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<p style="text-align: center;">General Conditions for DVB-T / DVB-H Fill-In Transmitters</p> <p style="text-align: center;">The following additionally apply: Technical Guideline No. 5/1.0 Part 1: General Conditions for Transmitter-related Devices and Systems, Part 2: Telecontrol Interface, Part 3: SNMP Interface, Technical Guideline No. 5/1.1 Stand-by Systems and the Technical Guideline 5/9.1 Requirements on Terrestrial DVB-T Transmitters</p>	

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Note:

This Technical Guideline 5/9.2 has been coordinated identically in terms of the text with T-Systems Media&Broadcast in most text sections and where it is published under the title “Technical Specification for DVB-T / DVB-H Fill-In Transmitters”. The defaults for the technical parameters match each other in both papers.

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1. General

The DVB-T/-H fill-in transmitters differ according to their **function** (device type) and **design** (mechanical structure and performance).

For this reason, in addition to requirements, which apply for all the devices, differences exist that relate to the design or function.

This document starts out by describing these different functions and designs.

In the subsequent sections, the generally valid requirements are first presented, indicating any deviations, where applicable, which are then followed by a description of the special requirements of the individual functions and designs.

In the following text, for the sake of simplicity, only DVB-T is written. The requirements / specifications do however also apply for DVB-H devices.

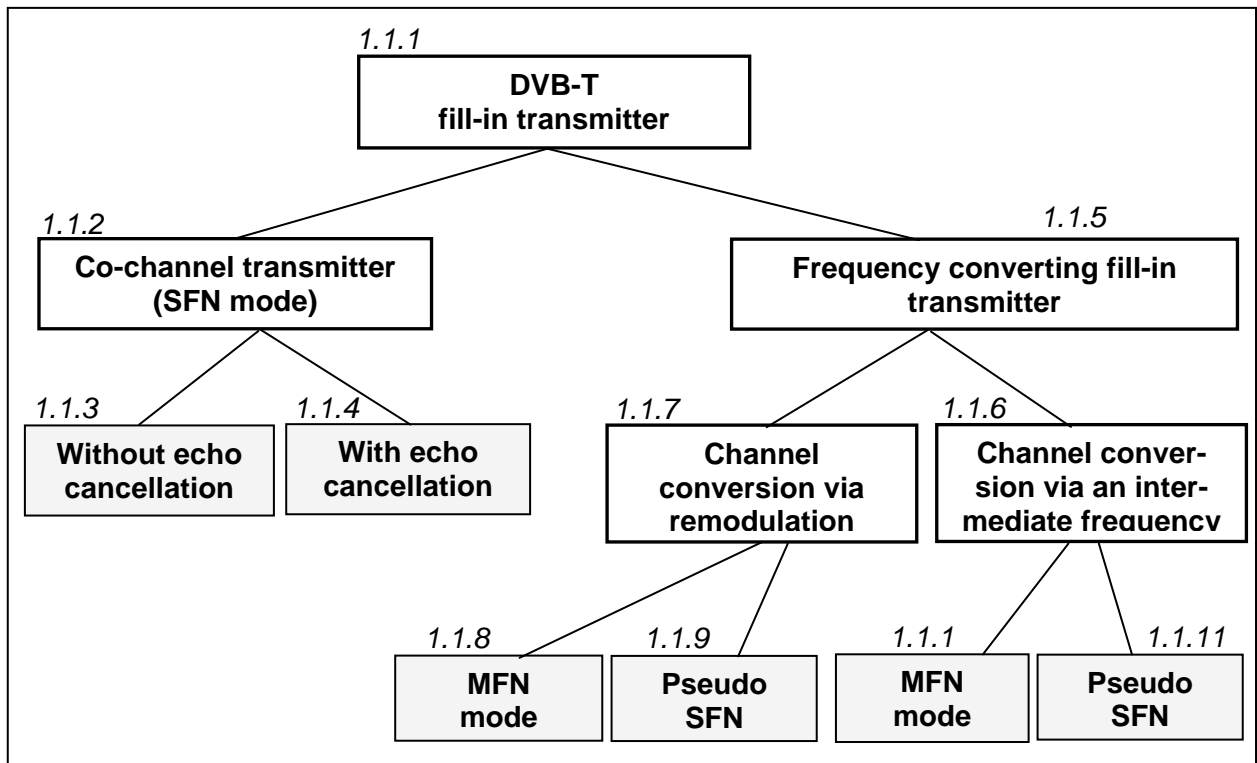
1.1. Description of the device types by function

DVB-T fill-in transmitters as defined by this Technical Specification / Technical Guideline are receivers and transmitters that are used for receiving DVB-T signal and for the standardised terrestrial emission of DVB-T signals as per ETSI EN 300 744. The bandwidth of the HF signal and the transport stream contents should not be modified during this process.

Frequency conversions between the UHF and VHF band are not permitted, since different bandwidths are used here.

Depending on the particular application (function), different types of devices exist.

The designations for the device types are not always clearly specified in the literature or by the manufacturers and, in some cases, differing names are used for the same devices. The following overview shows the possible device types (repeaters, transposers, gap fillers, converters).



