



Rohde & Schwarz USA, Inc.
6821 Benjamin Franklin Drive Columbia, MD 21046-2633
Phone (410) 910-7800 Fax (410) 910-7801

May 9, 2019

STATE OF NEBRASKA
Department of Administrative Services
State Purchasing Bureau
1526 K Street
Suite 130
Lincoln, NE 68508

Attention: Julie Dabydeen
Contract Manager

Subject: Invitation to Bid

Reference: Solicitation #6079 OF

Rohde & Schwarz is pleased to respond to the State of Nebraska's Invitation to Bid. The attached quotation(s) details the discount, estimated delivery schedule and product(s). This response is valid through 7 July 2019, and consists of:

1. This Cover Letter / Transmittal Document;
2. State of Nebraska Invitation to Bid Forms (signed);
3. Quotations: #195229.0; #195291.0; and #195293.0;
4. Exceptions to Terms and Conditions;
5. R&S TMU9evo Air-Cooled UHF Transmitter Family Product Brochure;
6. R&S TMU9/R&S TMV9 Air-Cooled Transmitter Families Product Brochure; and
7. R&S TLU9 Low-Power UHF Transmitter and GapFiller Family.

The offered products are commercial off-the-shelf products, and are manufactured by Rohde & Schwarz.

Freight is FOB Destination CONUS. Rohde & Schwarz payment terms are net 30 days with approved credit from date of invoice. The attached quotation is issued in U.S. dollars, and includes a warranty period of twelve (12) months.

The Tax Identification Number for Rohde & Schwarz is 11-2485528; and R&S is registered with the System for Award Management (SAM) web site (formally Central Contractor's Registration or CCR).

Rohde & Schwarz, Inc. has completed our annual representations and certifications, and is registered with the ORCA. Please reference the Rohde & Schwarz DUNS number 095609798 to view the current representations and certifications.



ROHDE & SCHWARZ

Rohde & Schwarz USA, Inc.
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Phone (410) 910-7800 Fax (410) 910-7801

We appreciate the opportunity to be your supplier of choice for this solution. If you have any additional questions or concerns regarding this proposal, please contact Jennifer Engelhard, Contracts & Trade Compliance Supervisor, at Jen.Engelhard@rsa.rohde-schwarz.com, or (410) 910-7894; or Greg Martin, Account Manager, at Greg.Martin@rsa.rohde-schwarz.com, or (224) 653-8647.

Best regards, Jen

Jennifer Engelhard
Contracts & Trade Compliance Supervisor

Rohde & Schwarz USA, Inc.
6821 Benjamin Franklin Drive
Columbia, MD 21046
Phone: 410-910-7894 | Fax: 410-910-7801
Email: Jen.Engelhard@rsa.rohde-schwarz.com
Internet: www.rohde-schwarz.com

State of Nebraska- INVITATION TO BID ONE TIME PURCHASE

Return to:
State Purchasing Bureau
1526 K Street, Suite 130
Lincoln, Nebraska 68508

Telephone: 402-471-6500
Fax: 402-471-2089

Date	4/23/19	Page	1 of 2
Solicitation Number	6079 OF		
Opening Date and Time	05/13/19	2:00pm	
Buyer	JULIE DABYDEEN (AS)		

DESTINATION OF GOODS
EDUCATIONAL TELECOMM COMM
1800 N 33rd ST
Lincoln, NE 68503-1409

Per Nebraska's Transparency in Government Procurement Act, DAS is required to collect statistical information regarding the number of contracts awarded to Nebraska contractors. This information is for statistical purposes only and will not be considered for contract award purposes.

NEBRASKA CONTRACTOR AFFIDAVIT: Bidder hereby attests that bidder is a Nebraska Contractor. "Nebraska Contractor" shall mean any bidder who has maintained a bona fide place of business and at least one employee within this state for at least the six (6) months immediately preceding the posting date of this ITB.

_____ I hereby certify that I am a Resident disabled veteran or business located in a designated enterprise zone in accordance with Neb. Rev. Stat. §73-107 and wish to have preference, if applicable, considered in the award of this contract.

One Time Purchase to supply and deliver NET Displaced TV Translators (3 transmitters) to the State of Nebraska as per the attached specifications.

A response to this Solicitation is subject to, but not limited to, the Standard Terms and Conditions. **PLEASE READ CAREFULLY!**

This form is part of the specification package and must be signed and returned, along with all documents, by the opening date and time specified.

No facsimile or email solicitation responses will be accepted on bids \$25,000 and over.

(bs 04/19/19)

INVITATION

Line	Description	Quantity	Unit of Measure	Unit Price	Extended Price
1	SOW UHF TRANSMITTER, CHANNEL27	1.0000	EA	<u>\$7258.31</u>	<u>\$7258.31</u>

BIDDER MUST COMPLETE THE FOLLOWING

DISCOUNT PAYMENT TERMS: 0 % 30 DAYS

By signing this Invitation to Bid form, the bidder guarantees compliance with the provisions stated in this Invitation to Bid, agrees to the terms and conditions unless otherwise agreed to (see Section III) and certifies that bidder maintains a drug free work place environment. Vendor will furnish the items requested within _____ days after receipt of order. Failure to enter Delivery Date may cause quotation to be REJECTED.

Sign _____

Here (Authorized Signature) **MANDATORY- MUST BE SIGNED IN INK**

VENDOR# _____

VENDOR: Rohde & Schwarz USA, Inc.

Address: 6821 Benjamin Franklin Drive, Columbia, MD 21046

Enter Contact Information Below

Contact: JENNIFER ENGELHARD

Telephone: 410-910-7894

Facsimile 410-910-7801

Email JEN.ENGELHARD@RSA.

ROHDE-SCHWARZ.COM

State of Nebraska - INVITATION TO BID CONTRACT

Return to:
State Purchasing Bureau
1526 K Street, Suite 130
Lincoln, Nebraska 68508

Telephone: 402-471-6500
Fax: 402-471-2089

Date	4/23/19	Page	2 of 2
Solicitation Number	6079 OF		
Opening Date and Time	05/13/19	2:00 pm	
Buyer	JULIE DABYDEEN (AS)		

DESTINATION OF GOODS
AS MATERIEL - STATE PURCHASING
1526 K ST STE 130
LINCOLN NE 68508-2732

INVITATION

Line	Description	Quantity	Unit of Measure	Unit Price	Extended Price
2	EXTERNAL HARMONIC FILTER (IF REQUIRED), CHANNEL 27	1.0000	EA	\$841.70	\$841.70
3	MASK FILTER, CHANNEL 27	1.0000	EA	\$988.64	\$988.64
4	600W UHF TRANSMITTER CHANNEL 31	1.0000	EA	\$22200.00	\$22200.00
5	EXTERNAL HARMONIC FILTER (IF REQUIRED), CHANNEL 31	1.0000	EA	\$0.00	\$0.00
6	MASK FILTER, CHANNEL 31 CHANNEL 31	1.0000	EA	\$2123.53	\$2123.53
7	1400W UHF TRANSMITTER CHANNEL 21	1.0000	EA	\$43100.00	\$43100.00
8	EXTERNAL HARMONIC FILTER (IF REQUIRED) CHANNEL 21	1.0000	EA	\$0.00	\$0.00
9	MASK FILTER, CHANNEL 21	1.0000	EA	\$3229.41	\$3229.41
10	DUAL EXCITER CONFIGURATION CHANNEL 21	1.0000	EA	\$0.00	\$0.00
11	SHELF SPARE PA MODULE OPTION CHANNEL 21	1.0000	EA	\$4543.00	\$4543.00

INVITATION TO BID Number 6079 OF

The State of Nebraska (State), Department of Administrative Services (DAS), Materiel Division, State Purchasing Bureau (SPB), is issuing this solicitation for a one time purchase, ITB Number 6079 OF for the purpose of selecting a qualified Contractor to provide NET Displaced TV Translators (3 transmitters). A more detailed description can be found in Section VI. The resulting contract may not be an exclusive contract as the State reserves the right to contract for the same or similar goods from other sources now or in the future.

INFORMATION PERTINENT TO THIS SOLICITATION CAN BE FOUND ON THE INTERNET AT:

<http://das.nebraska.gov/materiel/purchasing.html>

IMPORTANT NOTICE: Pursuant to Neb. Rev. Stat. § 84-602.02, State contracts in effect as of January 1, 2014, and contracts entered into thereafter, must be posted to a public website. The resulting contract, the solicitation, and the successful Contractor's proposal or response will be posted to a public website managed by DAS, which can be found at:

<https://statecontracts.nebraska.gov>

In addition and in furtherance of the State's public records statute (Neb. Rev. Stat. § 84-712 et seq.) all proposals or responses received regarding this solicitation will be posted to the SPB website.

These postings will include the entire proposal or response. Contractor must request that proprietary information be excluded from the posting. The Contractor must identify the proprietary information, mark the proprietary information according to state law, and submit the proprietary information in a separate container or envelope marked conspicuously using an indelible method with the words "PROPRIETARY INFORMATION". The Contractor must submit a **detailed written document showing** that the release of the proprietary information would give a business advantage to named business competitor(s) and explain how the named business competitor(s) will gain an actual business advantage by disclosure of information. The mere assertion that information is proprietary or that a speculative business advantage might be gained is not sufficient. (See Attorney General Opinion No. 92068, April 27, 1992) **THE CONTRACTOR MAY NOT ASSERT THAT THE ENTIRE PROPOSAL OR RESPONSE IS PROPRIETARY. COST WILL NOT BE CONSIDERED PROPRIETARY AND IS A PUBLIC RECORD IN THE STATE OF NEBRASKA.** The State will then determine, in its discretion, if the interests served by nondisclosure outweighs any public purpose served by disclosure. (See Neb. Rev. Stat. § 84-712.05(3)) The Contractor will be notified of the agency's decision. Absent a State determination that information is proprietary, the State will consider all information a public record subject to release regardless of any assertion that the information is proprietary.

If the agency determines it is required to release proprietary information, the Contractor will be informed. It will be the Contractor's responsibility to defend the Contractor's asserted interest in non-disclosure.

To facilitate such public postings, with the exception of proprietary information, the State of Nebraska reserves a royalty-free, nonexclusive, and irrevocable right to copy, reproduce, publish, post to a website, or otherwise use any contract, proposal, or response to this solicitation for any purpose, and to authorize others to use the documents. Any individual or entity awarded a contract, or who submits a proposal or response to this solicitation, specifically waives any copyright or other protection the contract, proposal, or response to the solicitation may have; and, acknowledges that they have the ability and authority to enter into such waiver. This reservation and waiver is a prerequisite for submitting a proposal or response to this solicitation, and award of a contract. Failure to agree to the reservation and waiver will result in the proposal or response to the solicitation being found non-responsive and rejected.

Any entity awarded a contract or submitting a proposal or response to the solicitation agrees not to sue, file a claim, or make a demand of any kind, and will indemnify and hold harmless the State and its employees, volunteers, agents, and its elected and appointed officials from and against any and all claims, liens, demands, damages, liability, actions, causes of action, losses, judgments, costs, and expenses of every nature, including investigation costs and expenses, settlement costs, and attorney fees and expenses, sustained or asserted against the State, arising out of, resulting from, or attributable to the posting of the contract or the proposals and responses to the solicitation, awards, and other documents.

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GLOSSARY OF TERMS

Acceptance Test Procedure: Benchmarks and other performance criteria, developed by the State or other sources of testing standards, for measuring the effectiveness of products or goods and the means used for testing such performance

Addendum: Something to be added or deleted to an existing document; a supplement

After Receipt of Order (ARO): After Receipt of Order

Agency: Using agencies shall mean and include all officers of the state, departments, bureaus, boards, commissions, councils, and institutions receiving legislative appropriations

Agent/Representative: A person authorized to act on behalf of another

Amend: To alter or change by adding, subtracting, or substituting

Amendment: A written correction or alteration to a document

Appropriation: Legislative authorization to expend public funds for a specific purpose. Money set apart for a specific use

Automated Clearing House (ACH): Electronic network for financial transactions in the United States

Award: All purchases, leases, or contracts which are based on competitive proposals will be awarded according to the provisions in the solicitation

Best and Final Offer (BAFO): In a competitive proposal, the final offer submitted which contains contractor's most favorable terms for price

Bid Bond: An insurance agreement, accompanied by a monetary commitment, by which a third party (the surety) accepts liability and guarantees that the contractor will not withdraw the proposal

Bidder: A contractor who submits an offer proposal in response to a written solicitation

Breach: Violation of a contractual obligation by failing to perform or repudiation of one's own promise.

Business: Any corporation, partnership, individual, sole proprietorship, joint-stock company, joint venture, or any other private legal entity

Business Day: Any weekday, except State-recognized holidays

Calendar Day: Every day shown on the calendar including Saturdays, Sundays, and State/Federal holidays

Cancellation: To call off or revoke a proposal, purchase order or contract without expectation of conducting or performing at a later time

Catalog/Non-Core: A printed or electronic list of products a contractor may provide at a discounted rate or discount off list price to the State. Initial contract award(s) is not based on Catalog/Non-Core items

Central Processing Unit (CPU): Any computer or computer system that is used by the State to store, process, or retrieve data or perform other functions using Operating Systems and applications software

Change Order: Document that provides amendments to an executed purchase order

Collusion: An agreement or cooperation between two or more persons or entities to accomplish a fraudulent, deceitful, or unlawful purpose

Commodities: Any equipment, material, supply or goods; anything movable or tangible that is provided or sold

Commodities Description: Detailed descriptions of the items to be purchased; may include information necessary to obtain the desired quality, type, color, size, shape, or special characteristics necessary to perform the work intended to produce the desired results

Competition: The effort or action of two or more commercial interests to obtain the same business from third parties

Confidential Information: Unless otherwise defined below, "Confidential Information" shall also mean proprietary trade secrets, academic and scientific research work which is in progress and unpublished, and other information which if released would give

advantage to business competitors and serve no public purpose (see Neb. Rev. Stat. §84-712.05(3)). In accordance with Nebraska Attorney General Opinions 92068 and 97033, proof that information is proprietary requires identification of specific, named competitor(s) who would be advantaged by release of the information and the specific advantage the competitor(s) would receive

Contract: An agreement between two or more parties creating obligations that are enforceable or otherwise recognizable at law; the writing that sets forth such an agreement

Contract Administration: The management of the contract which includes and is not limited to contract signing, contract amendments and any necessary legal actions

Contract Management: The management of day to day activities at the agency which includes and is not limited to ensuring deliverables are received, specifications are met, handling meetings and making payments to the Contractor

Contract Period: The duration of the contract

Contractor: An individual or entity lawfully conducting business in the State, who seeks or agrees to provide goods or services under the terms of a written contract.

Contractor Performance Report: A report that documents good and poor performance. (See Supplier and Procurement Manual)

Cooperative Purchasing: The combining of requirements of two or more political entities to obtain advantages of volume purchases, reduction in administrative expenses or other public benefits

Copyright: A property right in an original work of authorship fixed in any tangible medium of expression, giving the holder the exclusive right to reproduce, adapt and distribute the work

Core List: Items specifically listed on the solicitation upon which a proposal is evaluated for award .

Critical Program Error: Any Program Error, whether or not known to the State, which prohibits or significantly impairs use of the Licensed Software as set forth in the documentation and intended in the contract

Customer Service: The process of ensuring customer satisfaction by providing assistance and advice on those products or goods provided by a Contractor

Default: The omission or failure to perform a contractual duty

Deviation: Any proposed change(s) or alteration(s) to either the terms and conditions or deliverables within the scope of the written solicitation or contract

Evaluation: The process of examining an offer after opening to determine the contractor's responsibility, responsiveness to requirements, and to ascertain other characteristics of the offer that relate to determination of the successful award

Evaluation Committee: Committee(s) appointed by the requesting agency that advises and assists the procuring office in the evaluation of proposal/s (offers made in response to written solicitations)

Extension: Continuance of a contract for a specified duration upon the agreement of the parties beyond the original Contract Period. Not to be confused with "Renewal Period"

Free on Board (F.O.B.) Destination: The delivery charges are included in the quoted price and prepaid by the contractor. Contractor is responsible for all claims associated with damages during delivery of product

Free on Board (F.O.B.) Point of Origin: The delivery charges are not included in the quoted price and are the responsibility of the agency. Agency is responsible for all claims associated with damages during delivery of product

Foreign Corporation: A foreign corporation that was organized and chartered under the laws of another state, government, or country.

Installation Date: The date when the procedures described in "Installation by Contractor", and "Installation by State", as found in the solicitation, or contract are completed.

Interested Party: A person, acting in their personal capacity, or an entity entering into a contract or other agreement creating a legal interest therein

Invalid Proposal: A proposal that does not meet the requirements of the solicitation or cannot be evaluated against the other proposals.

Invitation to Bid (ITB): A written solicitation utilized for obtaining competitive offers for Services or Goods

Late Proposal: An offer received after the Opening Date and Time

Licensed Software Documentation: The user manuals and any other materials in any form or medium customarily provided by the Contractor to the users of the Licensed Software which will provide the State with sufficient information to operate, diagnose, and maintain the Licensed Software properly, safely, and efficiently

Mandatory/Must: Required, compulsory, or obligatory

May: Discretionary, permitted; used to express possibility

Module (see System): A collection of routines and data structures that perform a specific function of software

Must: See Mandatory/Must and Shall/Will/Must

National Institute for Governmental Purchasing (NIGP): National Institute of Governmental Purchasing – Source used for assignment of universal commodity codes to goods and services

Non-core: See Catalog.

Open Market Purchase: Authorization may be given to an agency to purchase items above direct purchase authority due to the unique nature, price, quantity, location of the using agency, or time limitations by the AS Materiel Division, State Purchasing Bureau

Opening Date and Time: Specified date and time for the public opening of received, labeled, and sealed formal proposals

Operating System: The control program in a computer that provides the interface to the computer hardware and peripheral devices, and the usage and allocation of memory resources, processor resources, input/output resources, and security resources

Outsourcing: The contracting out of a business process which an organization may have previously performed internally or has a new need for, to an independent organization from which the process is purchased back

Payroll & Financial Center (PFC): Electronic procurement system of record

Performance Bond: An insurance agreement, accompanied by a monetary commitment, by which a third party (the surety) accepts liability and guarantees that the Contractor fulfills any and all obligations under the contract

Platform: A specific hardware and Operating System combination that is different from other hardware and Operating System combinations to the extent that a different version of the Licensed Software product is required to execute properly in the environment established by such hardware and Operating System combination

Point of Contact (POC): The person designated to receive communications and to communicate

Pre-Proposal Conference: A meeting scheduled for the purpose of clarifying a written solicitation and related expectations

Product: Something that is distributed commercially for use or consumption and that is usually (1) tangible personal property, (2) the result of fabrication or processing, and (3) an item that has passed through a chain of commercial distribution before ultimate use or consumption

Program Error: Code in Licensed Software which produces unintended results or actions, or which produces results or actions other than those described in the specifications. A program error includes, without limitation, any Critical Program Error

Program Set: The group of programs and products, including the Licensed Software specified in the solicitation, plus any additional programs and products licensed by the State under the contract for use by the State

Project: The total scheme, program, or method worked out for the accomplishment of an objective, including all documentation, commodities, and goods to be provided under the contract

Proposal: An offer, bid, or quote submitted by a contractor in a response to a written solicitation

Proprietary Information: Proprietary information is defined as trade secrets, academic and scientific research work which is in progress and unpublished, and other information which if released would give advantage to business competitors and serve no public purpose (see Neb. Rev. Stat. § 84-712.05(3)). In accordance with Attorney General Opinions 92068 and 97033, proof that information is proprietary requires identification of specific named competitor(s) advantaged by release of the information and the demonstrated advantage the named competitor(s) would gain by the release of information

Protest/Grievance: A complaint about a governmental action or decision related to the solicitation or resultant contract, brought by a contractor who has timely submitted a proposal response in connection with the award in question, to AS Materiel Division or another designated agency with the intention of achieving a remedial result

Public Proposal Opening: The process of opening correctly submitted offers at the time and place specified in the written solicitation and in the presence of anyone who wished to attend

Quote: See Proposal

Recommended Hardware Configuration: The data processing hardware (including all terminals, auxiliary storage, communication, and other peripheral devices) to the extent utilized by the State as recommended by the Contractor.

Release Date: The date of public release of the written solicitation to seek offers

Renewal Period: Optional contract periods subsequent to the original Contract Period for a specified duration with previously agreed to terms and conditions. Not to be confused with Extension

Request for Information (RFI): A general invitation to contractor is requesting information for a potential future solicitation. The RFI is typically used as a research and information gathering tool for preparation of a solicitation

Responsible Contractor: A Contractor who has the capability in all respects to perform fully and lawfully all requirements with integrity and reliability to assure good faith performance

Responsive Contractor: A Contractor who has submitted a proposal which conforms to all requirements of the solicitation document

Shall: See Must

Should: Expected; suggested, but not necessarily mandatory

Software License: Legal instrument with or without printed material that governs the use or redistribution of licensed software

Sole Source – Commodity: When an item is available from only one source due to the unique nature of the requirement, its contractor, or market conditions

Sole Source – Service: A service of such a unique nature that the contractor selected is clearly and justifiably the only practical source to provide the service. Determination that the contractor selected is justifiably the sole source is based on either the uniqueness of the service or sole availability at the location required

Specifications: The detailed statement, especially of the measurements, quality, materials, and functional characteristics, or other items to be provided under a contract

Statutory: These clauses are controlled by state law and are not subject to negotiation

Subcontractor: Individual or entity with whom the contractor enters a contract to perform a portion of the work awarded to the contractor

System (see Module): Any collection or aggregation of two (2) or more Modules that is designed to function, or is represented by the Contractor as functioning or being capable of functioning, as an entity

Termination: Occurs when the contract expires or either party, pursuant to a power created by agreement or law puts an end to the contract prior to the stated expiration date. All obligations which are still executory on both sides are discharged but any right based on prior breach or performance survives

Third-Party: Any person or entity, including but not limited to fiduciaries, shareholders, owners, officers, managers, employees, legally disinterested persons, and sub-contractors or agents, and their employees. It shall not include any entity or person who is an interested Party to the contract or agreement

Trade Secret: Information, including, but not limited to, a drawing, formula, pattern, compilation, program, device, method, technique, code, or process that (a) derives independent economic value, actual or potential, from not being known to, and not being ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use; and (b) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy (see Neb. Rev. Stat. § 87-502(4))

Trademark: A word, phrase, logo, or other graphic symbol used by a manufacturer or contractor to distinguish its product from those of others, registered with the U.S. Patent and Trademark Office

Upgrade: Any change that improves or alters the basic function of a product of service

Will: See Mandatory/Must/Shall

Work Day: See Business Day

ACRONYM LIST

ARO – After Receipt of Order

ACH – Automated Clearing House

BAFO – Best and Final Offer

COI – Certificate of Insurance

CPU – Central Processing Unit

DAS – Department of Administrative Services

F.O.B. – Free on Board

ITB – Invitation to Bid

NIGP – National Institute for Governmental Purchasing

PA – Participating Addendum

RFI – Request for Information

RFP – Request for Proposal

SPB – State Purchasing Bureau

I. PROCUREMENT PROCEDURE

A. GENERAL INFORMATION

The solicitation is designed to solicit proposals from qualified Contractors who will be responsible for providing NET Displaced TV Translators (3 transmitters) at a competitive and reasonable cost. Terms and Conditions, Project Description and Scope of Work, Proposal Instructions, and Cost Proposal Requirements may be found in Sections II through VI.

Proposals shall conform to all instructions, conditions, and requirements included in the solicitation. Prospective Contractors are expected to carefully examine all documents, schedules, and requirements in this solicitation, and respond to each requirement in the format prescribed. Proposals may be found non-responsive if they do not conform to the solicitation.

B. PROCURING OFFICE AND COMMUNICATION WITH STATE STAFF AND EVALUATORS

Procurement responsibilities related to this solicitation reside with SPB. The point of contact (POC) for the procurement is as follows:

Name: Julie Dabydeen
Agency: State Purchasing Bureau
Address: 1526 K Street, Suite 130
Lincoln, NE 68508

Telephone: 402-471-6500

E-Mail: as.materielpurchasing@nebraska.gov

From the date the solicitation is issued until the Intent to Award is issued, communication from the Contractor is limited to the POC listed above. After the Intent to Award is issued, the Contractor may communicate with individuals the State has designated as responsible for negotiating the contract on behalf of the State. No member of the State Government, employee of the State, or member of the Evaluation Committee is empowered to make binding statements regarding this solicitation. The POC will issue any answers, clarifications or amendments regarding this solicitation in writing. Only the SPB or awarding agency can award a contract. Contractors shall not have any communication with, or attempt to communicate or influence any evaluator involved in this solicitation.

The following exceptions to these restrictions are permitted:

1. Contact made pursuant to pre-existing contracts or obligations;
2. Contact required by the schedule of events or an event scheduled later by POC; and
3. Contact required for negotiation and execution of the final contract.

The State reserves the right to reject a contractor's proposal, withdraw an Intent to Award, or terminate a contract if the State determines there has been a violation of these procurement procedures.

C. SCHEDULE OF EVENTS

The State expects to adhere to the procurement schedule shown below, but all dates are approximate and subject to change.

ACTIVITY		DATE/TIME
1.	Release solicitation	April 23, 2019
2.	Last day to submit written questions	May 1, 2019
3.	State responds to written questions through a solicitation "Addendum" and/or "Amendment" to be posted to the Internet at: http://das.nebraska.gov/materiel/purchasing.html	May 3, 2019
4.	Proposal Opening Location: State Purchasing Bureau 1526 K Street, Suite 130 Lincoln, NE 68508	May 13, 2019 2:00 PM Central Time
5.	Review for conformance with proposal requirements	May 13, 2019
6.	Evaluation period	TBD
7.	Post "Notification of Intent to Award" to Internet at: http://das.nebraska.gov/materiel/purchasing.html	TBD
8.	Purchase Order finalization period	TBD
9.	Purchase Order award	TBD
10.	Purchase Order issuance	TBD

D. WRITTEN QUESTIONS AND ANSWERS

Questions regarding the meaning or interpretation of any solicitation provision must be submitted in writing to SPB and clearly marked "ITB Number 6079 OF; NET Displaced TV Translators (3 transmitters). Questions". POC is not obligated to respond to questions that are received late per the Schedule of Events.

Contractors should present, as questions, any assumptions upon which the Contractor's proposal is or might be developed. Proposals will be evaluated without consideration of any known or unknown assumptions of a Contractor. The contract will not incorporate any known or unknown assumptions of a Contractor.

It is preferred that questions be sent via e-mail to as.materielpurchasing@nebraska.gov, but may be delivered by hand or by U.S. Mail. It is recommended that Contractors submit questions using the following format.

Solicitation Section Reference	Solicitation Page Number	Question

Written answers will be posted at <http://das.nebraska.gov/materiel/purchasing.html> per the Schedule of Events.

E. SECRETARY OF STATE/TAX COMMISSIONER REGISTRATION REQUIREMENTS (Statutory)

All Contractors must be authorized to transact business in the State and comply with all Nebraska Secretary of State Registration requirements. The Contractor who is the recipient of an Intent to Award will be required to certify that it has complied and produce a true and correct copy of its current (within ninety (90) calendar days of the intent to award) Certificate or Letter of Good Standing, or in the case of a sole proprietorship, provide written documentation of sole proprietorship and the United States Citizenship Attestation Form, available on the DAS website at: <http://das.nebraska.gov/materiel/purchasing.html>. This must be accomplished prior to execution of the contract.

F. ETHICS IN PUBLIC CONTRACTING

The State reserves the right to reject proposals, withdraw an intent to award or award, or terminate a contract if a Contractor commits or has committed ethical violations, which include, but are not limited to:

1. Offering or giving, directly or indirectly, a bribe, fee, commission, compensation, gift, gratuity, or anything of value to any person or entity in an attempt to influence the bidding process;
2. Utilize the services of lobbyists, attorneys, political activists, or consultants to influence or subvert the bidding process;
3. Being considered for, presently being, or becoming debarred, suspended, ineligible, or excluded from contracting with any state or federal entity;
4. Submitting a proposal on behalf of another party or entity;
5. Collude with any person or entity to influence the bidding process, submit sham proposals, preclude bidding, fix pricing or costs, create an unfair advantage, subvert the proposal, or prejudice the State.

The Contractor shall include this clause in any subcontract entered into for the exclusive purpose of performing this contract.

Contractor shall have an affirmative duty to report any violations of this clause by the Contractor throughout the bidding process, and throughout the term of this contract for the successful Contractor and their subcontractors.

G. DEVIATIONS FROM THE INVITATION TO BID

The requirements contained in the solicitation (Sections II through VI) become a part of the terms and conditions of the contract resulting from this solicitation. Any deviations from the solicitation in Sections II through VI must be clearly defined by the Contractor in its proposal and, if accepted by the State, will become part of the contract. Any specifically defined deviations must not be in conflict with the basic nature of the solicitation, solicitation requirements, or applicable state or federal laws or statutes. "Deviation", for the purposes of this solicitation, means any proposed changes or alterations to either the contractual language or deliverables within the scope of this solicitation. The State discourages deviations and reserves the right to reject proposed deviations.

