets for the next block of audio are delayed a bit. Increasing the rate limiter maximum speed will reduce these drops – but as described before, increasing it too much may cause dropouts.

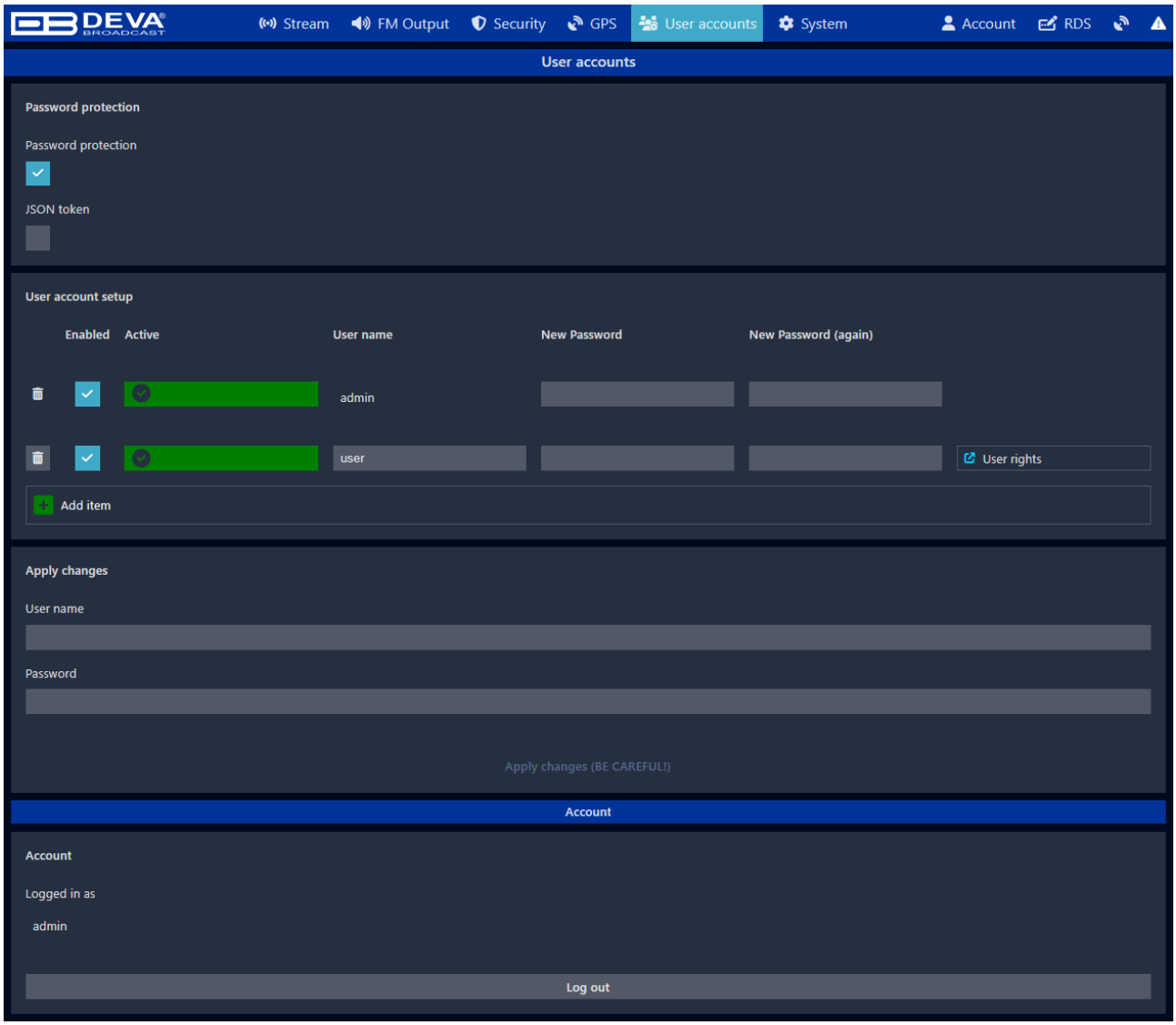
White pixels above and below the green line **(2)** indicate keyframes.

