

NATIONAL REGULATORY AGENCY FOR COMMUNICATIONS
OF THE REPUBLIC OF MOLDOVA

TECHNICAL REQUIREMENTS
regarding the procurement of a portable spectrum analyzer

Prepared by:

Oleg LEAȘOC
Head of Spectrum Monitoring Department

1. Introduction	
<p>These Technical Requirements are an integral part of the Procurement Documentation and constitutes the complete set of requirements on the basis of which the Technical Proposal is to be prepared by each tenderer.</p> <p>The requirements set forth shall be considered minimum and mandatory. In this regard, any submitted offer that deviates from the provisions of the Technical Requirements will only be considered to the extent that the Technical Proposal ensures a qualitative level superior to the minimum requirements specified herein. Any offer containing product characteristics inferior to those stipulated in these Technical Requirements will be deemed non-compliant and will be rejected.</p> <p>The subject matter of the procurement procedure is the supply of one portable spectrum analyzer together with all necessary accessories.</p>	
2. Purpose of procurement	
<p>The purpose of procuring the portable spectrum analyzer is to modernize the National Spectrum Monitoring System operated by the National Regulatory Agency for Communications (ARCOM), by replacing existing portable spectrum analyzers that are outdated and have a high degree of wear.</p> <p>The portable spectrum analyzer is intended to be used in the process of verifying and measuring the technical emission parameters of radio communication stations, particularly base stations within mobile cellular communication networks, including 5G NR.</p>	
	Guaranteed Technical Specifications <i>(to be completed by the tenderer)</i>
3. Quantity	
one portable spectrum analyzer with all necessary accessories.	
4. Minimum equipment requirements	
<p>4.1 The portable spectrum analyzer shall have an integrated GNSS receiver (GPS, GLONASS, Galileo).</p> <p>4.2 The portable spectrum analyzer shall allow updating and expanding its internal firmware/software with new functionalities and options.</p> <p>4.3 The portable spectrum analyzer shall have a compact, durable, and ergonomic design, so that it can be easily used in the field by a single person.</p> <p>4.4 The portable spectrum analyzer shall have a built-in high-quality color display (minimum resolution 1280 × 800 px) with a diagonal of at least 10 inches, allowing clear image visualization both indoors and outdoors in sunlight.</p>	