H. SUBMISSION OF PROPOSALS

*****ALL PROPOSALS MUST BE SUBMITTED IN A SEALED ENVELOPE OR CONTAINER!*****

Contractors should submit one proposal marked on the first page: "ORIGINAL". If multiple proposals are submitted, the State will retain one copy marked "ORIGINAL" and destroy the other copies. The Contractor is solely responsible for any variance between the copies submitted. Proposal responses should include the completed Form A, "Contractor Proposal Point of Contact". Proposals must reference the ITB number and be sent to the specified address. Please note that the address label should appear as specified in Section I B. on the face of each container or contractor's proposal response packet. If a recipient phone number is required for delivery purposes, 402-471-6500 should be used. The ITB number should be included in all correspondence. The State will not furnish packaging and sealing materials. It is the contractor's responsibility to ensure the ITB is received in a sealed envelope or container and submitted by the date and time indicated in the Schedule of Events. Sealed proposals must be received in the State Purchasing Bureau by the date and time of the proposal opening per the Schedule of Events. No late proposals will be accepted.

The Invitation to Bid form must be manually signed in an indelible manner and returned by the proposal opening date and time along with the contractor's Invitation to Bid along with any other requirements as stated in the Invitation to Bid document in order for the contractor's Invitation to Bid response to be evaluated.

It is the responsibility of the contractor to check the website for all information relevant to this Invitation to Bid to include addenda and/or amendments issued prior to the opening date. Website address is as follows: <http://das.nebraska.gov/material/purchasing.html>

Emphasis should be concentrated on conformance to the ITB instructions, responsiveness to requirements, completeness, and clarity of content. If the contractor's proposal is presented in such a fashion that makes evaluation difficult or overly time consuming the State reserves the right to reject the proposal as non-conforming.

By signing the Invitation to Bid, the contractor guarantees compliance with the provisions stated in this ITB.

The State shall not incur any liability for any costs incurred by contractors in replying to this ITB, in the demonstrations and/or oral presentations, or in any other activity related to bidding on this ITB.

I. PROPOSAL PREPARATION COSTS

The State shall not incur any liability for any costs incurred by Contractors in replying to this solicitation, including any activity related to bidding on this solicitation.

J. FAILURE TO COMPLY WITH INVITATION TO BID

Violation of the terms and conditions contained in this solicitation or any resultant contract, at any time before or after the award, shall be grounds for action by the State which may include, but is not limited to, the following:

1. Rejection of a Contractor's proposal;
2. Withdrawal of the Intent to Award;
3. Withdrawal of the Award;
4. Termination of the resulting contract;
5. Legal action; or,
6. Suspension of the Contractor from further bidding with the State for the period of time relative to the seriousness of the violation, such period to be within the sole discretion of the State.

K. PROPOSAL CORRECTIONS

A contractor may correct a mistake in a proposal prior to the time of opening by giving written notice to the State of intent to withdraw the proposal for modification or to withdraw the proposal completely. Changing a proposal after opening may be permitted if the change is made to correct a minor error that does not affect price, quantity, quality, delivery, or contractual conditions. In case of a mathematical error in extension of price, unit price shall govern.

L. LATE PROPOSALS

Proposals received after the time and date of the proposal opening will be considered late proposals. Late proposals will be returned unopened, if requested by the Contractor and at Contractor's expense. The State is not responsible for proposals that are late or lost regardless of cause or fault.

M. PROPOSAL OPENING

Anyone may attend the opening. It is considered a public opening. The Buyer will read the names of the respondents. Depending upon the complexity of the proposal for goods, the buyer may read the proposals aloud or allow proposals be available for viewing by the public during the proposal opening. Once the proposal opening has concluded, the proposals will not be available for viewing until the Intent to Award has been posted. An initial proposal tabulation will be posted to the website as soon as feasible. Information identified as proprietary by the submitting contractor, in accordance with the solicitation and state statute, will not be posted. If the state determines submitted information should not be withheld, in accordance with the Public Records Act, or if ordered to release any withheld information, said information may then be released. The submitting contractor will be notified of the release and it shall be the obligation of the submitting contractor to take further action, if it believes the information should not be released.

N. INVITATION TO BID/PROPOSAL REQUIREMENTS

The proposals will first be examined to determine if all requirements listed below have been addressed and whether further evaluation is warranted. Proposals not meeting the requirements may be rejected as non-responsive. The requirements are:

1. Original Commodity ITB form signed using an indelible method (electronic signatures are acceptable);
2. Clarity and responsiveness of the proposal;
3. Completed Sections II through VI;
4. Completed ITB Form or State's Cost Sheet.

O. EVALUATION OF PROPOSALS

All proposals that are responsive to the solicitation will be evaluated based on the following:

1. Cost Proposal

Neb. Rev. Stat. §73-107 allows for a preference for a resident disabled veteran or business located in a designated enterprise zone. When a state contract is to be awarded to the lowest responsible contractor, a resident disabled veteran or a business located in a designated enterprise zone under the Enterprise Zone Act shall be allowed a preference over any other resident or nonresident contractor, if all other factors are equal.

Resident disabled veterans means any person (a) who resides in the State of Nebraska, who served in the United States Armed Forces, including any reserve component or the National Guard, who was discharged or otherwise separated with a characterization of honorable or general (under honorable conditions), and who possesses a disability rating letter issued by the United States Department of Veterans Affairs

establishing a service-connected disability or a disability determination from the United States Department of Defense and (b)(i) who owns and controls a business or, in the case of a publicly owned business, more than fifty percent of the stock is owned by one or more persons described in subdivision (a) of this subsection and (ii) the management and daily business operations of the business are controlled by one or more persons described in subdivision(a) of this subsection. Any contract entered into without compliance with this section shall be null and void.

Therefore, if a resident disabled veteran or business located in a designated enterprise zone submits a proposal in accordance with Neb. Rev. Stat. §73-107 and has so indicated on the ITB cover page under "Contractor must complete the following" requesting priority/preference to be considered in the award of this contract, the following will need to be submitted by the contractor within ten (10) business days of request:

1. Documentation from the United States Armed Forces confirming service;
2. Documentation of discharge or otherwise separated characterization of honorable or general (under honorable conditions);
3. Disability rating letter issued by the United States Department of Veterans Affairs establishing a service-connected disability or a disability determination from the United States Department of Defense; and
4. Documentation which shows ownership and control of a business or, in the case of a publicly owned business, more than fifty percent of the stock is owned by one or more persons described in subdivision (a) of this subsection; and the management and daily business operations of the business are controlled by one or more persons described in subdivision (a) of this subsection.

Failure to submit the requested documentation within ten (10) business days of notice will disqualify the contractor from consideration of the preference.

P. BEST AND FINAL OFFER

If best and final offers (BAFO) are requested by the State and submitted by the contractor, they will be evaluated (using the stated BAFO criteria) and ranked by the Evaluation Committee. The State reserves the right to conduct more than one BAFO. The award will then be granted to the lowest responsible contractor. However, a contractor should provide its best offer in its original proposal. Contractors should not expect that the State will request a BAFO.

Q. REFERENCE AND CREDIT CHECKS

The State reserves the right to conduct and consider reference and credit checks. The State reserves the right to use third parties to conduct reference and credit checks. By submitting a proposal in response to this solicitation, the contractor grants to the State the right to contact or arrange a visit in person with any or all of the contractor's clients. Reference and credit checks may be grounds to reject a proposal, withdraw an intent to award, or rescind the award of a contract.

R. AWARD

The State reserves the right to evaluate proposals and award contracts in a manner utilizing criteria selected at the State's discretion and in the State's best interest. After evaluation of the proposals, or at any point in the solicitation process, the State of Nebraska may take one or more of the following actions:

1. Amend the solicitation;
2. Extend the time of or establish a new proposal opening time;
3. Waive deviations or errors in the State's solicitation process and in contractor proposals that are not material, do not compromise the solicitation process or a contractor's proposal, and do not improve a contractor's competitive position;
4. Accept or reject a portion of or all of a proposal;
5. Accept or reject all proposals;
6. Withdraw the solicitation;
7. Elect to rebid the solicitation;
8. Award single lines or multiple lines to one or more contractors; or,
9. Award one or more all-inclusive contracts.

The State of Nebraska may consider, but is not limited to considering, one or more of the following award criteria:

1. Price;
2. Location;
3. Quality;
4. Delivery time;
5. Contractor qualifications and capabilities;

6. State contract management requirements and/or costs; and,
- 7.

The solicitation does not commit the State to award a contract. Once intent to award decision has been determined, it will be posted to the Internet at:

<http://das.nebraska.gov/materiel/purchasing.html>

Any protests must be filed by a contractor within ten (10) business days after the intent to award decision is posted to the Internet. Grievance and protest procedure is available on the Internet at:

<http://das.nebraska.gov/materiel/purchasing.html>

S. SPECIFICATIONS

Any manufacturer's names, trade names, brand names, information and/or catalog numbers listed in a specification are for reference and not intended to limit competition, but will be used as the standard by which equivalent material offered will be judged. The Materiel Administrator will be the sole judge of equivalency. The Contractor may offer any brands which meets or exceeds the specification. When a specific product is required, the solicitation will so state. Any item proposal is to be the latest current model under standard production at the time of order. No used or refurbished equipment will be accepted, unless otherwise stated.

T. ALTERNATE/EQUIVALENT PROPOSALS

Contractor may offer proposals which are at variance from the express specifications of the solicitation. The State reserves the right to consider and accept such proposals if, in the judgment of the Materiel Administrator, the proposal will result in goods and/or services equivalent to or better than those which would be supplied in the original proposal specifications. Contractor must indicate on the solicitation the manufacturer's name, number and shall submit with their proposal, sketches, descriptive literature and/or complete specifications. Reference to literature submitted with a previous proposal will not satisfy this provision. Proposals which do not comply with these requirements are subject to rejection. In the absence of any stated deviation or exception, the proposal will be accepted as in strict compliance with all terms, conditions and specification, and the Contractor shall be held liable therefore.

U. LUMP SUM OR "ALL OR NONE" PROPOSALS

The State reserves the right to purchase item-by-item, by groups or as a total when the State may benefit by so doing. Contractors may submit a proposal on an "all or none" or "lump sum" basis, but should also submit a proposal on an item-by-item basis. The term "all or none" means a conditional proposal which requires the purchase of all items on which proposals are offered and Contractor declines to accept award on individual items; a "lump sum" proposal is one in which the Contractor offers a lower price than the sum of the individual proposals if all items are purchased, but agrees to deliver individual items at the prices quoted.

V. EMAIL SUBMISSIONS

SPB will not accept proposals by email, electronic, voice, or telephone proposals **except** for one-time purchases under \$50,000.00.

W. PROPOSAL TABULATIONS

Proposal tabulations are available on the website at: <http://www.das.state.ne.us/materiel/purchasing/bidtabs.htm>.

X. REJECTION OF PROPOSALS

The State reserves the right to reject any or all proposals, wholly or in part, in the best interest of the State.

Y. RESIDENT BIDDER

Pursuant to Neb. Rev. Stat. §§ 73-101.01 through 73-101.02, a Resident Bidder shall be allowed a preference against a Non-resident Bidder from a state which gives or requires a preference to Bidders from that state. The preference shall be equal to the preference given or required by the state of the Nonresident Bidders. Where the lowest responsible bid from a resident Bidder is equal in all respects to one from a nonresident Bidder from a state which has no preference law, the resident Bidder shall be awarded the contract. The provision of this preference shall not apply to any contract for any project upon which federal funds would be withheld because of the provisions of this preference.

II. TERMS AND CONDITIONS

Contractors should complete Section II through VI as part of their proposal. Contractor is expected to read the Terms and Conditions and must initial either accept, reject, or reject and provide alternative language for each clause. The Contractor should also provide an explanation of why the Contractor rejected the clause or rejected the clause and provided alternate language using "Track Changes". Upon request an electronic copy of the proposal with "Track Changes" must be submitted in an editable Word format. By signing the solicitation, Contractor is agreeing to be legally bound by all the accepted terms and conditions, and any proposed alternative terms and conditions submitted with the proposal. The State reserves the right to negotiate rejected or proposed alternative language. If the State and Contractor fail to agree on the final Terms and Conditions, the State reserves the right to reject the proposal. The State is soliciting proposals in response to the solicitation. The State reserves the right to reject proposals that attempt to substitute the Contractor's commercial contracts and/or documents for this solicitation.

The Contractor should submit with their proposal any license, user agreement, service level agreement, or similar documents that the Contractor wants incorporated in the Contract. Upon notice of Intent to Award, the Contractor must submit a copy of these documents in an editable Word format. The State will not consider incorporation of any document not submitted with the Contractor's proposal. These documents shall be subject to negotiation and will be incorporated as addendums if agreed to by the Parties.

If a conflict or ambiguity arises after the addendums have been negotiated and agreed to, the addendums shall be interpreted as follows:

1. If only one (1) Party's document has a particular clause then that clause shall control;
2. If both Party's documents have a similar clause, but the clauses do not conflict, the clauses shall be read together;
3. If both Party's documents have a similar clause, but the clauses conflict, the State's clause shall control.

A. GENERAL

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAC			

The contract resulting from this solicitation shall incorporate the following documents:

1. Invitation to Bid and Addenda;
2. Amendments to the solicitation;
3. Questions and Answers;
4. Contractor's proposal response;
5. The executed Contract and any Addenda, if applicable, and properly submitted documents; and,
6. Amendments to the Contract

These documents constitute the entirety of the contract.

Unless otherwise specifically stated in a future contract amendment, in case of any conflict between the incorporated documents, the documents shall govern in the following order of preference with number one (1) receiving preference over all other documents and with each lower numbered document having preference over any higher numbered document: 1) Amendment to the executed Contract with the most recent dated amendment having the highest priority, 2) executed Contract and any attached Addenda, 3) Amendments to solicitation and any Questions and Answers, 4) the original solicitation document and any Addenda, and 5) the Contractor's submitted Proposal.

Any ambiguity or conflict in the contract discovered after its execution, not otherwise addressed herein, shall be resolved in accordance with the rules of contract interpretation as established in the State.

B. NOTIFICATION

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

Contractor and State shall identify the contract manager who shall serve as the point of contact for the executed contract.

Communications regarding the executed contract shall be in writing and shall be deemed to have been given if delivered personally or mailed, by U.S. Mail, postage prepaid, return receipt requested, to the parties at their respective addresses set forth below, or at such other addresses as may be specified in writing by either of the parties. All notices, requests, or communications shall be deemed effective upon personal delivery or five (5) calendar days following deposit in the mail.

Contractor Contract Manager	Agency Contract Manager Julie Dabydeen
Contractor	Agency Department of Administrative Services, State Purchasing Bureau
Contractor Street Address	Agency Street Address 1526 K Street, Suite 130
Contractor City, State, Zip	Agency City, State, Zip Lincoln, NE 68508

Either party may change its address for notification purposes by giving notice of the change, and setting forth the new address and an effective date.

C. GOVERNING LAW (Statutory)

Notwithstanding any other provision of this contract, or any amendment or addendum(s) entered into contemporaneously or at a later time, the parties understand and agree that, (1) the State of Nebraska is a sovereign state and its authority to contract is therefore subject to limitation by the State's Constitution, statutes, common law, and regulation; (2) this contract will be interpreted and enforced under the laws of the State of Nebraska; (3) any action to enforce the provisions of this contract must be brought in the State of Nebraska per state law; (4) the person signing this contract on behalf of the State of Nebraska does not have the authority to waive the State's sovereign immunity, statutes, common law, or regulations; (5) the indemnity, limitation of liability, remedy, and other similar provisions of the final contract, if any, are entered into subject to the State's Constitution, statutes, common law, regulations, and sovereign immunity; and, (6) all terms and conditions of the final contract, including but not limited to the clauses concerning third-party use, licenses, warranties, limitations of liability, governing law and venue, usage verification, indemnity, liability, remedy or other similar provisions of the final contract are entered into specifically subject to the State's Constitution, statutes, common law, regulations, and sovereign immunity.

The Parties must comply with all applicable local, state and federal laws, ordinances, rules, orders, and regulations.

D. CHANGE ORDERS OR SUBSTITUTIONS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

The State and the Contractor, upon the written agreement, may make changes to the contract within the general scope of the solicitation. Changes may involve specifications, the quantity of work, or such other items as the State may find necessary or desirable. Corrections of any deliverable, service, or work required pursuant to the contract shall not be deemed a change. The Contractor may not claim forfeiture of the contract by reasons of such changes.

The Contractor shall prepare a written description of the work required due to the change and an Itemized cost sheet for the change. Changes in work and the amount of compensation to be paid to the Contractor shall be determined in accordance with applicable unit prices if any, a pro-rated value, or through negotiations. The State shall not incur a price increase for changes that should have been included in the Contractor's proposal, were foreseeable, or result from difficulties with or failure of the Contractor's proposal or performance.

No change shall be implemented by the Contractor until approved by the State, and the Contract is amended to reflect the change and associated costs, if any. If there is a dispute regarding the cost, but both parties agree that immediate implementation is necessary, the change may be implemented, and cost negotiations may continue with both Parties retaining all remedies under the contract and law.

*****Contractor will not substitute any item that has been awarded without prior written approval of SPB*****

E. NOTICE OF POTENTIAL CONTRACTOR BREACH

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

If Contractor breaches the contract or anticipates breaching the contract, the Contractor shall immediately give written notice to the State. The notice shall explain the breach or potential breach, a proposed cure, and may include a request for a waiver of the breach if so desired. The State may, in its discretion, temporarily or permanently waive the breach. By granting a waiver, the State does not forfeit any rights or remedies to which the State is entitled by law or equity, or pursuant to the provisions of the contract. Failure to give immediate notice, however, may be grounds for denial of any request for a waiver of a breach.

F. BREACH

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

Either Party may terminate the contract, in whole or in part, if the other Party breaches its duty to perform its obligations under the contract in a timely and proper manner. Termination requires written notice of default and a thirty (30) calendar day (or longer at the non-breaching Party's discretion considering the gravity and nature of the default) cure period. Said notice shall be delivered by Certified Mail, Return Receipt Requested, or in person with proof of delivery. Allowing time to cure a failure or breach of contract does not waive the right to immediately terminate the contract for the same or different contract breach which may occur at a different time.

In case of breach by the Contractor, the State may, without unreasonable delay, make a good faith effort to make a reasonable purchase or contract to purchased goods in substitution of those due from the contractor. The State may recover from the Contractor as damages the difference between the costs of covering the breach. Notwithstanding any clause to the contrary, the State may also recover the contract price together with any incidental or consequential damages defined in UCC Section 2-715, but less expenses saved in consequence of Contractor's breach. OR In case of default of the Contractor, the State may contract the service from other sources and hold the Contractor responsible for any excess cost occasioned thereby.

The State's failure to make payment shall not be a breach, and the Contractor shall retain all available statutory remedies. (See Indemnity - Self-Insurance and Payment)

G. NON-WAIVER OF BREACH

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

The acceptance of late performance with or without objection or reservation by a Party shall not waive any rights of the Party nor constitute a waiver of the requirement of timely performance of any obligations remaining to be performed.

H. SEVERABILITY

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

If any term or condition of the contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and conditions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the contract did not contain the provision held to be invalid or illegal.

I. INDEMNIFICATION

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
		JAE	PLEASE SEE EXCEPTIONS TO TERMS AND CONDITIONS FOR ALTERNATIVE LANGUAGE.

1. GENERAL

The Contractor agrees to defend, indemnify, and hold harmless the State and its employees, volunteers, agents, and its elected and appointed officials ("the indemnified parties") from and against any and all claims, liens, demands, damages, liability, actions, causes of action, losses, judgments, costs, and expenses of every nature, including investigation costs and expenses, settlement costs, and attorney fees and expenses ("the claims"), sustained or asserted against the State for personal injury, death, or property loss or damage, arising out of, resulting from, or attributable to the willful misconduct, negligence, error, or omission of the Contractor, its employees, Subcontractors, consultants, representatives, and agents, resulting from this contract, except to the extent such Contractor liability is attenuated by any action of the State which directly and proximately contributed to the claims.

2. INTELLECTUAL PROPERTY

The Contractor agrees it will, at its sole cost and expense, defend, indemnify, and hold harmless the indemnified parties from and against any and all claims, to the extent such claims arise out of, result from, or are attributable to, the actual or alleged infringement or misappropriation of any patent, copyright, trade secret, trademark, or confidential information of any third party by the Contractor or its employees, Subcontractors, consultants, representatives, and agents; provided, however, the State gives the Contractor prompt notice in writing of the claim. The Contractor may not settle any infringement claim that will affect the State's use of the Licensed Software without the State's prior written consent, which consent may be withheld for any reason.

If a judgment or settlement is obtained or reasonably anticipated against the State's use of any intellectual property for which the Contractor has indemnified the State, the Contractor shall, at the Contractor's sole cost and expense, promptly modify the item or items which were determined to be infringing, acquire a

license or licenses on the State's behalf to provide the necessary rights to the State to eliminate the infringement, or provide the State with a non-infringing substitute that provides the State the same functionality. At the State's election, the actual or anticipated judgment may be treated as a breach of warranty by the Contractor, and the State may receive the remedies provided under this solicitation.

3. SELF-INSURANCE (Statutory)

The State is self-insured for any loss and purchases excess insurance coverage pursuant to Neb. Rev. Stat. § 81-8,239.01 (Reissue 2008). If there is a presumed loss under the provisions of this contract, Contractor may file a claim with the Office of Risk Management pursuant to Neb. Rev. Stat. §§ 81-8,829 through 81-8,306 for review by the State Claims Board. The State retains all rights and immunities under the State Miscellaneous (Section 81-8,294), Tort (Section 81-8,209), and Contract Claim Acts (Section 81-8,302), as outlined in Neb. Rev. Stat. § 81-8,209 et seq. and under any other provisions of law and accepts liability under this contract to the extent provided by law.

J. ATTORNEY'S FEES

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

In the event of any litigation, appeal, or other legal action to enforce any provision of the contract, the Parties agree to pay all expenses of such action, as permitted by law and if ordered by the court, including attorney's fees and costs, if the other party prevails.

K. ASSIGNMENT, SALE, OR MERGER

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

Either party may assign the contract upon mutual written agreement of the other party. Such agreement shall not be unreasonably withheld.

The Contractor retains the right to enter into a sale, merger, acquisition, internal reorganization, or similar transaction involving Contractor's business. Contractor agrees to cooperate with the State in executing amendments to the contract to allow for the transaction. If a third party or entity is involved in the transaction, the Contractor will remain responsible for performance of the contract until such time as the person or entity involved in the transaction agrees in writing to be contractually bound by this contract and perform all obligations of the contract.

L. CONTRACTING WITH OTHER POLITICAL SUB-DIVISIONS OF THE STATE OR ANOTHER STATE

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

The Contractor may, but shall not be required to, allow agencies, as defined in Neb. Rev. Stat. § 81-145, to use this contract. The terms and conditions, including price, of the contract may not be amended. The State shall not be contractually obligated or liable for any contract entered into pursuant to this clause.

The Contractor may, but shall not be required to, allow other states, agencies or divisions of other states, or political subdivisions of other states to use this contract. The terms and conditions, including price, of this contract shall apply to any such contract, but may be amended upon mutual consent of the Parties. The State of Nebraska shall not be contractually or otherwise obligated or liable under any contract entered into pursuant to this clause. The State shall be notified if a contract is executed based upon this contract.

M. FORCE MAJEURE

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
GAE			

Neither party shall be liable for any costs or damages, or for default resulting from its inability to perform any of its obligations under the contract due to a natural or man-made event outside the control and not the fault of the affected party ("Force Majeure Event"). The Party so affected shall immediately make a written request for relief to the other party, and shall have the burden of proof to justify the request. The other Party may granted the relief requested; relief may not be unreasonably withheld. Labor disputes with the impacted party's own employees will not be considered a Force Majeure Event.

N. CONFIDENTIALITY

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
GAE			

All materials and information provided by the Parties or acquired by a Party on behalf of the other Party shall be regarded as confidential information. All materials and information provided or acquired shall be handled in accordance with federal and state law, and ethical standards. Should said confidentiality be breached by a Party, the Party shall notify the other Party immediately of said breach and take immediate corrective action.

It is incumbent upon the Parties to inform their officers and employees of the penalties for improper disclosure imposed by the Privacy Act of 1974, 5 U.S.C. 552a. Specifically, 5 U.S.C. 552a (i)(1), which is made applicable by 5 U.S.C. 552a (m)(1), provides that any officer or employee, who by virtue of his/her employment or official position has possession of or access to agency records which contain individually identifiable information, the disclosure of which is prohibited by the Privacy Act or regulations established thereunder, and who knowing that disclosure of the specific material is prohibited, willfully discloses the material in any manner to any person or agency not entitled to receive it, shall be guilty of a misdemeanor and fined not more than \$5,000.

III. CONTRACTOR DUTIES

A. INDEPENDENT CONTRACTOR / OBLIGATIONS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

It is agreed that the Contractor is an independent contractor and that nothing contained herein is intended or should be construed as creating or establishing a relationship of employment, agency, or a partnership.

The Contractor is solely responsible for fulfilling the contract. The Contractor or the Contractor's representative shall be the sole point of contact regarding all contractual matters.

The Contractor shall secure, at its own expense, all personnel required to perform the services under the contract. The personnel the Contractor uses to fulfill the contract shall have no contractual or other legal relationship with the State; they shall not be considered employees of the State and shall not be entitled to any compensation, rights or benefits from the State, including but not limited to, tenure rights, medical and hospital care, sick and vacation leave, severance pay, or retirement benefits.

By-name personnel commitments made in the Contractor's proposal shall not be changed without the prior written approval of the State. Replacement of these personnel, if approved by the State, shall be with personnel of equal or greater ability and qualifications.

The Contractor warrants that all persons assigned to the project shall be employees of the Contractor or a Subcontractor, and shall be fully qualified to perform the work required herein. Personnel employed by the Contractor or a subcontractor to fulfill the terms of the contract shall remain under the sole direction and control of the Contractor or the subcontractor respectively.

With respect to its employees, the Contractor agrees to be solely responsible for the following:

1. Any and all pay, benefits, and employment taxes and/or other payroll withholding;
2. Any and all vehicles used by the Contractor's employees, including all insurance required by state law;
3. Damages incurred by Contractor's employees within the scope of their duties under the contract;
4. Maintaining Workers' Compensation and health insurance that complies with state and federal law and submitting any reports on such insurance to the extent required by governing law;
5. Determining the hours to be worked and the duties to be performed by the Contractor's employees; and,
6. All claims on behalf of any person arising out of employment or alleged employment (including without limit claims of discrimination alleged against the Contractor, its officers, agents, or subcontractors or subcontractor's employees).

If the Contractor intends to utilize any subcontractor, the Subcontractor's level of effort, tasks, and time allocation must be clearly defined in the Contractor's proposal. The Contractor shall agree that it will not utilize any Subcontractors not specifically included in its proposal in the performance of the contract without the prior written authorization of the State.

The State reserves the right to require the Contractor to reassign or remove from the project any Contractor or Subcontractor employee.

Contractor shall insure that the terms and conditions contained in any contract with a sub-contractor does not conflict with the terms and conditions of this contract.

The Contractor shall include a similar provision, for the protection of the State, in the contract with any Subcontractor engaged to perform work on this contract.

B. EMPLOYEE WORK ELIGIBILITY STATUS

The Contractor is required and hereby agrees to use a federal immigration verification system to determine the work eligibility status of employees physically performing work within the State. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work eligibility status of an employee.

If the Contractor is an individual or sole proprietorship, the following applies:

- 1. The Contractor must complete the United States Citizenship Attestation Form, available on the DAS website at <http://das.nebraska.gov/materiel/purchasing.html>

The completed United States Attestation Form should be submitted with the solicitation response.

- 2. If the Contractor indicates on such attestation form that he or she is a qualified alien, the Contractor agrees to provide the U.S. Citizenship and Immigration Services documentation required to verify the Contractor's lawful presence in the United States using the Systematic Alien Verification for Entitlements (SAVE) Program.
- 3. The Contractor understands and agrees that lawful presence in the United States is required and the Contractor may be disqualified or the contract terminated if such lawful presence cannot be verified as required by Neb. Rev. Stat. § 4-108.

C. COMPLIANCE WITH CIVIL RIGHTS LAWS AND EQUAL OPPORTUNITY EMPLOYMENT / NONDISCRIMINATION (Statutory)

The Contractor shall comply with all applicable local, state, and federal statutes and regulations regarding civil rights laws and equal opportunity employment. The Nebraska Fair Employment Practice Act prohibits Contractors of the State, and their Subcontractors, from discriminating against any employee or applicant for employment, with respect to hire, tenure, terms, conditions, compensation, or privileges of employment because of race, color, religion, sex, disability, marital status, or national origin (Neb. Rev. Stat. §§ 48-1101 through 48-1125). The Contractor guarantees compliance with the Nebraska Fair Employment Practice Act, and breach of this provision shall be regarded as a material breach of contract. The Contractor shall insert a similar provision in all Subcontracts for goods or services to be covered by any contract resulting from this solicitation.

D. DISCOUNTS

Prices quoted shall be inclusive of ALL trade discounts. Cash discount terms of less than thirty (30) days will not be considered as part of the proposal. Cash discount periods will be computed from the date of receipt of a properly executed claim voucher or the date of completion of delivery of all items in a satisfactory condition, whichever is later.

E. PRICES

Prices quoted shall be net, including transportation and delivery charges fully prepaid by the contractor, F.O.B. destination named in the solicitation. No additional charges will be allowed for packing, packages, or partial delivery costs. When an arithmetic error has been made in the extended total, the unit price will govern.

All prices, costs, and terms and conditions submitted in the proposal shall remain fixed and valid commencing on the opening date of the proposal until an award is made or the ITB is cancelled.

The State reserves the right to deny any requested price increase. No price increases are to be billed to any State Agencies prior to written amendment of the contract by the parties.

F. COST CLARIFICATION

The State reserves the right to review all aspects of cost for reasonableness and to request clarification of any proposal where the cost component shows significant and unsupported deviation from industry standards or in areas where detailed pricing is required.