Overview of the various DVB-T fill-in transmitter types (function)
 (The numberings relate to the subsequent description)

1.1.1. DVB-T fill-in transmitter

Generic term for all the device types. In the literature, the term “DVB-T Repeater” is sometimes used as the generic term for all the device types and also for co-channel devices only.

According to the interface description by the BNetzA ‘Federal Network Agency’ (draft version), the term “repeater” implies a co-channel fill-in transmitter.

1.1.2. Co-channel fill-in transmitter

This is also referred to as “co-channel repeater”, simply as “repeater” or as “gap filler”. The Federal Network Agency’s (*Bundesnetzagentur*, abbreviated to BNetzA) interface description [draft version] refers to this as a “repeater”.

It receives a DVB-T signal, which it filters, regulates and amplifies before emitting it again on the same frequency. As such, it is possible to deploy the co-channel fill-in transmitter in a single frequency network (SFN). However, the signal processing time must be very short ($\leq 10 \mu\text{s}$).

If only an oscillator is used for HF signal processing via an IF (intermediate frequency), it is possible to dispense with a reference frequency connection.

The advantage of co-channel fill-in transmitters is that they can be deployed in SFNs.

The drawback is their restriction in terms of the output power, since the system can oscillate due to feedback between the transmit and receive antenna.

1.1.3. Co-channel fill-in transmitter without echo cancellation

The signal fed back at the fill-in transmitter input must have a level that is at least 10 dB lower than the useful received signal.

Accordingly, with these devices, the maximum amplification at the operating site must be 10 dB lower than the feedback between the antennas (coupling between the device output and device input including cables, couplers, antenna gain and reflections). If, for example, the feedback between the device output and device input is 65 dB, the amplification of this co-channel fill-in transmitter must be a maximum of 55 dB.

1.1.4. Co-channel fill-in transmitter with echo cancellation

The signal fed back at the fill-in transmitter input can have a higher level than the useful received signal. On the basis of today's state of the art in technology, at least 10 dB is possible.

If, for example, the feedback between the device output and device input is 65 dB, the amplification of the co-channel fill-in transmitter is allowed to be a maximum of 75 dB.

1.1.5. Frequency-converting fill-in transmitters

These devices receive a DVB-T signal on one frequency and emit it again on a different one. In this regard, the conversion can ensue via an intermediate frequency or via the transport stream level (demodulation and modulation).

Note for the telecommunications carrier: Within the transport stream, the additional frequencies need to be entered in the Network Information Table (NIT).

1.1.6. Channel conversion via an intermediate frequency

The DVB-T signal is received, is mixed down into the intermediate frequency position, filtered, regulated, mixed up to a new frequency, amplified and emitted again.

The mixture frequency conditioning must be highly stable and, if necessary, a connection must be made to a frequency reference.

Since no oscillation can occur due to the antenna feedback as in the case of the co-channel fill-in transmitter, the output power is not limited.

This type of fill-in transmitter is referred to as a "transposer", sometimes also as a "repeater" or "relay". However, it is also referred to by the name of "gap filler", whilst in the BNetzA interface description [draft version], the term "converter" is used.

1.1.7. Channel conversion via remodulation

The DVB-T signal is received on one frequency and demodulated down to the transport stream level. This is followed by modulation and emission on a different frequency.

The advantage of these devices lies in the fact that the signal is regenerated.

These fill-in transmitters can be regarded as a transmitter that receives its modulation signal via a DVB-T receiver.

The BNetzA treats these devices as DVB-T transmitters!

1.1.8. Channel conversion via remodulation (MFN mode)

The DVB-T signal is received on one frequency and demodulated down to the transport stream level. This is followed by modulation and emission on a different frequency.

The processing time in the device is negligible, since the signal is transmitted on a new single frequency. The frequency stability must satisfy that of an MFN transmitter.

1.1.9. Channel conversion via remodulation (pseudo SFN mode)

The DVB-T signal is received on one frequency and demodulated down to transport stream level. This is followed by modulation and emission on a different frequency.

However, more than one of these fill-in transmitters that receive the same DVB-T signal can form a single frequency network on the same transmit frequency.

The DVB-T signal emission must ensue for all the devices at the same time and at a constant frequency (DVB-T SFN). For this reason, synchronisation to the transport stream of the incoming DVB-T signal or a GPS synchronisation is necessary.

Furthermore, the frequency stability of the device must correspond to that of an SFN transmitter (in other words, in 8 k mode, max. 1 Hz frequency deviation).

1.1.10. Channel conversion via an IF (MFN mode)

The DVB-T signal is received, mixed down into the intermediate frequency position, filtered, regulated, mixed up to the new frequency, amplified and emitted again.

The processing time in the device is negligible, since the signal is transmitted on a new single frequency. The frequency stability must satisfy that of an MFN transmitter.

1.1.11. Channel conversion via an IF (pseudo SFN mode)

The DVB-T signal is received, mixed down into the intermediate frequency position, filtered, regulated, mixed up to the new frequency, amplified and emitted again.

