**TERMS OF REFERENCE**

**for the procurement of thermal imaging systems**

**Requirements:** The thermal imaging system must be composed of at least 2 image acquisition technologies that cover the visible spectrum as well as the infrared. It is required to ensure proper operation and applicability when used during the day, in total darkness, in excess of sunlight or other unfavorable environmental conditions (fog, smog, rain, etc.). Based on the listed considerations, the system is to be encapsulated in a housing with a protection rating of at least IP67 and anti-vandal design. The equipment must offer the possibility of integration with other systems, i.e. have communication interfaces for remote control and retrieval of images or video materials in real time.

1. **Equipment delivery requirements**
2. Any accessory provided by the manufacturer of the supplied equipment, mentioned in the manufacturer's documentation as being part of the composition of the equipment, will be delivered to the Beneficiary, even if it was not explicitly provided in the descriptive documentation;
3. Delivery time – 150 days;
4. Delivery destination: preliminary locations where delivery and installation are required, as follows: Chisinau (Petricani 19), Vasilcau Tower, Cosauti Tower, Cuhnesti Tower, Copceac Tower, Giurgiulesti Tower.

# Reception of the supplied equipment and related accessories

1. The responsibility for the reception belongs to the Supplier, who must allocate the appropriate resources to its completion.
2. Place of reception: same as place of delivery;
3. The reception will be carried out by the Supplier, assisted by the representatives of the Beneficiary and will involve the piece by piece counting of the equipment provided;
4. Mandatory, the Supplier will provide centralizing tables, in electronic format (Excel) with all the series of equipment supplied, the records being kept by both the Beneficiary and the Supplier; also, for each piece of equipment, complete inventories will be made available to the Beneficiary, with all series of subassemblies/modules/cards from the complete set (where applicable);
5. Functional tests will be performed for the delivered equipment, based on samples chosen by the Beneficiary;
6. Relevant reception documents will be signed by the representatives of the Beneficiary and those of the Supplier, who participated in the reception, or are responsible for the execution of this operation.

# Minimum requirements for carrying out installation, configuration and commissioning works

1. To have qualified engineers for installation, configuration and commissioning of systems;
2. To have all the necessary equipment and machinery for the installation and configuration of the system;
3. Delegation of a project manager responsible for coordinating the processes between the parties;
4. To have engineers with certificates of competence for work at height.

# Warranty requirements

1. Warranty period: minimum 2 years from the signing of the acceptance documents;
2. **Bidder/supplier requirements**:
3. The existence of an authorized service center;
4. Experience in the delivery of similar goods - min. 2 years;
5. ISO 9001 certificate, for the bidder;
6. Authorization from the manufacturer;
7. Performing the installation, configuration and commissioning of the system;
8. The warranty for the supplied equipment will constitute a minimum of 24 months from the date of commissioning and final acceptance.

The system must ensure at least the following minimum characteristics:

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| **General requirements for the mutisensor (EO head)** | |
| All components of the multisensor must be built to withstand extreme conditions such as: strong winds - the system must be built rigidly and without an overall roof / sunshade that would cause wind resistance. Each device (day/night chamber, thermal chamber, power box) must be equipped with its own individual roof/sunshade to minimize wind resistance. All external components must be designed to operate in high humidity, very low and very high temperatures. | |
| Camera layout | The cameras must be in the same housing |
| Control interface | Serial and Ethernet |
| Camera video output | The system should have two separate, independent H.264 video streams, one for each camera |
| Supported control protocols | ONVIF Profile S, |
| Supported video outputs | RTSP H.264 video streams and ONVIF S profile |
| Consumption | Not more than 190 W |
| Operating voltage | At least from 18 to 32 Vdc |
| Operating temperature range | From -32°C to +55°C |
| Environmental | At least IP67 |
| Weight | No more than 25 kg |
| **Thermal camera** | |
| Detector | Uncooled LWIR VOx microbolometer |
| Resolution | 640 x 512 |
| Detector pitch | 12 µm |
| Spectral Band | From 8 to 14 µm |
| NETD | ≤ 40 mK |
| Focal length | 30 – 150 mm |
| Field of View | 14.6° - 3.0° (H) |
| Continuous Optical Zoom | Yes, up to 5x |
| Continuous Digital Zoom | Yes, up to 8x |
| Focus | Automatic or Manual (remote) |
| Image stabilization | Yes (using VPU/ST) |
| Image processing | Tuneable Digital Detail Enhancement  Brightness  Contrast  Digital Noise Reduction  Non uniformity correction  White Hot / Black Hot  Colour Palette  OSD |
| Video outputs | Analog, RTSP H.264 Ethernet stream |
| Control interface | Serial, Ethernet |
| Consuption | 15 W typical, <60W maximum with heaters /lens defrost |
| Operating voltage | 18 - 32 Vdc |
| Operating temperature range | -32°C to +55°C |
| IP rating | IP67, built according to MIL-810 |
| Dimensions | 596 x 222 x 216 mm |
| Weight | 14 kg |
| D/R/I NATO (2.3 m x 2.3 m)\* | Min. 11.15 km / 5.28 km / 2.74 km |
| D/R/I human (1.8 m x 0.5 m)\* | Min. 6.38 km / 2.28 km / 1.17 km |