G. PERMITS, REGULATIONS, LAWS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within	NOTES/COMMENTS:
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--		Solicitation Response (Initial)	
JAE			

The contract price shall include the cost of all royalties, licenses, permits, and approvals, whether arising from patents, trademarks, copyrights or otherwise, that are in any way involved in the contract. The Contractor shall obtain and pay for all royalties, licenses, and permits, and approvals necessary for the performance of the contract. The Contractor must guarantee that it has the full legal right to the materials, supplies, equipment, software, and other items used to execute this contract.

H. NOTICE OF POTENTIAL CONTRACTOR BREACH

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

If Contractor breaches the contract or anticipates breaching the contract the Contractor shall immediately give written notice to the State. The notice shall explain the breach or potential breach, and may include a request for a waiver of the breach if so desired. The State may, at its discretion, temporarily or permanently waive the breach. By granting a temporary waiver, the State does not forfeit any rights or remedies to which the State is entitled by law or equity, or pursuant to the provisions of the contract. Failure to give immediate notice, however, may be grounds for denial of any request for a waiver of a breach.

I. ANTITRUST

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

The Contractor hereby assigns to the State any and all claims for overcharges as to goods and/or services provided in connection with this contract resulting from antitrust violations which arise under antitrust laws of the United States and the antitrust laws of the State.

J. CONFLICT OF INTEREST

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JAE			

By submitting a proposal, Contractor certifies that there does not now exist a relationship between the Contractor and any person or entity which is or gives the appearance of a conflict of interest related to this solicitation or project.

The Contractor certifies that it shall not take any action or acquire any interest, either directly or indirectly, which will conflict in any manner or degree with the delivery of its goods and services hereunder or which creates an actual or an appearance of conflict of interest.

The Contractor certifies that it will not employ any individual known by Contractor to have a conflict of interest.

The Parties shall not knowingly, for a period of two (2) years after execution of the contract, recruit or employ any employee or agent of the other Party who has worked on the solicitation or project, or who had any influence on decisions affecting the solicitation or project.

K. ADVERTISING

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
GAE			

The Contractor agrees not to refer to the contract award in advertising in such a manner as to state or imply that the company or its goods and services are endorsed or preferred by the State. Any publicity releases pertaining to the project shall not be issued without prior written approval from the State.

L. DRUG POLICY

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
GAE			

Contractor certifies it maintains a drug free work place environment to ensure worker safety and workplace integrity. Contractor agrees to provide a copy of its drug free workplace policy at any time upon request by the State.

M. WARRANTY

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
		GAE	PLEASE SEE "EXCEPTIONS TO TERMS AND CONDITIONS" FOR ADDITIONAL LANGUAGE.

Despite any clause to the contrary, the Contractor represents and warrants that its services hereunder shall be performed by competent personnel and shall be of professional quality consistent with generally accepted industry standards for the performance of such services and shall comply in all respects with the requirements of this Contract. For any breach of this warranty, the Contractor shall, for a period of ninety (90) days from performance of the service, perform the services again, at no cost to Customer, or if Contractor is unable to perform the services as warranted, Contractor shall reimburse Customer the fees paid to Contractor for the unsatisfactory services. The rights and remedies of the parties under this warranty are in addition to any other rights and remedies of the parties provided by law or equity, including, without limitation actual damages, and, as applicable and awarded under the law, to a prevailing party, reasonable attorneys' fees and costs.

IV. PAYMENT

A. PROHIBITION AGAINST ADVANCE PAYMENT (Statutory)

Neb. Rev. Stat. §§81-2403 states, "[n]o goods or services shall be deemed to be received by an agency until all such goods or services are completely delivered and finally accepted by the agency."

B. TAXES (Statutory)

The State is not required to pay taxes and assumes no such liability as a result of this solicitation. The Contractor may request a copy of the Nebraska Department of Revenue, Nebraska Resale or Exempt Sale Certificate for Sales Tax Exemption, Form 13 for their records. Any property tax payable on the Contractor's equipment which may be installed in a state-owned facility is the responsibility of the Contractor.

C. INVOICES

Invoices for payments must be submitted by the Contractor to the agency requesting the services with sufficient detail to support payment. Mail invoices to NET, 1800 N 33rd St., Lincoln, NE 68503. The terms and conditions included in the Contractor's invoice shall be deemed to be solely for the convenience of the parties. No terms or conditions of any such invoice shall be binding upon the State, and no action by the State, including without limitation the payment of any such invoice in whole or in part, shall be construed as binding or estopping the State with respect to any such term or condition, unless the invoice term or condition has been previously agreed to by the State as an amendment to the contract.

D. PAYMENT (Statutory)

Payment will be made by the responsible agency in compliance with the State of Nebraska Prompt Payment Act (See Neb. Rev. Stat. §81-2403). The State may require the Contractor to accept payment by electronic means such as ACH deposit. In no event shall the State be responsible or liable to pay for any goods and services provided by the Contractor prior to the Effective Date of the contract, and the Contractor hereby waives any claim or cause of action for any such services.

E. LATE PAYMENT (Statutory)

The Contractor may charge the responsible agency interest for late payment in compliance with the State of Nebraska Prompt Payment Act (See Neb. Rev. Stat. §§ 81-2401 through 81-2408).

F. SUBJECT TO FUNDING / FUNDING OUT CLAUSE FOR LOSS OF APPROPRIATIONS (Statutory)

The State's obligation to pay amounts due on the Contract for a fiscal years following the current fiscal year is contingent upon legislative appropriation of funds. Should said funds not be appropriated, the State may terminate the contract with respect to those payments for the fiscal year(s) for which such funds are not appropriated. The State will give the Contractor written notice thirty (30) calendar days prior to the effective date of termination. All obligations of the State to make payments after the termination date will cease. The Contractor shall be entitled to receive just and equitable compensation for any authorized work which has been satisfactorily completed as of the termination date. In no event shall the Contractor be paid for a loss of anticipated profit.

G. RIGHT TO AUDIT (First Paragraph is Statutory)

The State shall have the right to audit the Contractor's performance of this contract upon a thirty (30) day written notice. Contractor shall utilize generally accepted accounting principles, and shall maintain the accounting records, and other records and information relevant to the contract (Information) to enable the State to audit the contract. (Neb. Rev. Stat. § 84-304 et seq.) The State may audit and the Contractor shall maintain the information during the term of the contract and for a period of five (5) years after the completion of this contract or until all issues or litigation are resolved, whichever is later. The Contractor shall make the information available to the State at Contractor's place of business or a location acceptable to both Parties during normal business hours. If this is not practical or the Contractor so elects, the Contractor may provide electronic or paper copies of the Information. The State reserves the right to examine, make copies of, and take notes on any information relevant to this contract, regardless of the form or the Information, how it is stored, or who possesses the Information. In no circumstances will contractor be required to create or maintain documents not kept in the ordinary course of contractor's business operations, nor will contractor be required to disclose any information, including but not limited to product cost data, which is confidential or proprietary to contractor.

Accept	Reject	Reject & Provide	NOTES/COMMENTS:
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(Initial)	(Initial)	Alternative within Solicitation Response (Initial)	
		JAE	PLEASE SEE "EXCEPTIONS TO TERMS AND CONDITIONS" FOR ADDITIONAL DETAILS.

The Parties shall pay their own costs of the audit unless the audit finds a previously undisclosed overpayment by the State. If a previously undisclosed overpayment exceeds three percent (3%) of the total contract billings, or if fraud, material misrepresentations, or non-performance is discovered on the part of the Contractor, the Contractor shall reimburse the State for the total costs of the audit. Overpayments and audit costs owed to the State shall be paid within ninety (90) days of written notice of the claim. The Contractor agrees to correct any material weaknesses or condition found as a result of the audit.

V. SCOPE OF WORK

The Contractor must provide the following Information in response to this solicitation.

A. SCOPE

The Intent of this request for NET (Nebraska Educational Telecommunications) Is to replace three low power TV transmitters at three sites that are displaced out of the 600MHz band. Displacement Applications for the three sites were granted by the FCC and expire in July 2021 therefore the project must be completed by that time. It is intended for these transmitters to be purchased together as a one-time purchase. The contractor must provide all three transmitters listed below.

50W UHF Channel 27
600W UHF Channel 31
1400W UHF Channel 21

A special consideration is required for the 600W transmitter listed above. This transmitter must be quoted as rack mountable but without rack. Transmitter will be installed in an existing outdoor rated air conditioned weathertight 19" equipment rack. Transmitter must be 8RU or smaller physical size. Enclosure dimensions available upon request.

For technical details regarding each of the power levels listed above, please see the sections labeled "Technical Specifications" later in this document.

It is the intent of this solicitation to issue a purchase order for the Item(s) requested.

All items proposed shall be of the latest manufacture in production as of the date of the solicitation and be of proven performance and under standard design complete as regularly advertised and marketed. All necessary materials for satisfactory performance of the supplies shall be incorporated into the replacement of three low power TV transmitters that are displaced out of the 600MHz band whether or not they may be specifically mentioned below.

Complete specifications, manufacturer's current descriptive literature and/or advertising data sheets with cuts or photographs must be included with the proposal for the IDENTICAL items proposed. Any information necessary to show compliance with these specifications not given on the manufacturer's descriptive literature and/or advertising data sheets must be supplied in writing on or attached to the proposal document. If manufacturer's information necessary to show compliance with these specifications is not attached to the proposal document, the Contractor may be required to submit requested information within three (3) business days of a written request. Failure to submit requested descriptive literature or advertising data sheets may be grounds to reject the proposal.

VI. TECHNICAL SPECIFICATIONS

A. CONTRACTOR INSTRUCTIONS

Contractor must respond to each of the following statements. Specifications listed are minimum conditions that must be met in order for a Contractor to qualify for the award.

"YES" response means the Contractor guarantees they can meet this condition.

"NO" response means the Contractor cannot meet this condition and will not be considered.

"NO & PROVIDE ALTERNATIVE" responses should be used only with a narrative response in the NOTES/COMMENTS section explaining in detail any deviation from the Contractor's ability to meet the condition, and an explanation of how this would be determined to be an acceptable alternative to meeting the condition. Alternatives must be detailed in such a way that allows such deviations to be fully evaluated. The State shall determine at its sole discretion whether or not the Contractor's alternative is an acceptable alternative.

B. NON-COMPLIANCE STATEMENT

YES	NO	NO & PROVIDE ALTERNATIVE	
X			1. Read these specifications carefully. Any and all exceptions to these specifications must be written on or attached to solicitation response. Any noncompliance may void your proposal. Non-compliance to any single specification can void your proposal.
X			2. It is the responsibility of Contractors to obtain information and clarifications as provided below. The State is not responsible for any erroneous or incomplete understandings or wrongful interpretations of this solicitation by any Contractor.
X			3. No interpretation related to the meaning of solicitation specifications or other pre-proposal documents will be made orally to any Contractor by the State. Any solicitation interpretation must be put in writing by the Contractor to: the State Purchasing Bureau, E-mail questions to SPB. as.materielpurchasing@nebraska.gov by the last day to submit written questions per the Schedule of Events. (Inquiries received after the last day to submit written questions may not be addressed).
NOTES/COMMENTS:			

C. TECHNICAL SPECIFICATIONS: 50W UHF Transmitter (50W at output of transmitter), for Channel 27. High-Efficiency, Solid State, Air Cooled, Digital UHF Transmitter, 120VAC 60Hz

YES	NO	NO & PROVIDE ALTERNATIVE	
X			1. Transmitter will be capable of producing 50W at output of the transmitter. Transmitter shall employ high-efficiency, solid state devices, air cooling, and broadband UHF amplifiers
X			2. Transmitter power output shall be adjustable via front panel, parallel remote, web interface and SNMP interface from 0dB to -13dB of rated output power

X			3. Transmitter power output shall be adjustable via front panel, parallel remote, web interface and SNMP Interface from 0dB to -10dB of rated output power
X			4. It shall be possible to turn the transmitter RF output ON and OFF from the front panel, parallel remote, web remote and SNMP interface
X			5. AC power input shall accept single-phase 110-240VAC, 50/60Hz
X			6. Transmitter shall be designed for unattended remote control operation, compatible with standard commercial parallel remote control systems and must be capable of remote control from built-in web interface and SNMP protocol
X			7. Sideband performance shall be compliant with FCC emission mask requirements, measured at the directional located at the output of the mask filtered provided
X			8. Harmonic and Spurious performance shall meet all FCC requirements specified for UHF television over-the-air broadcast systems. If an external harmonic filter is required it shall be included in the proposal as a separate line item with the transmitter system
X			9. The exciter shall include two, auto-switching ASI/SMPTE-310M inputs for ATSC 1.0. For ATSC 3.0 the exciter shall include at least one (1) native 1GBE TSolP input. TSolP input connectors shall be RJ-45, female
X			10. Exciter shall be upgradeable to ATSC 3.0 mode with minimum effort. Exciter to be shipped with ATSC 1.0 configuration. Provide brief description of process for upgrading to ATSC 3.0 here or as attachment: 11. See notes below
X			12. 6 pole external standard mask reflective bandpass filter for use with proposed transmitter broadcasting ATSC digital signal utilizing a 6MHz channel shall be provided as a line item in the system proposal.
X			13. Mask Filter shall be tuned and tested for channel specified prior to shipment. Mask Filter shall be capable of being retuned to any standard 6MHz channel across the VHF Band I TV band
X			14. Insertion loss of the Mask Filter shall be no greater 1.1 dB
X			15. Mask Filter shall include a directional coupler at the output and provide a calibrated forward power sample.
NOTES/COMMENTS: A software keycode and 1 RU IT Server model SDE900 is needed to upgrade the exciter to ATSC 3.0			

E. TECHNICAL SPECIFICATIONS: 1400W UHF Transmitters (1400W at output of transmitter), for Channel 21, High-Efficiency, Solid State, Air Cooled, Digital UHF Transmitter, 208-240VAC single phase 60Hz

YES	NO	NO & PROVIDE ALTERNATIVE	
X			1. Transmitter will be capable of producing 1400 Watts at output of the transmitter. Transmitter shall employ high-efficiency, solid state devices, air cooling, and broadband UHF amplifiers
X			2. Shall include one shelf spare PA module as an option.

E. DELIVERY ARO

YES	NO	NO & PROVIDE ALTERNATIVE	
X			1. At the time of delivery, a designated State employee will sign the "invoice/packing slip." This signature will only indicate that the order has been received and that the items actually delivered agree with the delivery invoice. This signature does not indicate all items were received in good condition and/or that there is not possible hidden damage.
NOTES/COMMENTS:			

F. DELIVERY LOCATIONS / INSTRUCTIONS (CONTRACTOR AGREES THAT THEY CAN MEET THE DELIVERY LOCATIONS/INSTRUCTIONS)

YES	NO	NO & PROVIDE ALTERNATIVE	
X			1. Nebraska Educational Telecommunications, 1800 N 33 rd St., Lincoln, NE 68503
NOTES/COMMENTS:			

G. PACKAGING

YES	NO	NO & PROVIDE ALTERNATIVE	
X			1. Packages are to be clearly marked with size, weight, color, quantity, and the purchase order number.
X			2. Packaging must be of suitable size and of sufficient strength to protect the contents during shipping, handling and storage.
NOTES/COMMENTS:			

K. WARRANTY

YES	NO	NO & PROVIDE ALTERNATIVE	
X			<p>1. The Contractor warrants for a period of three (3) years from the date of Acceptance that: (a) the Products perform according to all specific claims that the Contractor made in its response to the solicitation, (b) the Product is suitable for the ordinary purposes for which such Product is used, (c) the Product is suitable for any special purposes identified in the solicitation or for which the State has relied on the Contractor's skill or judgment, (d) the Product is designed and manufactured in a commercially reasonable manner, and (e) the Product is free of defects. Upon breach of the warranty, the Contractor will repair or replace (at no charge to the State) the Product whose nonconformance is discovered and made known to the Contractor. If the repaired and/or replaced Product proves to be inadequate, or fails of its essential purpose, the Contractor will refund the full amount of any payments that have been made. The rights and remedies of the parties under this warranty are in addition to any other rights and remedies of the parties provided by law or equity, including, without limitation actual damages, and, as applicable and awarded under the law, to a prevailing party, reasonable attorneys' fees and costs.</p>
<p>NOTES/COMMENTS:</p>			

Form A Contractor Contact Sheet

Invitation To Bid Number 6079 OF

Form A should be completed and submitted with each response to this solicitation. This is intended to provide the State with information on the Contractor's name and address, and the specific person(s) who are responsible for preparation of the Contractor's response.

Preparation of Solicitation Contact Information	
Contractor Name:	Rohde & Schwarz USA, Inc.
Contractor Address:	6821 Benjamin Franklin Drive, Columbia, MD 21046
Contact Person & Title:	Greg Martin, Account Manager
E-mail Address:	Greg.Martin@rsa.rohde-schwarz.com
Telephone Number (Office):	224-653-8647
Telephone Number (Cellular):	630-267-5929
Fax Number:	410-910-7801

Each Contractor shall also designate a specific contact person who will be responsible for responding to the State if any clarifications of the Contractor's response should become necessary.

Communication with the State Contact Information	
Contractor Name:	Rohde & Schwarz USA, Inc.
Contractor Address:	6821 Benjamin Franklin Drive, Columbia, MD 21046
Contact Person & Title:	Jennifer Engelhard, Contracts & Trade Compliance Supervisor
E-mail Address:	Jen.Engelhard@rsa.rohde-schwarz.com
Telephone Number (Office):	410-910-7894
Telephone Number (Cellular):	202-302-1461
Fax Number:	410-910-7801



Rohde & Schwarz USA, Inc.

Rohde & Schwarz USA, Inc.
6821 Benjamin Franklin Dr. / Columbia MD 21046 / US

Quotation Contact:

Phone +1 630-267-5929
greg.martin@rsa.rohde-schwarz.com

Ms. Julie Dabydeen
Nebraska Educational Telecommunications
1800 North 33rd St
LINCOLN NE 68503

May 9, 2019

Subject: NETV CH27 TLU9 Transmitter System
Quote Number: 195229.0

Main Number +1 888-837-8772
www.rsa.rohde-schwarz.com

Thank you for your interest in Rohde & Schwarz USA, Inc.
Attached is the requested quote.

To place an order, e-mail purchase order to: rsaorders@rsa.rohde-schwarz.com,
or fax to +1 410-910-7825. Should you require assistance with your order,
please call
+1 410-910-7989.

To expedite processing of your order, please provide your Rohde & Schwarz
quotation number on your submitted purchase order.

Sincerely,

Rohde & Schwarz USA, Inc.

Item	Model	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
1	R&S®TLX9 Description / Estimated Delivery (Weeks) configured as:		1	10,542.60 -39.69%	10,542.60 6,358.31
	Analog/Digital: Single Transmitter / GapFiller DTV Standard: ATSC Mains supply: 90 V...265 V AC 50/60 Hz Nominal output power: 50 W Frequency band: UHF Band 4/5 Customer settings: Country of Delivery:USA Station:NETV CH27 Output power set to: Channel No: 27 fc(centerfrequency): 551.00 MHz offset: 0.00000 kHz Bandwidth: 6 MHz Software freeze:00.0.0				
1.1	R&S®TLX9 Broadcast Transmitter TLx9		1		
1.1.1	R&S®TLX9 TLU9 Base Unit 2U	2506.5001K02	1		
	Warranty: 12 months				
	R&S®TLX9 TLU9 Base Unit 2U	2506.5001.20	1		
	R&S®TLX9-B02 TLX9 Advanced Transmitter Exciter Board DTV	2506.8023.02	1		
	R&S®TLX9-B43 TLU9 Amplifier Module 50W	2506.8430.02	1		

Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
	R&S®TLX9-B22 TLU9 Air Filter Kit for 2U	2506.8223.02	1		
	R&S®TLX9K41 SOFTWARE OPTION ATSC	2506.9413.02	1		
	R&S®TLX9K31 Software option IP input	2506.9313.02	1		
	R&S®TLX9K71 Software option Redundant signal feeding	2506.9713.02	1		
	R&S®TLX9K85 Software option 50W	2506.9859.02	1		
	R&S®TLX9K65 Software option HTML5 GUI (software license)	2506.9659.02	1		
	R&S®TLX9 Final test protocol TLx9 printed	2506.5160.02	1		
	R&S®ERST.2 CD manual TLU9 english	2506.5101.04	1		
	R&S®TLX9 TLX9 Packing 2HU	2506.5218.20	1		
1.1.2	Accessories				
	R&S®TX9-T23 Cable for ADE measurements after bandpass filter	2600.0821.05	1		
	Warranty: 12 months				
	R&S®TDU901 Transmitter Display Unit with Touchscreen for TLx9 without LAN Interface	2510.2703.12	1		
	Warranty: 12 months				

Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
	R&S®BWTX9 Warranty PLUS: Service level BASIC (12 months) for R&S TLx9. Includes repairs, SW updates, access to online ticketing system and technical support.	2505.5120.76	1		
2	R&S®TMU9-T57 Harmonic filter broadband 7/16 input/output for 3rd party racks incl. Installationmaterial with RF-Cable Warranty: 12 months	2600.0850.13	1	1,395.60 -39.69%	1,395.60 841.70
3	R&S®SLATLX9 Service Level Agreement, Silver 3 years for R&S®TLx9	3632.5331.04	1	1,300.00 -50.00%	1,300.00 650.00
4	Shipping		1	250.00	250.00
4.1	Shipping		1	250.00	250.00
5	RF System		1	988.64	988.64
5.1	ATSC Mask Filter Dielectric UHF 6 Pole ATSC Mask Filter Includes Directional Coupler Includes 6' N-N Connection Cable		1	988.64	988.64
				Gross Price	USD 14,476.84
				Total Item Discount	-37.22% -5,388.19
				Total Net Price	USD 9,088.65

Essential technical modifications may make it necessary to replace certain items ordered by the customer with new successor items. In this case, the customer agrees to the modification of the subject matter of the contract even after placement of the order, provided that the agreed terms and conditions are retained and that the successor item complies with the technical specifications of the item ordered by the customer.

The customer has to make all payments from a bank account under their name. The customer is liable for all payments from the contractual relationship and must ensure compliance with all applicable legislation, in particular on the prevention of money laundering.



ROHDE & SCHWARZ



****MODEL IS SUBJECT TO EXPORT CONTROL REGULATIONS OF THE FEDERAL REPUBLIC OF GERMANY WHERE THIS PRODUCT WILL ORIGINATE.**

- Delivery:** FOB (Free on board)
Destination: US
Ship via: Rohde & Schwarz Preferred Carrier
- Delivery Time:** The delivery period stated reflects the situation at the time the offer is made. The planned delivery date will be confirmed in the order acknowledgment.
- Payment:** 25% downpayment, 75% 30 days after date of invoice
- Validity:** This offer shall be valid until July 07, 2019.
- Quote Number:** Please include the quote reference number on your purchase order.
- Sales Tax:** Quotation does not include sales tax, or value added tax. Please provide any applicable sales tax exemption certificates, or direct pay information with your order.
- First Time Customers:** Please include your Dunn & Bradstreet number and standard credit reference sheet.
- Terms & Conditions:** This offer is subject to and limited to the terms and conditions contained on the face hereof and the terms and conditions of the agreement identified above or, if no such agreement is so identified, the Rohde & Schwarz Terms and Conditions of Sale, following on a separate page. In case of conflict, the order of precedence will be 1) terms appearing on the face of this document and 2) the terms and conditions of the agreement identified above or the Rohde & Schwarz Terms and Conditions of Sale, whichever is applicable. No additional or different terms listed or referenced on your purchase order will apply.

TERMS AND CONDITIONS OF SALE 04/2012

1. THE TERMS CONTROL THE AGREEMENT:

The Buyer's purchase order confirms acceptance of the Rohde & Schwarz USA, Inc. (R&S) offer to deliver products and/or services ("Products") according to these terms, and such additional or different terms as stated in the R&S quotation. Any terms or conditions of the Buyer's order, or contained in any other communication from the Buyer, which are inconsistent with or in addition to the terms and conditions contained herein shall not be binding on either party unless expressly accepted in writing by R&S. R&S's failure to object to any provisions contained in verbal or written communications from the Buyer shall not be the acceptance thereof or a waiver of these terms and conditions.

2. DELIVERY, TITLE AND RISK OF LOSS:

Delivery shall be FOB Buyer's designated ship to location in the United States ("Destination"), unless otherwise stated in the quotation. Orders for Products must specify delivery within 180 days from purchase order date unless otherwise stated in the quotation. Title and risk of loss will pass to Buyer in accordance with the stated Shipment Terms in the quotation. Acceptance by Buyer is presumed unless Buyer notifies R&S in writing within 10 days after delivery that the Products are non-conforming ("Acceptance"). R&S will make a reasonable effort to meet the Buyer's requirements as to time of delivery and volume of Products. Partial deliveries are permitted. If R&S is unable to meet the Buyer's delivery requirements, including the firm delivery date, alternative arrangements may be agreed. In the absence of such agreement, the Buyer's sole remedy is the right to cancel its order.

3. PAYMENT AND SECURITY INTEREST:

R&S payment terms, conditional on approved credit, are net 30 days from date of invoice unless otherwise stated in writing by R&S. An order for a System, that includes Products configured to Buyer requirements, with a price of more than \$100,000 must be accompanied by a non-interest bearing down payment equal to 30% of the purchase price plus applicable taxes. R&S has the right to modify the payment terms after an order has been accepted if, in R&S's opinion, the payment record or financial condition of the Buyer so warrants, or if R&S otherwise has grounds to feel insecure about receiving payment. Any dispute about the quality or condition, performance or functioning of Products supplied, or otherwise in connection with the terms and conditions set out herein, shall not entitle the Buyer to refuse to pay for the Products. Late payments shall be subject to an interest charge of 1.5% per month on the unpaid balance. R&S reserves a security interest in the Products, and any products or proceeds thereof until payment in full has been received by R&S. R&S may perfect its security interest by any necessary filings in public registers, and Buyer shall cooperate therewith as required by law until payment in full, for the Products sold and any other amounts owed by Buyer to R&S, has been received.

4. PRICES AND TAXES:

Prices are quoted FOB Destination, unless otherwise stated in the quotation. Any sales or use tax shall be borne by the Buyer and unless collected by R&S, shall be paid by the Buyer directly to the relevant government authorities. Unless otherwise stated on the quotation, all R&S quotations are valid for thirty (30) days from issuance.

5. RESCHEDULING, CANCELLATION & RESTOCKING:

A request to reschedule or cancel an order must be made in writing to R&S and received no later than 45 days before the scheduled ship date. R&S may refuse or accept the request, with or without charging the rescheduling/cancellation fee of 5% of the order value for the affected Product. A request to reschedule a shipment cannot exceed 180 days from the original purchase order date.

A request to return a Product must be made in writing to R&S and received no later than 30 days after receipt of Product. R&S may refuse or accept the request, with or without charging the restocking fee of 15% of the net order value for the Product being returned. The original packaging must be unopened, and Buyer must follow R&S return instructions. The return of spare parts are subject to a \$100 restocking charge per order. Freight pre-paid or service completed by R&S is not refundable.

6. EXCUSABLE DELAYS:

R&S shall not be liable for nondelivery or delay if directly or indirectly caused by fires, floods, accidents, riots, war, governmental interference or embargoes, strikes or shortage of labor, or other difficulties (whether or not similar in nature to any of those specified) beyond its reasonable control, or if performance would cause R&S to incur unreasonable expense. Delivery shall be suspended so long as any such causes delay performance. R&S agrees to make, and the Buyer agrees to accept, deliveries whenever such causes no longer exists. If such cause continues for more than 180 Days the order may be cancelled.

7. INDEMNITY:

At its expense, R&S will settle or defend and pay all damages and costs finally awarded in any action brought against Buyer to the extent that it is based on a claim that the Product infringes any patent, copyright, or other intellectual property right of a third party in the country of delivery, provided Buyer promptly gives R&S the notice, authority and assistance necessary to defend or settle the claim and the infringement does not arise out of compliance with the Buyer's specifications, or a combination with or an addition to products not supplied by R&S, or from a modification after delivery. If any Product is in R&S's opinion likely to cause a claim of infringement, R&S at its option and expense may procure for Buyer the right to continue using the Product, or modify it to make it noninfringing, or replace it with a substantially equivalent noninfringing Product, or recall it and grant Buyer a credit for the depreciated value of the Product after it is returned to R&S. Upon such recall, R&S shall have no further obligation or liability relating to the infringing Product other than the obligation to defend or settle the infringement claim as set forth above.

8. SOFTWARE:



The Buyer will not acquire title to any software incorporated in, accompanying, or delivered for use with the Products. R&S grants a perpetual nonexclusive license to use such software on one unit of Product. R&S may terminate the license if licensee (Buyer) discloses the software to others who are using the Product without R&S's written consent. Back-up copies of the software may be made for archiving purposes or for purposes expressly authorized by R&S, and licensee may sublicense the software in the event of transfer of said one unit of Product. All copies must bear the copyright notes as the original. Disassembly, recompilation and reverse engineering of any software is strictly prohibited.

The above provisions shall also apply to any modifications or supplements made to the software or associated documentation. The Buyer undertakes, in the event of a resale of Product and/or software, to impose the above obligations on its customer.

R&S reserves any other rights to the software and the documentation.

9. **WARRANTY:**

R&S warrants each Product manufactured by Rohde & Schwarz to be free from defects in material and workmanship under normal use and service. Software is warranted to operate in accordance with its programmed instructions on appropriate Products. It is not warranted to be error free. The warranty period shall be one year from the date of Acceptance. R&S's obligation under this warranty is limited to repairing or replacing a Product that is returned to an authorized Service Center within the applicable warranty period and that upon examination, R&S determines to be defective. Products that have been repaired or replaced may include remanufactured materials which are equivalent to new in performance and functionality. If R&S determines the failure has been caused by misuse, neglect, accident or abnormal condition of operation, repairs will be made and Buyer shall be billed for the reasonable costs of repair. R&S shall not be responsible for any malfunctioning or defect of the Products in the event that the Buyer shall have made modifications thereto unauthorized by R&S.

