

# R&S®TMU9 family of TV transmitters: minimum operating costs – maximum flexibility

Small footprint, short delivery times, low operating costs and maximum availability – these are the qualities most valued by network operators for transmitters used in terrestrial broadcast networks. And all of these qualities are offered by the R&S®Tx9 generation of transmitters, which has now been expanded to include the R&S®TMU9 air-cooled transmitters with power classes between 300 W and 2.85 kW.

## MultiTX – winning strategy against insufficient space and high rent costs

Lack of space and rising rent costs – problems every network operator knows. Additional multiplexers are frequently needed at transmitter sites that are already short on space. Not to mention the additional rent costs to open up space for more transmitter racks. These serious problems for operators were the focus behind the development of the new R&S®TMU9 family of UHF transmitters for power levels between 300 W and 2.85 kW. The MultiTX concept makes it possible to integrate up to six transmitters into one rack and achieve space savings of up to 80 % compared to the previous space requirements (Fig. 1). Complete backup systems can be housed in a single transmitter rack, e.g. a 2+1 system

Fig. 2 The R&S®TMU9 can take on many different configurations: This picture shows R&S®TCE900 base units pulled from the rack. They can be configured either as exciters or as transmitter control units by changing the plug-in board.



with an output power of 1.14 kW, which allows users to save space and commissioning time. The R&S®TMU9 with output power levels of 1.14 kW is also available without a rack, allowing empty spots in existing racks to be filled.

## Modular and series produced – ready for any project and any timeline

Fixed schedules for commissioning transmitters are a daily fact of life for network operators. Series-produced transmitters help because they can be delivered fast. Yet it should be possible to configure them so flexibly, as if each were custom-made. A good example is the series-produced, completely modular R&S®TMU9. Its modularity allows more than 50 different configurations. This is easily seen in the cooling system: Many countries use ducted exhaust air systems, while in other countries the warm exhaust air is blown directly into the room and must be cooled there. The cooling system of the R&S®TMU9 can be adapted to meet local requirements. Its modularity makes it quick and easy to retrofit the transmitter to meet any new requirements in the future.

The R&S®TCE900 base unit is also modular: Depending on the plug-in board, it can function as either an exciter or as a transmitter control unit (Fig. 2). Boards can be added or swapped out at any time. If multiple transmitters from the new R&S®Tx9 generation are being used in a network, spare parts are easily and inexpensively procured thanks to the seamless compatibility of the R&S®TCE900.

## Doherty method – reduces operating costs by more than 40 % over the entire lifecycle

The current generations of transmitters from many manufacturers typically consume four to five times more energy than they output. The R&S®TMU9 improves on this statistic: With an efficiency of up to 38 %, it is the first air-cooled transmitter that can reduce energy costs by more than 40 %.

### Transmitter based on Doherty technology

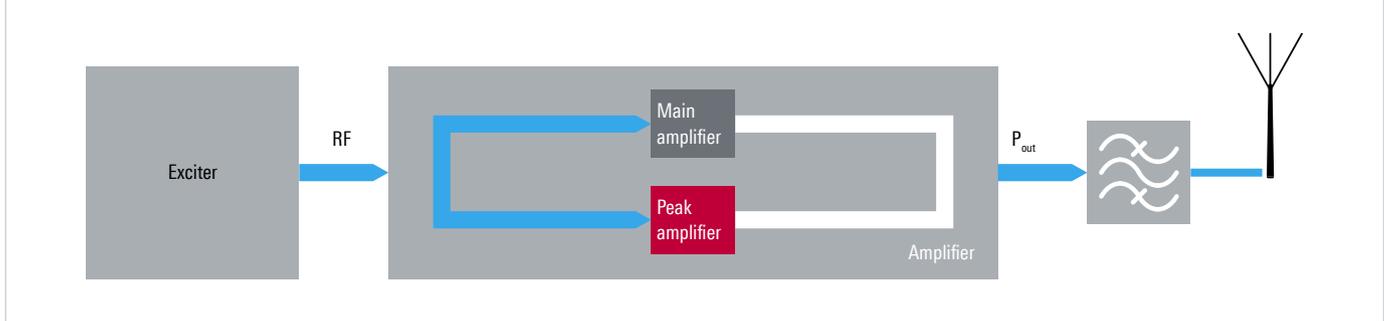


Fig. 3 The R&S<sup>®</sup>TMU9 uses Doherty technology, which allows it to achieve an efficiency of up to 38 %.

Doherty power amplifiers are the trick behind the efficiency. This Doherty technology is based on the findings of William H. Doherty in the 1930s. It has been used successfully in wireless communications for many years and helps to reduce energy costs. The basic principle involves splitting the signal amplification into two paths. One path amplifies the peak signals and the other – the main amplifier – amplifies the average signals (Fig. 3). This has the advantage that the main amplifier does not have to hold power in reserve for the peak signals. The peak amplifier is used only when power peaks actually occur. The result is energy savings in both amplifiers. Rohde&Schwarz has revolutionized Doherty technology with its R&S<sup>®</sup>TMU9. For the first time, the formerly narrow-band Doherty architecture has been implemented in broadband amplifiers. This simplifies spare part provisioning in large transmitter networks with many different frequencies by reducing the number of different amplifiers that need to be kept on hand.

#### Innovative redundancy concept for maximum availability

Contracts between network operators and broadcasting corporations regulate the costs incurred due to an interruption in the transmission or when the transmitter is not commissioned on schedule. The R&S<sup>®</sup>TMU9 provides relief with respect to the commissioning schedule. The transmitters are delivered prewired and just need to be slid into place – making on-time commissioning considerably easier. Their versatile operability is also an advantage: The transmitters can be operated locally via a laptop or using an optional touchscreen, or remotely via a web browser or SNMP.

Unstable power networks, air conditioning system failures or problems with signal feeds – the R&S<sup>®</sup>TMU9 provides a variety of options to meet these challenges. Redundant power supplies in the amplifiers protect against the failure of individual phases and of a complete power supply unit. Special solutions for exhaust air ducting allow the transmitter to be operated regardless of whether air conditioning is available. This increases availability and also reduces energy consumption. For more stringent availability requirements, sophisticated redundancy concepts are offered, e.g. dual drive, backup drive or N+1 systems.

#### R&S<sup>®</sup>TMU9: presented in September – on air and winning awards by December

In September 2012, the R&S<sup>®</sup>TMU9 was presented to the technical audience at the IBC, which is held every year in Amsterdam. Only two months later, the first two transmitters went on air. Their high efficiency and compact design was enough to convince Onecast (a Bouygues company), one of the network operators belonging to the largest broadcaster in France, TF1. Onecast ordered the two transmitters in a MultiTX configuration with Doherty technology and ducted exhaust air. The project also included ten transmitters from the new R&S<sup>®</sup>THU9\* generation of high-power transmitters, also in MultiTX configuration and with Doherty technology. This project earned Onecast an award in the competition for responsible purchasing in the category “most economical and eco-friendly projects” within the Bouygues group of companies, awarded for the first time in December 2012.

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\* Efficiency redefined: the R&S<sup>®</sup>THU9 UHF high-power transmitters. NEWS (2011) No. 204, pp. 46–52.