However, more than one of these fill-in transmitters that receive the same DVB-T signal can form a single frequency network on the same transmit frequency.

Furthermore, the frequency stability of the device must correspond to that of an SFN transmitter (in other words, in 8 k mode, max. 1 Hz frequency deviation).

1.2. Description of the device types by design

1.2.1. Devices for outdoor installation

These devices are accommodated inside a weather-proof housing and are intended for outdoor installation on antenna supports, house walls, railway stations, underpasses, etc. Since the devices are to be operated without requiring maintenance, the heat has to be removed via a convection cooling system; fans must not be used. Due to the design of these fill-in transmitters, the output power will only be a few watts (max. 10 W approx.).

1.2.2. Compact devices

Compact devices entail portable devices (19 inch plug-in modules or portable racks), which are intended for indoor installation. The devices can have a built-in fan, although a connection to an external ventilation or cooling system is not envisaged.

Depending on the design, the output power of these devices is limited to around 200 W.

1.2.3. Devices in rack-type design

These are fill-in transmitters with higher powers (not upwardly limited), and are comparable in terms of their design and function with DVB-T transmitters. External ventilation / cooling is possible here.

These devices are also governed by Technical Guideline 5/1.0, Part 1 Conditions for Transmitter-related Devices and Systems, General Conditions (ARD) and the TS 0152/96 Conditions for Transmitter-related Devices and Systems, General Requirements (T-Systems).

1.3. Basic functions of all the designs

Attention:

Important remark concerning the BNetzA interface description.

Please refer to section: 2.1 BNetzA interface description

1.3.1. Direct signal processing without IF or remodulation

This technical implementation will only be used for co-channel fill-in transmitters.

These devices filter a DVB-T signal out of the reception spectrum that is received via an antenna and transmitted from a master transmitter in order to release it from other undesired received signals, regulate and amplify it, and emit it again via a transmit antenna.

In this regard, the co-channel fill-in transmitter must not change the DVB-T signal either in terms of the spectrum or in the frequency.

Remark to "Do not change spectrum": This implies that the position of the useful carriers to each other is not changed. Needless to say, the level of the useful signal and spurious or outbound emissions will be changed after signal processing.

This device encompasses all modules that

- release the received signal from undesired signal components
- control the level
- amplify the filtered-out, regulated DVB-T signal to the required output power
- are necessary for observing the requirements as defined by the BNetzA interface descriptions (filter masks for HF output signal).

1.3.2. Signal processing via the intermediate frequency

These DVB-T fill-in transmitters filter a DVB-T signal out of the reception spectrum that is received via an antenna and transmitted from a master transmitter in order to release it from other undesired received signals, perform a conversion via an intermediate frequency level, regulate and amplify the signal and emit it again with the same or a different frequency via a transmit antenna.

In this regard, the co-channel fill-in transmitter must not change the DVB-T signal either in terms of the spectrum or in the frequency.

The frequency-converting fill-in transmitter must not change the spectrum of the signal.

Remark to “Do not change spectrum”: This implies that the position of the useful carriers to each other is not changed. Needless to say, the level of the useful signal and spurious or outbound emissions will be changed after signal processing.

A DVB-T fill-in transmitter converting via an IF encompasses all the modules that

- release the received signal from undesired signal components
- are used for generating the mixture frequency
- amplify the DVB-T received signal, if necessary, and mix it down into the IF level
- control the level
- mix up the DVB-T signal to the output frequency and amplify it to the required output power
- are necessary for observing the requirements as defined by the BNetzA interface descriptions (filter masks for HF output signal)
- are necessary for maintaining the frequency stability.

1.3.3. Conversion via the transport stream level

This entails a DVB-T receiver and DVB-T transmitter.

This DVB-T fill-in transmitter receives a DVB-T signal on one frequency, demodulates it down to the transport stream level, modulates and transmits the signal on a different frequency.

If it is possible to generate a pseudo SFN with the devices (more than one of these fill-in transmitters transmit on the same new frequency in the SFN), the devices can be synchronised via the received transport stream and by means of an additional synchroniser (built-in or external GPS receiver).

A remodulating DVB-T fill-in transmitter encompasses all the modules that

- receive the DVB-T signal and demodulate it to transport stream level
- convert the transport stream into a DVB-T signal in the HF frequency position
- amplify the signal to the required output power
- are necessary for observing the requirements as defined by the BNetzA interface descriptions (filter masks for HF output signal)
- are required for synchronising the frequency and, if necessary, the time.

1.4. GPS / reference connection

If a GPS frequency reference is necessary, an integrated GPS receiving device with an antenna has to be offered. The connecting cable to the GPS antenna must have a minimum length of 200 m.

In the case of compact devices and devices with a rack-type design, external synchronisation e.g. via a central GPS receiving station must be possible.

1.5. User control and service software / user manuals

Local operation and service via a PC / laptop must be possible via HTML format using a standard Internet browser.

The operating and service instructions for the fill-in transmitter is to be provided in German. The service documents along with the sixpacks for maintenance are to be supplied along with the necessary circuit diagrams.