If the decoder plays silence, the background of this display (at that point in time) is colored red.



If you see occurrences like this, you can see that the yellow packet was recovered only just in time, and that could be a reason to increase the Delay a bit. Or reduce the forward error correction span setting.

USER ACCOUNTS



DB94 provides you with protected access to the device settings. You can choose between two types of log in.

as Administrator

– It will give you full control over the device's settings;

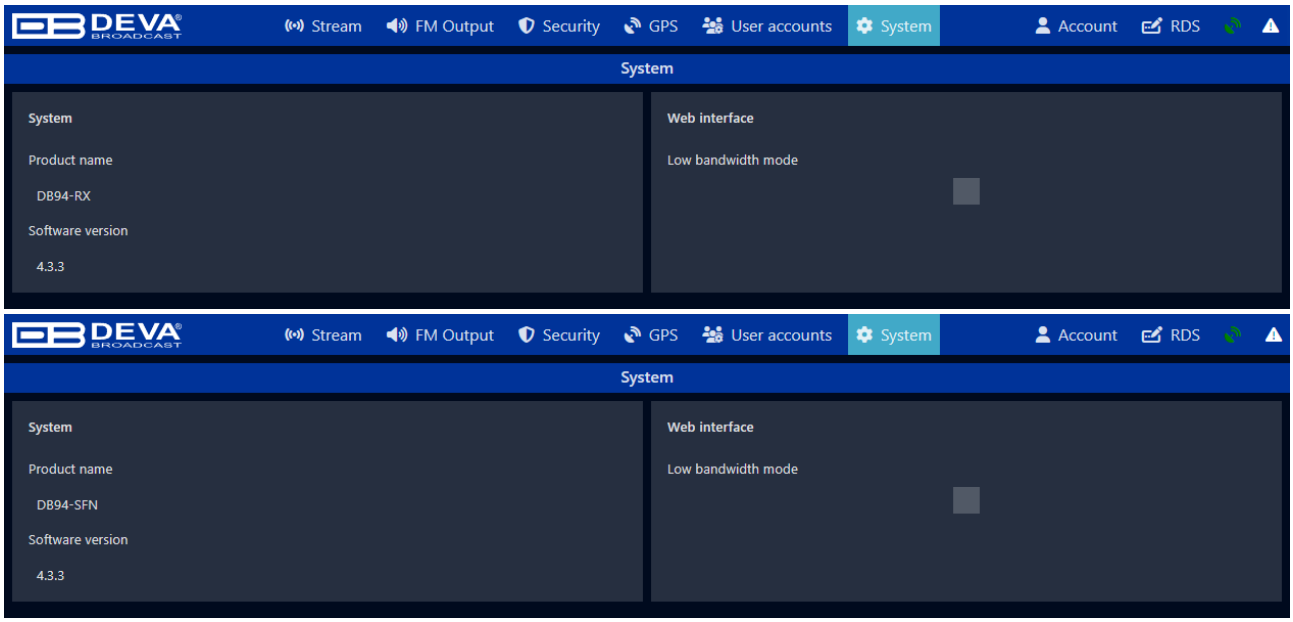
as User

– that will allow you to just monitor the device, while all the settings remain locked.

In order for the security of DB94 to be enhanced, new username and password could be set from the Security section.

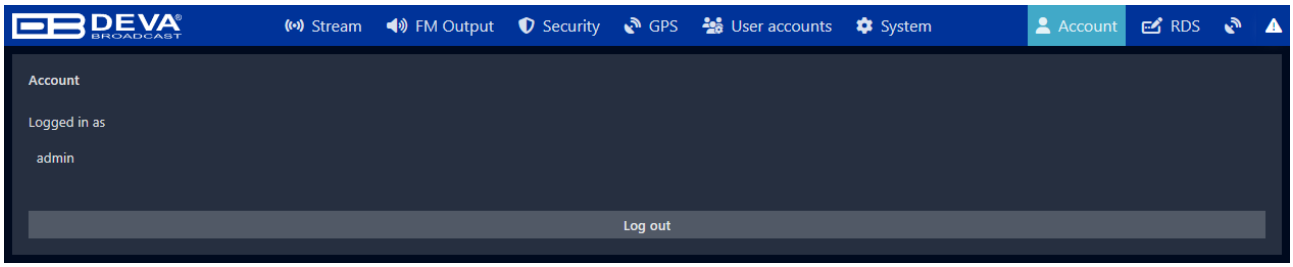
You can also generally disable the password protection option or select JSON token.

