

NATIONAL REGULATORY AGENCY FOR COMMUNICATIONS
OF THE REPUBLIC OF MOLDOVA

TECHNICAL REQUIREMENTS
regarding the procurement of a Portable Monitoring Receiver
with Receiving Antennas

1. Introduction	
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. 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. The subject of this procurement procedure is the supply of one portable monitoring receiver, complete with a set of portable receiving antennas and all necessary accessories.	
2. Purpose of procurement	
The purpose of procuring the portable monitoring receiver is to modernize the National Spectrum Monitoring System of the National Regulatory Agency for Communications (ARCOM). The receiver shall provide the technical capabilities required to: - detect, identify, and locate unauthorized radiocommunication stations; - detect, identify, and locate sources of harmful interference affecting the normal operation of authorized radiocommunication stations; - verify that the transmission technical parameters of radiocommunication stations comply with the approved values.	
	Guaranteed Technical Specifications (to be completed by the tenderer)
3. Quantity	
One portable monitoring receiver, complete with a set of portable receiving antennas and all necessary accessories.	
4. Minimum equipment requirements	
4.1 The portable monitoring receiver and the receiving antennas shall have a compact, durable, and ergonomic design, enabling easy operation in the field by a single operator. 4.2 The portable monitoring receiver shall be equipped with localization capabilities, using the triangulation method, to locate the signal source by means of the supplied directional antennas. 4.3 The portable monitoring receiver shall be equipped with a color display having a diagonal size of at least 6.5 inches, providing clear image visibility both indoors and outdoors, including in direct sunlight.	

4.4 The portable monitoring receiver, together with all accessories, as well as the set of receiving antennas, shall be supplied in waterproof and shock-resistant carrying cases. 4.5 The portable monitoring receiver shall be equipped with a built-in, replaceable rechargeable battery providing a minimum operating time of 3 hours, and an AC power adapter (220 V AC) for battery charging. The receiver shall also be supplied with one additional spare rechargeable battery, providing a minimum operating time of 3 hours, to extend the overall operating autonomy. 4.6 The portable monitoring receiver shall allow the recording of measured data on internal memory or external memory (SD card), with the possibility of downloading the recorded data to a computer. 4.7 The portable monitoring receiver shall allow the updating and enhancement of the internal software with new functionalities and options. 4.8 The graphical user interface for the specialized software and all software/firmware options provided and installed on the receiver 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.	
5. Composition	
• Portable monitoring receiver with built-in rechargeable (Li-Ion) battery and installed software/firmware options to ensure compliance with the minimum required specifications. • Set of directional antennas. • Durable, waterproof, and shock-resistant wheeled carrying case for the portable monitoring receiver and accessories. • Durable, waterproof, and shock-resistant wheeled carrying case for the portable receiving antenna set. • Spare Lithium-Ion battery. • Battery charger, 220 V AC / 12 V DC. • Set of straps for securing the receiver to the operator's body. • Transparent waterproof cover for the receiver (for use in rainy conditions). • User manual. • Calibration certificate for the portable monitoring receiver.	
6. Minimum Technical Specifications	
6.1 Portable Monitoring Receiver • Display of digital maps (e.g., OpenStreetMap) on the receiver's screen for the examination of triangulation results on the map, based on measurements performed at multiple points and at different times. • Storage of signal angle-of-arrival measurements for the localization of radio signal sources in the internal memory or on an SD card inserted into the receiver.	

- Recording and storage, in the internal memory or on an SD card inserted into the receiver, of the radio frequency spectrum, geographic location, and demodulated audio, with the possibility of subsequent replay of the recorded data.
- The receiver shall be equipped with physical control buttons for operation.
- Numerical display of the measured signal level at the receiver input simultaneously with the radio frequency spectrum.
- Analysis/inspection of the radio frequency spectrum using configurable markers.
- Monitoring of various radio services, including the ability to scan a frequency band with a configurable step size depending on the monitored radio services, and the ability to scan predefined radio channels together with the technical parameters of each radio channel.
- Alphanumeric display, on an integrated color display with a diagonal size of at least 6.5 inches, of the main characteristic parameters of a radio signal, namely frequency and signal level at the receiver input, expressed in dBm, dBμV, etc., with values associated with a marker on the displayed spectrum, which can be configured at any frequency within the analyzed band.
- Fast frequency scanning or scanning from a list of discrete frequencies across the entire receiver frequency range, with panoramic display of the scanned spectrum (panorama scan).
- Real-time display of the frequency spectrum and spectrogram through a polychromatic visualization of the radio spectrum evolution over time, with signal level values represented by color coding, enabling the separation of multiple overlapping signals (polychrome spectrum).
- Real-time display of the radio frequency spectrum (frequency-versus-time representation, also known as a waterfall display).
- Simultaneous measurement and display of spectrum and envelope, with time-gated spectrum determination for the investigation of interference in TDD/TDMA transmissions.
- Real-time demodulation of at least AM, FM, Pulse, I/Q, USB, LSB, ISB, and CW signals. The receiver shall provide audio output of the demodulated signal through a headphone connector and a built-in speaker.
- Detection and display of short-duration signals (bursts).
- Audio signal for emission source localization using an audio tone with variable intensity depending on the level of the received radio signal.
- Recording and storage measurement results on the internal memory, an SD card, or a USB flash drive inserted into the receiver, selectable from the receiver menu, for subsequent analysis.
- Frequency range: *minimum 10 kHz – 8 GHz*;
- Instantaneous displayed bandwidth (real-time): $\geq 125 \text{ MHz}$;
- Programmable frequency resolution: *1 Hz*;