1.6. Reset – user IDs, passwords, IP addresses

If, in order to operate the device, it is necessary to log in by means of user IDs and / or access is gained via a network connection, it must be ensured that it is possible to reset or retrieve any such IDs, passwords and addresses.

User IDs, passwords and IP addresses that are no longer known (forgotten) must be capable of being retrieved on the device by the service personnel or reset to a default value. This can be realised in the following way:

- Reset facility in / on the device by means of a switch or other procedure (concealed switch or accessible after opening the housing)
- Option for retrieving the values with a terminal program by means of direct RS232 connection (without addressing and password)
- Retrieve option on the display.

If, after resetting the device, it is necessary to reload the software or settings (firmware, calibration settings or similar), this must be possible for the service personnel to realise. The corresponding software on an external data carrier is supplied along with the device or must be capable of being backed up onto a data carrier. The procedure for doing this is to be described in the user manual.

1.7. Co-valid documents

This Technical Guideline is only valid in conjunction with the co-valid documents listed in appendix 1 in the version valid at the time of the contract being awarded, provided that the corresponding requirements for the fill-in transmitter apply.

The standards valid at the time of the contract being awarded (e.g. EN, IEC/DIN), the provisions of the VDE regulations and the CE conformity requirements, the respective legal safety requirements and the interface descriptions of the Federal Network Agency (BNetzA) are to be kept to.

In addition, special technical conditions can be contractually agreed when awarding the contract.

1.8. Additional general conditions

The transmit-sided high-frequency-related requirements of this Specification / Technical Guideline apply at the fill-in transmitter input and/or at the fill-in transmitter output. In this regard, a test load is to be connected to the output (refer to TS 0154/96 (T-Systems) and Technical Guideline No. 5/9.1 (ARD)).

The HF interface for connecting the antenna supply is defined as the input and/or output of the DVB-T fill-in transmitter. The fill-in transmitter input is located upstream from the input filter, the fill-in transmitter output is located downstream from the output channel bandpass filter, provided that filters are necessary in order to meet the admission requirements or for operating the device.

1.9. Liability on the part of subcontractors

If the contractor himself is not the manufacturer, he must make the subcontractor (manufacturer) liable for meeting all the technical and organisational requirements imposed by this Technical Specification.

If the subcontractor is changed by the general contractor, the customer's consent to do so must be obtained.

2. Technical requirements – all devices

2.1. BNetzA interface description

At the time of drafting this Specification / Technical Guideline, no BNetzA interface description existed for DVB-T fill-in transmitters (repeaters / converters).

In the case of direct signal processing or conversion via the intermediate frequency level, the masks of the DVB-T transmitters are to be used, whereby a residual amplification of adjacent channels is not to be technically prevented and is permissible. The interface description for DAB repeaters (SSB RU 08) provides guidance here.

Remodulating fill-in transmitters are to be regarded as DVB-T transmitters, since a transport stream is present at the input of the transmit section with these devices. The BNetzA interface description for DVB-T transmitters is taken into account here (SSB RU 05)

2.2. Rated power

The rated power is the maximum output power at which the required transmission properties are still fulfilled.

The rated power of the fill-in transmitter will vary depending on the particular design of the device. The following information provides a rough overview.

- Devices for outdoor installation: up to 10 W
- Compact design: up to 200 W
- Rack design: from 200 W

In the case of co-channel fill-in transmitters, the power is restricted on account of the feedback coupling between the antenna output and antenna input. The maximum transmit power and/or amplification depends on the radiation pattern of the antennas, the constructional aspects and the type of echo cancellation used.

2.3. Output power

The output power is taken as the effective power of all the carriers within the transmit channel measured at the output of the DVB-T fill-in transmitter. It is to be measured with a thermal output meter downstream from the output bandpass filter.

The output power is agreed on placing the order.

The output power must be capable of being reduced either continuously or in increments of ≤ 0.1 dB up to 6 dB below the rated power, without infringing the quality re-

quirements of this document. In this regard, rebalancing of the transmission properties (non-linear distortion) is permitted.

2.4. Frequency range

DVB-T fill-in transmitters are to be designed for the following frequency ranges:

VHF DVB-T devices:	Frequency range	174 MHz to 230 MHz
	Operating channels	5 to 12
	Channel bandwidth	7 MHz

UHF DVB-T devices:	Frequency range	470 MHz to 862 MHz
	Operating channels	21 to 69
	Channel bandwidth	8 MHz

The fill-in transmitter must be capable of being tuned within the frequency range with the aid of simple means. Excluded from this is the input / output filter (if required). The retuning instructions for the devices and filters are to be included in the scope of delivery.

Co-channel fill-in transmitters must be capable of being tuned to all the channels of the respective frequency band (UHF or VHF).

Frequency-converting fill-in transmitters must permit conversion within the frequency band between all the channels.

2.5. Frequency stability

Converting fill-in transmitters:

The deviation from the required frequency must not exceed the factor of 10^{-7} within the period of one year.

Co-channel fill-in transmitters and converting devices in pseudo SFN mode:

With these devices, the same frequency stability is to be maintained as that of the master transmitter.