Additional terms applicable for Repair and Calibration Services are available upon request.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHERS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE.

10. **LIMITATION OF REMEDIES AND LIABILITY:**

THE REMEDIES OF THE BUYER WITH RESPECT TO THE PRODUCTS SOLD, ANY WARRANTY, ANY INDEMNITY OR ANYTHING TO BE DONE BY R&S IN CONNECTION HERewith, SHALL BE EXCLUSIVELY AS SET FORTH HEREIN, AND THE LIABILITY OF R&S SHALL NOT, EXCEPT AS OTHERWISE PROVIDED IN SECTION 7, EXCEED THE PRICE OF THE PRODUCTS WITH RESPECT TO WHICH SUCH LIABILITY ARISES. IN NO EVENT SHALL R&S BE LIABLE FOR ANY LOSS OF PROFIT OR USE, INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, WHETHER IN CONTRACT, WARRANTY, INDEMNITY, TORT OR OTHERWISE.

11. **EXPORT RESTRICTIONS:**

Products may be subject to export restrictions and end user certification. Buyer shall not export, re-export, or transfer, directly or indirectly, any Product or technical data received hereunder, to any country or user to which such actions are restricted by United States or local country law or regulation without first obtaining any required governmental license, authorization, certification or approval. Buyer shall be responsible for United States export duties, fees, licenses and such, in addition to any import duties imposed by the country of destination.

12. **GENERAL:**

This agreement is not assignable without approval of R&S, which approval shall not be unreasonably withheld. If any of the terms or provisions of this agreement shall be declared in violation of law, the remaining terms and provisions shall remain in full force and effect. The laws of the State of Maryland shall govern this agreement. Any dispute relating to this order shall be submitted to the courts in that State, and the Buyer accepts the exclusive jurisdiction of such courts for any action by or against R&S.

ROHDE & SCHWARZ USA, INC., 6821 Benjamin Franklin Drive, Columbia, MD 21046
Tel. (410) 910-7800 Fax. (410) 910-7801
v.04-2012_RSA



Rohde & Schwarz USA, Inc.

Rohde & Schwarz USA, Inc.
6821 Benjamin Franklin Dr. / Columbia MD 21046 / US

Ms. Julie Dabydeen
Nebraska Educational Telecommunications
1800 North 33rd St
LINCOLN NE 68503

Quotation Contact:

Phone +1 630-267-5929
greg.martin@rsa.rohde-schwarz.com

May 9, 2019

Subject: NETV CH21 TMU9-1 Transmitter System
Quote Number: 195291.0

Main Number +1 888-837-8772

www.rsa.rohde-schwarz.com

Thank you for your interest in Rohde & Schwarz USA, Inc.
Attached is the requested quote.

To place an order, e-mail purchase order to: rsaorders@rsa.rohde-schwarz.com,
or fax to +1 410-910-7825. Should you require assistance with your order,
please call
+1 410-910-7989.

To expedite processing of your order, please provide your Rohde & Schwarz
quotation number on your submitted purchase order.

Sincerely,

Rohde & Schwarz USA, Inc.

Item	Model	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
1	R&S®TX9 Description / Estimated Delivery (Weeks)		1	31,411.31	31,411.31
	consisting of Transmitters System and accessories			-36.33%	20,000.00
1.1	R&S®TX9 consisting of: 1 transmitter(s) Rack: 3rd party integration kit System configuration: Single Transmitter Mains voltage: 190 - 240 V ± 10 % RF output: amplifier current software version 00.0.0		1		
1.1.1	R&S®TX9 configured as: Single Drive Analog/Digital: Digital Television (DTV) DTV Standard: ATSC Efficiency mode: Normal Mode Output power: 0.6 kW* Number of amplifier:1 Band: UHF Band 4 Bandwidth: 6 MHz Customer definition: Software Freeze: current software version, 00.0.0 Channel: 31, fc: 575.00 MHz, offset: 0.00000 kHz		1		
	* Output power before output filter				
	Expert Mode: no				

Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
1.1.1.1	R&S®TMU9 TMU9 Transmitter Warranty: 12 months	2600.0015K02	1		
	R&S®TX9-T23 Cable for ADE measurements after bandpass filter	2600.0821.05	1		
	R&S®TX9-T23 Measurement direction coupler 150 MHz to 862 MHz input 7-16 socket, output 7-16 socket max. RF input power 1400 W rms 1 measuring system with N-socket"	2600.0821.16	1		
	R&S®TM9-T61 Integration kit 3rd party racks 1 amplifier, single drive without rack mounting rails and rack holders	2503.0050.51	1		
	R&S®TM9-T7 Power cable PMU901 3rd party rack integration worldwide use	2600.0667.59	1		
	R&S®SLX8000B16 Parallel remote interface TX9 small for TMx9/TLx9 9 commands, 12 messages fixed function	2100.3455.10	1		
	R&S®TMU9-T57 Harmonic filter broadband 7/16 input/output for 3rd party racks incl. Installationmaterial with RF-Cable	2600.0850.13	1		
1.1.1.2	R&S®PMU901 UHF amplifier band IV/V for TMU9 Warranty: 12 months	2600.1111K02	1		

Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
	R&S®PMU901 UHF amplifier band IV/V, air cooled DTV: 600 W rms single phase	2600.1111.02	1		
	R&S®PMU901-B20 Tunit normal mode 470 - 862 MHz	2600.2001.99	1		
	R&S®PMU901-B3 Dust filter PMU901/PMV901	2600.2024.02	1		
1.1.1.3	R&S®TCE900 TCE900 Transmitter components control unit configured as exciter Warranty: 12 months	2109.2000K02	1		
	R&S®TCE900 Basic unit TCE900	2109.2000.02	1		
	R&S®TCE900-M2 Extended coder board	2109.2397.03	1		
	R&S®TCE900-M3 RF board	2109.2597.02	1		
	R&S®TCE900K31 Software option IP input	2500.3613.02	1		
	R&S®TCE900K65 Software option HTML5 GUI	2500.3971.02	1		
1.1.2	R&S®TMU9 TM9-SYSTEM Warranty: 12 months	2600.0009K02	1		
	R&S®TDU900 Transmitter Display Unit with touch screen	2109.4760.03	1		



Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD	
Accessories:						
1.2	R&S®ERST.2 CD manual TM9 german/english System manual, operating manual, service manual level 1, Circuit documents/spare part lists simple transmitter, MultiTX, N+1 Warranty: 12 months	2600.5669.04	1			
1.3	R&S®PROJ.-D Packing SCx8000 with single exciter for sea freight / Packing for TMU9/TMV9 with 3rd party integration kit, all transportation forms Warranty: 12 months	2065.6712.70	1			
1.4	R&S®BWTMX9 Warranty PLUS: Service level BASIC (12 months) for R&S TMx9. Includes repairs, SW updates, access to online ticketing system and technical support.	2505.5195.76	1			
2	R&S®SLATMX9 Service Level Agreement, Silver 3 years for R&S®TMx9	3632.5325.04	1			
3	Shipping		1	1,000.00	1,000.00	
3.1	Shipping		1	1,000.00	1,000.00	
4	RF System		1	2,123.53	2,123.53	
4.1	ATSC Mask Filter Dielectric 600W 6 Pole ATSC Mask Filter Includes Directional Coupler Includes 7/16 Connection Cable		1	2,123.53	2,123.53	
				Gross Price	USD	38,734.84
				Total Item Discount	-37.21%	-14,411.31
				Total Net Price	USD	24,323.53

Essential technical modifications may make it necessary to replace certain items ordered by the customer with new successor items. In this case, the customer agrees to the modification of the subject matter of the contract even after placement of the order, provided that the agreed terms and conditions are retained and that the successor item complies with the technical specifications of the item ordered by the customer.



ROHDE & SCHWARZ

The customer has to make all payments from a bank account under their name. The customer is liable for all payments from the contractual relationship and must ensure compliance with all applicable legislation, in particular on the prevention of money laundering.



ROHDE & SCHWARZ

****MODEL IS SUBJECT TO EXPORT CONTROL REGULATIONS OF THE FEDERAL REPUBLIC OF GERMANY WHERE THIS PRODUCT WILL ORIGINATE.**

- Delivery:** FOB (Free on board)
Destination: US
Ship via: Rohde & Schwarz Preferred Carrier
- Delivery Time:** The delivery period stated reflects the situation at the time the offer is made. The planned delivery date will be confirmed in the order acknowledgment.
- Payment:** 25% downpayment, 75% 30 days after date of invoice
- Validity:** This offer shall be valid until July 08, 2019.
- Quote Number:** Please include the quote reference number on your purchase order.
- Sales Tax:** Quotation does not include sales tax, or value added tax. Please provide any applicable sales tax exemption certificates, or direct pay information with your order.
- First Time Customers:** Please include your Dunn & Bradstreet number and standard credit reference sheet.
- Terms & Conditions:** This offer is subject to and limited to the terms and conditions contained on the face hereof and the terms and conditions of the agreement identified above or, if no such agreement is so identified, the Rohde & Schwarz Terms and Conditions of Sale, following on a separate page. In case of conflict, the order of precedence will be 1) terms appearing on the face of this document and 2) the terms and conditions of the agreement identified above or the Rohde & Schwarz Terms and Conditions of Sale, whichever is applicable. No additional or different terms listed or referenced on your purchase order will apply.

TERMS AND CONDITIONS OF SALE 04/2012

1. THE TERMS CONTROL THE AGREEMENT:

The Buyer's purchase order confirms acceptance of the Rohde & Schwarz USA, Inc. (R&S) offer to deliver products and/or services ("Products") according to these terms, and such additional or different terms as stated in the R&S quotation. Any terms or conditions of the Buyer's order, or contained in any other communication from the Buyer, which are inconsistent with or in addition to the terms and conditions contained herein shall not be binding on either party unless expressly accepted in writing by R&S. R&S's failure to object to any provisions contained in verbal or written communications from the Buyer shall not be the acceptance thereof or a waiver of these terms and conditions.

2. DELIVERY, TITLE AND RISK OF LOSS:

Delivery shall be FOB Buyer's designated ship to location in the United States ("Destination"), unless otherwise stated in the quotation. Orders for Products must specify delivery within 180 days from purchase order date unless otherwise stated in the quotation. Title and risk of loss will pass to Buyer in accordance with the stated Shipment Terms in the quotation. Acceptance by Buyer is presumed unless Buyer notifies R&S in writing within 10 days after delivery that the Products are non-conforming ("Acceptance"). R&S will make a reasonable effort to meet the Buyer's requirements as to time of delivery and volume of Products. Partial deliveries are permitted. If R&S is unable to meet the Buyer's delivery requirements, including the firm delivery date, alternative arrangements may be agreed. In the absence of such agreement, the Buyer's sole remedy is the right to cancel its order.

3. PAYMENT AND SECURITY INTEREST:

R&S payment terms, conditional on approved credit, are net 30 days from date of invoice unless otherwise stated in writing by R&S. An order for a System, that includes Products configured to Buyer requirements, with a price of more than \$100,000 must be accompanied by a non-interest bearing down payment equal to 30% of the purchase price plus applicable taxes. R&S has the right to modify the payment terms after an order has been accepted if, in R&S's opinion, the payment record or financial condition of the Buyer so warrants, or if R&S otherwise has grounds to feel insecure about receiving payment. Any dispute about the quality or condition, performance or functioning of Products supplied, or otherwise in connection with the terms and conditions set out herein, shall not entitle the Buyer to refuse to pay for the Products. Late payments shall be subject to an interest charge of 1.5% per month on the unpaid balance. R&S reserves a security interest in the Products, and any products or proceeds thereof until payment in full has been received by R&S. R&S may perfect its security interest by any necessary filings in public registers, and Buyer shall cooperate therewith as required by law until payment in full, for the Products sold and any other amounts owed by Buyer to R&S, has been received.

4. PRICES AND TAXES:

Prices are quoted FOB Destination, unless otherwise stated in the quotation. Any sales or use tax shall be borne by the Buyer and unless collected by R&S, shall be paid by the Buyer directly to the relevant government authorities. Unless otherwise stated on the quotation, all R&S quotations are valid for thirty (30) days from issuance.

5. RESCHEDULING, CANCELLATION & RESTOCKING:

A request to reschedule or cancel an order must be made in writing to R&S and received no later than 45 days before the scheduled ship date. R&S may refuse or accept the request, with or without charging the rescheduling/cancellation fee of 5% of the order value for the affected Product. A request to reschedule a shipment cannot exceed 180 days from the original purchase order date.

A request to return a Product must be made in writing to R&S and received no later than 30 days after receipt of Product. R&S may refuse or accept the request, with or without charging the restocking fee of 15% of the net order value for the Product being returned. The original packaging must be unopened, and Buyer must follow R&S return instructions. The return of spare parts are subject to a \$100 restocking charge per order. Freight pre-paid or service completed by R&S is not refundable.

6. EXCUSABLE DELAYS:

R&S shall not be liable for nondelivery or delay if directly or indirectly caused by fires, floods, accidents, riots, war, governmental interference or embargoes, strikes or shortage of labor, or other difficulties (whether or not similar in nature to any of those specified) beyond its reasonable control, or if performance would cause R&S to incur unreasonable expense. Delivery shall be suspended so long as any such causes delay performance. R&S agrees to make, and the Buyer agrees to accept, deliveries whenever such causes no longer exists. If such cause continues for more than 180 Days the order may be cancelled.

7. INDEMNITY:

At its expense, R&S will settle or defend and pay all damages and costs finally awarded in any action brought against Buyer to the extent that it is based on a claim that the Product infringes any patent, copyright, or other intellectual property right of a third party in the country of delivery, provided Buyer promptly gives R&S the notice, authority and assistance necessary to defend or settle the claim and the infringement does not arise out of compliance with the Buyer's specifications, or a combination with or an addition to products not supplied by R&S, or from a modification after delivery. If any Product is in R&S's opinion likely to cause a claim of infringement, R&S at its option and expense may procure for Buyer the right to continue using the Product, or modify it to make it noninfringing, or replace it with a substantially equivalent noninfringing Product, or recall it and grant Buyer a credit for the depreciated value of the Product after it is returned to R&S. Upon such recall, R&S shall have no further obligation or liability relating to the infringing Product other than the obligation to defend or settle the infringement claim as set forth above.

8. SOFTWARE:

The Buyer will not acquire title to any software incorporated in, accompanying, or delivered for use with the Products. R&S grants a perpetual nonexclusive license to use such software on one unit of Product. R&S may terminate the license if licensee (Buyer) discloses the software to others who are using the Product without R&S's written consent. Back-up copies of the software may be made for archiving purposes or for purposes expressly authorized by R&S, and licensee may sublicense the software in the event of transfer of said one unit of Product. All copies must bear the copyright notes as the original. Disassembly, recompilation and reverse engineering of any software is strictly prohibited.

The above provisions shall also apply to any modifications or supplements made to the software or associated documentation. The Buyer undertakes, in the event of a resale of Product and/or software, to impose the above obligations on its customer.

R&S reserves any other rights to the software and the documentation.

9. **WARRANTY:**

R&S warrants each Product manufactured by Rohde & Schwarz to be free from defects in material and workmanship under normal use and service. Software is warranted to operate in accordance with its programmed instructions on appropriate Products. It is not warranted to be error free. The warranty period shall be one year from the date of Acceptance. R&S's obligation under this warranty is limited to repairing or replacing a Product that is returned to an authorized Service Center within the applicable warranty period and that upon examination, R&S determines to be defective. Products that have been repaired or replaced may include remanufactured materials which are equivalent to new in performance and functionality. If R&S determines the failure has been caused by misuse, neglect, accident or abnormal condition of operation, repairs will be made and Buyer shall be billed for the reasonable costs of repair. R&S shall not be responsible for any malfunctioning or defect of the Products in the event that the Buyer shall have made modifications thereto unauthorized by R&S.

Additional terms applicable for Repair and Calibration Services are available upon request.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHERS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE.

10. **LIMITATION OF REMEDIES AND LIABILITY:**

THE REMEDIES OF THE BUYER WITH RESPECT TO THE PRODUCTS SOLD, ANY WARRANTY, ANY INDEMNITY OR ANYTHING TO BE DONE BY R&S IN CONNECTION HERewith, SHALL BE EXCLUSIVELY AS SET FORTH HEREIN, AND THE LIABILITY OF R&S SHALL NOT, EXCEPT AS OTHERWISE PROVIDED IN SECTION 7, EXCEED THE PRICE OF THE PRODUCTS WITH RESPECT TO WHICH SUCH LIABILITY ARISES. IN NO EVENT SHALL R&S BE LIABLE FOR ANY LOSS OF PROFIT OR USE, INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, WHETHER IN CONTRACT, WARRANTY, INDEMNITY, TORT OR OTHERWISE.

11. **EXPORT RESTRICTIONS:**

Products may be subject to export restrictions and end user certification. Buyer shall not export, re-export, or transfer, directly or indirectly, any Product or technical data received hereunder, to any country or user to which such actions are restricted by United States or local country law or regulation without first obtaining any required governmental license, authorization, certification or approval. Buyer shall be responsible for United States export duties, fees, licenses and such, in addition to any import duties imposed by the country of destination.

12. **GENERAL:**

This agreement is not assignable without approval of R&S, which approval shall not be unreasonably withheld. If any of the terms or provisions of this agreement shall be declared in violation of law, the remaining terms and provisions shall remain in full force and effect. The laws of the State of Maryland shall govern this agreement. Any dispute relating to this order shall be submitted to the courts in that State, and the Buyer accepts the exclusive jurisdiction of such courts for any action by or against R&S.

ROHDE & SCHWARZ USA, INC., 6821 Benjamin Franklin Drive, Columbia, MD 21046
Tel. (410) 910-7800 Fax. (410) 910-7801
v.04-2012_RSA



Rohde & Schwarz USA, Inc.

Rohde & Schwarz USA, Inc.
6821 Benjamin Franklin Dr. / Columbia MD 21046 / US

Ms. Julie Dabydeen
Nebraska Educational Telecommunications
1800 North 33rd St
LINCOLN NE 68503

Quotation Contact:

Phone +1 630-267-5929
greg.martin@rsa.rohde-schwarz.com

May 9, 2019

Subject: Broadcast Transmitter System TMx9evo
Quote Number: 195293.0

Main Number +1 888-837-8772

www.rsa.rohde-schwarz.com

Thank you for your interest in Rohde & Schwarz USA, Inc.
Attached is the requested quote.

To place an order, e-mail purchase order to: rsaorders@rsa.rohde-schwarz.com,
or fax to +1 410-910-7825. Should you require assistance with your order,
please call
+1 410-910-7989.

To expedite processing of your order, please provide your Rohde & Schwarz
quotation number on your submitted purchase order.

Sincerely,

Rohde & Schwarz USA, Inc.

Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
1	R&S®TMU9C consisting of Transmitters System and accessories This transmitter system provides SNMP-capability and a JAVA-free WebInterface based on HTML5 technology. Warranty: Warranty item 1.1.1.1 - 1.1.1.6: 12 months Warranty item 1.1.1.7 - 1.1.1.11: 12 months Warranty item 1.1.1.12 - 1.1.1.16: 12 months		1	66,026.92 -39.57%	66,026.92 39,900.00
1.1	R&S®TMU9C Broadcast transmitter system TMU9evo Warranty: Warranty item 1.1.1.1 - 1.1.1.6: 12 months Warranty item 1.1.1.7 - 1.1.1.11: 12 months Warranty item 1.1.1.12 - 1.1.1.16: 12 months		1		
1.1.1	R&S®TMU9C configured as: Analog/Digital: Digital Television (DTV) DTV Standard: ATSC Mains supply: EU 400V/230V Y 3-phase Nominal output power: 1.5 kW Frequency band: UHF Band 4/5 Customer settings: Country of Delivery: USA Station: NETV CH21 Output power set to: Channel No: 21 fc(centerfrequency): 515.00 MHz offset: 0.00000 kHz Bandwidth: 6 MHz Software freeze: 00.0.0 Additional settings: Transmitter Type: TMx9-evo		1		

Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
	Redundancy: BackupDrive System Variant: Tx Transmitter Index: TxA1 Exciter Type: A Amplifiers: 4 Amplifier Type: PMU905 Amplifier Mode: Normal Mode				
	Warranty: Warranty item 1.1.1.1 - 1.1.1.6: 12 months Warranty item 1.1.1.7 - 1.1.1.11: 12 months Warranty item 1.1.1.12 - 1.1.1.16: 12 months months				
1.1.1.1	R&S®PMU905 UHF amplifier band IV/V, air cooled DTV: 400 W rms, non-Doherty single phase	2509.8999.04	4		
1.1.1.2	R&S®PMU905 Air Filter for PMU905 amplifier	2509.9708.02	4		
1.1.1.3	R&S®TM9-T7 Power cord for PMU905 with open ends	2600.0667.20	4		
1.1.1.4	R&S®TMX9C-T20 Mounting kit 1500W backup drive DTV without rack integration kit	2510.0130.42	1		
1.1.1.5	R&S®TX9-T23 Cable for ADE measurements after bandpass filter	2600.0821.05	1		
1.1.1.6	R&S®TX9-T1 ASI transport stream distributor for dual drive	2700.5001.02	1	1,298.00 -39.57%	1,298.00 784.38
1.1.1.7	R&S®TCE901 Exciter TCE901	2509.4106.02	1		

Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
1.1.1.8	R&S®TCE901 TCE901 19" mounting kit for TMx9evo	2510.2503.03	1		
1.1.1.9	R&S®TCE900K31 Software option IP input	2500.3613.02	1		
1.1.1.10	R&S®TCE900K41 Software option ATSC for MFN and SFN	2500.3636.02	1		
1.1.1.11	R&S®TCE900K65 Software option HTML5 GUI	2500.3971.02	1		
1.1.1.12	R&S®TCE901 Exciter TCE901	2509.4106.02	1		
1.1.1.13	R&S®TCE901 TCE901 19" mounting kit for TMx9evo	2510.2503.03	1		
1.1.1.14	R&S®TCE900K31 Software option IP input	2500.3613.02	1		
1.1.1.15	R&S®TCE900K41 Software option ATSC for MFN and SFN	2500.3636.02	1		
1.1.1.16	R&S®TCE900K65 Software option HTML5 GUI	2500.3971.02	1		
	Accessories:				
1.2	R&S®TDU901 Transmitter Display Unit with Touchscreen for TMx9 without LAN interface Warranty: 12 months	2510.2703.02	1		
1.3	R&S®TMU9-T57 Harmonic filter Band 4/5 7/8 input/output for 3rd party racks incl. installation material without RF-Cable Warranty: 12 months	2600.0850.23	1		



Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
1.4	R&S@PROJ.-D Packing SCx8000 with backup exciter for trucking or air freight Warranty: 12 months	2065.6712.66	1		
1.5	R&S@ERST.2 CD manual TM9 german/english System manual, operating manual, service manual level 1, Circuit documents/spare part lists simple transmitter, MultiTX, N+1 Warranty: 12 months	2600.5669.04	1		
1.6	R&S@TMX9C Final test protocol TMU9compact printed Warranty: 12 months	2510.0046.02	1		
1.7	R&S@BWTMX9 Warranty PLUS: Service level BASIC (12 months) for R&S TMx9. Includes repairs, SW updates, access to online ticketing system and technical support.	2505.5195.76	1		
2	R&S@SLX8000B16 Parallel remote interface TX9 small for TMx9/TLx9 9 commands, 12 messages fixed function Warranty: 12 months	2100.3455.10	1	814.20 -38.59%	814.20 500.00
3	R&S@SLATMX9 Service Level Agreement, Silver 3 years for R&S@TMx9	3632.5325.04	1		
4	Shipping		1	1,500.00	1,500.00
4.1	Shipping		1	1,500.00	1,500.00
5	RF System		1	3,229.41	3,229.41

Item	Model Description / Estimated Delivery (Weeks)	Part Number	Qty. pc.	Unit Price USD	Ext. Price USD
5.1	ATSC Mask Filter Dielectric 1.5kW 6 Pole ATSC Mask Filter Includes Directional Coupler 7/8 Input 1-50 Output Includes 7/8 Connection Cable		1	3,229.41	3,229.41
6	Optional items <i>Optional items are not included in total price</i>				
6.1	R&S®PMU905 UHF amplifier band IV/V, air cooled DTV: 400 W rms, non-Doherty single phase Warranty: 12 months	2509.8999.04	1	4,543.00	4,543.00
				Gross Price	USD 75,770.53
				Total Item Discount	-38.86% -29,441.12
				Total Net Price	USD 46,329.41

Essential technical modifications may make it necessary to replace certain items ordered by the customer with new successor items. In this case, the customer agrees to the modification of the subject matter of the contract even after placement of the order, provided that the agreed terms and conditions are retained and that the successor item complies with the technical specifications of the item ordered by the customer.

The customer has to make all payments from a bank account under their name. The customer is liable for all payments from the contractual relationship and must ensure compliance with all applicable legislation, in particular on the prevention of money laundering.



ROHDE & SCHWARZ



Delivery: FOB (Free on board)
Destination: US
Ship via: Rohde & Schwarz Preferred Carrier

Delivery Time: The delivery period stated reflects the situation at the time the offer is made. The planned delivery date will be confirmed in the order acknowledgment.

Payment: 25% downpayment, 75% 30 days after date of invoice

Validity: This offer shall be valid until July 08, 2019.

Quote Number: Please include the quote reference number on your purchase order.

Sales Tax: Quotation does not include sales tax, or value added tax. Please provide any applicable sales tax exemption certificates, or direct pay information with your order.

First Time Customers: Please include your Dunn & Bradstreet number and standard credit reference sheet.

Terms & Conditions: This offer is subject to and limited to the terms and conditions contained on the face hereof and the terms and conditions of the agreement identified above or, if no such agreement is so identified, the Rohde & Schwarz Terms and Conditions of Sale, following on a separate page. In case of conflict, the order of precedence will be 1) terms appearing on the face of this document and 2) the terms and conditions of the agreement identified above or the Rohde & Schwarz Terms and Conditions of Sale, whichever is applicable. No additional or different terms listed or referenced on your purchase order will apply.

TERMS AND CONDITIONS OF SALE 04/2012

1. THE TERMS CONTROL THE AGREEMENT:

The Buyer's purchase order confirms acceptance of the Rohde & Schwarz USA, Inc. (R&S) offer to deliver products and/or services ("Products") according to these terms, and such additional or different terms as stated in the R&S quotation. Any terms or conditions of the Buyer's order, or contained in any other communication from the Buyer, which are inconsistent with or in addition to the terms and conditions contained herein shall not be binding on either party unless expressly accepted in writing by R&S. R&S's failure to object to any provisions contained in verbal or written communications from the Buyer shall not be the acceptance thereof or a waiver of these terms and conditions.

2. DELIVERY, TITLE AND RISK OF LOSS:

Delivery shall be FOB Buyer's designated ship to location in the United States ("Destination"), unless otherwise stated in the quotation. Orders for Products must specify delivery within 180 days from purchase order date unless otherwise stated in the quotation. Title and risk of loss will pass to Buyer in accordance with the stated Shipment Terms in the quotation. Acceptance by Buyer is presumed unless Buyer notifies R&S in writing within 10 days after delivery that the Products are non-conforming ("Acceptance"). R&S will make a reasonable effort to meet the Buyer's requirements as to time of delivery and volume of Products. Partial deliveries are permitted. If R&S is unable to meet the Buyer's delivery requirements, including the firm delivery date, alternative arrangements may be agreed. In the absence of such agreement, the Buyer's sole remedy is the right to cancel its order.

3. PAYMENT AND SECURITY INTEREST:

R&S payment terms, conditional on approved credit, are net 30 days from date of invoice unless otherwise stated in writing by R&S. An order for a System, that includes Products configured to Buyer requirements, with a price of more than \$100,000 must be accompanied by a non-interest bearing down payment equal to 30% of the purchase price plus applicable taxes. R&S has the right to modify the payment terms after an order has been accepted if, in R&S's opinion, the payment record or financial condition of the Buyer so warrants, or if R&S otherwise has grounds to feel insecure about receiving payment. Any dispute about the quality or condition, performance or functioning of Products supplied, or otherwise in connection with the terms and conditions set out herein, shall not entitle the Buyer to refuse to pay for the Products. Late payments shall be subject to an interest charge of 1.5% per month on the unpaid balance. R&S reserves a security interest in the Products, and any products or proceeds thereof until payment in full has been received by R&S. R&S may perfect its security interest by any necessary filings in public registers, and Buyer shall cooperate therewith as required by law until payment in full, for the Products sold and any other amounts owed by Buyer to R&S, has been received.

4. PRICES AND TAXES:

Prices are quoted FOB Destination, unless otherwise stated in the quotation. Any sales or use tax shall be borne by the Buyer and unless collected by R&S, shall be paid by the Buyer directly to the relevant government authorities. Unless otherwise stated on the quotation, all R&S quotations are valid for thirty (30) days from issuance.

5. RESCHEDULING, CANCELLATION & RESTOCKING:

A request to reschedule or cancel an order must be made in writing to R&S and received no later than 45 days before the scheduled ship date. R&S may refuse or accept the request, with or without charging the rescheduling/cancellation fee of 5% of the order value for the affected Product. A request to reschedule a shipment cannot exceed 180 days from the original purchase order date.