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| \* | Method | | STANAG 4347 |
| \* |  | | 2 |
| \* |  | | 0,2 |
| \* | Probability | | 50 % |
| \* | Background temperature | | 288 K |
| **Day/Night camera** | | | |
| Sensor | | 1/1.9'' CMOS sensor | |
| Resolution | | 1920x 1080 | |
| Sensitivity | | Colour 0.001 Lux @ (F1.5, 25 fps);  B&W 0.0001 Lux @ (F1.5, 25 fps); | |
| Horizontal FoV | | 59° to 2.25° | |
| Continuous optical zoom | | Yes, up to 30x | |
| Digital optical zoom | | Yes, up to 8x | |
| Focus | | Automatic or Manual (remote) | |
| Image stabilization | | Yes\* (using VPU/ST) | |
| Optical filters | | Colour: IR Cut filter / B&W: Defog Filter –  NIR only | |
| Image processing | | Auto / Manual White Balance  Auto / Manual Gain Control  Wide Dynamic Range  Digital Fog Removal / Auto Contrast  Dynamic Noise Reduction | |
| Video outputs | | HD-SDI or analog, optional RTSP H.264  Ethernet stream (using VPU/ST) | |
| Control interface | | Serial, Ethernet | |
| Consumption  Wide Dynamic Range  Digital Fog Removal / Auto Contrast  Dynamic Noise Reduction | | 15 W typical, < 60 W maximum  with heaters / lens defrost | |
| Operating voltage | | 18 - 32 Vdc | |
| Operating temperature range | | -32°C to +55°C | |
| IP rating | | IP67, built according to MIL-810 | |
| Dimensions | | 488 x 166x 172 mm | |
| Weight | | 7.5 kg | |
| **Pan tilt** | | | |
| Load capacity / Torque | | 35 kg / 60 Nm | |
| Weight | | No more than 17 kg | |
| Pan axis range / angle | | n x 360° | |
| Dimensions (HxWxL) | | 323 x 220 x 336 mm (without arms) | |
| Materials | | Aluminium | |
| Operating temperature | | -32°C to +55°C | |
| Pan axis range / angle | | n x 360° | |
| Pan axis speed | | At least from 0.001°/s to 60 °/s | |
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| Tilt axis range / angle | | ± 90° (limited by application between ±  35° and ± 45°) | |
| Tilt axis speed | | At least from 0.001°/s to 60 °/s | |
| Accuracy | | Not less than 0.02° | |
| Backlash | | None | |
| Brake | | Self-Locking | |
| Operating voltage | | 18 - 32 VDC | |
| Maximum power | | 160 W | |
| Communication to the unit | | Eth 10/100 Base-T, RS-232, RS-485,  422 (optional) | |
| Control protocol | | DC-PT protocol | |
| Protection / IP rating | | IP67, built according to MIL-810 | |
| **Laser Rangefinder** | | | |
| Eye safety | | Laser Class 1 | |
| Measurement range | | 50m – 32 000m | |
| Measurement range (Standard target): | | 10 000m – Target size 2.3 x 2.3 m, visibility  15 km, target reflectivity 30%, detection  probability >90% | |
| Precision | | 0.5 – 1.5 m depending on the distance and  target reflectivity | |
| Beam divergence | | 0.35 mrad | |
| Wave length | | 1.54 μm | |
| Measurement rates | | 10 meas. per min (up to 40 meas. per min  with reduced power / range) | |
| Control interface | | Serial, Ethernet | |
| Operating voltage | | 18 - 32Vdc | |
| Power consumption | | 3 W on standby, 7 W max on measurement | |
| IP rating | | IP67, built according to MIL-810 | |
| Operating temperature | | -32°C + 55°C | |
| Dimensions | | 172 x 151 x 75 mm with connector | |
| Weight | | 2 kg | |
| **Metal support for tower mounting at height** | | **25 m** | |
| **Power supply box** | | | |
| Power supply box with sun shield and dual shielding | | Yes | |
| Environmental | | Able to withstand temperatures from -32° to 55°C, in outdoor conditions | |
| Power | | Multisensor compatibility | |
| Input power | | 230Vac 50Hz standard connector | |
| Input communication | | 1xRJ-45 standard connector | |
| Protection | | High and low voltage breaker | |