2.6. Wave resistance

The impedance of all the HF inputs and outputs in addition to the HF measuring points should be 50 Ohm.

2.7. Matching / reflection interruption

In the event of a short circuit or no-load operation at the fill-in transmitter output or input, no damage should be sustained by the transmitter and/or the front end of the receiver.

Devices for outdoor installation and compact devices (lower powers)

The rated power must be capable of being output to a loaded impedance of 50 Ohm with a return loss of ≥ 18 dB (mismatching with any phase).

The fill-in transmitter must continue to operate in the event of a lower return loss up to 14 dB and block the RF power output at values of < 14 dB. Automatic restarting (e.g. after the antenna has iced-up) is to be ensured by repeated testing.

Devices in rack-type design (higher powers from 200 W)

The rating of the input and output impedance of the power amplifiers is 50 Ohm. The rated output power must be capable of being output to an impedance with a return loss of ≥ 18 dB. If the return loss deteriorates to values > 12 dB, it is permissible to re-adjust the output power up to 6 dB. In the case of further deterioration of the matching including no-load operation or a short circuit at the output, the fill-in transmitter switch off after three attempts at testing the power amplifiers. The fill-in transmitter must not be damaged in the process.

2.8. Input level – operating performance

In the case of input signals in the range of -60 dBm to -25 dBm, the fill-in transmitter must satisfy the requirements of this document.

Other channels within the frequency band must not cause any interference in the operating channel or HF spectrum. At the same time, the channel immediately adjacent must be capable of having a level at least 30 dB higher than the basic channel. This value must be even better for more remote channels.

If an input level is either missing or insufficient at the input of the fill-in transmitter, the HF output must be blocked (carrier block). This block must be lifted when the input signal either returns or is sufficient. This function must be capable of being disabled and the switching threshold must be adjustable.

In the event of fluctuations in the input power, the output power must be balanced out within the space of 1 second to ± 0.5 dB. It must be possible to switch over the gain control to manual mode. (This requirement does not apply remodulating devices).

2.9. Measuring points

Measuring points are to be provided for the RF input signal and for the RF output signal as well as for the oscillator frequencies. The coupling attenuation of the RF measuring points is to be specified.

In the case of remodulating fill-in transmitters, an additional measuring point must also be available for the transport stream.

In the case of fill-in transmitters that convert in the IF, an IF measuring point must be available.

In the case of a random termination of the measuring outputs, no disturbing feedback must be noticeable on the transmitter.

Note on fill-in transmitter with rack-type design:

The following forward and return measuring points are to be provided and must be readily accessible:

- Between the pre-stage and power amplifier (without return measurement)
- In the case of multiple power amplifier modules, a control output at each module (without return measurement)
- At the output of the power amplifier following the addition of the partial powers

- A precision measuring point at the output of the fill-in transmitter (incl. bandpass)
- For fill-in transmitters with full passive stand-by an additional measuring point in each case downstream from the RF two-way switch in the drop cable to the antenna and to the test load

The RF measuring points are to be designed in the form of directional coupler measuring points with the following parameters:

- Output level: -10 to +10 dBm, accuracy ± 1 dB
(RF precision measuring point ± 0.15 dB)
- Directional attenuation: ≥ 26 dB
- Intrinsic resistance: 50 Ohm
- Frequency response of amplitude: Constant progression of the coupling attenuation in the frequency range 30 MHz to 2700 MHz, within the operating channel of the DVB-T transmitter must not exceed the amplitude deviation by more than 0.05 dB/MHz.

2.10. Transmission quality

Direct signal processing and IF conversion

The influences of the properties of the DVB-T fill-in transmitter on the quality of the transmitted signal can be specified by means of a comparison of the C/N ratio between the input and output signal. The deterioration must be max. ≤ 1.0 dB (measurement, refer to ETSI TR 101 290, appendix E.13).

Remodulation

Remodulating fill-in transmitters are to be regarded as transmitters. For the transmit signal, the parameters from the requirement profile for terrestrial DVB-T transmitters (Technical Guideline 5/9.1) and the Specification for DVB-T transmitters (TS 0154/96) are to be kept to here.

2.11. Power supply, mains interruption

When changing the rated mains voltage 230V/400V in the range of +10% to -14%, the output power of the fill-in transmitter must not change by more than 10%.

In the case of a mains failure, all the set operating parameters must be stored in a fail-safe manner. When the mains power is restored, the fill-in transmitter must have resumed operation with the previously set values after a maximum delay of one minute.

Note on rack design fill-in transmitters:

The power supply of the control transmitter and the modules, which play an important role in restoring power to the fill-in transmitter, is to be routed separately to the system's main power supply (separate mains connection). One or a number of switches are to be integrated in the front, with which both power supplies can be disconnected from the mains.

Note for fill-in transmitters that require frequency and possibly time synchronisation:

Irrespective of the synchronisation method (GPS reception or synchronisation to the incoming transport stream with remodulation), the operation with the previously set values must have been resumed in a stable fashion after a maximum delay of 10 minutes.