A request to return a Product must be made in writing to R&S and received no later than 30 days after receipt of Product. R&S may refuse or accept the request, with or without charging the restocking fee of 15% of the net order value for the Product being returned. The original packaging must be unopened, and Buyer must follow R&S return instructions. The return of spare parts are subject to a \$100 restocking charge per order. Freight pre-paid or service completed by R&S is not refundable.

6. EXCUSABLE DELAYS:

R&S shall not be liable for nondelivery or delay if directly or indirectly caused by fires, floods, accidents, riots, war, governmental interference or embargoes, strikes or shortage of labor, or other difficulties (whether or not similar in nature to any of those specified) beyond its reasonable control, or if performance would cause R&S to incur unreasonable expense. Delivery shall be suspended so long as any such causes delay performance. R&S agrees to make, and the Buyer agrees to accept, deliveries whenever such causes no longer exists. If such cause continues for more than 180 Days the order may be cancelled.

7. INDEMNITY:

At its expense, R&S will settle or defend and pay all damages and costs finally awarded in any action brought against Buyer to the extent that it is based on a claim that the Product infringes any patent, copyright, or other intellectual property right of a third party in the country of delivery, provided Buyer promptly gives R&S the notice, authority and assistance necessary to defend or settle the claim and the infringement does not arise out of compliance with the Buyer's specifications, or a combination with or an addition to products not supplied by R&S, or from a modification after delivery. If any Product is in R&S's opinion likely to cause a claim of infringement, R&S at its option and expense may procure for Buyer the right to continue using the Product, or modify it to make it noninfringing, or replace it with a substantially equivalent noninfringing Product, or recall it and grant Buyer a credit for the depreciated value of the Product after it is returned to R&S. Upon such recall, R&S shall have no further obligation or liability relating to the infringing Product other than the obligation to defend or settle the infringement claim as set forth above.

8. SOFTWARE:



The Buyer will not acquire title to any software incorporated in, accompanying, or delivered for use with the Products. R&S grants a perpetual nonexclusive license to use such software on one unit of Product. R&S may terminate the license if licensee (Buyer) discloses the software to others who are using the Product without R&S's written consent. Back-up copies of the software may be made for archiving purposes or for purposes expressly authorized by R&S, and licensee may sublicense the software in the event of transfer of said one unit of Product. All copies must bear the copyright notes as the original. Disassembly, recompilation and reverse engineering of any software is strictly prohibited.

The above provisions shall also apply to any modifications or supplements made to the software or associated documentation. The Buyer undertakes, in the event of a resale of Product and/or software, to impose the above obligations on its customer.

R&S reserves any other rights to the software and the documentation.

9. **WARRANTY:**

R&S warrants each Product manufactured by Rohde & Schwarz to be free from defects in material and workmanship under normal use and service. Software is warranted to operate in accordance with its programmed instructions on appropriate Products. It is not warranted to be error free. The warranty period shall be one year from the date of Acceptance. R&S's obligation under this warranty is limited to repairing or replacing a Product that is returned to an authorized Service Center within the applicable warranty period and that upon examination, R&S determines to be defective. Products that have been repaired or replaced may include remanufactured materials which are equivalent to new in performance and functionality. If R&S determines the failure has been caused by misuse, neglect, accident or abnormal condition of operation, repairs will be made and Buyer shall be billed for the reasonable costs of repair. R&S shall not be responsible for any malfunctioning or defect of the Products in the event that the Buyer shall have made modifications thereto unauthorized by R&S.

Additional terms applicable for Repair and Calibration Services are available upon request.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHERS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE.

10. **LIMITATION OF REMEDIES AND LIABILITY:**

THE REMEDIES OF THE BUYER WITH RESPECT TO THE PRODUCTS SOLD, ANY WARRANTY, ANY INDEMNITY OR ANYTHING TO BE DONE BY R&S IN CONNECTION HEREWITH, SHALL BE EXCLUSIVELY AS SET FORTH HEREIN, AND THE LIABILITY OF R&S SHALL NOT, EXCEPT AS OTHERWISE PROVIDED IN SECTION 7, EXCEED THE PRICE OF THE PRODUCTS WITH RESPECT TO WHICH SUCH LIABILITY ARISES. IN NO EVENT SHALL R&S BE LIABLE FOR ANY LOSS OF PROFIT OR USE, INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, WHETHER IN CONTRACT, WARRANTY, INDEMNITY, TORT OR OTHERWISE.

11. **EXPORT RESTRICTIONS:**

Products may be subject to export restrictions and end user certification. Buyer shall not export, re-export, or transfer, directly or indirectly, any Product or technical data received hereunder, to any country or user to which such actions are restricted by United States or local country law or regulation without first obtaining any required governmental license, authorization, certification or approval. Buyer shall be responsible for United States export duties, fees, licenses and such, in addition to any import duties imposed by the country of destination.

12. **GENERAL:**

This agreement is not assignable without approval of R&S, which approval shall not be unreasonably withheld. If any of the terms or provisions of this agreement shall be declared in violation of law, the remaining terms and provisions shall remain in full force and effect. The laws of the State of Maryland shall govern this agreement. Any dispute relating to this order shall be submitted to the courts in that State, and the Buyer accepts the exclusive jurisdiction of such courts for any action by or against R&S.

ROHDE & SCHWARZ USA, INC., 6821 Benjamin Franklin Drive, Columbia, MD 21046
Tel. (410) 910-7800 Fax. (410) 910-7801
v.04-2012_RSA



Rohde & Schwarz USA, Inc.
6821 Benjamin Franklin Drive Columbia, MD 21046-2633
Phone (410) 910-7800 Fax (410) 910-7801

EXCEPTIONS TO TERMS AND CONDITIONS

Solicitation #6079 OF

Section I. INDEMNIFICATION

1. General

The Contractor agrees to **settle or** defend, indemnify, and hold harmless the State and its employees, volunteers, agents, and its elected and appointed officials ("the indemnified parties") from and against any and all **third party** claims, liens, demands, damages, liability, actions, causes of action, losses, judgements, costs, and expenses of every nature, including investigation costs and expenses, settlement costs, and attorney fees and expenses ("the claims"), sustained or asserted against the State for personal injury, **or** death, **or property loss or damage, arising out of,** resulting from, **or attributable to** the willful misconduct, **gross** negligence, error, or omission of the Contractor, its employees, Subcontractors, consultants, representatives, and agents, **directly** resulting from this contract, except to the extent such Contractor liability is attenuated by any action of the State which directly and proximately contributed to the claims.

2. Intellectual Property

The Contractor agrees it will, at its sole cost and expense, **settle or** defend, indemnity, and hold harmless the indemnified parties from and against any and all claims, to the extent such claims arise out of, **result from, or are attributable to,** the actual or alleged infringement or misappropriation of any patent, copyright, trade secret, trademark, or confidential information of any third party by the Contractor or its employees, Subcontractors, consultants, representatives, and agents; provided, however, the State gives the Contractor prompt notice in writing of the claim, **the authority and assistance necessary to defend or settle the claim, and the infringement does not arise out of compliance with the State's specifications, or a combination with or an addition to products not supplied by Contractor, or from a modification after delivery.** The Contractor may not settle any infringement claim that will affect the State's use of the Licensed Software without the State's prior written consent, which consent may be withheld for any reason.

If a judgement or settlement is obtained or reasonably anticipated against the State's use of any intellectual property for which the Contractor has indemnified the State, the Contractor shall, at the Contractor's sole cost and expense, **procure for State the right to continue using the product, or** promptly modify the item or items which were determined to be infringing, **acquire a license or licenses on the State's behalf to provide the necessary rights to the State to eliminate the infringement,** or provide the State with a non-infringing substitute that provides the State the same functionality, **or recall it and grant State a credit for the depreciated value of the product after it is returned to Contractor. Upon such recall, Contractor shall have no further obligation or liability relating to the infringing product other than the obligation to defend or settle the infringement claim as set forth above.** At the State's election, that actual or anticipated judgment may be treated as a breach of warranty by the Contractor, and the State may receive the remedies provided under this solicitation.



ROHDE & SCHWARZ

Rohde & Schwarz USA, Inc.
6821 Benjamin Franklin Drive Columbia, MD 21046-2633
Phone (410) 910-7800 Fax (410) 910-7801

3. Limitation of Liability **(new paragraph)**

THE REMEDIES OF THE STATE WITH RESPECT TO THE PRODUCTS SOLD, ANY WARRANTY, ANY INDEMNITY OR ANYTHING TO BE DONE BY CONTRACTOR IN CONNECTION HERewith, SHALL BE EXCLUSIVELY AS SET FORTH HEREIN, AND THE LIABILITY OF CONTRACTOR SHALL NOT EXCEED THE PRICE OF THE PRODUCTS WITH RESPECT TO WHICH SUCH LIABILITY ARISES. IN NO EVENT SHALL CONTRACTOR BE LIABLE FOR ANY LOSS OF PROFIT OR USE, INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, WHETHER IN CONTRACT, WARRANTY, INDEMNITY, TORT OR OTHERWISE.

Section M. WARRANTY

Despite any clause to the contrary, the Contractor represents and warrants that its services hereunder shall be performed by competent personnel and shall be of professional quality consistent with generally accepted industry standards for the performance of such services and shall comply in all respects with the requirements of this Contract. For any breach of this warranty, the Contractor shall, for a period of ninety (90) days from the performance of the service, perform the services again, at no cost to Customer, or if Contractor is unable to perform the services as warranted, Contractor shall reimburse Customer the fees paid to Contractor for the unsatisfactory services. ~~The rights and remedies of the parties under this warranty are in addition to any other rights and remedies of the parties provided by law or equity, including without limitation actual damages, and, as applicable and awarded under the law, to a prevailing party, reasonable attorneys' fees and costs.~~

Contractor warrants each product manufactured by Contractor to be free from defects in material and workmanship under normal use and service. Software is warranted to operate in accordance with its programmed instructions on appropriate products. It is not warranted to be error free. The warranty period shall be one year from the date of Acceptance. Contractor's obligation under this warranty is limited to repairing or replacing a product that is returned to an authorized Service Center within the applicable warranty period and that upon examination, Contractor determines to be defective. Products that have been repaired or replaced may include remanufactured materials which are equivalent to new in performance and functionality. If Contractor determines the failure has been caused by misuse, neglect, accident or abnormal condition of operation, repairs will be made and State shall be billed for the reasonable costs of repair. Contractor shall not be responsible for any malfunctioning or defect of the Products in the event that State shall have made modifications thereto unauthorized by Contractor.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHERS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE.

Section G. RIGHT TO AUDIT

The State shall have the right to audit the contractor's performance of this contract upon a thirty (30) day written notice. Contractor shall utilize generally accepted accounting principles, and shall maintain the accounting records, and other records and information **directly** relevant to the Contract (Information) to enable the State to audit the contract. (Neb. Rev. Stat. 84-304 et seq.) ~~The State may audit and the Contractor shall maintain the information during the term of the contract and for a period of five (5) years after the completion of this contract or until all issues or litigation are resolved, whichever is later. The Contractor shall make the information available to the State at Contractor's place of business or a location acceptable to both Parties during normal business hours. If this is~~



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~~not practical or the Contractor so elects, the Contractor may provide electronic or paper copies of the information. The State reserves the right to examine, make copies of, and take notes on any information relevant to this contract, regardless of the form or the information, how it is stored, or who possesses the information. In no circumstances will Contractor be required to create or maintain documents not kept in the ordinary course of Contractor's business operations, nor will Contractor be required to disclose any information, including but not limited to product cost data, which is confidential or proprietary to Contractor.~~

~~The Parties shall pay their own costs of the audit unless the audit finds a previously undisclosed overpayment by the State. If a previously undisclosed overpayment exceeds three percent (3%) of the total contract billings, or if fraud, material misrepresentations, or non-performance is discovered on the part of the Contractor, the Contractor shall reimburse the State for the total costs of the audit. Overpayments and audit costs owed to the State shall be paid within ninety (90) days of written notice of the claim. The Contractor agrees to correct any material weaknesses or condition found as a result of the audit. _____~~

R&S® TMU9evo

Air-Cooled

UHF Transmitter Family

The best even better



R&S®TMU9evo Air-Cooled UHF Transmitter Family At a glance

The R&S®TMU9evo UHF transmitter represents the next step toward minimizing operating costs in the medium power class. The transmitter's superior energy efficiency of up to 40 % for COFDM and 43 % for ATSC, combined with its long-life design, results in an exceptional operating experience. Network operators benefit highly from low operating costs throughout the product's lifecycle.

The air-cooled R&S®TMU9evo UHF medium-power transmitter has output power levels from 400 W to 3.0 kW for COFDM as well as for ATSC TV standards (including ATSC 3.0). The R&S®TMU9evo is an ideal choice for network operators who demand both excellent quality of service and perfect preparation for channel clearance programs.

As a member of the successful R&S®Tx9 transmitter generation, the R&S®TMU9evo minimizes total cost of ownership (TCO) with its unrivaled long-lived transmitter design, minimal space requirements and efficiency of up to 40 % for COFDM. The new adaptive efficiency optimization feature ensures maximum energy cost savings even after channel changes or output power adjustments.

The transmitters are based on the established R&S®TMU9 platform with all of its proven strengths, including the MultiTX concept, outstanding system flexibility and ease of use. Thousands of installed R&S®TMU9 transmitters around the globe are proof of how well the platform meets network operators' needs.

Key facts

- ▮ Even greater efficiency gains through many years of experience with Doherty technology
- ▮ Maximum on-air time
- ▮ Built on the strengths of the established R&S®TMU9 platform
- ▮ Intelligent efficiency optimization for minimized energy costs for all types of applications
- ▮ Future-ready ATSC 3.0 support



R&S®TMU9evo

Air-Cooled

UHF Transmitter

Family

Benefits and

key features

Minimized operating costs for every application

- Superior energy efficiency thanks to the R&S®PMU905 amplifier with enhanced Doherty technology
 - Rapid channel changes and maximum efficiency in a single amplifier
 - Minimum energy costs for every operating scenario thanks to intelligent efficiency optimization
- ▷ [page 5](#)

Ensured quality of service

- Stringent focus on long-lived transmitter design
 - Built-in performance analysis capabilities
 - Innovative redundancy concepts at all levels
- ▷ [page 7](#)

Future-ready ATSC 3.0 support

- Server-based exciter solution
 - Easy upgrading
- ▷ [page 9](#)

Compact design and easy operation

- Minimal infrastructure requirements
 - Compact, expandable exciter
 - Easy and efficient operation
- ▷ [page 10](#)

Minimized service effort

- Servicing at the component level thanks to modular design
 - No special knowledge or tools required
- ▷ [page 12](#)

Rohde&Schwarz – the partner you can count on

- Quality transmitters since 1949
 - Spare parts availability far beyond 10 years
 - From pre-sale to service. At your doorstep.
- ▷ [page 13](#)

E⁵ – efficiency to the power of five

The R&S®Tx9 transmitter generation scores with efficiency on five different levels:

■ Efficiency in energy

Economical: minimum power consumption for cost savings over system lifetime

■ Efficiency in space

Space-saving: several transmitters and additional components in one rack

■ Efficiency in operation

Smooth: installation, operation and maintenance

■ Efficiency in configuration

Customer-focused: modular solutions for flexible system configuration

■ Efficiency for a lifetime

Future-ready: can be expanded to accommodate new standards and technologies



Model overview

R&S [®] TMU9evo UHF transmitter system			
Number of amplifiers	Output power (AVG) for digital TV standards in Doherty and normal operation ¹⁾ (DVB-T2, DVB-T, ISDB-TB, DTMB, ATSC, ATSC 3.0)	Dimensions (W x H x D)	Possible MultiTX configurations
1	400 W	483 mm x 132 mm (3 HU) x 550 mm; 19 in x 5.2 in x 21.6 in	up to 6
2	750 W	483 mm x 352 mm (8 HU) x 550 mm; 19 in x 13.9 in x 21.6 in	up to 4
3	1,15 kW	483 mm x 440 mm (10 HU) x 550 mm; 19 in x 17.3 in x 21.6 in	up to 3
4	1.5 kW	483 mm x 528 mm (12 HU) x 550 mm; 19 in x 20.8 in x 21.6 in	2
6	2,3 kW	600 mm x 2000 mm (42 HU) x 800 mm; 23.62 in x 78.74 in x 31.49 in	no MultiTX configuration
8	3,0 kW		

¹⁾ Before bandpass filter.

Minimized operating costs for every application

Superior energy efficiency thanks to the R&S®PMU905 amplifier with enhanced Doherty technology

Focusing on the challenges faced by network operators has always been one of the driving principles behind transmitter development at Rohde&Schwarz. Customer satisfaction and the market success experienced with the R&S®TMU9 are proof of how well the R&S®TMU9 platform satisfies this principle. One of the primary challenges for network operators is and will remain the reduction of operating costs. The R&S®TMU9evo incorporates all of the proven and valued strengths of the R&S®TMU9 platform, while taking key features such as energy efficiency and compactness to the next level. Built on years of pioneering achievements with Doherty technology, the R&S®TMU9evo offers even greater efficiency.

The introduction of the Rohde&Schwarz multiband Doherty technology in the R&S®Tx9 transmitter generation has revolutionized the broadcast transmitter market. With the R&S®TMU9evo, this amplifier technology is now available for the first time in the medium power class, allowing the R&S®TMU9evo to reach the next level of energy efficiency. The transmitter sets the benchmark with an efficiency of up to 40%. It reduces energy costs by up to 50% compared with the average efficiency delivered by other transmitters in this power class.

The R&S®PMU905 amplifier (400 W) offers the highest efficiency and highest power density in its class.

Years of experience and continuous development have given Rohde&Schwarz complete mastery over the Doherty technology, which the company has been able to deploy to the greatest advantage.

The Rohde&Schwarz multiband Doherty technology was first introduced in the R&S®Tx9 generation of transmitters in 2012. This amplifier technology has since become synonymous with energy cost savings for many network operators. Thousands of amplifier modules employing Rohde&Schwarz multiband Doherty technology are now in use around the world. Each and every day, Rohde&Schwarz technology saves in excess of 600 000 kWh compared with conventional amplifier technology. This corresponds to the daily power consumption of a medium-sized European town.

Rapid channel changes and maximum efficiency in a single amplifier

Thanks to the Rohde&Schwarz multiband Doherty technology, the R&S®PMU905 amplifier can be operated over the entire frequency range without modifications. Optimizations for the various frequency bands are even easier with the R&S®PMU905 than with the predecessor model. With the R&S®TMU9evo, network operators are optimally equipped for channel changes.



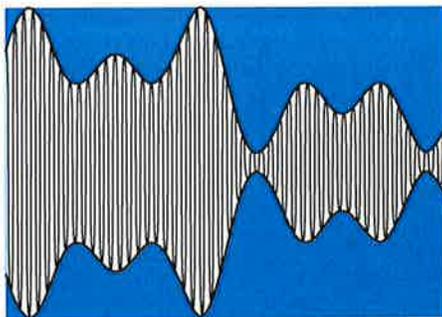
Minimum energy costs for every operating scenario thanks to intelligent efficiency optimization

Normally, transmitters are not operated at their full nominal power. Conventional transmitters experience a significant reduction in efficiency at reduced power. This is where another intelligent R&S®TMU9evo technology comes into play. The R&S®TMU9evo transmitter family features power agile efficiency, i.e. transmitter efficiency remains optimal even at reduced power. This is made possible through complete control of the Doherty amplifier circuits, intelligent control of amplifier parameters, and highly advanced precorrection.

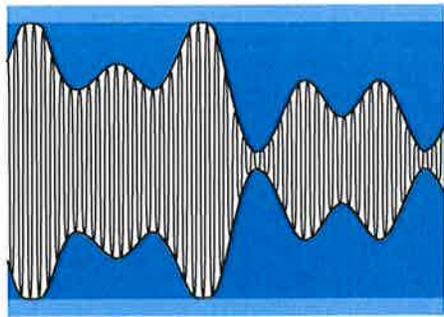
To allow network operators to use this potential to maximize energy economy, the R&S®TMU9evo offers a new feature: Rohde&Schwarz efficiency optimization. This intelligent algorithm, deployed either at the press of a button or adaptively, optimizes amplifier parameters to meet specific signal quality requirements. Whether changing channels or adjusting the transmitter output power, Rohde&Schwarz efficiency optimization ensures that the system delivers maximum efficiency at all times.

The R&S®TMU9evo also offers improved adaptive precorrection (ADE). This technology has consistently been optimized for Rohde&Schwarz Doherty amplifier characteristics, making it the most effective and fastest precorrection technology on the market. With these advanced R&S®Tx9evo technologies, network operators are optimally prepared for channel changes and output power adjustments.

Adaptive efficiency optimization minimizes energy costs for all operating scenarios



Without efficiency optimization
| Unadjusted power amplifier parameters
| Low efficiency



With efficiency optimization
| Adaptively adjusted power amplifier parameters
| High efficiency

Ensured quality of service

Stringent focus on long-lived transmitter design

Like all other R&S®Tx9 transmitters, the R&S®TMU9evo offers an excellent level of quality. Based on decades of transmitter design experience and built with high-quality components, it offers unmatched reliability and excellent signal quality. For example, the R&S®TCE901 exciter uses direct digital RF generation to deliver TV signals.

The R&S®TMU9evo is based on the R&S®TMU9 medium-power transmitter, which has been a market success since 2012. Thousands of R&S®TMU9 transmitters are in operation around the world. This exceptional success is a clear statement of how the R&S®TMU9 transmitter platform meets the needs of network operators, both in terms of minimal operating costs and maximum availability. Transmitter development at Rohde&Schwarz always focuses on the challenges faced by network operators. Key features such as frequency agility across the entire IV and V bands and built-in performance analysis capabilities were targeted for improvement in the R&S®TMU9evo, while all of the field-proven strengths of the R&S®TMU9 platform were maintained, including MultiTX and highly optimized, low-attenuation RF power components.

The broad base of installed R&S®TMU9 systems exhibits extremely low failure rates. Based on this established platform, the R&S®TMU9evo demonstrates the same level of proven reliability, keeping off-the-air time to a minimum.

Built-in performance analysis capabilities

The R&S®TMU9evo is able to track its performance with built-in analysis capabilities such as efficiency measurement and integrated signal analysis. These features offer instant feedback about operational parameters through self-monitoring to ensure a consistently high quality of service combined with lowest operational costs.

The integrated signal analysis function continuously measures and outputs shoulder distance and MER values. Operators benefit from this feature because they have full control of the signal quality without having to invest in additional measuring equipment.

Innovative redundancy concepts at all levels

The R&S®TMU9evo comes with an optional, integrated exciter backup battery, a feature that is unique in this power class. The battery minimizes the negative effects of mains voltage interruptions. It powers the CPU and the signal processing components during voltage interruptions, ensuring that interruptions of up to 10 seconds do not result in a time-consuming reboot of the transmitter. The battery effectively reduces off-the-air time without requiring a full-featured uninterruptible power supply (UPS).

Optional power supply redundancy for the amplifiers also helps increase availability. If one of the power supplies fails, the other delivers the full current. This ensures interruption-free transmission even if a power supply or a phase in the feed network fails. Redundant power supplies are hot-pluggable and can be easily replaced during operation.

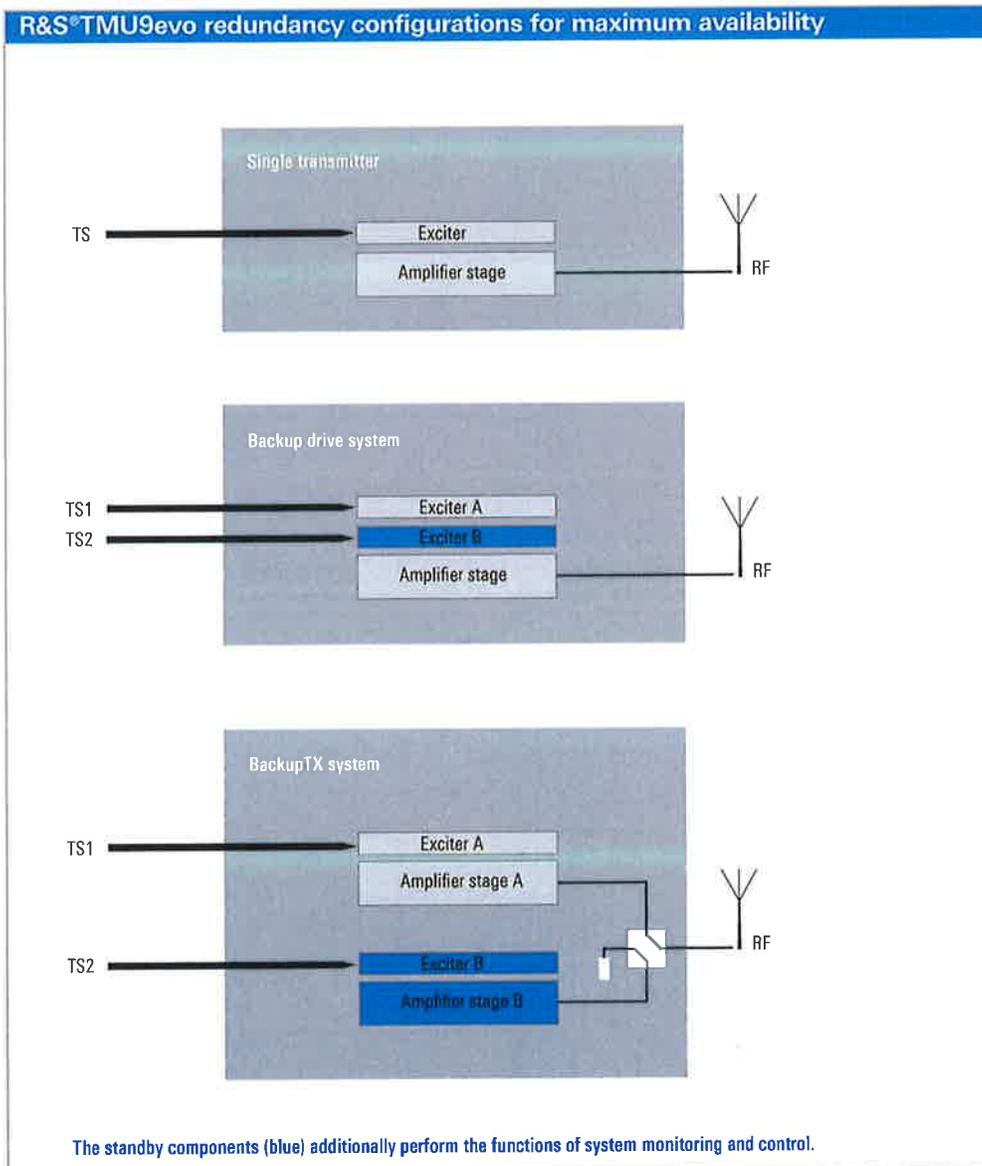


At the transmitter level, the R&S®TMU9evo uses the familiar backup drive redundancy concept from the R&S®TMU9 transmitter family comprising only two R&S®TCE901 exciters. It operates without a centralized monitoring unit since the passive exciter monitors the active exciter. The backup drive configuration offers the functionality and convenience of a classic exciter redundancy configuration and increases transmitter availability.

At the system level, the R&S®TMU9evo offers an innovative redundancy configuration: BackupTX.

In a BackupTX system, two R&S®TMU9evo transmitters operate in a fully symmetrical 1+1 configuration. The two transmitters monitor each other, making extra hardware for system monitoring and control unnecessary. Doing away with a separate, governing control unit eliminates the risk of a single point of failure. The BackupTX configuration offers the functionality and convenience of a classic passive standby configuration and also increases the availability of transmitter functionality. BackupTX systems require considerably less space than conventional 1+1 systems.

For example, a 400 W R&S®TMU9evo BackupTX system with integrated DVB-S/S2 receivers requires just seven rack units, saving an enormous amount of space compared with conventional transmitters in this power class. This is a major advantage at locations where space is at a premium.



Future-ready ATSC 3.0 support

R&S®SDE900 server-based exciter solution

The ATSC 3.0 broadcast standard was defined to give broadcast network operators a great degree of flexibility in their service offerings. It was designed to evolve together with broadcasters' future requirements. To optimally address network operators' future needs for flexibility, Rohde & Schwarz revolutionized how a broadcast standard is implemented. The R&S®SDE900 has a pure software-based approach that ideally prepares network operators for ATSC 3.0. Based on a high-performance IT server, it enables network operators to optimally leverage the full capabilities of the standard and flexibly respond to signal processing requirements of the future. The Rohde & Schwarz exciter solution fully supports ATSC 3.0 features such as multiple physical layer pipes (PLP), multiple subframes and SFN capabilities for optimal utilization of valuable spectrum. The R&S®SDE900 also supports ATSC 3.0 layered division multiplexing (LDM), helping network operators maximize coverage for different reception scenarios (e.g. fixed and mobile reception).

By design, broadcast standard evolutions can easily be accommodated. Operators benefit from a secure investment and can optimally capitalize on their valuable spectrum assets even in the broadcasting days after tomorrow.

The R&S®SDE900 is designed as a plug-in, rackmount module for the R&S®Tx9 generation of transmitters, making it an easy upgrade path to the ATSC 3.0 standard. The R&S®SDE900 software-based encoder generates the I/Q modulation data. The field-proven R&S®TCE901 exciter generates the COFDM waveform based on the I/Q data and applies the most powerful precorrection on the market with the high level of signal quality expected from Rohde & Schwarz.

Server-based exciter solution



Compact design and easy operation

Minimal infrastructure requirements

Apart from energy and service costs, infrastructure costs account for a large proportion of the expenses incurred during a transmitter's lifecycle. Through numerous innovations and by focusing on what is essential for transmission, the R&S®TMU9evo is able to minimize infrastructure costs and condense transmitter functionality into the smallest of spaces. Furthermore, the transmitter makes little demands on cooling or energy supply and is therefore ideal for use in environments that do not provide a typical transmitter site infrastructure. The transmitter's compact design facilitates easy installation into existing racks, and its excellent energy efficiency eliminates the need for costly cooling systems.

