S.N. RADIOCOMUNICAȚII S.A.
INTRARE REGISTRATURA
IEȘIRE 1844 27.03.2024

APPROVED,

Chief Technology Officer

TECHNICAL REQUREMENTS

MEDIUM WAVE TRANSMITTERS

CPV code: 32210000-8 Radio and television equipment (Rev. 2)

100 kW medium wave transmitter: 1 pc
50 kW medium wave transmitter: 1 pc

Broadcasting Department Manager,

Radio Broadcasting Chief Engineer

Bucharest, 2024

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193.486.918,66 lei

CONTENTS

No.	Chapter / Sub-chapter	Pag.
1.	**INTRODUCTION**	3
2.	**CONTEXT OF THE TENDER**	3
2.1.	Information about the Contracting Authority	3
2.2.	Information about the context that led to the purchase of the products	3
2.3.	General framework of the Contracting Authority activity sector	4
3.	**DESCRIPTION OF REQUIRED PRODUCTS**	5
3.1.	The general objective of required products	5
3.2.	Required products and ancillary operations to be performed	5
	3.2.1. Products requested	5
	3.2.2. Warranty	6
	3.2.3. Delivery, packing, labelling, transport, and insurance during transport	7
	3.2.4. Auxiliary operations	7
	3.2.4.1. Training of Contracting Authority staff for product testing and operating	7
	3.2.4.2. Installation and commissioning	8
	3.2.4.3. Testing products and accessories	8
	3.2.4.4. Technical support and preventive maintenance during the warranty period	8
	3.2.4.5. Spare parts for corrective maintenance activities after warranty period expiration	9
3.3.	Duties and responsibilities of the Parties	9
4.	**DOCUMENTATION TO BE SUPPLIED TO THE CONTRACTING AUTHORITY IN RELATION TO THE PRODUCT**	10
5.	**RECEPTION OF PRODUCTS**	11
6.	**PAYMENT TERMS AND CONDITIONS**	11
7.	**METHODOLOGY OF BID EVALUATION**	11
8.	**ANNEXES**	11

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1. INTRODUCTION

In this procedure that will be concluded by signing a product supply contract Romanian National Radiocommunications Company S.A. (S.N.R. S.A.) performs the role of Contracting Authority, respectively beneficiary of the contract.

The tender specifications are an integral part of the procurement documentation and constitute the minimum set of technical and quality requirements to be fulfilled, on the basis of which each bidder will elaborate the technical and economic proposal, in order to conclude the contract for the supply of products. Any annex corresponding to any chapter of this tender book, is an integral part of that chapter and implicit of the procurement documentation.

Technical offers / proposals that do not meet all the minimum requirements, specified as such in the specifications, will be declared non-compliant. **Partial tenders, in terms of quantity and quality, are not admissible,** only full tenders that meet all the requirements set out in this tender book will be declared admitted. **Alternative offers are not accepted.**

Any tender which deviates from the mandatory minimum requirements will be considered admissible only in so far as it ensures a higher quality level than the minimum requirements.

The documentation related to the technical proposal will be presented in English or in Romanian and will be submitted in electronic format, with text search capability. In case of submission the technical proposal in English, the bidder assumes the obligation to submit, at the request of SNR S.A., the authorized translation into Romanian language.

In the case of english technical terms and their usual acronyms, as well as those which do not have officially equivalent accepted in the Romanian language, the semantic value retains their original technical meaning (according to specifications and definitions in the terminology used by reference structures in the field of communications) throughout the description of the technical specifications in this tender book.

In this document will be used the terms ***Bidder*** and the terms ***Contractor or Supplier***, which will have the same meaning. The terms ***Product Supply Contract*** and ***Contract*** will have the same meaning.

2. PRODUCTS PURCHASE INTENTION CONTEXT

2.1. Information about the Contracting Authority

Name of the Contracting Authority: Societatea Națională de Radiocomunicații S.A. (S.N.R. S.A.)
Address: Șoseaua Olteniței nr. 103, sector 4, București.

2.2. Information about the context that led to the purchase of the products

According to the provisions of H.G. nr. 372/1998 on the establishment of the Romanian National Radiocommunications Company S.A. through the reorganization of the Autonomous Administration " Radiocomunicații ", Societatea Națională de Radiocomunicații (S.N.R.) S.A. is a legal Romanian entity, a national company of public interest, which operates on the basis of economic management and financial autonomy.

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S.N.R. S.A. provides telecommunications services with a wide range of coverage and addressability. In order to achieve the purpose for which it is established, S.N.R. S.A. exercises its object of activity throughout the country and outside it, ensuring the transport and broadcasting of national radio and television programs, international radio and television programs, and other radio and television programs.

Romanian National Radiocommunications Company S.A. is the main provider of radio-tv broadcasting services (analog and digital), which deals with the transport and broadcasting of public radio and TV programs of the Romanian Radio and Television Broadcasting Companies at national and international level, through the largest network of DVB-T2, FM, AM and US transmitters.

AM Network include several transmitters older than 25 years, for which the manufacturers cannot supply spare parts anymore, so each and every major fault would cause long periods of 'off air' time.

In 'Valu lui Traian' site are installed 3 AM transmitters, one 100 kW Thomson AM transmitter operating on 1458 kHz, one 50kW Thomcast AM transmitter operating on 1314vkHz and one 25kW Thomcast AM tranamitter operating on 909 kHz. Starting from 2020, due to its long non stop operation, the 100kW Thomson transmitter manifested a periodic malfunction, the transmitter coming out of service without any obvious signaling or defect and from august 2021 it is defective; from April 16, 2023, with the agreement of the Romanian Radio Company, it was temporarily replaced by a rented "second-hand" transmitter with a power of 50kW TRAM 50.

