R&S®MLx
Multichannel
Low-Power Transmitter
Flexible last-mile solution
for digital TV networks

ROHDE & SCHWARZ

R&S®MLx Multichannel Low-Power Transmitter

At a glance

The highly flexible R&S®MLx UHF multichannel low-power transmitter system addresses a wide range of applications. It combines transmitter, transposer, gap filler and retransmitter functionality in a single, extremely compact unit and makes low demands on the surrounding infrastructure. This provides network operators with a high degree of freedom in selecting suitable sites and keeps operating costs down.

The highly flexible R&S®MLx transmitter system accommodates up to six channel modules with different output powers in a five HU, 19" subrack. Operators can choose between three module types for each channel: transmitter, gap filler or retransmitter, with output powers of 1 W, 5 W and 10 W, for the DVB-T/DVB-H and DVB-T2 digital TV standards.

The R&S®MLx transmitter system allows the combined operation of channel modules of different types and output powers in any desired configuration. The modular design of the R&S®MLx makes it easy to expand and modify the system in order to adapt to varying operational requirements.

The transmitter system is an excellent solution to bridge the last mile in digital TV networks. With its low demands on broadcasting and IT infrastructures and minimal space requirements, the system is ideal for use in environments that do not provide a typical transmitter site infrastructure. The system can be enhanced to receive transport streams via satellite to make it perfectly match the conditions of a specific site.

The R&S®MLx transmitter system is easy to operate, failsafe and offers flexible redundancy. Plus, it is cost-effective to maintain due to its intelligent system behavior and the use of hot-plug modules.

Key facts
❙ Multitransmitter system for transmitters, gap fillers and retransmitters
❙ Cost-saving, compact solution for closing the last gaps in DVB-T and DVB-T2 broadcast networks
❙ Highly flexible system providing custom-tailored solutions
❙ MultiTX system with transmitters of different output powers in a single subrack
❙ Ideal for use in environments with limited infrastructure
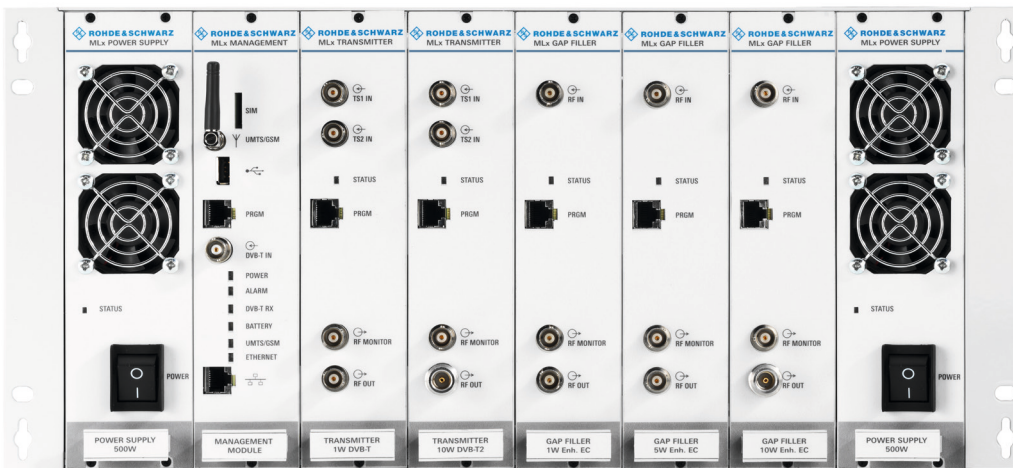
R&S®MLx Multichannel Low-Power Transmitter

Benefits and key features

A transmitter for challenging applications
- Highly flexible applications, even beyond typical transmitter site scenarios
- Transport stream feed via satellite

Outstanding system flexibility
- Modular system concept for optimum adaptation to user requirements
- Transmitters and gap fillers in a single product family
- MultiTX system – multiple transmitters with different output powers in a single rack
- Flexible redundancy concept: more than simply N+1