At only 12 rack units for 1.5 kW, the R&S®TMU9evo requires minimal space, whether used as a single transmitter or configured as a multitransmitter system (e.g. passive standby).

This exceptionally compact size was achieved by implementing signal generation and system control with a high level of integration, and by superior power density in the amplifiers. The space required for an R&S®TMU9evo system can in some cases be reduced by significantly more than 50% as compared with conventional transmitter systems in this power class.

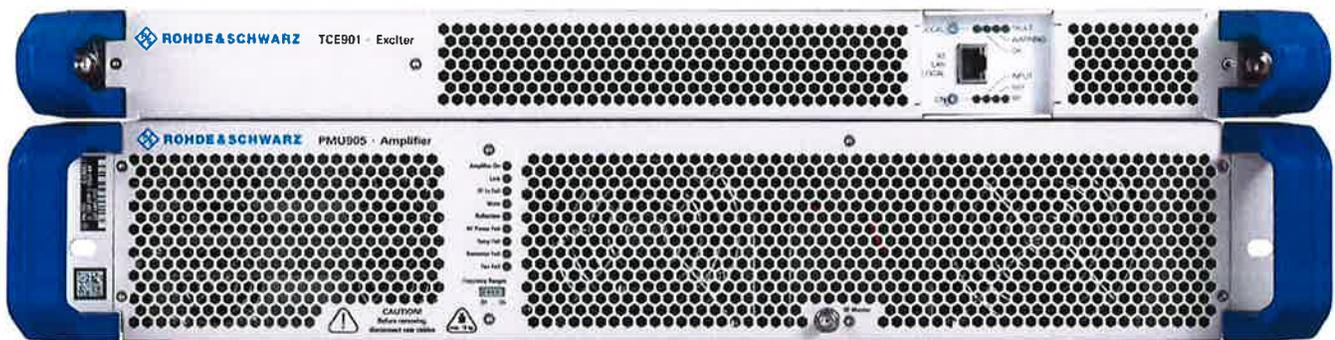
Compact, expandable exciter

The R&S®TMU9evo transmitter family comes with the new R&S®TCE901 exciter platform. The exciter offers an even higher level of integration than the previous R&S®TCE900 model. It integrates signal processing as well as transmitter and system control functionality. The R&S®TCE901 offers numerous functions and options that eliminate the need for equipment such as an integrated satellite receiver or integrated system components for N+1 configurations. This saves space and increases the system's availability.

The new R&S®TCE901 exciter platform supports the latest functionality implemented in the R&S®TMU9evo, such as adaptive efficiency optimization and performance analysis capabilities.

The R&S®TCE901 is multifunctional and extremely versatile. It supports the DVB-T, DVB-T2, ISDB-T/ISDB-TB and ATSC digital TV standards. Together with the R&S®SDE900, it provides a future-ready solution for ATSC 3.0. Multiple standards can be installed in a single exciter, allowing switchover between transmission standards (e.g. from DVB-T to DVB-T2) at the push of a button without any hardware modifications. The R&S®TCE901 is also well prepared to handle future transmission standards.

The R&S®TMU9evo consisting of the R&S®TCE901 exciter and R&S®PMU905 amplifier with 400 W output power.



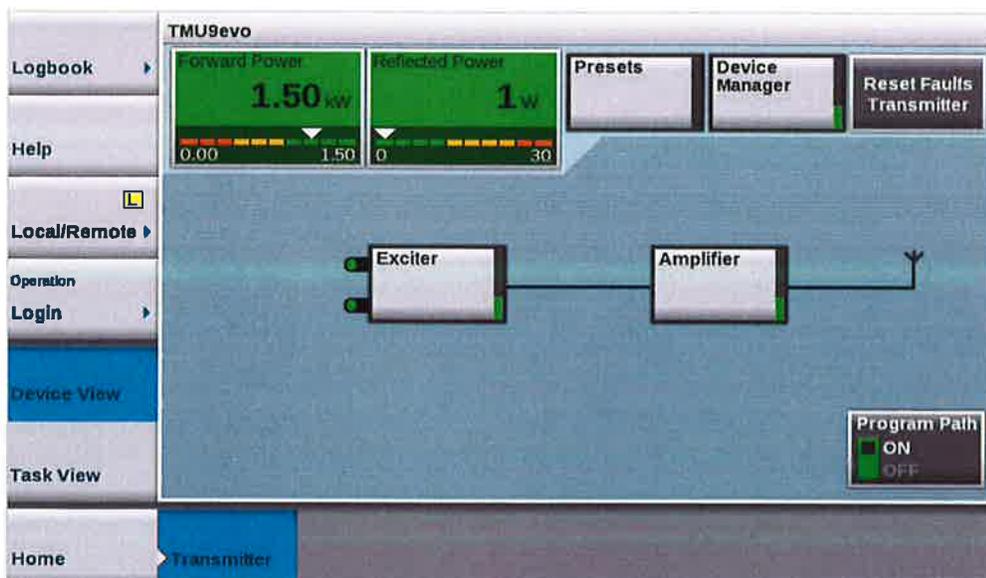
Easy and efficient operation

The R&S®TMU9evo graphical user interface (GUI) offers broadcast network operators the convenience they want and need when installing, commissioning and operating transmitters. The home screen provides a complete status overview of the transmitter and its individual components. The optional R&S®TDU901 transmitter display unit allows fast, intuitive operation of the transmitter system via a 7" touchscreen. In addition, a web interface is available that makes it possible to operate the transmitter either locally or remotely, or to integrate it into a network management system via SNMP.

Whether via touchscreen or web interface, the user benefits from the same convenient GUI used throughout the R&S®Tx9 transmitter generation. If multiple transmitter families from the R&S®Tx9 generation are installed in a broadcast network, the well-designed and uniform GUI significantly reduces training effort for service personnel.

The task-based menu shows the different tasks that can be performed with the transmitter. The tasks and their individual steps are presented in a well-structured layout so they can be accomplished in a minimum of time. For example, when putting the transmitter into operation, the operator is guided through the configuration of the different devices and given help when entering parameters and changing settings.

The device-based menu provides a graphical view of the transmitter structure. The user simply touches a component to directly access its parameters.



The user simply touches a transmitter component to directly access its parameters.

Minimized service effort

Servicing at the component level thanks to modular design

Broadcast networks often comprise a large number of transmitter stations delivering output powers below 1 kW. These stations usually have only minimal resources in terms of staff and equipment, i.e. no staff and few or no spare parts or replacement transmitters are available on site. Each transmitter failure results in considerable service effort, an effort that increases enormously with the large number of transmitters in the network. Long service intervals and minimum maintenance effort are therefore vital requirements for efficient and economical operation of a transmitter network.

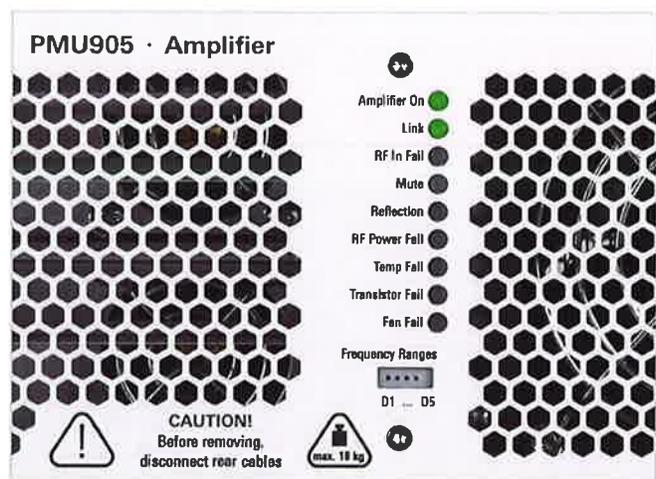
The R&S®TMU9evo was engineered to provide the best serviceability on the market. With its modular design, the transmitter can be serviced at the component rather than the device level. Most of the transmitter components can be replaced by the customer, so that the transmitter does not have to be returned to Rohde&Schwarz or a representative for servicing. In addition, the R&S®TMU9evo shares components with other transmitters from the R&S®Tx9 generation, simplifying spare parts handling and reducing spare parts stocking expenses.

Another important feature that simplifies spare parts management is the fact that the currently set Doherty band is continuously shown on each amplifier, even if the amplifier is without power. The R&S®PMU905 is the world's first amplifier to implement this via an ePaper display. The new feature allows the current Doherty setting of each R&S®PMU905 to be immediately identified in the spare parts warehouse without having to switch on the amplifier or open its housing.

No special knowledge or tools required

Service expenses can be kept moderate – in terms of both equipment and personnel skills. No special tools are required. Customers can carry out even more challenging repairs using an easy-to-handle test system. The transmitter architecture is straightforward, significantly reducing training requirements for service personnel. This lowers operating expenses even before an R&S®TMU9evo medium-power transmitter network is put into operation.

The currently set Doherty band is continuously displayed on the amplifier front panel, simplifying spare parts management.



Rohde & Schwarz – the partner you can count on

Quality transmitters since 1949 – decades of experience in transmitter design and production

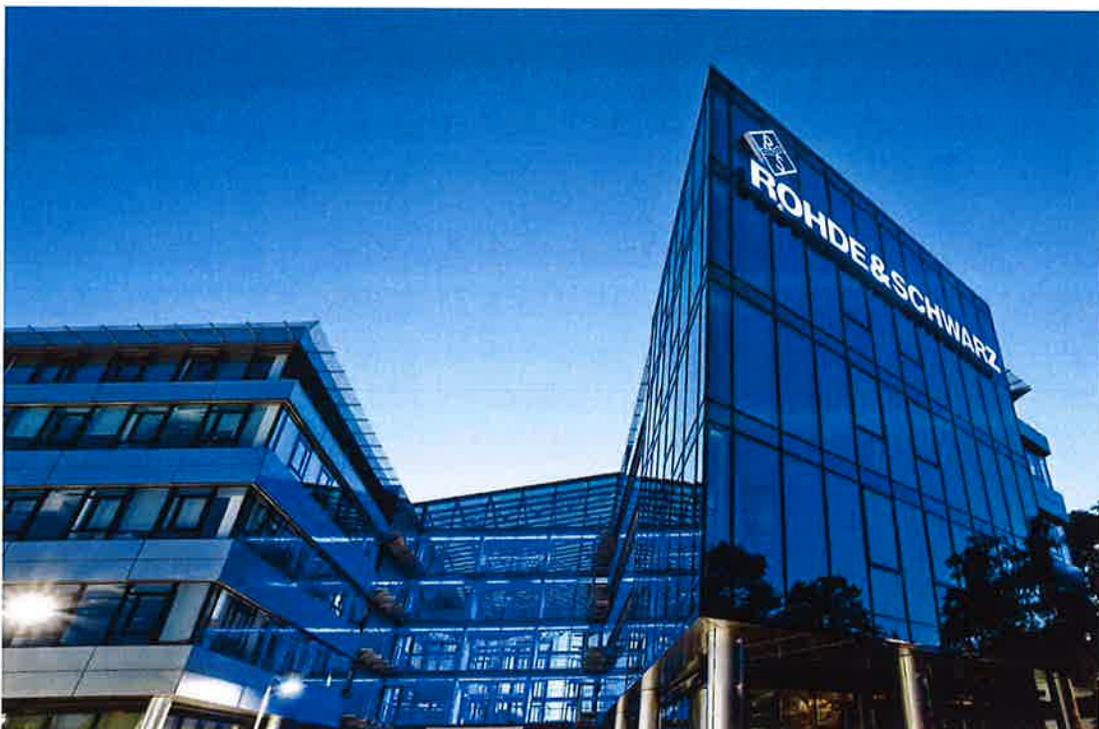
Rohde&Schwarz has developed and produced quality transmitters for almost 70 years. During this time, the transmitters have been continuously enhanced with new and improved functionality.

The company stands for quality, precision and innovation in all fields of wireless communications. As an independent, family-owned company, Rohde&Schwarz finances its growth from its own funds. The company is not bound by short-term, quarterly results. It plans for the long term, which greatly benefits customers. Purchasing Rohde&Schwarz products is a safe investment for the future.

Spare parts availability even 10 years after product discontinuation

Rohde&Schwarz ensures its customers spare parts availability for a period of 10 years from the time a product is discontinued. For new products such as the R&S®TMU9evo, this means ensured spare parts availability far beyond 10 years. Broadcast network operators can count on professional, expert support from Rohde&Schwarz during the entire service life of their transmitters.

Rohde&Schwarz transmitters offer safety of investment that is unparalleled on the broadcast market.



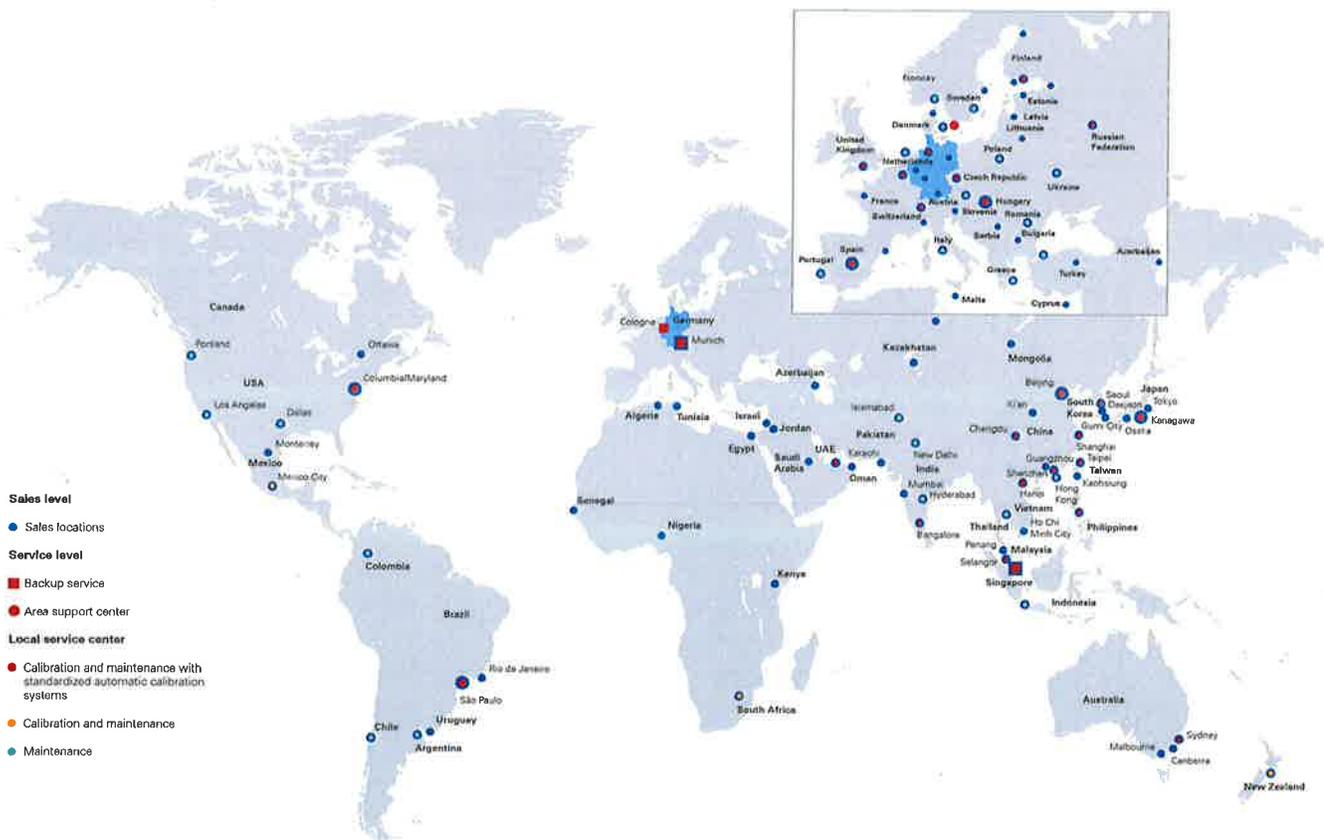
From pre-sale to service. At your doorstep.

The Rohde&Schwarz network in over 70 countries ensures optimum on-site support by highly qualified experts. User risks are reduced to a minimum at all stages of the project:

- Solution finding/purchase
- Technical startup/application development/integration
- Training
- Operation/calibration/repair

The R&S®TMU9evo UHF transmitter family is the most efficient medium-power TV transmitter series on the market. To ensure operational readiness of your systems and plannable budgeting for operational expenditures, Rohde&Schwarz offers service level agreements (R&S®SLA) for your systems. The R&S®SLA allows you to concentrate on your core business. We take care of the service you require to succeed with your business model.

For details, please contact your local Rohde&Schwarz representative.



Specifications

Specifications		
Digital TV		
Standards		DVB-T, DVB-T2, ISDB-TB, DTMB, ATSC, ATSC 3.0
Channel bandwidth	DVB-T	5/6/7/8 MHz
	DVB-T2	1.7/5/6/7/8 MHz
	ISDB-T/ISDB-TB, DTMB	6/8 MHz
	ATSC, ATSC 3.0	6 MHz
Inputs	DVB-T, DVB-T2, DTMB	2 × ASI (BNC, 75 Ω), 2 × TSolP (Gigabit Ethernet)
	ISDB-T/ISDB-TB	2 × BTS (BNC, 75 Ω), 2 × TSolP (Gigabit Ethernet)
	ATSC	2 × SMPTE 310M (BNC, 75 Ω) 2 × TSolP (Gigabit Ethernet)
	ATSC 3.0	2 × STL or TSolP (Gigabit Ethernet)
	DVB-S/S2 signal feed (optional)	2 × F (75 Ω)
General data		
Frequency range	UHF bands IV and V	470 MHz to 790 MHz (790 MHz to 862 MHz on request)
Supply voltage		230 V ± 15%, 2 wires + PE (L1/N/PE), 400 V/230 V ± 15%, 4 wires + PE (L1/L2/L3/N/PE), 50 Hz to 60 Hz ± 5%
Max. installation altitude		3000 m above sea level (> 3000 m on request)
Operating temperature range		+1 °C to +45 °C
Relative humidity (max.)		95%, non-condensing
Immunity ¹⁾	to fast transients and bursts in line with IEC 61000-4-4	±2 kV (AC supply) ±1 kV (signal inputs)
	to surges in line with IEC 61000-4-5	symmetrical: ±1 kV (e.g. L-N), asymmetrical: ±2 kV (e.g. L-PE, N-PE)
Synchronization		
Reference frequency		10 MHz, 0.1 V to 5 V (V_{pp}) or TTL, BNC
Reference pulse		1 Hz, TTL, BNC
GPS/GLONASS receiver sensitivity	optional	-144 dBm to -5 dBm, SMA
Integrated OCXO		bridges reference signal interruptions for up to 24 h
Operation		
Status panel with buttons and LEDs		local operation
Transmitter display unit with touchscreen	optional	local display and operation
Ethernet interface, RJ-45		web interface: local, remote; network management interface via SNMP
Parallel remote interface	optional	floating contacts for messages and commands

¹⁾ More stringent requirements must be satisfied by implementing appropriate measures at the transmitter site.

To comply with the applicable standards and limit values for the suppression of out-of-band emissions and 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

Service that adds value

- ▮ Worldwide
- ▮ Local and personalized
- ▮ Customized and flexible
- ▮ Uncompromising quality
- ▮ Long-term dependability

Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

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

Rohde & Schwarz training

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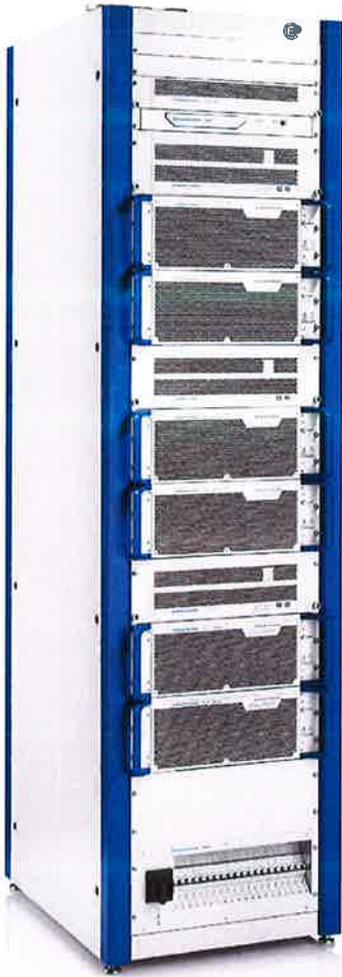


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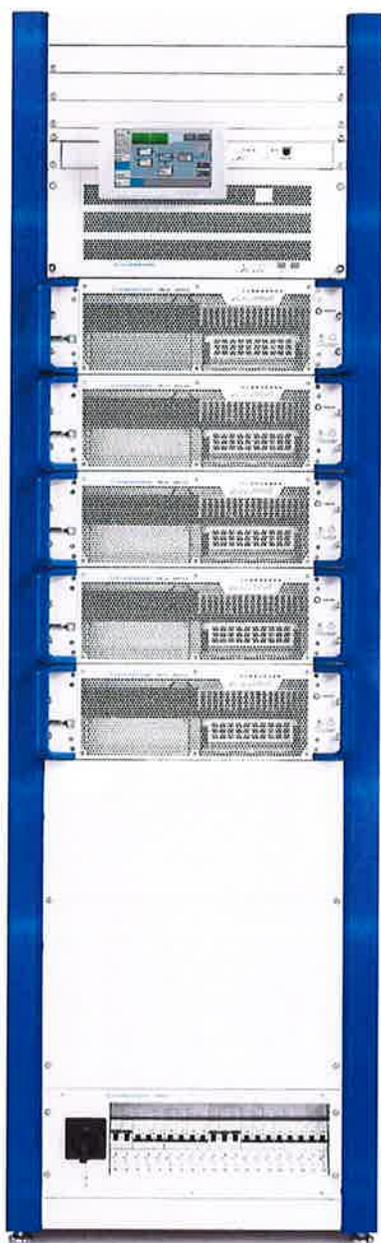
R&S®TMU9/R&S®TMV9

Air-Cooled Transmitter Families

Maximum flexibility,
minimum TCO



R&S®TMU9/ R&S®TMV9 Air-Cooled Transmitter Families At a glance



The R&S®TMU9/R&S®TMV9 transmitter families offer unique flexibility by providing more than 50 different standard configurations. Featuring efficiency of up to 42 % for UHF and up to 50 % for VHF, they achieve the highest energy savings on the market. Plus, the simple system configuration allows quick startup. The high availability of the R&S®TMU9 ensures unsurpassed reliable operation. And its compact size saves space at the transmitter site.

The R&S®TMU9 air-cooled transmitters attain output powers in the UHF range from 300 W to 3.0 kW for digital standards and up to 4.75 kW for analog standards. In the VHF range, the R&S®TMV9 achieves up to 4.3 kW for digital audio broadcasting and digital TV, and up to 6.9 kW for analog TV. The transmitters are accommodated in only one rack, saving a lot of space at the transmitter site.

With efficiency values of up to 30% for UHF and up to 41% for VHF in normal mode, the transmitters save a great deal of energy and significantly reduce CO₂ emissions. The Doherty architecture for boosting efficiency even increases these figures to up to 42% for UHF and up to 50% for VHF. These figures are unparalleled on the market, making the R&S®TMU9/R&S®TMV9 transmitter families the global benchmark for broadcast transmitters with optimized operating costs.

The transmitters feature unique system variability. Innovative configurations, such as MultiTX or N+1 systems in a single rack, and built-in bandpass filters ensure short delivery times even for special transmitter configurations. Excellent efficiency and the integration of multiple transmitters into a single rack reduce the total cost of ownership (TCO) of a transmitter system by more than half over the system's lifetime.

Key facts

- ▮ Efficiency of up to 42% for UHF and up to 50% for VHF
- ▮ Unique flexibility
- ▮ Small footprint
- ▮ Quick startup, easy operation and high availability

Outstanding efficiency		UHF	VHF
COFDM	Doherty mode	38%	46%
	Normal mode	25%	33%
ATSC	Doherty mode	42%	50%
	Normal mode	30%	41%

R&S®TMU9/ R&S®TMV9 Air-Cooled Transmitter Families Benefits and key features

Transmitters with exceptional efficiency

- ▮ Next level of efficiency thanks to Doherty technology
- ▮ Voltage regulation and crest factor reduction
- ▮ Adaptive digital equalization
- ▮ Efficient amplifier layout

▷ [page 5](#)

Unique variability

- ▮ Flexible system configuration
- ▮ R&S®TCE900 – a multitalent as transmitter control unit and/or exciter
- ▮ IP transport stream feed to reduce infrastructure costs
- ▮ Simple switchover from analog to digital TV
- ▮ Integrated satellite receiver for fewer components in the rack

▷ [page 7](#)

Small footprint

- ▮ Multiple transmitters in a single rack
- ▮ Compact coupler units integrate different functionalities
- ▮ Compact components with integrated cooling

▷ [page 9](#)

Easy handling and outstanding reliability

- ▮ Simple system configuration for quick startup and expansion
- ▮ Easy and efficient operation
- ▮ Innovative solutions for increasing availability

▷ [page 10](#)

E⁵ – efficiency to the power of five

The R&S®Tx9 transmitter generation scores with efficiency on five different levels:

▮ Efficiency in energy

Economical: minimum power consumption for cost savings over system lifetime

▮ Efficiency in space

Space-saving: several transmitters and additional components in one rack

▮ Efficiency in operation

Smooth: installation, operation and maintenance

▮ Efficiency in configuration

Customer-focused: modular solutions for flexible system configuration

▮ Efficiency for a lifetime

Future-ready: can be expanded to accommodate new standards and technologies



Model overview

R&S®TMU9/R&S®TMV9 transmitter system							
Number of amplifiers	1	1	2	3	4	5	6
UHF							
Output power (AVG) for digital standards ¹⁾							
470 MHz to 862 MHz	300 W	600 W	1200 W	1800 W	2400 W	3000 W	–
Output power (sync peak) for ATV ¹⁾							
470 MHz to 862 MHz	500 W	1000 W	1900 W	2850 W	3800 W	4750 W	–
VHF							
Output power (AVG) for digital standards ¹⁾							
170 MHz to 230 MHz	350 W	750 W	1450 W	2200 W	2900 W	3600 W	4300 W
230 MHz to 254 MHz	350 W	700 W	1350 W	2050 W	2700 W	3350 W	4000 W
Output power (sync peak) for ATV ¹⁾							
170 MHz to 230 MHz	600 W	1200 W	2350 W	3500 W	4650 W	5800 W	6900 W
230 MHz to 254 MHz	600 W	1100 W	2150 W	3200 W	4250 W	5300 W	6350 W
Dimensions (H x W x D)	2000 mm x 600 mm x 800 mm (78.74 in x 23.62 in x 31.49 in)						
Height of integration kit for 19" third-party rack	310 mm (12.2 in) (7 HU)	310 mm (12.2 in) (7 HU)	490 mm (19.3 in) (11 HU)	–	–	–	–
Possible MultiTX configurations							
Number of transmitters per rack with MultiTX	up to 6	up to 6	up to 3	2	–	–	–
N+1 configuration per rack with MultiTX	4+1	4+1	2+1	1+1	–	–	–

¹⁾ Before bandpass filter.



R&S®TMV9 transmitter with three amplifiers and an output power of 2,2 kW (DAB and DTV).

Transmitters with exceptional efficiency

Next level of efficiency thanks to Doherty technology

The R&S®TMU9/R&S®TMV9 broadcast transmitters even achieve excellent efficiency of up to 30% for UHF and 41% for VHF in normal mode.

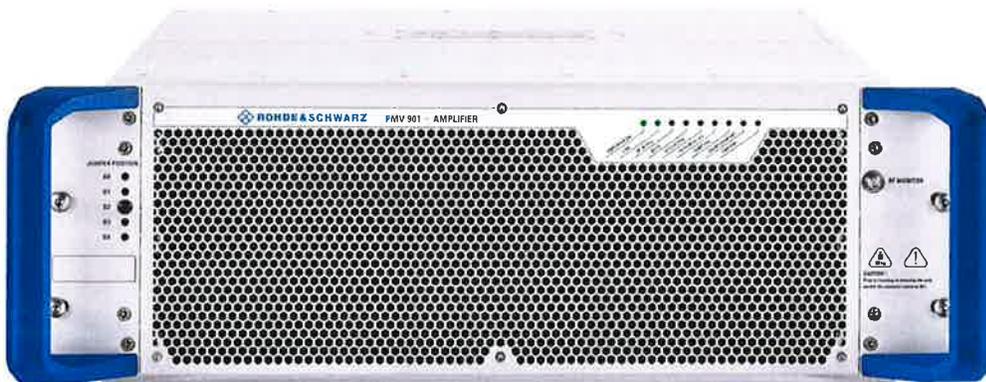
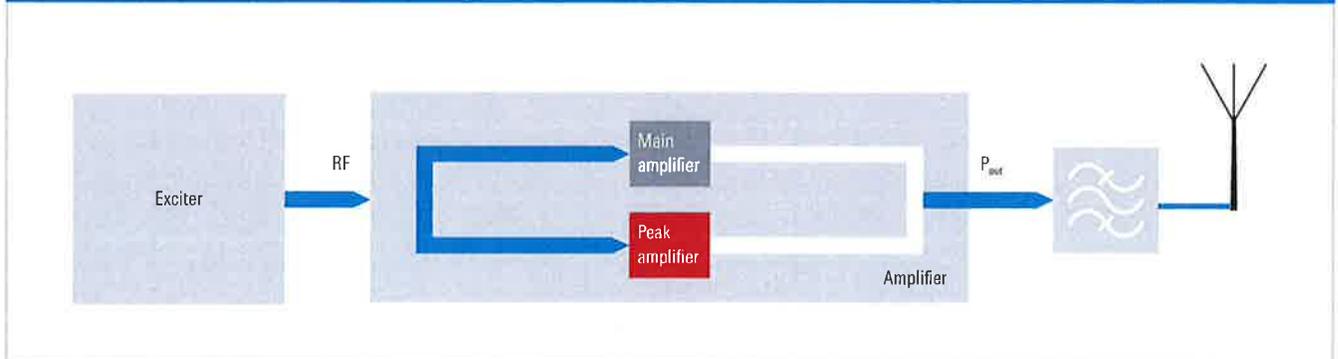
In Doherty mode, the R&S®TMU9/R&S®TMV9 attain the next level of efficiency. The transmitters set benchmarks, with up to 42% for UHF and up to 50% for VHF. The transmitters reduce energy costs by significantly more than 50% compared with the average 20% efficiency delivered by other transmitters on the market.