SYSTEM



The Status section provides general system information and operational data.

ACCOUNT



Information on the account with which you are logged-in.

RDS

Allows you to override the incoming RDS. Bear in mind that removing the RDS signal may lead to loss of loudness.

APPENDIX A - Possible problems and solutions

This section describes some issues that you might run into, plus and information on how to solve them.

PEAK CONTROL IS NOT PERFECT

Make sure that the input level and gain on the encoder are set such that peaks in the input signal reach exactly 0 dB (100%) on the waveform display. A warning will be shown if the level is too low. **NOTE** that setting it too high is bad as well, because values above 100% cannot be encoded, so the level must match exactly.

APPENDIX B - Recovery mode

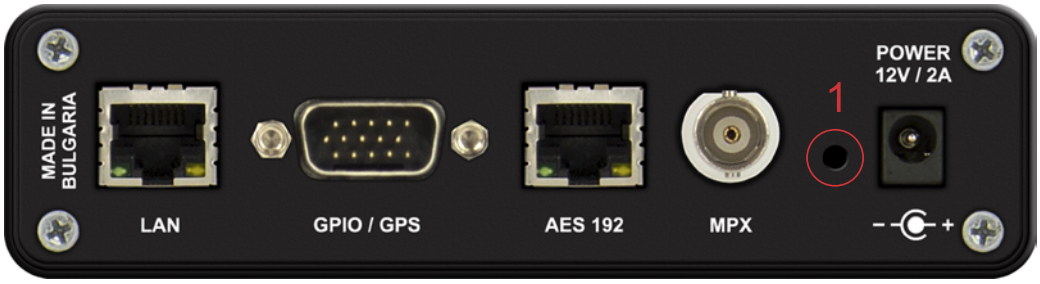
Recovery mode is designed to fix, update, or reinstall the DB94's core operating system when the main firmware is corrupted, in need of firmware update or malfunctioning (a "bricked" state). It allows re-flashing the device's firmware to restore normal operation.

In this mode, the device cannot perform normal tasks, but instead acts as a receiver for new, clean firmware files.

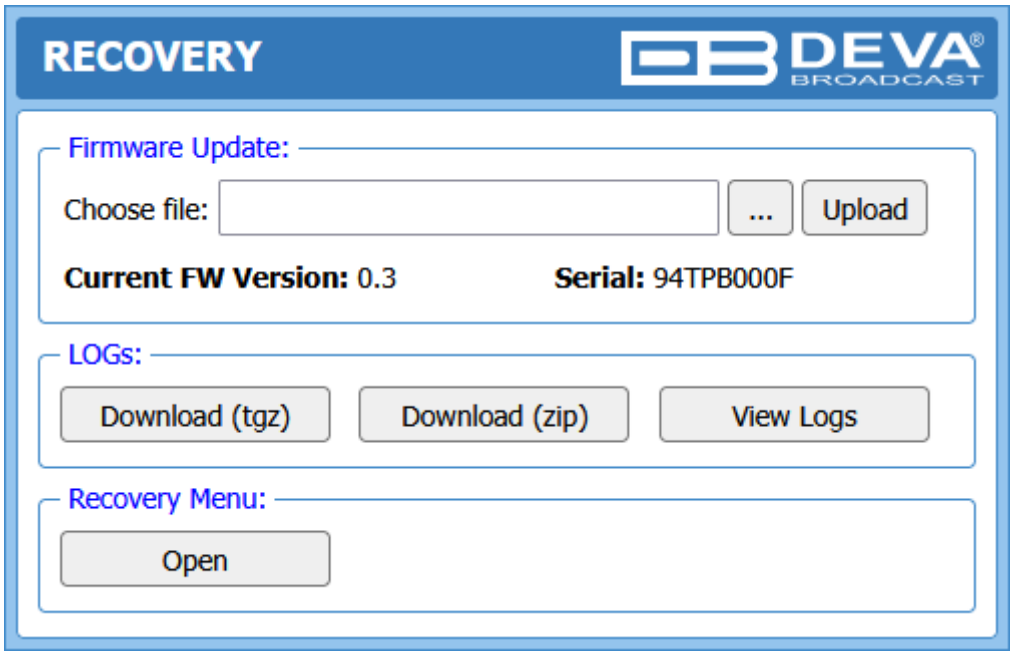
IMPORTANT: Using recovery mode to reinstall firmware may wipe all user settings and data from the device.