3. Technical requirements – devices for outdoor installation

Fill-in transmitters that are commissioned for outdoor installation must keep to their technical parameters with regard to the climatic conditions that prevail in Central Europe (temperatures -25°C to $+45^{\circ}\text{C}$, direct exposure to sunlight, rain, snow, vibrations and shaking caused by wind load stressing). Cable connections are to be designed accordingly.

The devices must be designed to be maintenance free and, accordingly, the use of a fan is not permissible.

In the event of a service instance or a fault, it must be possible to operate the device at the place of installation (mast / wall) without dismantling the fastening mechanism, e.g. by opening a housing cover.

The HF connections for the transmit and receive antenna are to be optionally equipped with 7/16 or N-plug connectors.

4. Technical requirements – compact devices

Design:

- Non-portable devices should be mounted on rollers and have a sufficient number of handles for transporting these devices
- The device should be manufactured in a 19-inch design
- The maximum height should not exceed 2 m
- The installed depth should be kept as shallow as possible (due to the small converter cabins approx. 60 cm),
- The top side must be free to allow a further device to be attached above it, if necessary
- Plug-in modules and connectorized assemblies must incorporate facilities that allow them to be pulled out
- Plug-in modules and assemblies that have to be lifted by hand must not exceed a maximum weight of 30 kg
- Plug-in modules weighing over 15 kg are to be secured by means of a lock to prevent them from being pulled out completely. It must be possible to release this lock without any need for tools. These plug-in modules must indicate their weight in a visible location
- If cables are to be disconnected prior to pulling out such plug-in modules, a corresponding notice is to be attached in a visible location.

A central earth connection is to be provided (central earth screw).

The HF connections for the transmit and receive antenna are to be equipped with 7/16 plug connectors; N-connectors are possible as an option.

Control elements, displays, measuring points and fuses must be accessible from the front.

If a filter needs to be changed, corresponding notice must be provided. For normal operating conditions, the replacement interval should not be less than 12 months.

5. Technical requirements – rack design

For fill-in transmitters in a rack design, the corresponding / applicable requirements of the Technical Guideline DVB-T Transmitters apply.

6. Technical requirements – co-channel fill-in transmitters

The signal processing time in the device must, as a result of being used in the SFN, be considerably shorter than the duration of the guard interval, 10 μ s must not be exceeded.

In the case of co-channel fill-in transmitters, the system is to be prevented from oscillating without interrupting operation. Reducing the output power is permissible in this regard. The required output power must be re-adjusted automatically.

If an echo canceller is used, this must work continuously and without interrupting the useful signal.

7. Technical requirements – remodulating fill-in transmitters

Within the DVB-T channel, it must be possible to adjust the mid frequency within the transmit path by ± 250 kHz in increments of 1 Hz.

All the DVB-T and/or DVB-H input signals (MFN or SFN) must be detected and be capable of being emitted again with the same modulation parameters (modulation type, error protection, guard interval, mode, etc.). When changing the modulation parameters of the received transmitter, the fill-in transmitter must adjust automatically to the new values and emit the signals in accordance with the new parameters.

In the case of an insufficient input signal, the emission must be interrupted (carrier lock) and re-activated automatically once the signal returns. The switching threshold must be adjustable. Irrespective of the input level, the emission is to be interrupted if errors occur within the demodulated transport stream of the input signal and resumed when the transport stream is error free.

The value of the cell identifier in the TPS pilots must be passed through or be capable of being adjusted.

8. Operation check and user controls

Note on fill-in transmitters in rack design:

For these devices, the Specification / Guideline for DVB-T transmitters additionally applies. Remote monitoring is to be offered as an option.

8.1. User controls

It must be possible to control the device with regard to configuration settings and error detection by means of a keyboard and display or / via an interface to the computer.

Control and display units as well as connections for operation and test purposes must be accessible from the front.

In the case of devices intended for outdoor installation, the connection can also be located on the underside of the device or behind a cover.


Incorrect operation (settings via the keyboard, PC or remote control) must not cause damage to the fill-in transmitter.

8.2. Operation check

The input and output power of the device as well as the return power must be capable of being indicated via a display or interface to the computer.

Operation and error messages must be capable of being stored along with the date and time (at least 100 messages).

To permit the rapid detection of faults, the device must be equipped with at least 2 (green and red) better 3 indicating lights (not filament lights):

Green = Operati  **Yellow** = Warning  **Red** = Fault 

For devices designed to be installed outdoors, these can also be installed behind cover.

Devices for outdoor installation and low power:

The power indicator and fault storage facility can be omitted.

8.3. Remote monitoring

A remote monitoring facility is to be offered as an option for all the designs of the fill-in transmitters.

Devices for outdoor installation

Preferably a remote monitoring facility via GSM (Global System for Mobile Communications) is to be provided for these devices.

Compact devices

For the monitoring and remote control of the fill-in transmitter, a network management interface (TCP/IP, SNMP) is to be provided in accordance with TR 5/1.0 Part 3 and/or TS 0213/96.

In this regard, operating states that are set in "Local" mode, must not be automatically overwritten when switching back to "Remote".