- Frequency accuracy: *in accordance with ITU-R Recommendation SM.377*;
- Noise figure: ≤ 20 dB;
- Receiver sensitivity: ≤ -95 dBm;
- Probability of Interception (100% POI), for a 100 MHz bandwidth: *100% for pulses of 2 μ s or shorter*;
- Panoramic display of the IF spectrum: *1 kHz – 125 MHz, with a minimum of 12 intermediate span settings*;
- Selection of intermediate frequency (IF) filter bandwidths: *in accordance with ITU-R SM.1836*;
- Receiver input VSWR: ≤ 2 ;
- Receiver input attenuator: *minimum 40 dB, selectable in steps of 1 dB or smaller*;
- Adjustable squelch from -30 dB μ V to +180 dB μ V, in 1 dB steps;
- Automatic and manual gain control (AGC and MGC);
- Automatic frequency control (AFC);
- Detection of signals of interest in the following modes: *Peak, RMS, Average*;
- Implementation of MinHold and MaxHold functions;
- AM, FM, Pulse, I/Q, USB, LSB, ISB, and CW demodulation;
- Scanning speed: > 150 GHz/s;
- Analog-to-digital converter: *minimum 14 bits*;
- Input impedance: 50Ω ;
- Maximum non-destructive signal level at the receiver input: $> +20$ dBm;
- Minimum required connectors and interfaces: *N-type RF input (female), 1 Gbps LAN, USB, SD card, 3.5 mm audio output for headphones*;
- External power supply of the receiver from a 220 V AC mains source;
- Capability of battery-powered operation in outdoor environments within a temperature range of -5 °C to $+50$ °C;
- Receiver weight (with internal battery): *maximum 3.5 kg*.

6.2 Set of Receiving Antennas

- The set of directional antennas shall include a handle support with RF and control cables for connection to the monitoring receiver, several interchangeable receiving modules (directional antennas), as well as an integrated GNSS receiver and electronic compass in the handle support, required for determining the azimuth and elevation of the received signal.
- At least one receiving module shall support switching and operation in signal minimum-based direction-finding mode (with a pronounced null characteristic) at least within the 700–2500 MHz frequency range, used for precise direction detection.
- Frequency range: *minimum 20 MHz – 8 GHz*;
- Polarization: *linear*;

• Operating mode: <i>switchable active/passive mode from the handle</i>; • Connector: <i>N-type (m), 50 Ohm</i>; • Antenna VSWR: <i>better than 3 across the frequency range of 20 MHz – 8 GHz</i>; • Possibility to mount and operate the handle support on a tripod; • Maximum dimensions of any antenna: <i>700 × 300 × 100 mm</i>; • Operating weight of a single antenna: <i>maximum 1 kg</i>.	
7. Warranty	
The warranty period shall be a minimum of 24 (twenty-four) 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. Throughout the warranty period, the supplier is obliged to provide, at no additional cost: - repair of all faults for all delivered equipment, by repairing or replacing defective components; - resolution of functional errors of the monitoring receiver; - provision and implementation of updates and/or upgrades to the firmware/software of the monitoring receiver; - transportation of defective equipment to/from the supplier/manufacturer, including international transport (if applicable); - technical support for personnel who will operate the monitoring receiver.	
8. Post-warranty support	
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.	
9. Other mandatory requirements	
Delivery period: <i>120 calendar days</i>. All delivered equipment must be new. The portable monitoring receiver 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. Place of delivery: <i>ARCOM, MD-2003, Chişinău municipality, Dureşti city, Nicolae Dima Street, 22/20</i>. To confirm expertise and capacity to deliver compliant equipment, tenderers must provide: - 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.	
10. Offer evaluation method	
The offer that meets all requirements of these Technical Requirements and has the lowest total price will be selected.	
11. Method of demonstrating offer compliances	
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. 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 monitoring receiver, 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.	