The same equipments produced by Thomcast are in service in Herastrau site (30kW working on 603 kHz) and in Oradea-Rontau site (50kW working on 603 kHz).

All these equipments are prone to malfunction due to imposibility to procure spare parts and considering that their guaranteed uptime given by the manufacturer was surpassed starting with 2010, there is no available technical support.

In this context, given the importance of the national programs transmitted by these equipments and the need to ensure a quality reception, it is necessary to purchase new medium wave transmitters, with the 'DRM30 ready' option included (given the current trend of migration towards digital terrestrial broadcasting, whose accepted worldwide standard in the medium and short wave bands is DRM30).

2.3. General framework of the Contracting Authority activity sector

S.N.R. S.A. carries out its activity in the field of radiocommunications, the main object of activity including: the provision and marketing of communications services, maintenance, operation, development and modernization of the national system of terrestrial broadcasting for public radio and television programs, the delivery, under the law, of radiocommunications services necessary for operating the national security system.

Activity of S.N.R. S.A. is carried out in accordance with the provisions of:

- **H.G. no. 372/1998** on the establishment of S.N. Radiocomunicații S.A. through the reorganization of the Autonomous Radiocommunication Directorate;
- **Law nr. 504/2002** of the audiovisual services, with subsequent amendments;
- **O.U.G. nr. 111/2011** on electronic communications, with subsequent amendments;

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- **Law nr. 159/2016** on the regime of physical infrastructure of electronic communications networks, as well as for establishing measures to reduce the cost of deploying electronic communications networks, with subsequent amendments and additions;
- **O.U.G. nr. 109/2011** on corporate governance of public enterprises, with subsequent amendments.

3. DESCRIPTION OF REQUIRED PRODUCTS

3.1. The general objective of required products

The object of the Contract consists in the purchase of a 100kW transmitter on the frequency of 1458 kHz and a 50kW transmitter on the frequency of 603 kHz.

NOTE: the supply of the products will also include on-site acceptance testing of the products after installation by the Contracting Authority.

3.2. Required products and ancillary operations to be performed

In the performance of the contract, the contractor's activity shall be guided by the following **principles**:

- The contractor shall act in the interest of the Contracting Authority throughout the duration of the contract, under the conditions and within the limits described in the documentation relating to this procurement procedure;
- The contractor shall act in order to achieve the objective, with regard to optimising the use of resources in order to achieve the objective of the contract.

3.2.1. Requested products

Delivery of the products will be made at the following **locations**:

No.	Location	Delivery address
1	Valu lui Traian	AM transmission site Valu lui Traian, Valu lui Traian Village, Constanta County
2	Rontău	AM transmission site Rontău, Sanmartin Village, Bihor County

The delivery Time is maximum **10 months**, from the date of signing the contract.

The technical warranty of the products shall be at **least 24 months** from the date of the Final Acceptance Report *and the certificate of acceptance on the* site, as specified in point 3. 2.2. Warranty.

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The products covered by the supply contract have the following technical characteristics:

- **Fully transistorized Medium Waves Transmitters**

Quantity, U.M.	**Place of delivery**	**Technical specifications OR minimum functional requirements**	**Spare parts - the minimum recommended set***
1 pc.	Valu lui Traian village, Constanta County	Power: 100 kW, working mode: AM, DRM30 ready; Two exciters with automatic switch-over equipment in case of failure Emission frequency: 1458 kHz Rack for monitoring and for modulation signal input equipment AM DRM control receiver	Electronic boards/modules, power supply, power amplifiers, air filters, air fan, calibrated fuses, RF power transistors, display, etc.
1 pc.	AM site Oradea Rontau, Bihor County	Power: 50 kW, working mode: AM, DRM30 ready; Two exciters with automatic switch-over equipment in case of failure Emission frequency : 603 kHz Rack for monitoring and for modulation signal input equipment AM DRM control receiver	Electronic boards/modules, power supply, power amplifiers, air filters, air fan, calibrated fuses, RF power transistors, display, etc.

Legend:

Spare parts - the minimum recommended set*- The bidder shall provide a complete list of the recommended spare parts for the post-warranty period and their price per unit. The total value of the recommended set of spare parts will not exceed **5% of the value of the transmitter**.

The technical characteristics of the medium wave transmitters that are the object of the contract, can be found in the technical proposal forms Annex 1 to this specification, respectively **Annex 1- Technical compliance for medium wave AM Solid State Transmitters**.

3.2.2. Warranty

The products/ equipments delivered under the contract benefit from the warranty and technical support period assumed by the Supplier in the bidding process, **of at least 24 months** from the date of signing the final reception protocol and the certificate of acceptance on site, without any additional cost for the Buyer.

During the warranty period, the Contractor shall notify the Supplier within 5 working days from the date of finding a malfunction, and the Supplier undertakes to repair or replace at its exclusive expense, any defective component or subassembly, including any installation material that is found to be defective or non-compliant with the technical specifications, within a maximum of 10 working days from the date of notification by the Purchaser. The replaced components will have a new warranty period, which runs from the date of their replacement.

The Supplier must provide qualified service personnel capable of providing technical support and managing the fixing of the failures during the warranty period.

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3.2.3. Delivery, packing, labelling, transport, and insurance during transport

The supplier shall be obliged to **pack the product** in such a way as to cope with its handling at loading/ unloading, the conditions during transport, transit and exposure to extreme temperatures, sun and precipitations that may occur during transport and storage, so as to reach its final destination in good condition, according to the manufacturer's specifications. In the case of packing weights and volumes in boxes, the supplier shall take into account the distance to the final destination of the products.

The products will be labeled and packaged according to the provisions of the execution standards, by category (e.g. transmitters, power suplies, monitoring equipment, installation materials, etc.) in separate packages. On each package, a label containing the type of equipment contained will be displayed in a visible place. If a category of equipment is contained in several packages, the Supplier must highlight this fact and make the correlation between these packages (e.g. by numbering them).