HOW TO ENTER RECOVERY MODE?

1. Locate the RESET button on Rear panel;



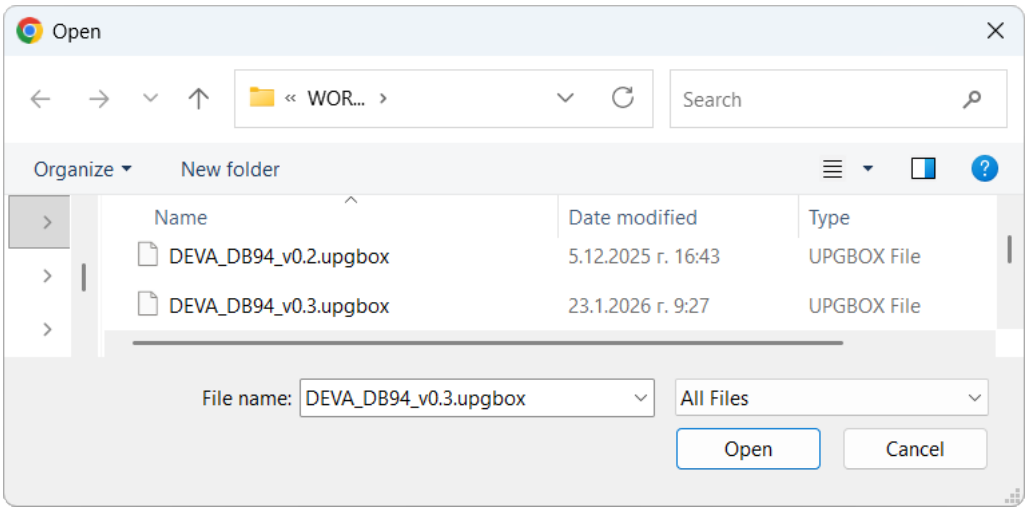
2. Press and hold the RESET button;
3. Keep pressing the RESET button and hold until the POWER and MEMORY LEDs blink 3 times alternately, then stop. This indicates that the device has entered RECOVERY mode;
4. Release the RESET button;
5. Allow 1 minute for the device to boot;
6. Open the devices RECOVERY WEB interface. For this purpose, you will need to know the DB94's IP address. If you are not aware of it, please use the DEVA Ethernet Setup Tool (see "DEVA Ethernet Setup Tool" on page 27).
7. A successful log-in will look as follows:



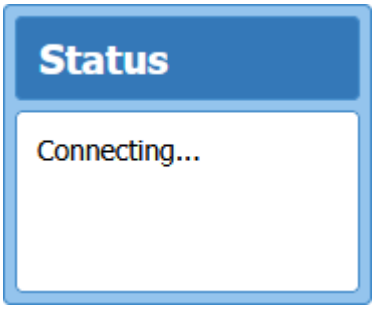
FIRMWARE UPDATE

The firmware update section allows users to verify the current firmware version, device serial number and installing updates.