<p>4.5 The portable spectrum analyzer shall allow data recording to internal and external memory (USB stick and/or SD card), with the possibility of downloading data to a computer.</p> <p>4.6 The portable spectrum analyzer shall have all necessary software/firmware options installed to fulfill all mandatory minimum functional requirements.</p> <p>4.7 The portable spectrum analyzer shall be operable from both a built-in rechargeable battery (Li-Ion) and from a 220 V AC power supply.</p> <p>4.8 The portable spectrum analyzer shall allow quick replacement of the built-in battery without disassembly or the use of special tools.</p> <p>4.9 The portable spectrum analyzer shall be operable in difficult climatic and environmental conditions typical of outdoor use.</p> <p>4.10 The portable spectrum analyzer shall have a built-in input preamplifier for amplifying received signals.</p> <p>4.11 The portable spectrum analyzer shall have a graphical user interface in Romanian and/or English for the specialized software installed on the analyzer.</p> <p>4.12 The graphical user interface for the specialized software and all software/firmware options provided and installed on the analyzer shall have a full license with no operational limitations, such as time-limited use of any option or the entire application. Shareware, adware, or similar applications are not acceptable.</p> <p>4.13 The portable spectrum analyzer shall be fully remotely accessible and controllable via Ethernet and/or Wi-Fi interfaces, using specialized software supplied free of charge by the vendor, compatible with the Windows 11 operating system.</p>	
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5. Minimum functional requirements	
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<p>The portable spectrum analyzer shall cumulatively provide the following functionalities:</p> <p>5.1 It shall have Real-Time Spectrum Analysis capability with an instantaneous bandwidth of at least 150 MHz.</p> <p>5.2 It shall allow selection of at least the following measurement units: dBV/m, dBmV/m, dBµV/m, V/m, dBm, dBW, dBV, dBmV, dBµV, V.</p> <p>5.3 It shall allow entry of antenna correction factors for automatic correction of the measured electromagnetic field level.</p> <p>5.4 It shall support the Detector function for at least the following modes: Peak, RMS/Avg, Negative, Sample, Normal.</p> <p>5.5 It shall support the Marker function with at least 10 markers that can be simultaneously activated on different traces (with at minimum the following functions: peak, next peak, peak left, peak right, center frequency, reference level, minimum), including manual value entry.</p> <p>5.6 It shall allow display of spectral density with infinite and time-variable persistence.</p>	
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<p>5.7 It shall have a minimum of 6 traces that can be simultaneously activated in different modes: Clear/Write, Average, Max Hold, Min Hold, Rolling Average, Rolling Max Hold, Rolling Min Hold.</p> <p>5.8 It shall allow spectrogram display, including waterfall mode with time-domain and delta-time markers (recording and subsequent playback of spectrogram recordings).</p> <p>5.9 It shall provide the capability to measure a periodic signal within a defined time interval using Gated Sweep mode.</p> <p>5.10 It shall have a Limit Line function with upper and lower limits, with manual setting or automatic generation of limit lines and an alarm when limits are exceeded.</p> <p>5.11 It shall have an AM/FM modulation measurement and analysis function with simultaneous display of the RF frequency spectrum, audio signal spectrum, and numerical results.</p> <p>5.12 It shall allow demodulation of analog signals with AM/FM modulation, audio playback through the internal speaker, and audio recording to internal memory.</p> <p>5.13 It shall allow detailed analysis and measurement of LTE FDD/TDD signals with demodulation capability and display of at least the following parameters: Cell ID, Sector ID, Cell Group, MNC, MCC, frequency error, time offset, cyclic prefix, bandwidth, RSRP, RSRQ, SINR, EVM, etc.</p> <p>5.14 It shall allow detailed analysis and measurement of 5G NR FDD/TDD signals with demodulation capability and display of at least the following parameters: Cell ID, Beam Index, Sector ID, Cell Group, frequency error, time offset, SS-RSRP, SS-RSRQ, SS-SINR, SS-RSSI, average/peak EVM, MNC, MCC, occupied bandwidth, etc.</p>	
6. Composition	
<p>The minimum mandatory composition for the portable spectrum analyzer is as follows:</p> <ul style="list-style-type: none"> • Portable spectrum analyzer with built-in rechargeable Li-Ion battery and software/firmware options installed to meet all minimum requirements. • Ergonomic carrying bag/case with shoulder strap. • A spare rechargeable Li-Ion battery. • AC/DC power supply adapter. • External GNSS antenna. • Compact omnidirectional antenna, frequency range 620 – 5000 MHz. • Coaxial measurement cable N(m) – N(f), 50 Ohm, length 1.5 m. • External battery charger. • Waterproof and shock-proof wheeled transport case with telescopic handle for the analyzer and accessories. • Calibration and conformity certificate. • User manual in Romanian and/or English. 	

7. Minimum Technical Specifications

7.1 Portable Spectrum Analyzer

- Frequency range: *minimum 10 kHz – 7,5 GHz*;
- Instantaneous displayed bandwidth (real-time): ≥ 150 MHz;
- Level measurement accuracy: $\leq \pm 2$ dB;
- Span: *10 Hz up to maximum frequency; Zero Span*;
- RBW (Resolution Bandwidth): *minimum 1 Hz – 10 MHz, (1 Hz – 40 MHz in Zero Span)*;
- VBW (Video Bandwidth): *minimum 0,1 Hz – 10 MHz, (1 Hz – 40 MHz in Zero Span)*;
- Displayed average noise level (DANL):
 - preamplifier off: ≤ -142 dBm (*typical ≤ -145 dBm*);
 - preamplifier on: ≤ -159 dBm (*typical ≤ -162 dBm*);
- Minimum detectable signal duration: ≤ 5 ns;
- Persistence: *infinite or variable 0 – 10 s*;
- Sweep time: *minimum 60 ns – 3600 s in Zero Span*;
- Dynamic range: *>106 dB minimum at 2.4 GHz, 2/3 (TOI-DANL) in 1 Hz RBW*;
- Measurement range: *from DANL up to +30 dBm*;
- Maximum input signal level: $\geq +30$ dBm;
- Third-order intercept point (TOI): $\geq +14$ dBm;
- Adjustable input attenuator: *0 to 65 dBm, with step 5 dB*;
- Available internal memory: *minimum 6 GB*;
- Connectors and interfaces (at least):
 - RF input: *N-type (f), 50 Ohms*;
 - GNSS antenna connector: *SMA (f), 50 Ohm*;
 - USB ports: *at least 1 x USB-A and 1 x USB-C*;
 - audio input: *3,5 mm*;
 - remote access interface: *RJ-45 (1 GBit)*;
- Dimensions: ≤ 315 mm \times 240 mm \times 100 mm;
- Weight: $\leq 5,5$ kg (*including built-in battery*);
- Battery autonomy: ≥ 2 hours in operation mode;
- Operating temperature: *minimum -10°C to +55°C*;
- Protection class: *minimum IP53*.