All packaging materials for the products, as well as all the materials necessary for the protection of the packages (wooden pallets, protection sheets, etc.) remain the property of the Purchaser.

The products/ equipments will be delivered to the sites mentioned in point 3.3.1., and ***their installation will be carried out by the Contracting Authority***. The supplier has the obligation to communicate to the Buyer, in writing, 5 working days before the dispatch of the products, the shipping dates, the description of the products, the quantity. The supplier shall send to the Buyer the following documents that will accompany the products:

- Cargo accompanying notice;
- List of products contained in each package (Packing-list);
- The quality certificate;
- Warranty certificate;
- Transport document (car, sea, etc.);
- Certificate of origin of the goods;
- The factory acceptance certificate, signed by the representatives of both contracting parties.

The products will be insured against loss or damage occurred during transport and caused by any external factor, the Supplier being fully liable for any damage/ malfunction of the products occurred during transport, the latter having the obligation to remedy any deficiency occurred, possibly to replace, if necessary, the damaged / defective product according to the contractual provisions on the technical warranty.

The Supplier shall be responsible for the delivery of the products within the agreed time limit and shall be deemed to have taken into account all the difficulties which he may encounter in this respect and shall not invoke any reason for delay or additional costs.

3.2.4. Auxiliary operations

3.2.4.1.Training of Contracting Authority staff for product testing and operating

The contractor is responsible for the training of the personnel designated by the Contracting Authority, respectively the schooling in **the factory of a number of 3 persons, during 5 working days**, in order to test the technical parameters of the equipment in the factory and on the site, after installation and for the subsequent operation of the product / equipment.

The training activity will be provided at no additional cost to the Buyer. **The provider will cover all costs of the training**, including those related to **travel and accommodation.**

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The technical training activities will be carried out by instructors authorized by the manufacturers of the transmitters and on their equipment; the training shall be carried out at the manufacturer's premises or in facilities approved by him, equipped in accordance with the purpose of the training.

Prior to the start of the training activities, the Tenderer has the obligation to elaborate and make available to the Buyer, in electronic format, ***technical-operational documentations, manuals for exploitation, administration and use in English or Romanian***, for all the functionalities of the product and its equipment. The participants in the training will be provided individually with training materials on electronic and printed support. After completing the training, diplomas / certificates of participation/ attestation will be issued for all participants.

3.2.4.2. Installation and commissioning

The on-site installation of the supplied products, **will be carried out by the Buyer**, under the coordination of the personnel trained by the Supplier for this purpose.

Upon completion of the installation of the transmitters on the site, the Buyer shall notify the Supplier in order to carry out, within a maximum of 15 working days from receiving the notification, **the on-site acceptance testing of** the products and **their commissioning**.

3.2.4.3. Testing products and accessories

Testing of the medium wave transmitters and accessories will be done **in the factory** and **on site**.

The products testing will be carried out in the presence of the Authorized Representatives of the Supplier and the Beneficiary's staff, trained by the Supplier in this scope.

The Contracting Authority requests **to fill in the test results** in forms of the kind provided in **Annex 3** to this specification.

Note: It is mandatory that the submitted offer contains a detailed "*Acceptance Test Protocol*", including the individual procedure and test equipments used to measure and test each parameter and functionality of the transmitters.

The factory testing of the transmitters will be carried for one transmitter from each power range (AM 100kW, AM 50kW), out *on dummy load.* Performance testing involves operation checks, electrical and mechanical checks, testing the operating regime, according to the protocol. At the end of the factory testing, the **acceptance certificate** will be issued, a document that will be signed by the representatives of the Beneficiary and of the Supplier.

On-site testing involves repeating factory tests on dummy load, with the exception of the 24-hour endurance test. **All tests will also be repeated in the antenna**, including the 24-hour endurance test.

Accessories testing

The related equipment will be tested and inspected according to the mutually acceptable acceptance testing protocols at the manufacturer's factory as well as on site. The bidder shall attach to the submitted bid, *the acceptance protocol for each type of equipment.*

3.2.4.4. Technical support and preventive maintenance during the warranty period

Throughout the duration of the contract, the Supplier shall provide **technical support**. It will provide a contact point dedicated to the Buyer, where the latter can report any problem / malfunction

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that requires maintenance, in order to ensure that any reported situation is promptly handled by the Supplier.

Maintenance during the warranty period, of **at least 24 months**, the Supplier will replace the defective components at his expense. The warranty for the product(s) repaired or replaced during the warranty period is extended by the duration of their immobilization in repair.

3.2.4.5. Spare parts for corrective maintenance activities after expiration of the warranty period

The supplier will ensure a stock of first intervention spare parts, within the limit of 5% of the value of the product / equipment, parts that will be ***delivered together with the equipment*** and will be made available to the Buyer for **use during the post-warranty period**, in order to remedy with maximum urgency some possible problems.

The supplier must be able to provide spare parts and any other necessary consumables. Thus, the Bidder shall present in the proposal:

a) **Recommendations regarding the spare parts** that must currently exist in order to facilitate the shortest possible time of the maintenance operations;
b) **The delivery time** for the recommended spare parts, within the limit of 5% of the value of each product / equipment, is the same as the delivery term of the product;
c) Other relevant information.

All spare parts provided by the Supplier must comply with the technical and quality requirements of the equipment manufacturer.