Appendix 1 – Quoted and co-valid documents, sources of reference

Document No.	Title	Source
ETSI EN 300 744	Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television	[1]
ETSI TR 101 190	Digital Video Broadcasting (DVB); Implementation guidelines for DVB terrestrial services, Transmission aspects	[1]
ETSI TS 101 191	Digital Video Broadcasting (DVB); DVB mega.-frame for Single Frequency Network (SFN) synchronization	[1]
ETSI TR 101 290	Measurement guidelines for DVB systems	[1]
ETSI ETS 300 429	DVB, Framing structure, channel coding and modulation for cable systems	[1]
ISO/IEC 13818-1	MPEG-2 Specification for transport streams	[1]
RRC-06	Final Acts of the Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service ...	[1]
DIN EN 302 296	Corresponds to ETSI EN 302 296	[1]
ETSI EN 302 296	Electromagnetic compatibility and Radio spectrum Matters, Transmitting equipment for DVB-T	[1]
TR 5/1.0, Part 1	Conditions for transmitter-related devices and systems; general requirements	[2]
TR 5/1.0, Part 2	Telecontrol interface	[2]
TR 5/1.0, Part 3	SNMP interface	[2]
TR 5/1.1	Stand-by systems	[2]
TR 5/9.1	Requirement profile for terrestrial DVB-T transmitters	[2]
BNetzA SSB RU 005	Interface description for DVB-T transmitters	[3]

The versions valid at the time of the contract being awarded apply.

Reference sources / publishers:

Documents, particularly standards of foreign institutions, are mostly available in Germany from Beuth Verlag.

[1] Beuth Verlag GmbH
D-10772 Berlin

[2] IRT Institut für Rundfunktechnik GmbH
Floriansmühlstrasse 60
D-80939 Munich
<http://www.irt.de/richtlinien>

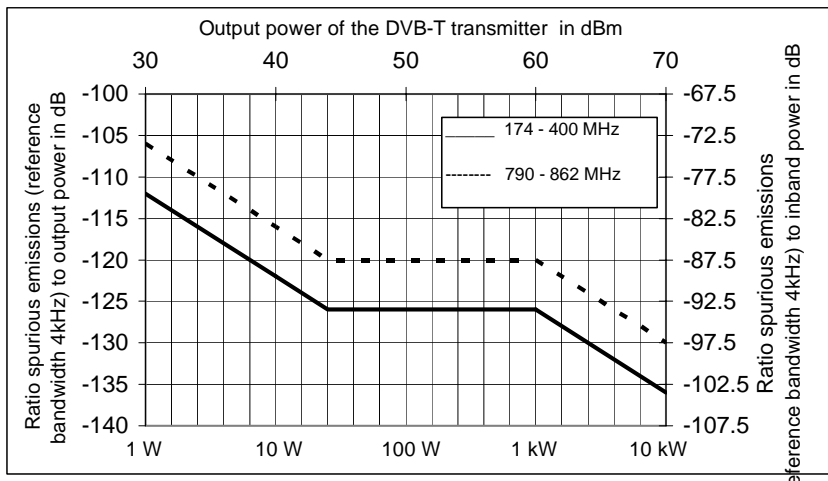
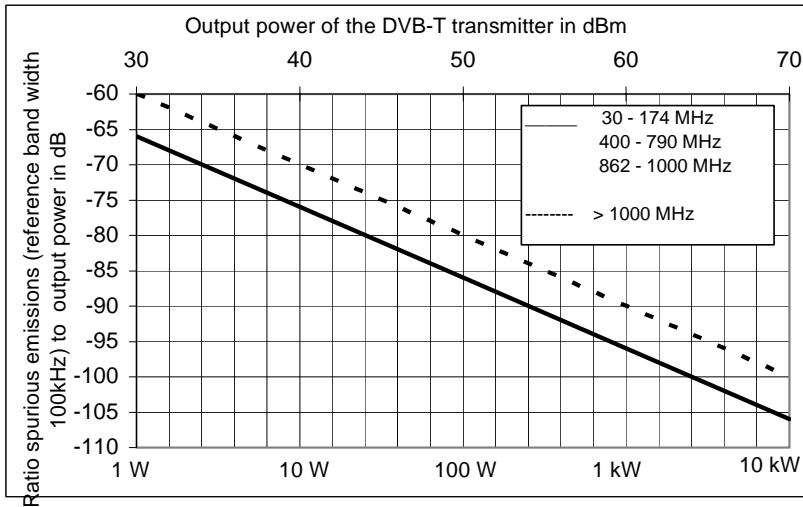
[3] Regulierungsbehörde für Telekommunikation und Post
<http://www.regtp.de>