Easy to operate in any configuration
- Central control of all components
- Easy, efficient operation

Number of modules per R&S®MLx subrack					
Output power (RMS)	DVB-T transmitter	DVB-T2 transmitter	Gap filler	DVB-T retransmitter	Combination of different module types
1 W modules	max. 6 modules (independent of module type)				max. 6 modules
5 W modules	max. 6 modules (independent of module type)				max. 6 modules
10 W modules	max. 5 modules (independent of module type)				max. 5 modules
Combination of different output powers	max. 5 × 10 W (independent of module type)				max. 5 × 10 W
Supported standards	DVB-T/DVB-H	DVB-T2, DVB-T/DVB-H	DTMB, DVB-T2, DVB-T/DVB-H	DVB-T/DVB-H	(depends on each individual module)
Frequency band	UHF band IV/V				

A transmitter for challenging applications

Highly flexible applications, even beyond typical transmitter site scenarios

The R&S®MLx multichannel low-power transmitters are ideal for use at sites offering limited space and infrastructure. This is due to the transmitters' compact design, support for outdoor rack integration and high degree of independence from wired infrastructures. The transmitters open up new possibilities for installing multitransmitter systems at sites that would normally be unsuitable for broadcasting.

Its innovative design allows the R&S®MLx to be installed in a minimum of space. The transmitter system accommodates a power supply, a management module and up to six channel modules in a five HU, 19" subrack with a depth of 250 mm. All user interfaces are located on the front panel so that users do not have to access the rear side for control or maintenance. Further advantages are low dissipated heat and combined fan and convection cooling, eliminating the need for a costly air conditioning system.