3.3. Duties and responsibilities of the Parties

- **Duties and responsibilities of the Provider**

- To provide products up to the standard and performance presented in its technical proposal, with the professionalism and promptness due to the commitment made;
- To inform the Buyer 5 working days before the delivery of the product, in writing, by sending the documents that will accompany the product on delivery;
- To supervise the delivery of the product and the provision of related services, to ensure the human, material, equipment or other similar resources required by and for the contract;
- To ensure all activities regarding the training of the designated personnel of the Buyer;
- To check the product on departure from the factory and to ensure the proper packaging and labelling of this, according to the requirements of the specification;
- To ensure the transport of the product to the destination and the unloading of the product on site, under conditions of maximum safety;
- To insure the products during transport s;
- To deploy together with the Contracting Authority the verification/ testing of the product - acceptance tests in the factory and on the site, after its installation by the Contracting Authority, within a maximum of 15 working days from the receipt of the notification on the completion of the installation works, issued by the Contracting Authority;
- To provide the spare parts within the limit and the technical specification established by the contract (max. 5% of the valueof the product / equipment); their delivery will be made together with the transmitter;
- To provide technical support and free maintenance during the warranty period, to remedy within 10 working days the failures notified by the Buyer;

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- To solve without additional costs for the Buyer, within a maximum of 10 working days from the notification of the Buyer, any inconsistency found after the quantitative acceptance, including in the case of inspected or tested products, both in the factory and on site, which do not comply with the technical specifications of the Supplier's technical proposal;
- To ensure, at the request of the Purchaser and at a reasonable price, the spare parts, materials and subassemblies necessary for the proper functioning of the delivered equipment, for a period of 10 years from the end of the contract. If during the 10 years, certain spare parts are no longer produced, the Supplier has the task of purchasing for the Buyer the equivalent spare parts, at current and reasonable prices, charged on the market and accepted by the Buyer.

- **Duties and responsibilities of the Buyer**

- To make available to the Contractor any information and/or documents which he holds and which may be relevant to the performance of the contract;
- To designate a representative responsible for the monitoring and performance of the contract;
- To ensure the access of the Supplier to the site mentioned in this specification, in order to unload the product in conditions of maximum safety;
- To quantitatively receive the product within 5 working days of its delivery on the site and to sign a quantitative reception report of, that will be aproved by both contracting parties;
- To install the product within 30 working days from the quantitative reception report and to notify the Supplier at the end of the installation of the product on the site, in order to carry out the acceptance tests within the stipulated time, together with the Supplier;
- To carry out the qualitative reception in the presence of a representative of the supplier and to draw up a performance test report, which will be signed by both contracting parties;
- To request technical support from the Supplier, under the conditions set out in the specifications and in the contract;
- To notify the Supplier within the warranty period of the product, within 5 working days from the occurrence of a malfunction, in order to remedy it;
- To pay to the Supplier the price agreed for the fulfillment of the contract, based on the invoice issued by him, accompanied by the Protocol of quantity and quality reception, and by the certificates of acceptance in the factory and on the site, without observations, under the conditions mentioned in the contract.

4. DOCUMENTATION TO BE SUPPLIED TO THE CONTRACTING AUTHORITY RELATED TO THE PRODUCTS

The products covered by this specification shall be compulsorily delivered together with the following documents:

a) The notice accompanying the goods;
b) List of products contained in each package (Packing-list);
c) The quality certificate;
d) Warranty certificate ;
e) Transport document (car, sea, etc.);
f) Certificate of origin of the goods;
g) Technical documentation, according to the specifications;
h) Acceptance certificate, following factory testing of the product, signed by both contracting parties.

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5. RECEPTION OF PRODUCTS

The final reception of the products will be made at the final destination and will include cumulatively:

a) **The quantitative acceptance,** which will consist in the inspection and visual verification by the Purchaser, counting of the products delivered, including the auxilliary components (it is mandatory to record all the series of the delivered products) within 5 working days of their receipt and a quantity reception report will be concluded, which will be signed by both contracting parties.

b) **Qualitative acceptance**, which will involve carrying out **conformity tests** in order to verify compliance with the technical specifications of the product in the technical proposal.

If, during the quantitative and qualitative acceptances, it is found that not all the components of the product have been delivered, or some of the components tested by the Purchaser do not meet the technical specifications of the technical proposal or are defective, the Buyer has the right to reject the products concerned, and the Supplier has the obligation to remedy the deficiencies found, without additional costs for the Buyer, by delivering within a maximum of 10 working days the missing product/components and/or replacing them, without exceeding the set deadline.

6. PAYMENT TERMS AND CONDITIONS

The payment of the delivered products will be made based on the invoices issued by the Supplier, by bank transfer to his account, according to the provisions of the Contract.

7. METHODOLOGY OF BID EVALUATION

The award criterion for the conclusion of the supply contract for products is **'the best value for money'**. The score will be awarded taking into account the evaluation factors and subfactors set out in **Annex 2** to this specification, respectively the **financial component - the bid price** and the **technical component**, consisting of 2 subfactors: **the performance of the technical parameters and the delivery time**.

The maximum score, for each factor/ subfactor, will be given to the most advantageous offer in relation to the value requested. For the rest of the admissible tenders, the score shall be calculated according to the algorithm set out in Annex 2.

The evaluation committee will award each bid an individual score, resulting from the summation of the partial scores obtained by applying the calculation algorithm for each evaluation factor/subfactor. **The bid with the highest final score will be considered the winning bid.**

The maximum score that an offer can accumulate is 100 points.

If two or more tenders are ranked first, with equal scores, the tiebreaker will be made taking into account the score obtained at the evaluation factors, in descending order of their weightings. If equality is maintained, the Contracting Authority shall be entitled to request new financial proposals and the successful tender shall be designated the one with the lowest financial proposal.

8. ANNEXES

- Annex 1 - Technical proposal form - Technical compliance for medium wave AM Transmitter.
- Annex 2 – Evaluation factors.
- Annex 3 - Forms for Medium Wave transmitter testing.