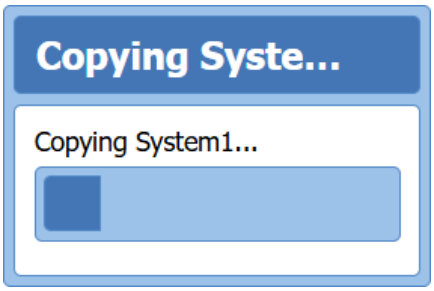
1. In section Firmware Update press [Choose file];
2. Select the **.upgbox** file to be used and press [Open]. The latest firmware is available for downloading at http://www.devabroadcast.com/downloads



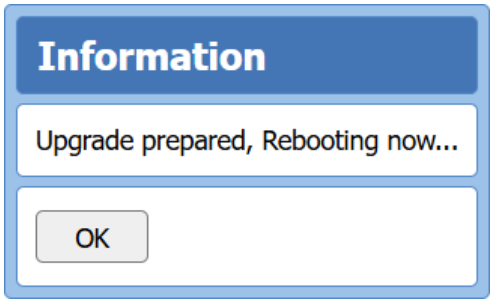
3. The following message indicating start of the process will appear:



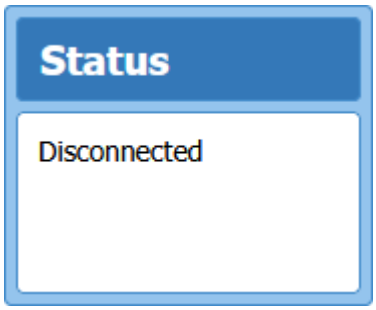
4. A message indicating “Copying of the system” will appear:



5. Once system file copying finishes, press [OK] when prompted to initiate the final installation phase:



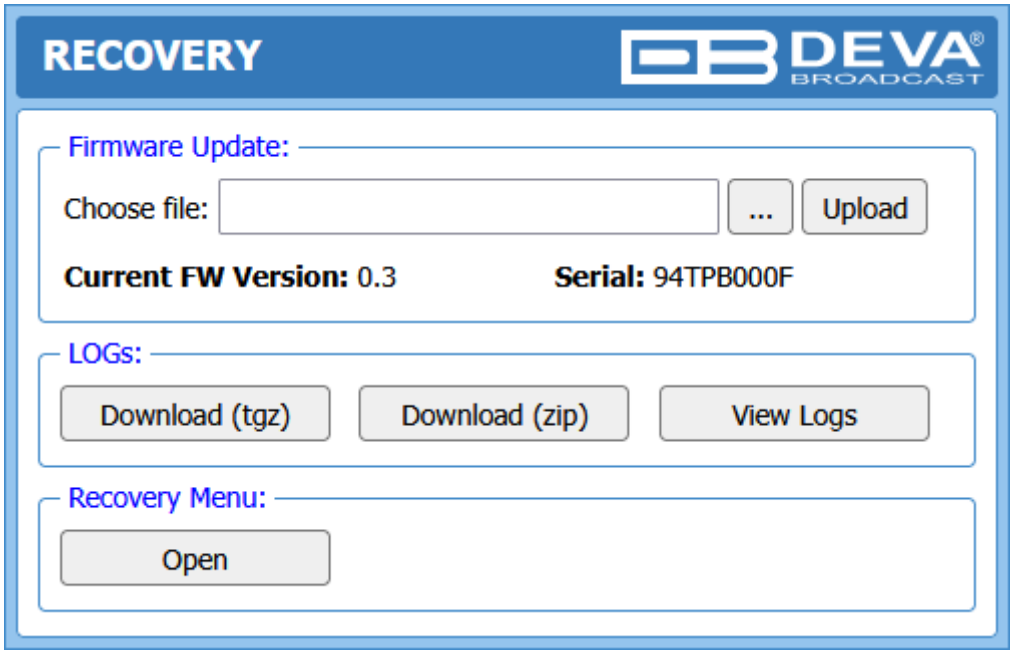
6. Upon Rebooting, the device will loose it's networ connection and you will need to reconnect to the WEB Interface manually.



7. The IP address of the device will be changed. You will need to use DEVA Ethernet Setup Tool (see "DEVA Ethernet Setup Tool" on page 27) to find the newly assigned IP.