The system's innovative design means less stringent requirements with respect to ambient conditions and infrastructures, opening up new applications. R&S®MLx transmitter systems can be installed in environments with shallow mounting depths that allow no direct access to the system rear. The R&S®MLx system can therefore be operated in extremely tight spaces, for example in very small telecommunications or IT rooms. The R&S®MLx can be installed in a standard 19" rack, a roadside cabinet or a wall-mounted rack.
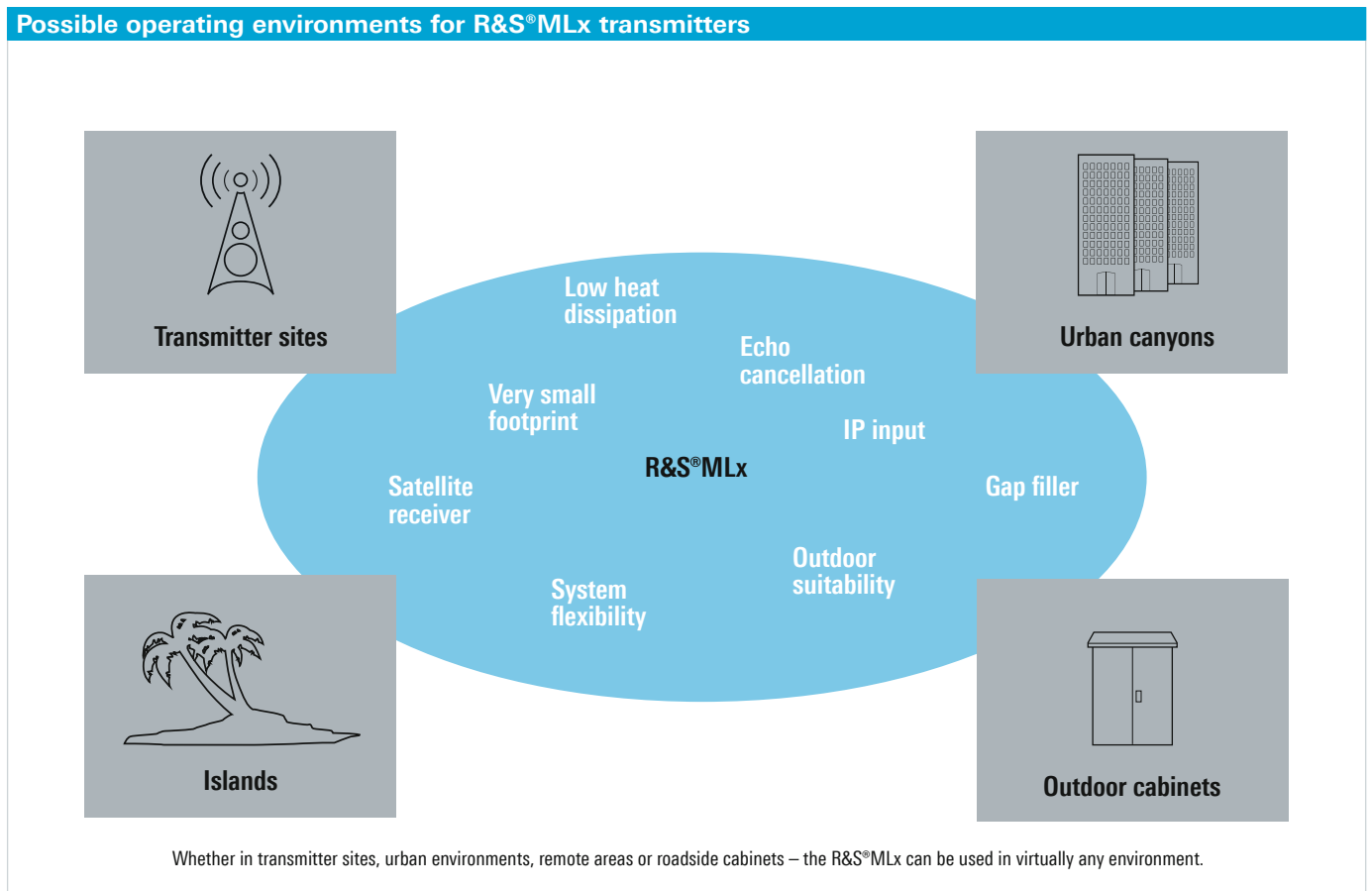

Extremely compact design allows installation in tight spaces.

Transport stream feed via satellite

To carry broadcast services to remote regions at reasonable cost, operators in the past often had to install RF rebroadcast systems such as retransmitters or gap fillers. These systems, however, rely on signals delivered by a master transmitter, which in some cases considerably restricts freedom in network planning. The problem can be solved by feeding digital transport streams via satellite. The R&S®MLx transmitter system with integrated DVB-S and DVB-S2 satellite receiver is largely independent of wired broadcast infrastructures. Cost-optimized solutions for transport stream feeding are possible without any compromise on signal quality – even if a large number of transmitter sites is involved.

The optional R&S®MLx satellite receiver module generates several MPEG-2 transport streams from the signal received from a DVB-S/DVB-S2 transponder and routes these streams via ASI interfaces to the R&S®MLx channel modules. The satellite receiver module contains a common interface (CI) for the reception of encrypted DVB-S/DVB-S2 data streams, which are decrypted using conditional access modules (CAM).

Possible operating environments for R&S®MLx transmitters

Transmitter sites

Urban canyons

Low heat dissipation

Echo cancellation

Very small footprint

IP input

R&S®MLx

Satellite receiver

Gap filler

Outdoor suitability

System flexibility

Islands

Outdoor cabinets

Whether in transmitter sites, urban environments, remote areas or roadside cabinets – the R&S®MLx can be used in virtually any environment.

Outstanding system flexibility

Modular system concept for optimum adaptation to user requirements

The R&S®MLx offers maximum flexibility and cost efficiency. Its modular design ensures low maintenance costs and lets operators enhance and upgrade the system as required for future modifications and expansions of their networks. Plus, the modular architecture makes a wide range of system configurations available to customers within short delivery times.