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ANNEX 1

Technical proposal form
Technical compliance for medium wave AM Solid State Transmitter

	Technical characteristics	Details	Obligatory	Method of fulfillment of the requirement	References
I	**Configuration**				
1	Digitally μP controlled transmitter		Yes		
2	Solid state transmitter, modular architecture		Yes		
3	Front panel with display for detailed system information		Yes		
4	Variable carrier depending on the level of the modulation signal (ACC, DCC, etc.); The carrier reduction up to 6dB will be provided		Yes		
5	DRM capabilities	**DRM Ready**	Yes		
II	**RF features**				
1	Frequency range	531 ÷ 1610 KHz	Yes		
		- possibility of subsequent change in frequency	Yes		
2	Exciters	- two exciters in stand-by configuration, with automatic switch over in case of malfunction - digitally controlled oscillator - input for external reference	Yes		
3	Frequency stability	+/- 2ppm	Yes		
4	Operating mode	AM(A3E)/(DRM30/after installing DRM exciter)	Yes		
III	**RF output**				
1	Output impedance	50 Ω (Unbalanced)	Yes		
2	Carrier power	according with quotation request	Yes		
3	Output power range	Adjustable in the range of 20%-100%	Yes		

	Technical characteristics	Details	Obligatory	Method of fulfillment of the requirement	References
4	VSWR	a. up to min. 1.3 with rated power, automatic power reduction in case of exceeding the threshold	Yes		
		b. the transmitter must have protections for short circuit and open circuit	Yes		
5	Harmonics and spurious	According to ITU-R SM.329-12	Yes		
6	Carrier shift	1% or less (for 95% modulation)	Yes		
7	Connector	3 1/8" EIA;	Yes		
IV	**Modulation inputs**				
1	Input	Analog input: 600 Ω balanced line input level from - 10 dBu to +10 dBu	Yes		
		AES/EBU digital input 110Ω; Input level from -20 dBFS to 0 dBFS for digital signal	Yes		
2	Modulation Capability	100% continuously sinusoidal wave	Yes		
		min. 125% peak program capability	Yes		
3	IP input	The provider must offer, within the transmitter system, the possibility to use IP input technology utilizing redundant WAN networks, with instant replacement of packets that may be lost on WAN1 by packets delivered on WAN2. This must take place seamless without switching between streams. Additionally, the technology must support similar functionality on a single WAN as well by utilizing delivery of delayed streams, where packets from second	Yes		

	Technical characteristics	Details	Obligatory	Method of fulfillment of the requirement	References
		stream replace lost packets from the first stream. Additionally, and at the same time, the IP source must be selectable between primary and secondary source.			
a	Encoding and decoding for IP signals	- MPEG2/4: AAC-LC - Linear PCM - Opus - MPEG-TS	Yes		
b	Must be able to upgrade with following algorimths:	- MPEG 1/2 Layer II - MPEG4: AAC-LD/ELD , AAC-HE v1/v2 - E-APT-x	Yes		
V	**Transmission characteristics**				
1	Modulation frequency range	30 Hz - 10 kHz	Yes		
2	Amplitude-frequency characteristic referred to fmod=1 kHz, 30 Hz - 10 kHz, 90% modulation	+0.5 / -0.8 dB	Yes		
3	THD (Total Harmonics Distortion) 30 Hz to 10 kHz, 80% modulation	≤ 1 %	Yes		
4	Intermodulation distortions	1.0% or less than 1:1, 60/7000Hz; 2% or less 4:1 at 95% modulation	Yes		
5	Signal-to-noise ratio, referred to fmod= 1 kHz, 100% modulation	≥ 60 dB	Yes		
VI	**Power supply, cooling, environment**				
1	Supply voltage	3 phases, 400 Va.c. +/- 5% with maintaining full performance; +/- 10% with keeping the transmitter on-air; 50 Hz +/-3 Hz: 4 conductors + grounding	Yes		
2	Power factor	≥ 0.9	Yes		
3	Overall efficiency	≥ 85%	Yes		

	Technical characteristics	Details	Obligatory	Method of fulfillment of the requirement	References
4	Cooling	Air cooling with built-in fans. Protection system with automatic power reduction and transmitter shutdown in case of overheating/ temperature fault Dust filters, the air intake will be from the same room where the transmitter is installed	Yes		
5	Operating temperature range	0°C to + 45°C	Yes		
6	Maximum relative humidity	up to 90% non-condensing	Yes		
7	Altitude	up to 2000 m	Yes		
VII	**Specific requirements**				
1	The AM transmitter must ensure uninterrupted and unattended operation 24 hours/day.		Yes		
	The RF power amplifiers must be modular.		Yes		
2	The transmitter shall be characterized by high reliability, high MTBF (15000 hours). A declaration must be provided by the manufacturer.		Yes		
3	The transmitter must display various parameters on the LCD display.		Yes		
4	The AM transmitter must be provided with a calibrated measuring sample port for power measurements and RF measurements.		Yes		
5	The AM transmitter must be provided with full local and remote monitoring and control system with GUI web interface for remote operation. The transmitter will be provided with web user interface. The transmitter should be controlled independently of any external software.		Yes		

	Technical characteristics	Details	Obligatory	Method of fulfillment of the requirement	References
	Minimum requirements:				
	a) Remote control interface	All devices and software necessary for the integration of the transmitter into the client monitoring system (RADIOCOM) (e.g., SNMP protocol, MIB files, etc.); TCP/ IP interface	Yes		
		Full control and indication of the main parameters of the transmitter	Yes		
	b) Local				
	Displaying the following parameters:	**Transmitter operating parameters** (frequency, direct and reflected power, voltage and main power currents, audio input status, alarm list and history)	Yes		
		Fault diagnosis: RF chain and exciter, power amplifier stage, VSWR, temperature, interlock, main power supply.	Yes		
		Alarms: no carrier, no audio, active fold-back, etc.	Yes		
6	Fully wired rack for audio program inputs and monitoring equipment. Including:		Yes		
a	Audio processor for AM operation	- adjustable audio gain, limiter, selectable audio filter, audio presets and user-defined presets;	Yes		
		- Analog and digital AES audio inputs with automatic switching between input sources, silence detection according to user configurable thresholds	Yes		
b	AM demodulator with modulation depth meter.		Yes		