Appendix 2 – Abbreviations and terms used

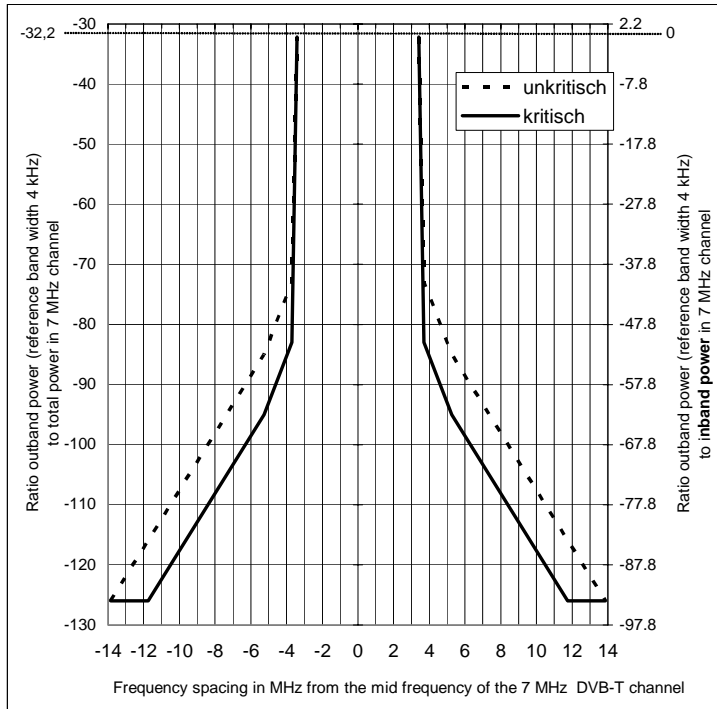
ASI	Asynchronous Serial Interface
BNC	Bayonet Nut Connector/Coupling, Bayonet Neill Concelman; plug connector 50 or 75 Ohm
BNetzA	<i>Bundesnetzagentur</i> , Federal Network Agency
C/N	Carrier-to-Noise-Ratio
CEPT	Conférence Européene des Administrations des Postes et des Télécommuni- cation
DVB	Digital Video Broadcasting
DVB-T	Digital Video Broadcasting Terrestrial
DVB-H	Digital Video Broadcasting - Handheld
EN	European Norm
END	Equivalent Noise Degradation
ETSI	European Telecommunications Standards Institute
FEC	Forward Error Correction
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HF	High Frequency
HTML	HyperText Markup Language
ICI	Intercarrier Interference
IF	Intermediate Frequency
IP	Internet Protocol
ITU	International Telecommunication Union
MFN	Multi Frequency Network
MIP	Mega-frame Initialization Packet
NIT	Network Information Table
OFDM	Orthogonal Frequency Division Multiplex
pps	Pulses per Second
BNetzA	<i>Bundesnetzagentur</i> (formerly RegTP) – Federal Network Agency
RF	Radio Frequency
SFN	Single Frequency Network
SSB	BNetzA Interface Description (formerly approval regulation)
TPS	Transmission Parameter Signalling
TS	Technical Specification
TS	Transport stream
UHF	Ultra High Frequency
VHF	Very High Frequency

Appendix 3 – Limit values of the spurious emissions

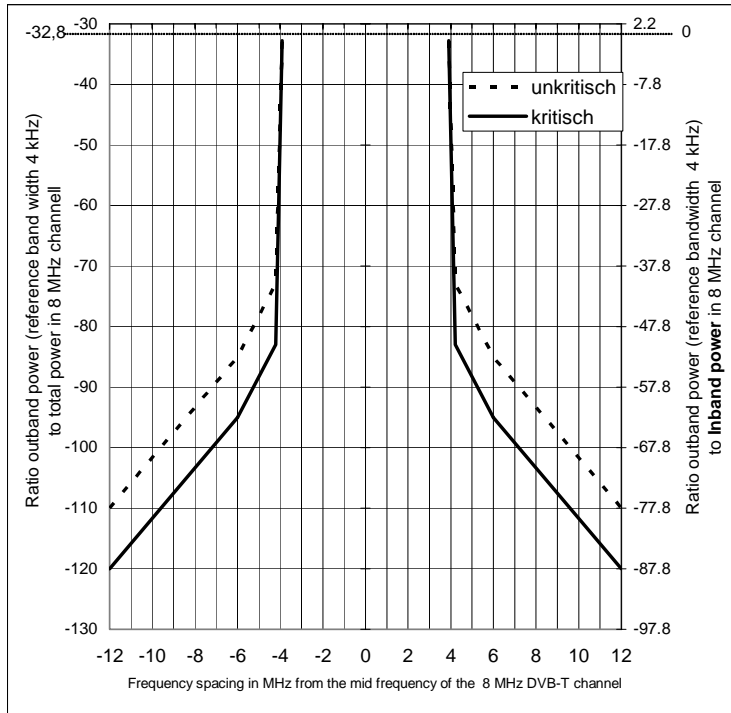
(according to RegTP SSB for DVB-T transmitters)



Appendix 4 – Limit values of the outband emissions 7 MHz channel (according to RegTP SSB for DVB-T transmitters)



Appendix 5 – Limit values of the outband emissions 8 MHz channel (according to RegTP SSB for DVB-T transmitters)



History

June 2004 – First draft for edition January 2005 (first edition)

January 2005 – First edition

April 2007 – Joint edition ARD / T-Systems