An R&S®MLx transmitter system consists of a 19" subrack that provides slots for up to eight different modules that are interconnected via the system's backplane. Two slots are reserved for the power supply and the management module. The remaining six slots can be used for channel modules or a redundant power supply.

Each channel module is a complete transmitter unit comprising an exciter and an amplifier. The modules are available as transmitters, gap fillers and retransmitters. Each variant can be equipped with a 1 W, 5 W or 10 W amplifier. The channel modules in a transmitter system function independently of one another, but they share the power supply and the management module.

Optional components include a DVB-S/DVB-S2 receiver and a GPS receiver, which are implemented as separate, 1 HU devices. The GPS receiver contains a GPS switching unit and offers slots for two redundant GPS receiver modules. One GPS receiver can supply up to eight R&S®MLx channel modules with 10 MHz and 1 pps reference signals.

Transmitters and gap fillers in a single product family

The R&S®MLx transmitter system is the perfect low-power solution for multifrequency networks (MFN) and single-frequency networks (SFN). The hot-plug channel modules can be configured independently of one another for optimum adaptation to the specifications of the individual digital channels. Transmitters and gap fillers are available for DVB-T, DVB-H or DVB-T2 MFNs and SFNs; retransmitters are currently available for DVB-T or DVB-H MFNs.

Wide range of system configurations for maximum flexibility.

Transmitter modules broadcast the digital signals fed via ASI, IP or DVB-S/DVB-S2. Gap filler and retransmitter modules amplify the digital terrestrial TV signals received over the air from a master transmitter and rebroadcast them into coverage gaps. With retransmitters, the focus is on high signal quality; gap fillers with their very short signal processing times are designed for use in SFNs.

Depending on the isolation between the transmit and the receive antenna and the topographical conditions on site, unwanted echoes occur which an SFN gap filler must be able to eliminate over a wide time and level range. The R&S®MLx features two-level echo cancellation for cost-optimized transmitter site planning.

Standard echo cancellation works well for moderate echo situations, eliminating echoes of up to +10 dB above the input level.

Enhanced echo cancellation is available for more critical echo scenarios – it can suppress echoes of up to +24 dB above the input level. With enhanced echo cancellation, echo analysis is performed within up to three detection windows with a width of 6 µs. The windows can be shifted along the time axis and the detection speed varied to optimally adapt to ambient conditions. In this way, even temporary reflections such as caused by wind turbines can be canceled.