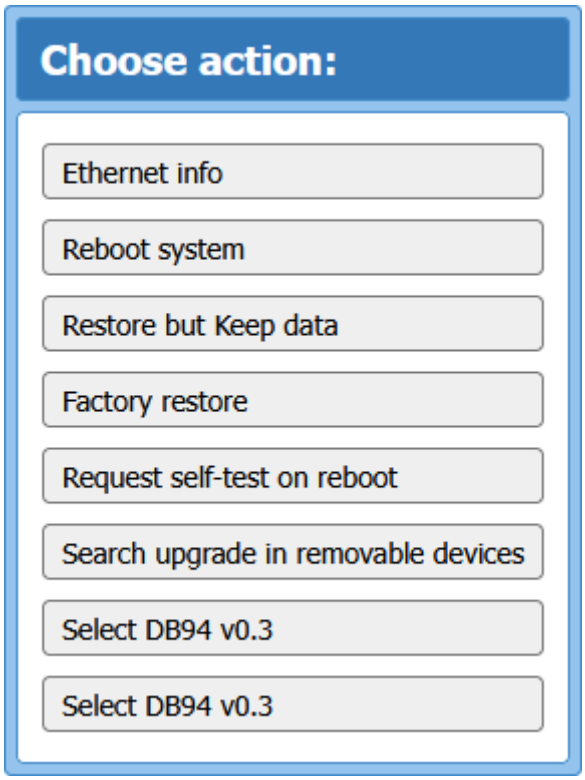
LOGs

The Recovery mode is also used for accessing, viewing, or downloading of the system logs.



RECOVERY MENU

Recovery menu is a built-in troubleshooting environment used to factory reset, reboot or update the firmware.



APPENDIX C

BATTERY REPLACEMENT PROCEDURE

IMPORTANT: Before starting the procedure, power off and disconnect the device. Perform the battery replacement on a static-resistant work surface and follow all applicable safety precautions.

REPLACEMENT

1. Using a suitable screwdriver, remove the bolts securing the back panel to the chassis.
2. Carefully pull out the back panel together with the motherboard. Handle the motherboard with care and avoid applying excessive force.
3. Locate the RTC battery socket on the motherboard.
4. Remove the depleted battery from the socket.
5. Insert a new **3V Lithium CR2032** battery into the battery socket. Ensure that the battery is correctly oriented and securely seated in the socket.

REASSEMBLY

1. Align both ends of the motherboard with their respective slots and carefully slide the motherboard into position simultaneously from both sides.
2. Make sure that the LED indicators are correctly aligned with their respective openings.
3. Reinstall the bolts securing the back panel to the chassis.
4. Using a suitable screwdriver, tighten the bolts securely. Do not overtighten.
5. Power on the device and set the correct time or wait for it to sync over the Internet.
6. Remove the power to the device and wait for a few seconds.
7. Power on the device again and verify that the time and date are displayed correctly.

VERIFICATION

If the time and date are retained correctly after the device is powered off and restarted, the RTC battery replacement has been completed successfully.

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

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 must be completed and returned to DEVA Broadcast Ltd. within 10 days of delivery. Product registration can also be done digitally at https://www.devabroadcast.com/members/product-registration, after registering on our website, 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 purchase 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 placing an RMA request at https://www.devabroadcast.com/rma. The number should be prominently marked on the outside of the shipping carton.

B. Equipment must be shipped prepaid to DEVA Broadcast Ltd. 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.

V. UPDATES TO THE TERMS OF SERVICE:

For the most up-to-date, valid, and accurate terms, conditions, and product documentation, please visit the official DEVA Broadcast Ltd. website downloads section at https://www.devabroadcast.com/downloads/deva-documents. Printed documents may not reflect recent amendments. Reviewing the current online versions ensures you have the latest information.

65 Aleksandar Stamboliyski Str., 8000 Bourgas, Bulgaria
Tel: +359 56 820027, Fax: +359 56 836700
E-mail: office@devabroadcast.com ,Web: www.devabroadcast.com

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.