	Technical characteristics	Details	Obligatory	Method of fulfillment of the requirement	References
c	Audio monitor with loudspeaker, selector for multiple audio inputs: audio processor output, demodulator output, main audio line, backup audio line.		Yes		
7	The AM transmitter will be equipped only with air cooling system.		Yes		
8	The following **typical protection requirements:**		Yes		
		Overload protection	Yes		
		Overheat protection	Yes		
		Protection against high VSWR including open and short conditions at output	Yes		
		Immediate power fold-back under severe / damaging fault conditions. Details of the self-protection operation must be provided	Yes		
		Operating personnel protection systems:	Yes		
		-Key interlocking system for dangerous areas in the transmitter. Adequate protection of operating personnel by means of an interlocking system which ensure that no doors can be opened until the high voltage are switched off; all main modules that remain alive must be adequately shielded	Yes		
		- The operating staff must be protected from the high voltage capacitors or other parts of the transmitter by ground connection circuits and ground sticks.	Yes		
9	The AM transmitter must be provided with automatic switch-		Yes		

	Technical characteristics	Details	Obligatory	Method of fulfillment of the requirement	References
	on at short interrupting of the main power supply (3 interrupts up to 1 second (in 5 seconds interval)). **A statement needs to be provided by manufacturer.** This need to be confirmed by factory test report supplied with the transmitter.				
10	The transmitter must have adequate protection against fire, rust, and corrosion. **The manufacturer must provide a declaration**		Yes		
11	An adequate system of protection shall be provided to safeguard the transmitter from damage under fault conditions. The protection system should act fast to protect the components.		Yes		
12	A proposal for recommended spare parts kit is required. **A complete list of spare parts and the price for each item must be provided.** The total value of the set of recommended spare parts will not exceed 5% of the value of the transmitter, see the requested offer list.		Yes		
13	Must be provided as "technical documentation", for all equipment, the following items		Yes		
	Documentation for the mechanical-electrical fitting		Yes		
	The technical manuals must contain:	Specifications			
		Installation and initial turn on	Yes		
		Operating Guide	Yes		
		Controls and indicators	Yes		
		Overall system theory	Yes		
		Maintenance and alignments	Yes		
		Troubleshooting	Yes		

	Technical characteristics	Details	Obligatory	Method of fulfillment of the requirement	References
		Overall system and transmitter diagram	Yes		
		Electronic Boards Diagrams	Yes		
		Parts list, etc.	Yes		
		All information necessary for on-site installation by the beneficiary's teams	Yes		
14	All equipment must comply with the articles of **Directive 2014/53/UE (RED) of the European Parliament and of the Council of 9 March 1999** and its amending acts relating to radio equipment and telecommunications terminal equipment, and to all European Community standards that apply to the respective type of equipment (including standards for toxic substances), otherwise, the equipment may not be imported in accordance with the Romanian legislation. **All equipment must be "CE" and "RoHS" certified.** The tenderer must provide the certificates of conformity for all equipment. **The manufacturer must be ISO 9001:2015 and ISO 14001:2015 certified**		Yes		
15	All the above requirements are mandatory and must be specified in the technical specifications documentation, released by the manufacturer, and will be attached as reference. The reference pages for each required parameter must be indicated.		Yes		
16	**Warranty period: minimum 24 months** for transmitter and auxiliary equipment.		Yes		

ANNEX 2

Evaluation factors

No.	Valuation factors/subfactors	Required value	Maximum score allotted	Algorithm for calculating the score of admissible bids
1	**Offer price (Lei / Euro)**	<7.675.000 (Lei) <1.535.000 (Euro)	**50**	* Maximum score (50) for the admissible offer with the lowest price. * Score for the remaining admissible tenders: **P Price $_x$= (Price $_{Min}$ /Price x) * maximum score allocated**, where: **P price $_x$** - the score obtained by the admissible tender under evaluation. **Price $_{Min}$** - the lowest of the prices of admissible offers. **Price x** - the price of the admissible offer under evaluation
2	**Delivery time**	maxim 10 months	**10**	* Maximum score (10) for the admissible offer with the shortest delivery time. * Score for the remaining admissible tenders: **P Time $_x$ = Time $_{Min}$ /Time x * maximum score allocated**, where: **P Time $_x$**- score obtained by the admissible tender under evaluation. **Time $_{Min}$** - the shortest of the delivery times of the admissible offers. **Time x** - delivery time of the admissible offer under evaluation
3	**Technical Performances:**		**40**, of which:	
3.1	**Modulation Capability (MC)**	≥ 125% peak program capability	10	* Minimum score (1) assigned for the minimum required value (**c**). * Maximum score (10) awarded for the maximum value among the bids of all tenderers (**b**). * **Span** = 9 * **x** - Value of the evaluated bid * Score for the remaining admissible tenders: **P MC_x= 10- ((MC x-MC_b)/ (MC c-MC_b)) * Span**
3.2	**Total harmonic distortion (THD) 30 Hz -10 kHz, 80% modulation**	≤ 1%	10	* Minimum score (1) assigned for the minimum required value (**c**). * Maximum score (10) awarded for the maximum value among the bids of all tenderers (**b**). * **Span** = 9 * **x** - Value of the evaluated bid * Score for the remaining admissible tenders: **P THD_x= 10- ((THD_x-THD_b)/ (THD_c-THD_b)) * Span**