Excellent echo cancellation even in difficult scenarios
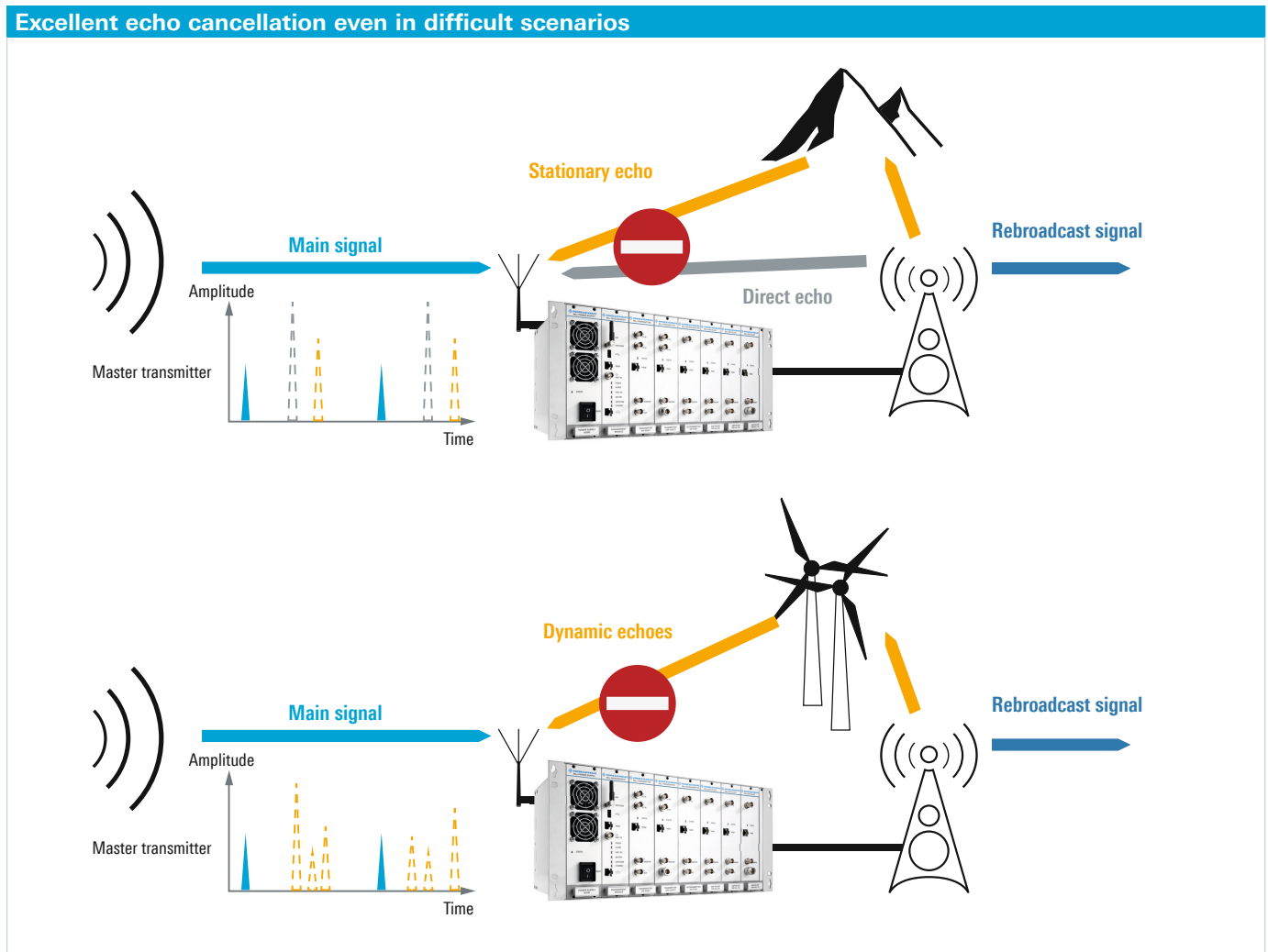
MultiTX system – multiple transmitters with different output powers in a single rack

The Rohde & Schwarz concept also covers the low-power segment. It opens up new levels of flexibility and scalability at moderate cost. Up to six transmitter, gap filler or retransmitter modules can be installed in one R&S®MLx subrack. Plus, up to three subracks can be combined to form a larger R&S®MLx system. The management module monitors and controls all channel modules in the system and reports their status to a central control station via a web interface or SNMP.

A MultiTX system can include any combination of channel module types, output powers and digital standards. This makes it possible to broadcast DVB-T and DVB-T2 services simultaneously using a single R&S®MLx system.

MultiTX systems can be expanded quickly and easily by adding further channel modules to accommodate varying requirements.