7.2 Receiving Antenna

- Frequency range: *minimum 620 – 5000 MHz*;
- Radiation pattern: *omnidirectional*;
- Polarization: *linear*;
- Feed type: *passive*;
- Length: ≤ 140 mm;
- Connector: *N-type (m), 50 Ohm*;
- Connection: *direct connection to the spectrum analyzer*.

8. Warranty

The warranty period shall be a minimum of 36 (thirty-six) months for all delivered components and shall commence from the date of the delivery-acceptance certificate being signed without objections, under the conditions set out in the procurement contract.

<p>Throughout the warranty period, the supplier is obliged to provide, at no additional cost:</p> <ul style="list-style-type: none"> - repair of all faults for all delivered equipment, by repairing or replacing defective components; - resolution of functional errors of the spectrum analyzer; - provision and implementation of updates and/or upgrades to the firmware/software of the spectrum analyzer; - transportation of defective equipment to/from the supplier/manufacturer, including international transport (if applicable); - technical support for personnel who will operate the spectrum analyzer. 	
9. Post-warranty support	
<p>The supplier is obliged to ensure, after the expiry of the warranty period, under the terms of a subsequent contract, services and spare parts for a minimum period of 7 years for all delivered equipment.</p>	
10. Other mandatory requirements	
<p>Delivery period: <i>120 calendar days.</i></p> <p>All delivered equipment must be new.</p> <p>The portable spectrum analyzer must bear the 'CE' marking, indicating that the manufacturer has certified it and that it meets all European Union conformity requirements and, correspondingly, those of the Republic of Moldova.</p> <p>Place of delivery: <i>ARCOM, MD-2003, Chişinău municipality, Durleşti city, Nicolae Dimo Street, 22/20.</i></p> <p>To confirm expertise and capacity to deliver compliant equipment, tenderers must provide:</p> <ul style="list-style-type: none"> - documents attesting to a minimum of 5 years of experience of the tenderer in supplying similar or superior equipment; - copies of recommendation letters or feedback from at least 3 electronic communications regulatory authorities in Europe that have purchased and use similar equipment. 	
11. Offer evaluation method	
<p>The offer that meets all requirements of these Technical Requirements and has the lowest total price will be selected.</p>	
12. Method of demonstrating offer compliances	
<p>Compliance with and adherence to all requirements set out above must be demonstrated for each requirement individually in the column 'Guaranteed Technical Specifications', by precisely stating the manner in which each requirement is met, referencing (page, section, etc.) the accompanying technical documentation where it can be identified.</p>	

Technical documents (technical specifications, diagrams, catalog sheets, brochures, etc.) from the manufacturer shall be attached to confirm compliance with the technical specifications and the minimum conditions imposed above. These documents may be presented in Romanian or English.

The technical offer shall specify the model and manufacturer of the portable spectrum analyzer, and shall indicate the codes of all options and accessories supplied along with a detailed description thereof.

Complete or partial copying of the Technical Requirements within the technical proposal is not permitted, tenderers are obliged to demonstrate the compliance of their offer with its requirements. Likewise, a mere declaration of compliance by the tenderer does not constitute proof of fulfillment of the required technical specifications.