To attain these values, Doherty technology is the method of choice. This technology is based on an architecture invented in the 1930s by William H. Doherty. It has been used successfully in wireless communications for many years and helps to reduce energy costs.

The basic principle involves splitting signal amplification into two paths. In the main amplifier, only the average signal is amplified, and no power margins have to be reserved for peak signals in this path. The peak amplifier is only used when peaks occur in the signal. This architecture saves energy in both the main and the peak amplifier.

Rohde & Schwarz has revolutionized this technology with the R&S®TMU9/R&S®TMV9. For the first time, the amplifier has a broadband design while still making use of the basically narrowband Doherty architecture. Even in large transmitter networks that use many different frequencies, it is now possible to efficiently manage the spare parts inventory. Because no additional modules are required, the mean time between failure (MTBF) of the amplifiers remains unchanged when this technology is used.

Transmitter system with Doherty amplifier



The R&S®PMV901 amplifier features an output power of 750 W for DAB/DTV and 1200 W for ATV.

Voltage regulation and crest factor reduction

To significantly increase efficiency, Rohde&Schwarz has incorporated two other innovative approaches into its mix of technologies, in addition to the optimized system design.

Voltage regulation considerably boosts efficiency. Only Rohde&Schwarz offers this. The control mechanism in the transmitter control unit allows transmitter efficiency to be optimized for all digital TV standards. The signal is decoupled by the directional coupler at the transmitter output, routed back to the R&S®TCE900 exciter and analyzed. At the same time, the supply voltage for the power transistors is iteratively adjusted via the power supplies in the amplifiers. Voltage regulation considerably boosts efficiency especially when a transmitter operates at reduced output power.

With the R&S®TCE900 exciter, Rohde&Schwarz is the first manufacturer to offer a reduction of the crest factor for all COFDM standards. The crest factor is reduced to 8 dB without any negative impact on MER, improving the total transmitter efficiency. For DVB-T2, the tone reservation method defined in the standard can alternatively be used to reduce the crest factor.

Adaptive digital equalization

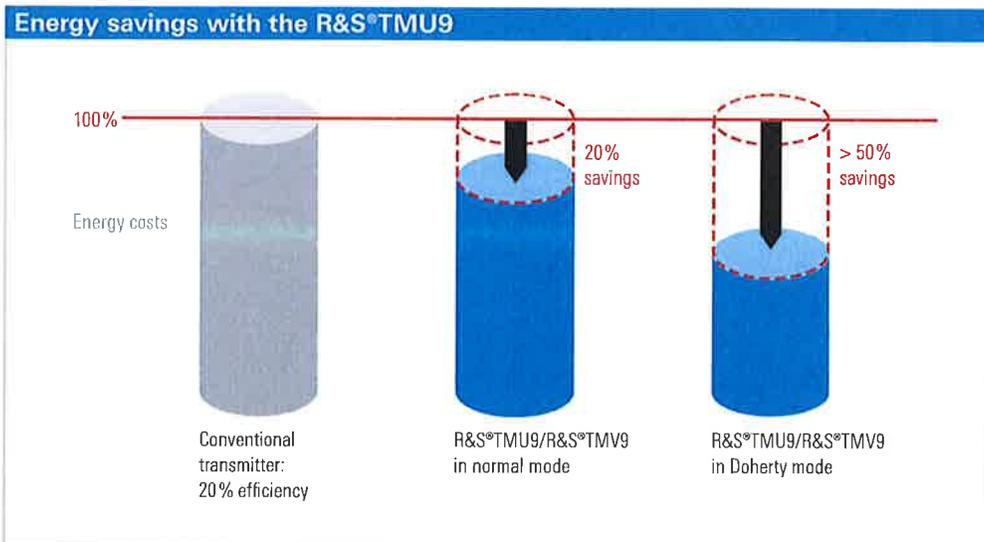
All R&S®TMU9/R&S®TMV9 configurations feature adaptive digital equalization (ADE) to equalize the transmitter system quickly, easily and at any time. ADE can be used either once when the system is put into operation or adaptively.

Efficient amplifier layout

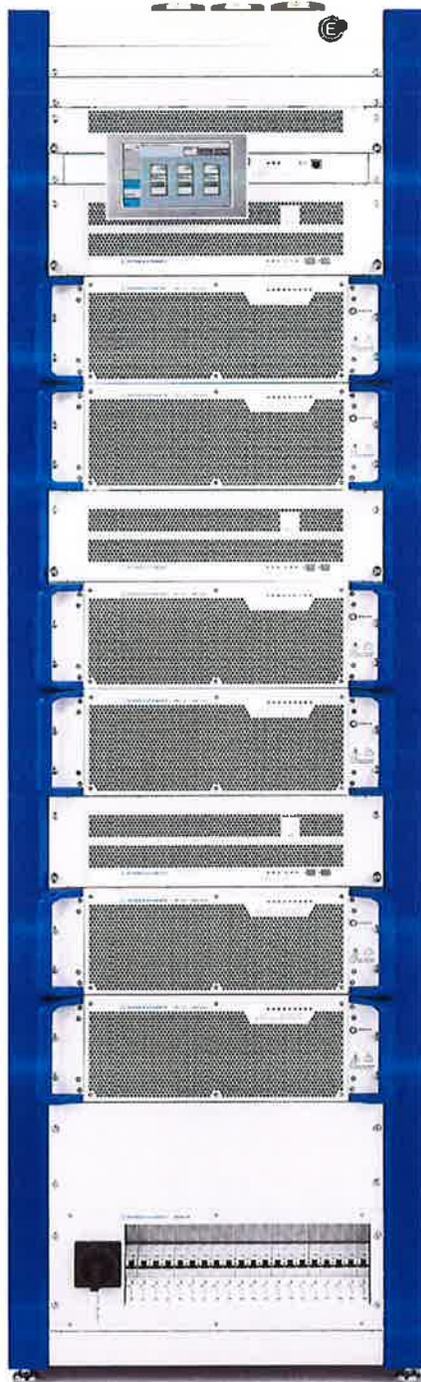
Featuring output power of 600 W for UHF and 750 W for VHF, the amplifier achieves outstanding power density. The power transistors use sophisticated 50 V LDMOS technology. The close cooperation between Rohde&Schwarz and the semiconductor manufacturer and the optimal matching of the transistors result in excellent efficiency and proven long-term stability of the amplifier section.

The same amplifier can be used both in normal mode and in Doherty mode.

A technology first, passively cooled power supplies are used in the new air-cooled amplifiers, contributing to system efficiency and increasing availability.



Unique variability



MultiTX system with three R&S™TMU9 1.2 kW transmitters in one rack.

Flexible system configuration

The R&S™TMU9/R&S™TMV9 broadcast transmitters offer unique flexibility. Because the system can be flexibly configured, more than 50 different standard system configurations are available, ensuring short delivery times even when special configuration requirements need to be met.

The new MultiTX concept makes it possible to install up to six transmitters in one rack. Even complete N+1 systems can be accommodated in a single rack.

Transmitters with up to two amplifiers can also be ordered without a rack, allowing installation in racks where space is still available or in a rack acquired on site. Bandpass filters, dummy antennas and other accessories can also be integrated into the transmitter rack, saving additional space.

Various air ducting configurations can be implemented, allowing the transmitter to operate both with and without ducted exhaust air. If the exhaust air is ducted, the system comes with a kit that has a pressure monitor and ensures constant cooling even if air intake fluctuates.

R&S™TCE900 – a multitalent as transmitter control unit and/or exciter

The R&S™TMU9/R&S™TMV9 transmitter families use the R&S™TCE900 platform introduced with the R&S™THU9 UHF TV transmitter family. This cross-family platform allows network operators who use multiple R&S™Tx9 transmitters to easily and economically manage their spare parts inventories. Thanks to the system's modularity, network operators with both DAB and TV networks can look forward to cost savings since they will require fewer spare parts.

By inserting supplementary specific plug-in boards, the base unit can be configured as a transmitter control unit or as an exciter, resulting in unprecedented flexibility for network operators. To reconfigure the R&S™TCE900 on site for another application, the user simply needs to exchange the modules. The platform also offers free option slots for expanding its functionality (e.g. by adding a satellite receiver).

When configured as a transmitter or system control unit, the R&S™TCE900 ensures smooth operation of the transmitter system. The R&S™TCE900 connects to the different system components via plug-in boards. Depending on the configuration, the cooling-system interface connects the exhaust air duct system, while the transmitter interface connects to the exciters. The control unit uses the connected exciters to communicate with the amplifiers, the directional coupler and other system modules via CAN bus.

In the exciter configuration, a coder board for base-band signal processing and an RF board for RF modulation are added to the R&S®TCE900 base unit. The exciter is extremely versatile. It can be used for the DVB-T, DVB-T2, DVB-H, ISDB-T/ISDB-T_B, DTMB, ATSC and ATSC Mobile DTV digital TV standards as well as for analog TV. Equipped with the appropriate coder board, the exciter is ideal for the DAB/DAB+ digital audio broadcast standards and T-DMB Mobile TV applications. All these transmission standards are available as software options for easy retrofitting. It is therefore no problem to install multiple standards in one exciter (e.g. DVB-T and DVB-T2). The exciter configuration also includes a GPS receiver that can be easily activated via option key.

In the R&S®TMU9/R&S®TMV9, the R&S®TCE900 can combine the functionalities of a transmitter control unit and an exciter, allowing a complete transmitter rack to operate with a single R&S®TCE900 as control unit and exciter. This saves space and increases the system's MTBF.

IP transport stream feed to reduce infrastructure costs

Due to its cost-effectiveness, IP technology is also gaining ground in broadcast networks. For all digital standards, the R&S®TCE900 exciter optionally offers feeding two transport streams redundantly via Gigabit Ethernet interfaces. This also applies to DAB. Transport streams can be fed in via IP at any time using the EDI standard, eliminating the need for external IP-to-ASI/ETI gateways. Because it is integrated in the transmitter control unit, this solution saves money and space, and simplifies feed monitoring.

Simple switchover from analog to digital TV

In the years to come, many operators will switch over from analog transmission to digital TV. The R&S®TMU9/R&S®TMV9 broadcast transmitters facilitate this transition. When the exciter is fed with both analog and digital input signals, switchover can take place locally (by pressing a key) or remotely.

Integrated satellite receiver for fewer components in the rack

A module with two satellite receivers makes it possible to receive up to two DVB-S/DVB-S2 satellite streams without additional external equipment. This saves space in the rack and eliminates investment costs for additional instruments. Encoded streams can be decoded via the two integrated common interface slots. Streams can also be processed outside the transmitter by feeding them to third-party instruments via the integrated IP output or ASI output and returning them via the IP and ASI inputs.



R&S®TMU9 with 1.2 kW DTV output power in dual drive in a MultiTX group.

Small footprint

Multiple transmitters in a single rack

The new MultiTX concept makes it possible to accommodate up to six transmitters in a 42 HU rack. Functioning as a system control unit, the R&S®TCE900 optionally monitors the transmitters and establishes a connection to the monitoring room via web interface or SNMP. If exhaust air is ducted, the R&S®TCE900 also monitors the exhaust air duct. If this is not desired, multiple autonomous transmitters can be integrated into a rack without shared monitoring.

Each transmitter in a multitransmitter group can be operated in dual drive configuration. A MultiTX system can also be quickly and easily expanded by installing an additional transmitter.



N+1 configurations can also be implemented in a single rack. For example, a 4+1 system with an output power of up to 600 W (UHF) and 750 W (VHF) can be configured in just one rack, making it possible to save up to three racks or more than 3 m² per transmitter system (compared with existing systems). As a result, an enormous amount of costs can be saved when leasing site surface.

Compact coupler units integrate different functionalities

The new 6-in-1 coupler unit includes the coupler unit, an input signal splitter, harmonics filter, lightning protection, power absorber and the measuring systems.

The harmonics filter is already integrated into the R&S®TMV9 amplifier. Coupler unit, power absorber and measuring systems are combined into one module. Each coupler unit has an optional connector for integrating a customer test point. The module is located directly behind the amplifiers, saving space and reducing the attenuation in the system. The compact design allows fast system startup and makes it possible to add a transmitter to the rack quickly and easily.

Compact components with integrated cooling

The compact R&S®PMU901/R&S®PMV901 amplifiers, only 3.5 height units in size, achieve an output power of up to 600 W for UHF and 750 W for VHF. This saves space in the rack for installing other components or additional transmitters. Two integrated fans in the amplifiers that can be exchanged during operation allow the transmitter system to operate without an exhaust air system. Ducted exhaust air can be optionally added to the configuration.

The R&S®TCE900 also significantly contributes to the system's compactness. The entire backup drive setup requires only three height units, saving more space. Integrated long-life fans allow reliable operation. They do not need to be replaced.

6-in-1 coupler unit for coupling two R&S®PMU901 amplifiers.

Easy handling and outstanding reliability

Simple system configuration for quick startup and expansion

The transmitters come fully cabled; only feed cables, power supply and system monitoring need to be added. Together with the self-engaging connection of the amplifier with the coupler, power supply and signal feed, the R&S®TMU9/R&S®TMV9 can be put into operation fast and easily.

The R&S®TCE900 is accessible from the front, allowing new plug-in boards to be added quickly and easily.

Easy and efficient operation

Each R&S®TMU9/R&S®TMV9 is equipped with a status display on the R&S®TCE900 rackmounts, where the transmitter status can be read off at any time. The buttons on the front panel make it quick and simple to switch from remote to local operation and to switch the transmitter on and off.

The optional R&S®TDU900 transmitter display unit allows fast, intuitive operation of the transmitter system via a 7" touchscreen. The retractable unit automatically slides out of the housing simply by giving it a slight push. It can be conveniently turned to the desired position, for fast, user-friendly operation.

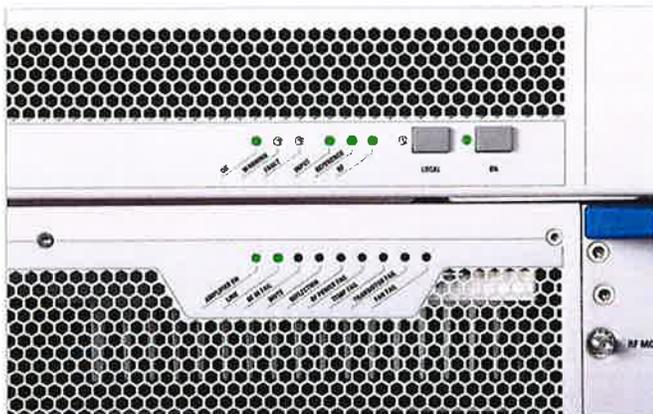
An Ethernet connector, available with and without an R&S®TDU900, allows the transmitter to be operated locally via the web interface. The transmitter can also be operated remotely via web interface or integrated into a network management system via SNMP.

Innovative solutions for increasing availability

The R&S®TMU9/R&S®TMV9 transmitters offer an innovative backup drive redundancy concept comprising only two R&S®TCE900. The two units monitor and synchronize each other, making extra hardware for monitoring and controlling exciter switchover unnecessary. Doing away with a separate, governing control unit eliminates the risk of a single point of failure. The backup drive configuration offers the functionality and convenience of a classic exciter redundancy configuration and also increases transmitter availability.

All transmitter settings can be performed centrally via exciter A. As a result, a single IP address is sufficient for configuring and monitoring the system. Nevertheless, this concept also makes it possible to directly address the second exciter via its own IP address in the event of a failure of exciter A, allowing convenient remote diagnosis and eliminating unnecessary visits to the transmitter site.

Optional power supply redundancy for the amplifiers also helps to increase availability. Normally, each of the two power supplies delivers half of the necessary current. If one of the power supplies fails, the other delivers the full current. This ensures interruption-free transmission even if a power supply or a phase in the feed network fails. The power supplies can be easily replaced during operation.



Transmitter status display on the front panel via LEDs.

Specifications

Specifications		
Digital TV		
Standards		DVB-T, DVB-T2, DVB-H, ISDB-T, ISDB-T _B , ATSC, ATSC Mobile DTV, DTMB
Channel bandwidth	DVB-T, DVB-H	5/6/7/8 MHz
	DVB-T2	1.7/5/6/7/8 MHz
	ATSC	6 MHz
	ISDB-T/ISDB-T _B	6/8 MHz
	DTMB	8 MHz
Inputs	DVB-T, DVB-H, DVB-T2, DTMB	2 × ASI (HP/LP), 75 Ω BNC, 2 × RJ-45
	ATSC	2 × SMPTE310M or 2 × ASI, 75 Ω BNC, 2 × RJ-45
	ISDB-T/ISDB-T _B	2 × BTS, 75 Ω BNC, 2 × RJ-45
Digital radio/Mobil TV in the VHF band		
Channel bandwidth		1.536 MHz
Inputs		2 × ETI, 75 Ω BNC/high impedance, 2 × RJ-45
Analog TV		
Color transmission	standards	B/G, D/K, M ²⁾ , N ²⁾ , I, I1
Sound transmission		PAL, NTSC, SECAM
Inputs		IRT dual-sound coding, FM single sound and NICAM728 (−13 dB/−20 dB) (optional), FM single sound (−10 dB) 1 × video (75 Ω BNC), 2 × audio (XLR)
General data		
Frequency range	UHF bands IV/V	470 MHz to 862 MHz
	VHF band III	170 MHz to 254 MHz
Supply voltage		<ul style="list-style-type: none"> ■ 230 V; 2 wires + PE (L1/N/PE) ± 15% ■ 400 V/230 V; 4 wires + PE (L1/L2/L3/N/PE) ± 15% ■ 240 V; 2 wires + PE (L1/L2/PE) ± 10% ■ 208 V; 4 wires + PE (L1/L2/L3/N/PE) ± 10%
Max. installation height		2000 m above sea level (> 2000 m on request)
Operating temperature range		+1 °C to +45 °C
Relative humidity (max.)		95 %, noncondensing
Immunity ¹⁾	to fast transients and bursts in line with EC 61000-4-4	< 2 kV (AC supply), < 1 kV (signal inputs)
	to surges in line with EC 61000-4-5	symmetrical < 1 kV (e.g. L1-L2), asymmetrical < 2 kV (e.g. L1-N)
Synchronization		
Reference frequency		10 MHz, 0.1 V to 5 V (V _{pp}) or TTL, BNC
Reference pulse		1 Hz, TTL, BNC
Operation		
Display unit with touchscreen and LEDs	optional	local operation and display
Ethernet interface, RJ-45	optional	local, remote, standard web browser
	optional	network management interface via SNMP
Parallel remote interface	optional	floating contacts for messages and commands

¹⁾ With built-in AC overvoltage protection; more stringent requirements must be satisfied by implementing appropriate measures in the stations.

²⁾ Single sound.

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

Service that adds value

- ▮ Worldwide
- ▮ Local and personalized
- ▮ Customized and flexible
- ▮ Uncompromising quality
- ▮ Long-term dependability

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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PD 3606.7353.12 | Version 05.00 | June 2016 (ch)
R&S® TMU9/R&S® TMV9 Air-Cooled Transmitter Families
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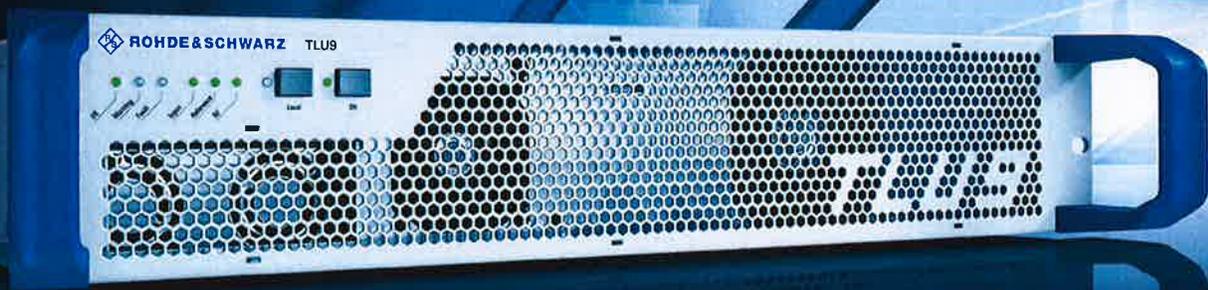
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R&S® TLU9

Low-Power UHF Transmitter and GapFiller Family

Powerful, reliable, smart



R&S®TLU9 Low-Power UHF Transmitter and GapFiller Family At a glance

From commissioning to servicing, the R&S®TLU9 Transmitter and GapFiller family offers the highest reliability, ensuring troublefree operation during the device's lifetime. The product is very convenient to use, thanks to features such as adaptive digital predistortion and an intuitive graphical user interface. The use of premium RF components and sophisticated design deliver high availability, with the highest MTBF values on the market.

The compact R&S®TLU9 low-power digital TV transmitter and gap filler delivers COFDM output power of up to 200 W from a single box.

The R&S®TLU9 Transmitter comes with state-of-the-art features such as adaptive digital predistortion, TSolP feeding and DVB-T to DVB-T2 switchover at the press of a button, and more.

The R&S®TLU9 GapFiller makes gapfilling effortless and straightforward with the unique feature R&S®smartEC, a built-in intelligent echo cancellation mechanism that continuously adapts to changing echo characteristics.

A comprehensive range of options including satellite receiver, redundancy system components and a backup battery for the exciter within the 1 HU or 2 HU transmitter and gap filler housing, plus a 7" touchscreen display, make this powerful transmitter and gap filler family a very attractive solution for network operators.

As a member of the successful R&S®Tx9 transmitter generation, the R&S®TLU9 saves energy and minimizes total cost of ownership (TCO) thanks to the highest efficiency in its power class and straightforward serviceability. For network operators, this means significant operating expense (OPEX) reductions over the device's entire lifetime.

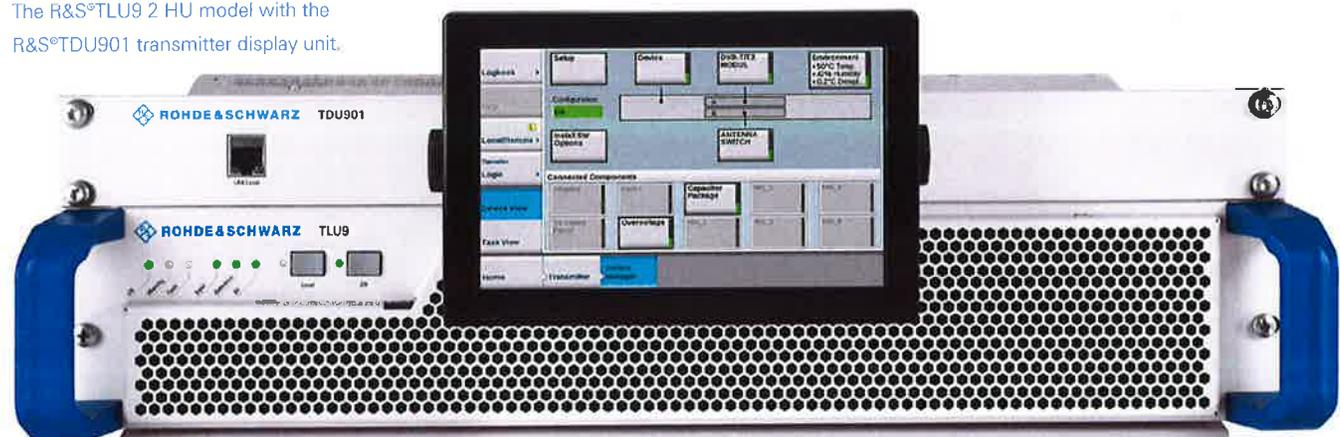
What makes the R&S®TLU9 unique is the combination of all these strong features in a single product.

Best serviceability + highest product quality + lowest operating expense

Key facts

- Highest availability in its power class
- 25% energy cost savings
- Best serviceability in its class
- Most compact low-power transmitter and gap filler
- World-class echo cancellation with R&S®smartEC

The R&S®TLU9 2 HU model with the R&S®TDU901 transmitter display unit.



R&S®TLU9

Low-Power UHF Transmitter and GapFiller Family

Benefits and key features

E5 – efficiency to the power of five

The R&S®Tx9 transmitter generation scores with efficiency at five different levels:

▮ Efficiency in energy

Economical: minimum power consumption for cost savings over system lifetime

▮ Efficiency in space

Space-saving: several transmitters and additional components in one rack

▮ Efficiency in operation

Smooth: installation, operation and maintenance

▮ Efficiency in configuration

Customer-focused: modular solutions for flexible system configuration

▮ Efficiency for a lifetime

Future-ready: can be expanded to accommodate new standards and technologies



Smooth operation

Robust and versatile

- ▮ Premium components and extremely robust design
 - ▮ R&S®THU9 experience in one or two height units
- ▷ [page 5](#)

Reliable and innovative

- ▮ Integrated exciter backup battery bridges voltage drops
 - ▮ Innovative redundancy configurations
- ▷ [page 6](#)

Unparalleled gap filler performance

- ▮ Integrated input filter
 - ▮ World-class echo cancellation for best signal quality
 - ▮ R&S®smartEC – continuous self-optimization
- ▷ [page 8](#)

Best-in-class TCO

- ▮ 35% lower OPEX
 - ▮ 25% higher efficiency than competing products
 - ▮ Designed for low service costs
 - ▮ 200 W in only two height units
- ▷ [page 10](#)

Straightforward serviceability

- ▮ Servicing at component level thanks to modular design
 - ▮ Fully self-adjusting
 - ▮ No special knowledge or tools required
- ▷ [page 11](#)

Easy to set up

- ▮ Convenient graphical user interface
 - ▮ Minimal infrastructure requirements, minimal footprint
 - ▮ Self-optimizing operation for maximum efficiency
- ▷ [page 12](#)

Rohde & Schwarz – the partner you can count on

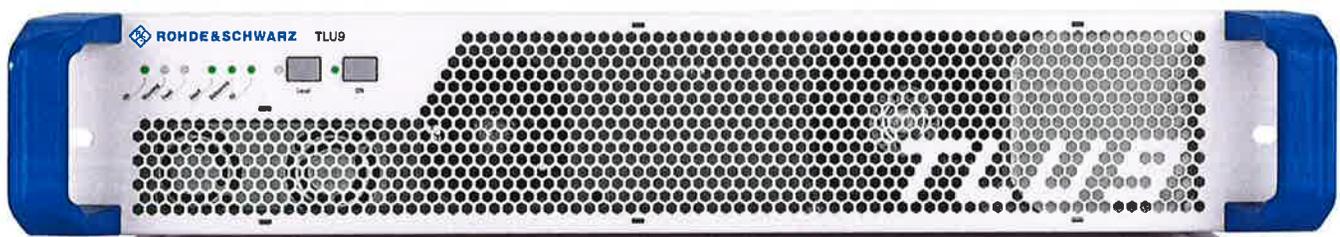
- ▮ Quality transmitters since 1949
 - ▮ Spare parts availability for more than 10 years
- ▷ [page 13](#)

Model overview

R&S®TLU9 Low-Power UHF Transmitter and GapFiller family							
	R&S®TLU9 1 HU model			R&S®TLU9 2 HU model			
UHF digital TV transmitters							
Output power (RMS) ¹⁾ for DVB-T2, DVB-T, ISDB-T _B , DTMB, ATSC	5 W	10 W	15 W	25 W	50 W	100 W	200 W
UHF digital TV gap filler and transposer							
Output power (RMS) ¹⁾ for DVB-T2, DVB-T, ISDB-T _B	5 W	10 W	15 W	25 W	50 W	100 W	200 W
Dimensions (W x H x D)	483 mm (19") x 44 mm (1 HU) x 600 mm 19 in x 1.73 in (1 HU) x 23.62 in			483 mm (19") x 88 mm (2 HU) x 450 mm 19 in x 3.46 in (2 HU) x 17.72 in			

¹⁾ Before bandpass filter.

R&S®TLU9 2 HU model.



Smooth operation

Robust and versatile

Premium components and extremely robust design

The R&S®TLU9 is the only high-quality transmitter product in its power class. Using premium components and based on an elaborate architecture, it offers unparalleled availability and long service intervals.

The R&S®TLU9 succeeds the R&S®SLx8000 low-power transmitter and the R&S®XLx8000 gap filler, thousands of which are in operation successfully around the world and have consistently exhibited extremely low failure rates. Building on the knowledge and experience gained with the R&S®SLx8000 and R&S®XLx8000 product families, the R&S®TLU9 Transmitter and R&S®TLU9 GapFiller were developed with a focus on creating even better and more robust products.