Flexible redundancy concept: more than simply N+1

The R&S®MLx saves costs without sacrificing reliability. It offers numerous N+1 configurations for transmitters and gap fillers and an optional, redundant power supply. For each R&S®MLx subrack, up to five active transmitters can be backed up by one standby transmitter in an N+1 configuration. In the event of a failure, the standby transmitter takes on the settings of the faulty transmitter and replaces the affected module. An R&S®MLx N+1 system with six HU takes up considerably less space than conventional low-power systems. This is a major advantage at locations where space is at a premium.
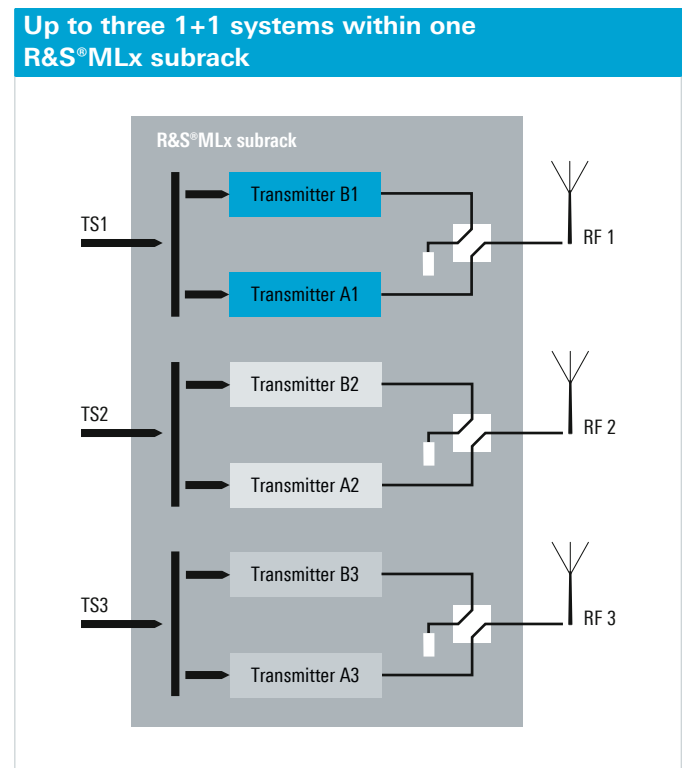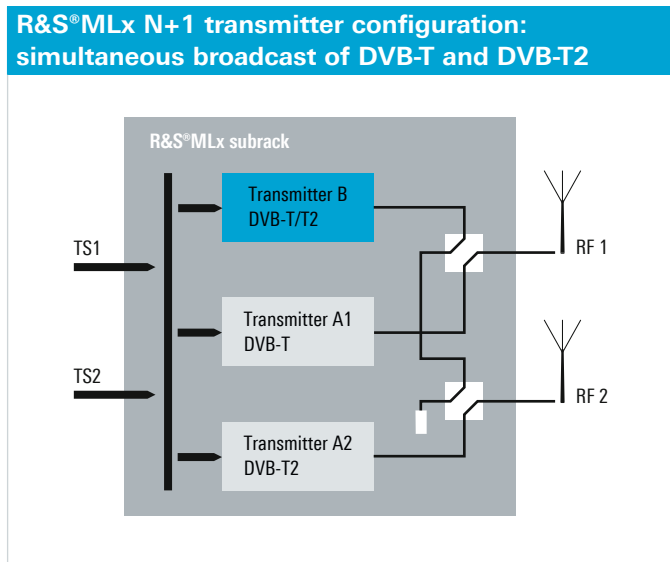
Flexible redundancy at its best: a 2+1 transmitter system combined with redundant power supplies and two independent gap fillers.
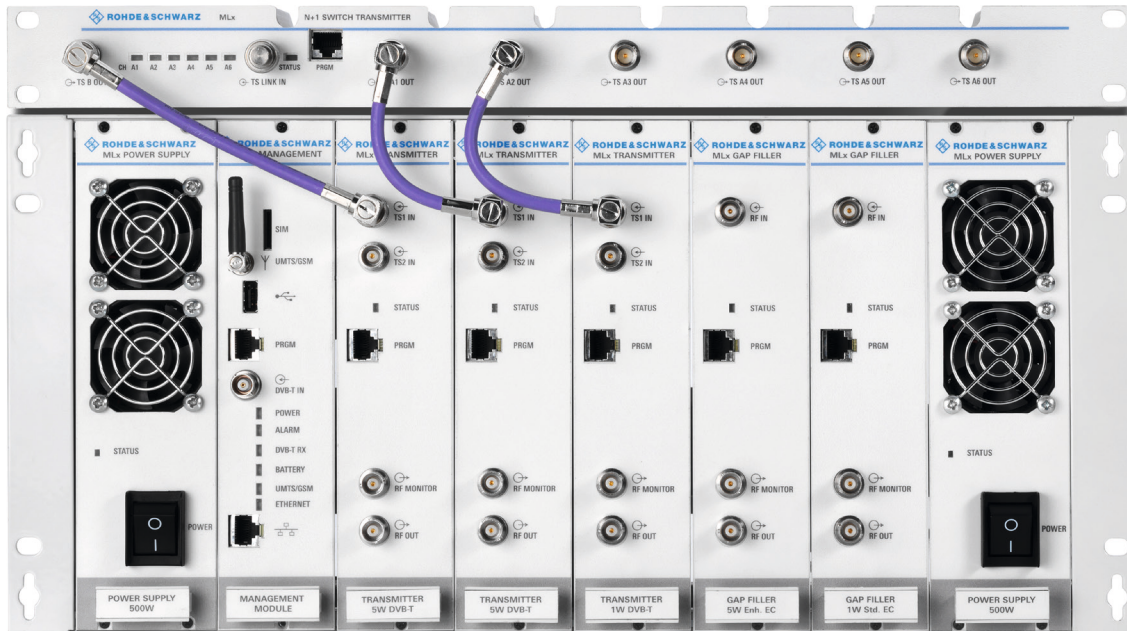
To configure an R&S®MLx multitransmitter system as an N+1 system, all that needs to be done is to add the appropriate N+1 switching unit and cable it. The N+1 switching unit comes as an extra, one HU device. It contains RF switches, plus transport stream switches for transmitter configurations and RF splitters for gap filler configurations. An N+1 system can be distributed over multiple R&S®MLx subracks and can include up to six active transmitters.