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| Service outlet | | Yes |
| All necessary interconnection cables | | Yes |
| **Joystick** | | |
| Type | | USB |
| Sensory type | | Hall effect |
| Joystick | | 3-axis, 2 buttons |
| Buttons | | 10 programmable buttons |
| Operating temperature | | -40°C to +80°C |
| **Software** | | |
| **MS software control features** | | |
| The software must be designed to run on the Windows 10 operating system. | | |
| Console | The software should allow full management and control of all electro-optical systems and modules, as well as other existing modules, devices, pan/tilt mechanisms. It should be implemented as a software package based on the Windows operating system that provides a stable and logical operating framework. The software package must be modular in nature and fully designed to provide a user-friendly interface. | |
| Keyboard | There must be programmable keyboard shortcuts for basic and advanced functions. | |
| Mouse | There must be full mouse control operations to assist the operator with control, navigation and data entry. | |
| Joystick | There must be full XYZ (Rotation) joystick control and programmable buttons for basic and advanced functions. | |
| Touch | There will be touch support and touch optimization for the software. | |
| System overview | There will be a tool that will show the current status of the system and all the involved components that support status reporting. This tool will provide insight into system health and possible maintenance needs. | |
| Cameras | There will be the option to fully and extensively control the cameras and other components of the EO. | |
| Control | There must be complete control of the elevation and azimuth of the system. Full lens control and full camera control over the system, separated by basic and advanced functionality (depending on the device). | |
| Picture in picture | While controlling the selected (primary) camera, which is in full frame, there will be an option to display the video of the uncontrolled (secondary) camera in Picture-in-Picture mode. This window should be resizable and movable on the desktop. | |
| Zoom synchronization | There must be an option to synchronize zooms between cameras so that an uncontrolled secondary camera follows the primary controlled camera. | |

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| Secondary camera control | There will be an option to manually control the lens of the secondary camera while in the primary camera view and observe the secondary camera in Picture-in-Picture mode. |
| Panorama | There will be an option to take panoramic photos with the selected camera. There will be an option to export and import such images, and the EO will be controllable by panning photo navigation. It means that selecting the area in the panorama photo will point the EO to the selected position. |
| Presets | There will be the option to define and play presets of EO components (pan-tilt, cameras).  There will be an option to store at least 12 presets separately on different playlists. These playlists should be played by the operator in selected mode, where the operator defines the movement speeds, wait times, and repeat behavior of the playlist. There must be at least 16 separate playlists. |
| BIT | There should be a tool that starts and logs the EO status. This tool will be started manually and will run built-in tests to determine the health of the system. A generated report will serve as a possible service request/report to the manufacturer. |
| System information | There must be a system information bar that reposts the current system state, at a minimum Pan, Tilt, Azimuth, Heading, FOV and Focus. |
| Recording and snapshots | There will be an option to trigger instant recordings of current video streams. |
| Full screen | There will be an option to enable full screen where only the video image will be displayed in full screen. |