No.	Valuation factors/subfactors	Required value	Maximum score allotted	Algorithm for calculating the score of admissible bids
3.3	**Signal-to-noise ratio (SNR), referred to fmod = 1 kHz, modulation = 100%**	≥ 60 dB	10	* Minimum score (1) assigned for the minimum required value (**c**). * Maximum score (10) awarded for the maximum value among the bids of all tenderers (**b**). * **Span** = 9 * **x** - Value of the evaluated bid * Score for the remaining admissible tenders: **P SNR_x= 10- ((SNR_x-SNR_b)/ (SNR_c-SNR_b)) * Span**
3.4	**Overall efficiency (OE)**	≥ 85%	10	* Minimum score (1) assigned for the minimum required value (**c**). * Maximum score (10) awarded for the maximum value among the bids of all tenderers (**b**). * **Span** = 9 * **x** - Value of the evaluated bid * Score for the remaining admissible tenders: **P OE_x= 10- ((OE_x-OE_b)/(OE_c-OE_b)) * Span**
	Total:		**100**	

ANNEX 3

MEDIUM WAVE TRANSMITTER TEST

Serial No: .....

Date: .....

- **Factory Testing**
- **Site testing**

I. Factory testing
to be performed on Dummy Load

1. PERFORMANCE

A) Carrier Frequency: Pass/ Fail

Limit: according with value specified in the technical proposal

Carrier frequency..... kHz (according to the technical specifications required for the transmitter)

Exciter 1 Frequency..... kHz

Exciter 2 Frequency..... kHz

B) Audio Input Level for 100% Modulation: Pass/ Fail

Limit: according with value specified in the technical proposal

C) Positive Peak Modulation Measurement: Pass/ Fail

Limit: according with value specified in the technical proposal

Peak modulation obtained _____%

D) Amplitude Frequency Response: Pass/ Fail

referred to fmod=1 kHz, 30 Hz to 10 kHz, modulation= 90%

Limit: according with value specified in technical proposal

Frequency	Measured (dB)
30 HZ	
50 HZ	
100 HZ	
200 HZ	
500 HZ	
1 KHz	
2 KHz	
3 KHz	
5 KHz	
6 KHz	
7 KHz	
9 KHz	
10 KHz	

E) Total Harmonic Distortion: Pass/ Fail

30 Hz to10 kHz modulation 80%.

Limit: according with value specified in technical proposal

Frequency	Measured (%)
30 HZ	
50 HZ	
100 HZ	
200 HZ	
500 HZ	
1 KHz	
2 KHz	
3 KHz	
5 KHz	
6 KHz	
7 KHz	
9 KHz	
10 KHz	

F) Signal-to-Noise Ratio (SNR): Pass/ Fail

referred to fmod=1 kHz, modulation=100%

Limit: according with value specified in technical proposal

Measured SNR.....(dB)

G) Intermodulation distortions: Pass/Fail

reffered to 4:1 at 95% modulation (60/7000Hz)

Limit: according with value specified in technical proposal

H) Harmonics and Spurious: Pass/ Fail

Limit: According to ITU-R SM.329-12

Harmonics of the carrier frequency

Harmonic	DB below carrier
2nd	
3rd	
4th	

5th	
6th	
7th	
8th	
9th	
10th	

Spurious emissions located within 10th harmonic range

Frequency	dB versus carrier	Source (if known)

I) ACC/DCC Mode Test: Pass/ Fail

Transmitter at nominal power, no modulation. Record carrier level from demodulator and forward power from wattmeter.

Limit: 6dB carrier reduction

ACC/CCM	Carrier level [%]	Power Level [kW]
OFF		
ON		

J) Overall Efficiency: Pass/ Fail

transmitter at full assigned carrier power and modulation into the load. The efficiency will be calculated from RF power readings against AC power consumption.

Limit: according with value specified in technical proposal

Overall Efficiency measured..... (%)

K) Power factor: Pass/ Fail

Transmitter at full assigned carrier power and modulation into the load. Record the power factor on power meter.

Limit: according with value specified in technical proposal

Measured power factor: ..... (%)

L) Functionality and Compliance Check:

1. Check for full compliance with technical specification requested: **Pass/Fail**
2. Check automatic switch-on at short interrupting of the main power supply (3 interrupts up to 1 second (in 5 seconds interval): **Pass/Fail**
3. Check of the protections: **Pass/Fail**
4. Check of the local and remote monitoring equipment: **Pass/Fail**
5. General mechanical checks: **Pass/Fail**
6. Technical documentation provided (Specifications, Installation & initial turn on, Operators guide, Controls and indicators, Overall system theory, Maintenance & alignments, Troubleshooting, Boards Diagrams, Parts list): **Pass/Fail**

2. OPERATING, ELECTRICAL AND MECHANICAL CHECKS: Pass/Fail

A. System testing

Transmitter Internal and External Interlock _____

Automatic AC Restart Test _____

VSWR Manual Foldback Test _____

Exciter Changeover Test _____

B. Visual Inspection

Transmitter Cabinet _____

Transmitter Components _____

Electrical Boxes and Wiring _____

C. 24 Hours Heat Run Test

Performed with Program Audio Modulation for 24 Hrs into the Dummy Load.

Start Time _____

Stop Time _____

3. METERING

A. Operating metering

Modulation		Measured power	PA Vdc	PA Idc
0% 60% 100%	Low power			
0% 60% 100%	Medium power			
0% 60% 100%	Maximum power			

B. Diagnostic metering

-to be detailed by supplier according with transmitter architecture for: VOLTAGES, CURRENTS

TEST EQUIPMENT **MADE BY/MODEL**
S/N

1.

2.

3.

4.