Network operators appreciate the high flexibility and the high degree of freedom afforded by the R&S®MLx system. The R&S®MLx makes it possible, for example, to simultaneously broadcast DVB-T/DVB-H and DVB-T2 signals in an N+1 transmitter configuration since the standby transmitter is immediately ready for use as a DVB-T/DVB-H and DVB-T2 transmitter. Moreover, multiple N+1 configurations, or N+1 combined with a MultiTX configuration, can be implemented in a single R&S®MLx subrack. For example, an R&S®MLx subrack can accommodate up to three 1+1 systems, or a 3+1 transmitter system together with two independent gap fillers.

The redundant power supply is another important feature that contributes toward the high availability of the R&S®MLx. During normal operation, each of the two power supplies delivers half of the supply current. If one power supply fails, the other one delivers the full current. This ensures interrupted power, for example in the event that a power supply or a phase in the supply network fails (in case the two power supplies are fed via different phases). The power supplies can be easily replaced during operation (hot swapping).

R&S®MLx N+1 transmitter configuration: simultaneous broadcast of DVB-T and DVB-T2

Up to three 1+1 systems within one R&S®MLx subrack

Easy to operate in any configuration

Central control of all components

The R&S®MLx is more than just a collection of transmitters in a single enclosure the individual components are integrated to form a transmitter system. This has distinct advantages during everyday operation; it facilitates access to the individual channel modules and provides overall system monitoring for all components under the control of a central management module.

Communications with an R&S®MLx system take place via the system's web interface or optionally via SNMP if the R&S®MLx is integrated into a network management system. Add-on devices such as N+1 switching units, GPS and satellite receivers are treated as integral parts of the system and controlled via the same interfaces.