Using state-of-the-art technology, the R&S®TLU9 Transmitter is the world's first transmitter to deliver TV signals by means of direct digital RF generation. This feature contributes substantially toward maximum signal quality and stability. The R&S®TLU9 delivers reliability and smooth operation, reducing transmitter downtimes to a minimum.

R&S®THU9 experience in one or two height units Uniform operating concept for transmitters of the R&S®Tx9 generation

The R&S®TLU9 comes with a status display, a remote/local switch and an RF on/off switch on the front panel.

An optional transmitter display unit (R&S®TDU901) is available for fast, intuitive operation of the R&S®TLU9 via a 7" touchscreen display. The standard Ethernet port makes it

possible to operate the transmitter and gap filler via a web interface, either locally or remotely, or to integrate it into a network management system via SNMP.

Whether via touchscreen or web interface – the user benefits from the same convenient GUI used throughout the R&S®Tx9 transmitter generation. That means that if multiple R&S®Tx9 transmitter families are used in a network, the uniform GUI significantly reduces training effort for operating personnel.

IP transport stream feed to reduce infrastructure costs

Due to its cost-effectiveness, IP technology is also gaining ground in broadcast networks. In addition to ASI interfaces, the R&S®TLU9 offers two optional Gigabit Ethernet interfaces for redundant feed of two transport streams. External IP-to-ASI gateways are no longer necessary. The TSolP functionality is monitored by the transmitter, so this solution saves money and space and simplifies program feed monitoring.

Built-in signal analysis

The R&S®TLU9 has an integrated signal analysis function that continuously measures and outputs shoulder distance and MER values. Operators benefit from this feature as they can monitor signal quality without having to invest in additional measuring equipment.

Smart optioning system

The R&S®TLU9 comes with a unique optioning system, making it possible to integrate optional hardware components such as a satellite receiver, DVB-T or DVB-T2 receiver or components for redundancy configurations within the transmitter housing. This eliminates the need for additional equipment, saving space and cost and simplifying operation, since these hardware components are controlled and monitored by the R&S®TLU9. The transmitter has free slots to accommodate hardware options for expanded functionality.

R&S®TLU9 1 HU model.



Smooth operation

Reliable and innovative

Integrated exciter backup battery bridges voltage drops

The R&S®TLU9 comes with an optional, integrated exciter backup battery, a feature that is unique on the low-power transmitter market. The battery minimizes the negative effects of mains voltage interruptions. It powers the CPU and the signal processing components during voltage interruptions, ensuring that interruptions of up to 10 seconds do not result in a reboot of the transmitter. The battery thus reduces off-the-air time, offering an economical alternative to using an uninterruptible power supply (UPS).

Innovative redundancy configurations

The R&S®TLU9 offers two different redundancy configurations:

- BackupTx
- Compact N+1

In a BackupTx system, two R&S®TLU9 operate in a fully symmetrical 1+1 configuration. The two units monitor each other, making extra hardware for system monitoring and control unnecessary. Doing away with a separate,

The R&S®TLU9 has free slots to accommodate hardware options for expanded functionality.



Interfaces of the R&S®TLU9 1 HU model.

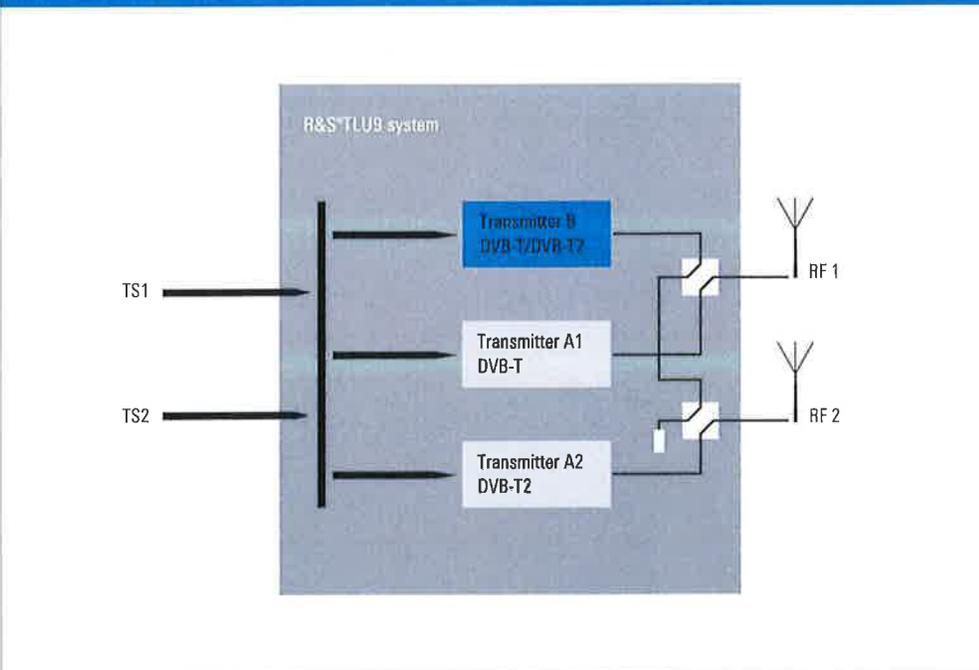


governing control unit eliminates the risk of a single point of failure. The BackupTx configuration offers the functionality and convenience of a classic passive standby configuration, and also increases the availability of transmitter functionality. BackupTx systems require considerably less space than conventional low-power transmitter systems, a major advantage when space is at a premium.

Compact N+1 is an enhanced version of the well-known N+1 configuration. Same as BackupTx, Compact N+1 requires no extra hardware for system monitoring and control. These functions are performed by the standby transmitter. The standby transmitter in a Compact N+1 configuration, same as the passive transmitter in a BackupTx configuration, is automatically adjusted to the settings of the active transmitters. If an active transmitter fails, the standby transmitter takes over without any interruption of transmission. The same applies in the event a standby transmitter needs to be replaced. The new standby transmitter reads the settings from the active transmitters, which continue operating.

The R&S®TLU9 offers a high degree of flexibility for network operators broadcasting DVB-T and DVB-T2 services in parallel or planning to migrate from DVB-T to DVB-T2. With the R&S®TLU9, operators can simultaneously broadcast DVB-T and DVB-T2 services in a Compact N+1 configuration, since the standby transmitter is immediately ready for operation as a DVB-T or DVB-T2 transmitter.

R&S®TLU9 N+1 transmitter configuration: simultaneous broadcasting of DVB-T and DVB-T2



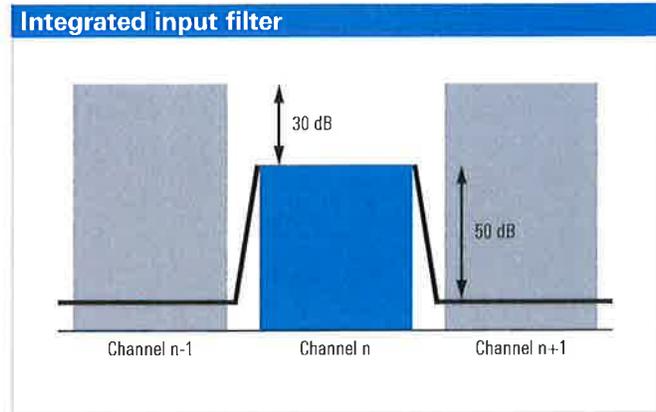
Unparalleled gap filler performance

The R&S®TLU9 is also available in rebroadcasting configurations for single-frequency as well as multifrequency networks. To meet network operators' needs and requirements, Rohde & Schwarz designed and developed a product that combines the strengths and benefits of the R&S®TLU9 Transmitter with pioneering and unique technologies to create an unparalleled rebroadcasting performance with the R&S®TLU9 GapFiller.

Former gap fillers are complex to configure. They only work well for specific reception scenarios and cannot handle changing echo characteristics. The R&S®TLU9 GapFiller addresses all these limitations. It offers gap filler operators the optimum combination of top signal quality, best reliability and minimal operating expenses. Furthermore, it is the first gap filler to feature R&S®smartEC, a built-in intelligent echo cancellation mechanism for self-configuration and automatic adaptation to changing echo characteristics.

Integrated input filter for independence of out-of-channel influences

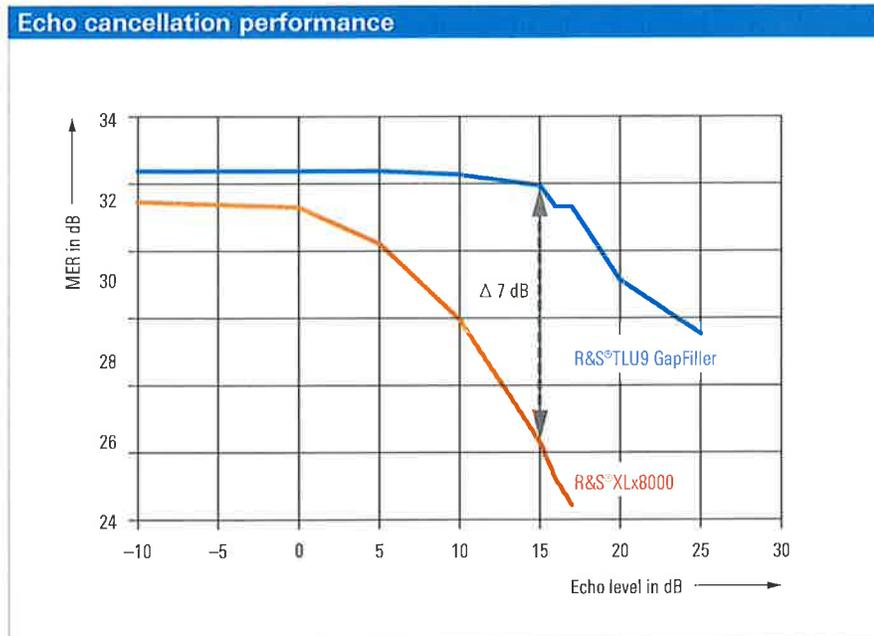
As a product for rebroadcasting applications, the R&S®TLU9 GapFiller was engineered to perform excellently in challenging adjacent channel situations. For this purpose, it features an integrated input filter that provides



an adjacent channel suppression of 80 dB. This filter is positioned in a very early stage of signal processing to ensure that no neighboring channels have any influence on the processing of the actual signal. The integrated input filter provides extremely sharp filter edges (80 dB at ± 4.115 MHz), which generates a crystal-clear signal without any emissions of adjacent channels and makes external input filter dispensable.

World-class echo cancellation for best signal quality

The R&S®TLU9 GapFiller comes with unparalleled echo cancellation performance. It not only cancels even very high echo levels of up to 25 dB stably. It also provides a strong Doppler echo cancellation and the ability to handle multiple echoes - always focusing on highly reliable operation as well as on excellent signal quality (MER), which are both of utmost importance for network operators.



In all echo scenarios, the R&S®TLU9 GapFiller performs significantly better than the R&S®XLx8000. The diagram below compares the echo cancellation abilities of both products in relation to the achieved MER. For echo levels of up to 15 dB, the new gap filler product from Rohde&Schwarz shows no significant MER degradation but a 7 dB higher MER than the previous product generation. That means for echoes up to 15 dB, the world-class echo cancellation of the R&S®TLU9 GapFiller eliminates the influence of echoes on the signal quality.

R&S®smartEC – continuous self-optimization for significantly reduced OPEX

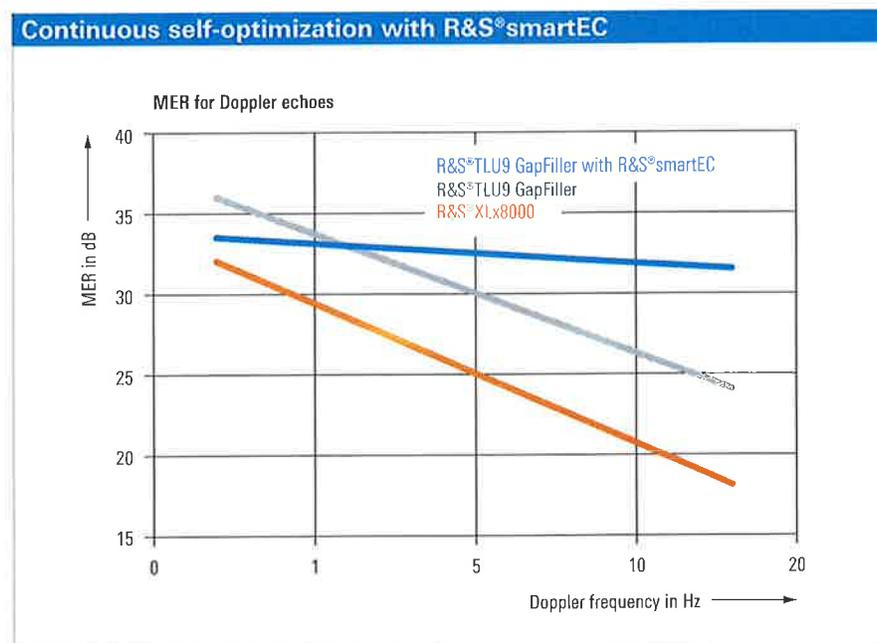
In complex and changing echo scenarios, former gap filler products provided an unpredictable signal quality, resulting in high operating expenses for manual signal quality optimization measures. The R&S®TLU9 GapFiller addresses these technical and commercial challenges of network operators – especially in networks with a high number of gap fillers – with a new unique feature: R&S®smartEC.

With this feature, the R&S®TLU9 GapFiller intelligently adapts its echo cancellation settings in changing echo situations, continuously and in realtime. It provides significantly better signal quality for both changing echo characteristics as well as Doppler echo scenarios. The MER degradation caused by the echo canceller is continuously minimized for all echo paths and ensures the required echo suppression with the lowest possible noise contribution. R&S®smartEC minimizes the need for reconfiguration of the echo cancellation settings. This makes regular site visits by technicians obsolete, which significantly reduces the costs for operating a gap filler network.

The R&S®TLU9 GapFiller offers the following advantages:

It addresses both the commercial and technical needs of network operators by providing maximized signal quality in any echo situation. While cancelling very high echoes and remaining stable even in complex echo scenarios, it features a continuous self-configuration of echo settings, adapts to changing echo characteristics and is robust for high adjacent channel levels.

With a maximized signal quality, minimized influence of outside conditions on MER degradation and no need for regular modification of the echo cancellation settings, the R&S®TLU9 GapFiller stands for reliable signal transmission and makes a deterministic planning of gap filler performance possible while minimizing OPEX.



Best-in-class TCO

35% lower OPEX

Due to the large number of units in low-power transmitter and gap filler networks, network operators focus on availability and service costs, as these are the key factors determining operating expenses. The R&S®TLU9 was developed with maximum availability and long service intervals in mind. Plus, it delivers clear diagnostic information in the event of a fault, enabling efficient, targeted troubleshooting.

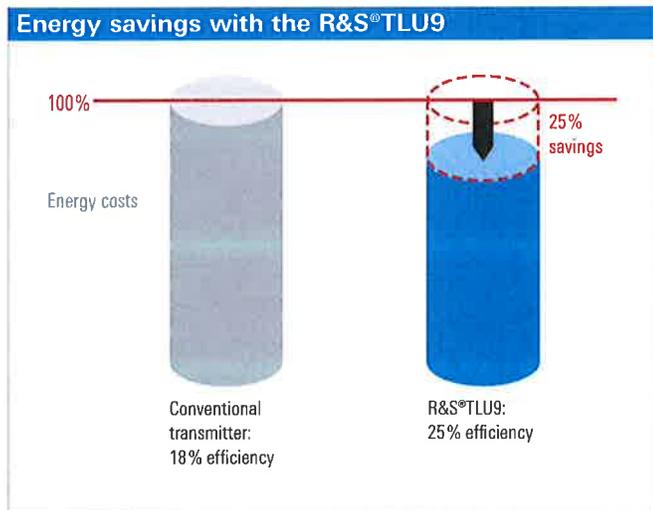
Like all transmitters of the R&S®Tx9 generation, the R&S®TLU9 can be monitored and controlled as a fleet using modern broadcast network management systems (NMS). The R&S®TLU9 comes with an SNMP interface with extensive capabilities, allowing even complex operating procedures to be implemented as automatic routines.

These features lower R&S®TLU9 operating expenses by up to 35% right from the start of operation, creating financial leeway for network operators and improving TV service quality.

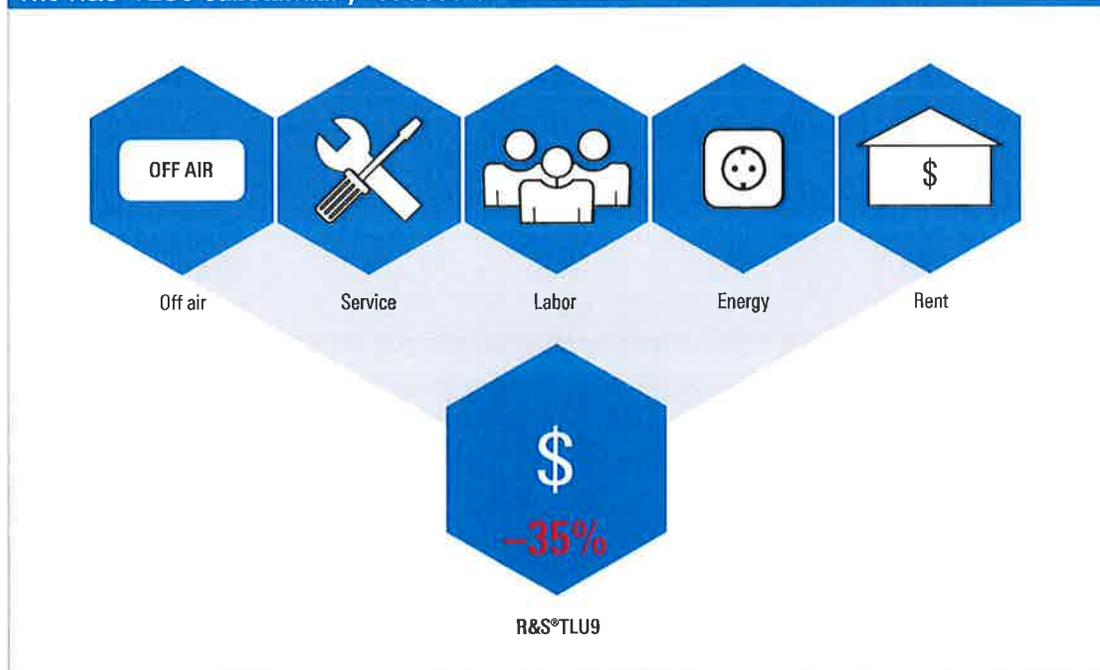
25% higher efficiency than competing products

Despite their low output powers, the efficiency of the R&S®TLU9 has a strong impact on operating expenses due to the fleet sizes employed in low-power transmitter and gap filler networks. R&S®TLU9 achieves energy efficiency of up to 25% for COFDM standards, setting the benchmark in the low-power transmitter class. This outstanding achievement is attributable to the company's consistent effort toward innovation in the development of cost-optimized low-power transmitters, as well as to the pioneering efficiency optimization feature developed by Rohde & Schwarz.

The R&S®TLU9 was designed with a consistent focus on maximum availability and efficiency. The use of state-of-the-art components and intelligent, self-optimizing operation are essential factors contributing to the exceptional performance and efficiency of the R&S®TLU9. The R&S®TLU9 delivers energy cost savings of more than 25%, outperforming conventional transmitters and gap fillers in this power class with only average efficiency.



The R&S®TLU9 substantially reduces OPEX drivers



Designed for low service costs

The R&S®TLU9 has been designed for minimum maintenance, calibration and testing effort in line with user requirements. Servicing is simple and straightforward, whether on site or at a Rohde&Schwarz service center, significantly reducing operating expenses for low-power transmitter and gap filler networks.

200 W in only two height units

Apart from energy and service costs, infrastructure costs account for a large proportion of the expenses incurred during a transmitter's lifecycle. The R&S®TLU9 delivers 200 W of output power in just two height units, another cost-cutting factor. This exceptionally compact size has been achieved through high integration density for the signal generation and transmitter control components,

and a well thought-out cooling concept. Moreover, diverse options can be integrated in the R&S®TLU9 for an even smaller footprint.

Users benefit from a highly compact, powerful transmitter and gap filler with densely packed features that satisfy the most stringent demands in terms of functionality, reliability and availability.

Straightforward serviceability

Servicing at component level thanks to modular design

Broadcast networks often comprise a large number of low-power transmitter or gap filler stations. These stations usually have only minimal resources in terms of staff and equipment, i.e. no staff and few or no spare parts or replacement devices are available on site. In the event of a transmitter or gap filler failure, this means considerable service effort for each unit, an effort that increases enormously with the large number of devices in the network. Long service intervals and minimum maintenance effort are thus vital requirements for the efficient and economical operation of a low-power transmitter and gap filler network.

The R&S®TLU9 was engineered to provide the best serviceability on the market. With its modular design, the product can be serviced at component rather than device level. Most of the components can be replaced by the customer, so that the device does not have to be returned to Rohde&Schwarz or a representative for servicing. In addition, the R&S®TLU9 shares components with other transmitters of the R&S®Tx9 generation, simplifying spare parts handling and cutting spare parts stocking expenses.

Fully self-adjusting

To minimize service effort at the transmitter site, adjustment and test requirements after replacing a defective component must be kept to a minimum. The R&S®TLU9 fully addresses this need. For example, the amplifier module can be replaced without any adjustment, making it quick and easy for service personnel to repair a transmitter or gap filler on site.

No special knowledge or tools required

Service expenses can be kept moderate – in terms of both equipment and personnel skills. No special tools are required. Customers can carry out even more challenging repairs using an easy-to-handle test system. The transmitter architecture is straightforward, significantly reducing training requirements for service personnel. This lowers operating expenses even before an R&S®TLU9 Transmitter or R&S®TLU9 GapFiller network is put into operation.

Easy to set up

Convenient graphical user interface

The R&S®TLU9 offers network operators the convenience they want and need when installing, commissioning and operating transmitters. The sophisticated graphical user interface (GUI) shows the transmitter and gap filler status at a glance.

The task-based menu shows the different tasks that can be performed with the product. The tasks and their individual steps are presented in a well-structured layout, so that they can be accomplished in a minimum of time. For example, when putting the transmitter or gap filler into operation, the operator is guided through the configuration of the different functional units and given help when entering parameters and changing settings.

The device-based menu provides a graphical view of the transmitter structure. The user simply touches a component to directly access its parameters.

Minimal infrastructure requirements, minimal footprint

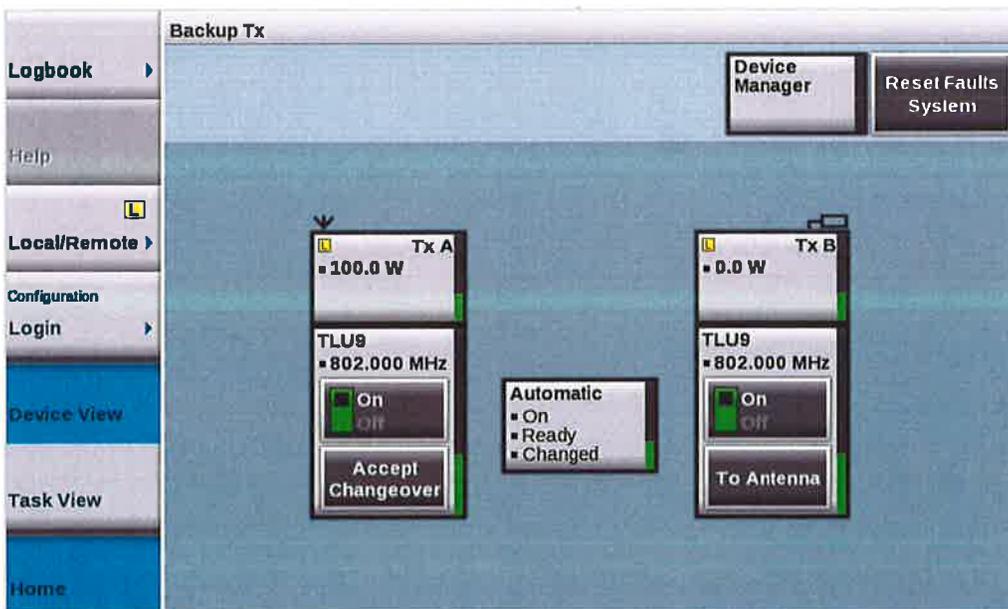
The new transmitter and gap filler are excellent solutions to bridge the last mile in digital TV networks. With their low demands on broadcasting and IT infrastructures and minimal space requirements, they are ideal for use in environments that do not provide a typical transmitter site infrastructure. The smart optioning system makes it possible to perfectly match the R&S®TLU9 to the conditions and requirements of a specific site. For instance, the R&S®TLU9 Transmitter can be enhanced to receive transport streams via satellite.

The transmitter can monitor ambient temperature and humidity, making it possible to verify that ambient conditions are within permissible limits to ensure a long service life. No extra equipment is required.

Self-optimizing operation for maximum efficiency

The R&S®TLU9 offers adaptive digital predistortion to linearize the transmitter and gap filler quickly, easily and at any time. This superior feature was developed by Rohde&Schwarz to simplify frequency changes, and it does more than outperform frequency-specific, time-consuming manual linearization. Adaptive digital predistortion is the prerequisite for the efficiency optimization feature, which adaptively optimizes transmitter efficiency, minimizing power consumption and thus energy costs. Thanks to this innovative feature, the R&S®TLU9 is able to transmit COFDM signals with up to 25% efficiency even without the use of Doherty technology.

The user simply touches a transmitter component to directly access its parameters.



Rohde & Schwarz – the partner you can count on

Quality transmitters since 1949 – decades of experience in transmitter design and production

Rohde&Schwarz has been developing and producing quality transmitters for more than 65 years. During this time, the transmitters have been continuously enhanced with new and improved functionality.

The company stands for quality, precision and innovation in all fields of wireless communications. As an independent, family-owned company, Rohde&Schwarz finances its growth from its own funds. The company plans for the long term to the benefit of its customers. Purchasing Rohde&Schwarz products is a safe investment for the future.

Spare parts availability for more than 10 years

Rohde&Schwarz ensures its customers spare parts availability for a period of at least 10 years from the time a product is discontinued. For new products such as the R&S®TLU9, this means almost 20 years of ensured spare parts availability. Broadcast network operators can count on professional, expert support from Rohde&Schwarz during the entire service life of their transmitters and gap fillers.

Rohde&Schwarz transmitters offer safety of investment that is unparalleled on the broadcast market.



Specifications

Specifications		
Digital TV		
Standards	transmitter	DVB-T, DVB-T2, ISDB-T _B , ATSC, DTMB
	gap filler	DVB-T, DVB-T2, ISDB-T _B
Channel bandwidth	DVB-T	5/6/7/8 MHz
	DVB-T2	1.7/5/6/7/8 MHz
	ISDB-T/ISDB-T _B , DTMB	6/8 MHz
	ATSC	6 MHz
Inputs of transmitter	DVB-T, DVB-T2, DTMB	2 × ASI (BNC, 75 Ω), 2 × TSolP (Gigabit Ethernet)
	ISDB-T/ISDB-T _B	2 × BTS (BNC, 75 Ω), 2 × TSolP (Gigabit Ethernet)
	ATSC	2 × SMPTE310M or 2 × ASI (BNC, 75 Ω), 2 × TSolP (Gigabit Ethernet)
Input of gap filler	DVB-S/DVB-S2 signal feeding (optional)	2 × F (75 Ω)
	DVB-T, DVB-T2, ISDB-T _B	1 × RF (BNC, 50 Ω)
General data		
Frequency range	UHF band IV/V	470 MHz to 790 MHz (790 MHz to 862 MHz on request)
Supply voltage		100 V to 240 V ±10%, 2 wires + PE (L1/N/PE), 50 Hz to 60 Hz ±5%
Max. installation altitude		3000 m above sea level (> 3000 m on request)
Operating temperature range		+1° to +45°C
Relative humidity (max.)		95%, non-condensing (indoors)
Immunity ¹⁾	to fast transients and bursts in line with IEC 61000-4-4 to surges in line with IEC 61000-4-5	±2 kV (AC supply), ±1 kV (signal inputs) symmetrical: ±1 kV (e.g. L-N), asymmetrical: ±2 kV (e.g. L-PE, N-PE)
Synchronization		
Reference frequency		10 MHz, 0.1 V to 5 V (V _{pp}) or TTL, BNC
Reference pulse		1 Hz, TTL, BNC
GPS/Glonass receiver sensitivity	optional for transmitter	-150 dBm (typ. -164 dBm), SMA
Integrated OCXO		bridges reference signal interruptions for up to 24 h
Operation		
Status panel with buttons and LEDs		local operation
Display unit with touchscreen	optional	local display and operation
Ethernet interface, RJ-45	optional	web interface: local, remote
Parallel remote interface	optional	network management interface via SNMP
	optional	floating contacts for messages and commands

¹⁾ More stringent requirements must be satisfied by implementing appropriate measures at the transmitter site.

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

From pre-sale to service. At your doorstep.

The Rohde & Schwarz network in over 70 countries ensures optimum on-site support by highly qualified experts. User risks are reduced to a minimum at all stages of the project:

- Solution finding/purchase
- Technical startup/application development/integration
- Training
- Operation/calibration/repair

The R&S®TLU9 Low-Power UHF Transmitter and GapFiller family is the most reliable TV transmitter and gap filler series on the market. To ensure operational readiness of your systems and plannable budgeting for operating expenses, Rohde & Schwarz offers service level agreements (R&S®SLA) for your systems. The R&S®SLA allows you to concentrate on your core business. We take care of the service you require to succeed with your business model.

For details, please contact your local Rohde & Schwarz representative.



Service that adds value

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

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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