ACCEPTANCE CERTIFICATE

The above listed tests have been successfully completed on the following transmitter and the results are compliant with the specifications.

Transmitter Serial Number _____

Frequency _____

Date of Manufacture _____

CUSTOMER REPRESENTATIVE

Name _____

Title _____

Date _____

SUPPLIER REPRESENTATIVE

Name _____

Title _____

Date _____

Comments:

II. SITE TESTS

All tests listed under factory tests item would be repeated on dummy load, **except the twenty-four hours heat run test.**

All tests will be repeated also into the antenna. **These tests will include the twenty-four hours endurance test.**

**Note: The transmitter will be coupled to the antenna via an existing patch panel. Switching between the antenna and dummy load will be done from the patch panel.*

The patch panel input impedance is 50 Ω

NOTE: IT IS MANDATORY FOR THE OFFER TO CONTAIN A DETAILED "ACCEPTANCE TESTS PROTOCOL" INCLUDING THE INDIVIDUAL PROCEDURE AND TEST EQUIPMENTS USED TO MEASURE AND TEST EACH PARAMETER AND FUNCTIONALITY OF THE TRANSMITTERS.

1. TESTING OF ACCESSORIES

The associated equipment shall be tested and inspected as per mutually acceptable Acceptance Test Protocols at the manufacturer's works as well as at the site. The tenderer shall enclose the ATP for each equipment type along with the tender.

ON SITE SYSTEM CHECKS: PASS/FAIL

Transmitter Internal and External Interlock _____

Grounding Switch _____

Automatic AC Restart Test _____

VSWR Manual Foldback Test_____

VISUAL INSPECTION

Transmitter Cabinet _____

Transmitter Components _____

Dummy Load _____

RF Transmission Lines _____

Patch Panel _____

Program Input Equipment _____

Electrical Boxes and Wiring _____

5. TEST EQUIPMENT **MANUFACTURER/MODEL**
S/N

1.

2.

3.

4.

Form

Tenderer

.....

(Company name)

Summary
Of prices for products

A. Medium Wave AM Solid State Transmitter: Site Valu lui Traian 1x100 kW

No.	Name of the product	Requirements	Quantity	Unit price (LEI or EUR, without VAT)
1	Medium Wave AM Solid State Transmitter in accordance with the requirements of technical proposal.	Power: 100 kW, working mode: AM, DRM30 ready Emission frequency: 1458 kHz Two exciters in stand-by configuration with automatic switch-over in case of failure. Fully wired rack for audio program inputs and monitoring equipment. AM DRM control receiver	1 pc.	
2	Recommended spare parts – The bidder will provide a complete list of spare parts, according to the requirements of technical proposal, and the price for each item. The total value of the recommended set of spare parts will not exceed 5% of transmitter value. *Please complete the list below.*	Minimum recommended spare parts set (*electronic boards/modules, power supply, power amplifiers, air filters, air fans, calibrated fuses, RF power transistors, display, etc.*)	1 set	
*3	On site commissioning, testing and putting into operation	No. of specialists/ no. of days	1 set	
			Total:	

Form

Detailed list of recommended spare parts for 100kW [1458 kHz] MW Transmitters Valu lui Traian

No.	Name of the spare part	spare part code	Unit	Quantity	Unit price (LEI or EUR, without VAT)	Total price (LEI or EUR, without VAT)
1						
...						
n						
	Total recommended set of spare parts					

Form

B. Medium Wave AM Solid State Transmitter: Site Oradea-Rontău 1x50 kW

No.	Name of the product	Requirements	Quantity	Unit price (LEI or EUR, without VAT)
1	Medium Wave AM Solid State Transmitter in accordance with the requirements of technical proposal.	Power: 50 kW, working mode: AM, DRM30 ready Emission frequency: 603 kHz Two exciters in stand-by configuration with automatic switch-over in case of failure. Fully wired rack for audio program inputs and monitoring equipment. AM DRM control receiver	1 pc.	
2	Recommended spare parts – The bidder will provide a complete list of spare parts, according to the requirements of technical proposal, and the price for each item. The total value of the recommended set of spare parts will not exceed 5% of transmitter value. *Please complete the list below.*	Minimum recommended spare parts set (*electronic boards/modules, power supply, power amplifiers, air filters, air fans, calibrated fuses, RF power transistors, display, etc.*)	1 set	
*3	On site commissioning, testing and putting into operation	No. of specialists/ no. of days	1 set	
			Total:	

Form

Detailed list of recommended spare parts for 50 kW [603 kHz] MW Transmitter Oradea-Rontau

No.	Name of the spare part	spare part code	Unit	Quantity	Unit price (LEI or EUR, without VAT)	Total price (LEI or EUR, without VAT)
1						
...						
n						
	Total recommended set of spare parts					

Form

C. Training in factory and factory acceptance tests services

No.	Name of service	Requirements	Quantity	Unit price (LEI or EUR, without VAT)
*1	Training in factory for Buyer's personnel and factory acceptance tests for the transmitters	3 persons/5 working days, including: _Air Transport _Hotel Accommodation _Lunch on working day _Living expenses:100 euro/day /person _Local transport _Insurances	1 set	
			Total:	

***Notes:**

- **Interconnection and adaptation with the existing radiant system** in the site (50 ohms impedance, connected through a patch panel with 3 18" EIA connectors);
- **Installation commissioning, power-up of the equipment and tests for technical reception in site**, on Dummy Load and on the antenna (the Supplier will bear all the costs of travel, accommodation, daily expenses of its own specialists);
- **Factory training and Factory acceptance tests of Contracting Authority staff** for product testing and operating: 5 working days (the Supplier will bear all the costs of travel, accommodation, local transport and daily expenses for 3 specialists of the Buyer)

Date.....

Authorized representative,

.....

(Position, surname and first name, signature)