Since all communications with an R&S®MLx transmitter system take place via its Ethernet port, the entire system can be configured and monitored using a single IP address. This places minimal demands on the surrounding IP infrastructure.

Easy, efficient operation

The R&S®MLx user interface has been designed with efficient operation and a low level of complexity in mind. This minimizes the time and effort needed to get familiarized with the system. A convenient web interface is available both for local and remote control. The straightforward interface makes system configuration easy and gives operators an instant overview of the system status regardless of their location. All components of an R&S®MLx multitransmitter system are displayed in a well-structured manner. By clicking a specific component, operators can directly access the associated parameters.

The implemented concept enables convenient remote system diagnosis and eliminates the need for visits to transmitter sites. In addition, each R&S®MLx channel module signals its current status via an LED, providing a quick overview of the system status without requiring any extra equipment or infrastructure.

Efficient operation:
Web interface displays status of all R&S®MLx system components at a glance.

Specifications in brief

General data		
Frequency range	UHF band IV/V	470 MHz to 862 MHz
Transmitter module		
Available standards		DVB-T2, DVB-T, DVB-H
Supported network types		MFN, SFN
Channel bandwidths		6/7/8 MHz
Inputs		2 × ASI (BNC 75 Ω)
	optionally	2 × IP (Ethernet)
Gap filler module		
Available standards		DVB-T2, DVB-T, DVB-H, DTMB
Supported network types		MFN, SFN
Channel bandwidths		8 MHz
Input		1 × RF (BNC 50 Ω)
Echo cancellation - standard echo cancellation	echo gain	+10 dB (max.)
	echo suppression	> 20 dB (below signal level)
Echo cancellation - enhanced echo cancellation	echo gain	+24 dB (max.)
	echo suppression	> 35 dB (below signal level)
Retransmitter module		
Available standards		DVB-T, DVB-H
Supported network type		MFN
Channel bandwidths		6/7/8 MHz
Input		1 × RF (BNC 50 Ω)
RF output connector		1 × BNC 50 Ω (for 1 W and 5 W modules), 1 × N 50 Ω (for 10 W modules)
Power supply		
Supply voltage		200 V to 260 V AC
AC supply frequency		50 Hz or 60 Hz
Environmental conditions		
Operating temperature range		+1°C to +45°C
Relative humidity (max.)		95%, noncondensing
Immunity		▪ to harmonic currents in line with EN 61000-3-2 ▪ to surges in line with EN 61000-4-5; < 1 kV (L-N), < 2 kV (L-PE) ▪ to voltage variations in line with EN 61000-4-11
Synchronization		
Reference frequency		10 MHz, −15 dBm to +10 dBm, BNC
Reference pulse		1 Hz, TTL (0 V to 5 V), BNC
Operation		
Local control		via web interface (Ethernet port)
Remote control		via web interface (Ethernet port)
	optionally	via SNMP (Ethernet port)
Dimensions	W × H × D	483 mm (19") × 222 mm (5 HU) × 250 mm (19 in × 8.7 in × 9.8 in)

To comply with the applicable standards and limit values for the suppression of out-of-band emissions (and in the case of digital standards, also for maintaining the required shoulder distance), the transmitter may only be operated with suitable filters at the RF output.

Ordering information

Your local Rohde & Schwarz expert will help you determine the optimum solution for your requirements.
To find your nearest Rohde & Schwarz representative, visit
www.sales.rohde-schwarz.com

About Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. Founded more than 80 years ago, this independent company has an extensive sales and service network and is present in more than 70 countries. The electronics group is among the world market leaders in its established business fields. The company is headquartered in Munich, Germany. It also has regional headquarters in Singapore and Columbia, Maryland, USA, to manage its operations in these regions.

Sustainable product design

▮ Environmental compatibility and eco-footprint
▮ Energy efficiency and low emissions
▮ Longevity and optimized total cost of ownership

Certified Quality Management
ISO 9001

Certified Environmental Management
ISO 14001

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