



LPS SR Air Navigation Services Provider

Letové prevádzkové služby Slovenskej republiky, štátny podnik



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**Specification for procurement of the delivery,
installation and introduction of the equipment /
system into operations**

Poprad-Tatry weather radar system

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CHAPTER 1. Introduction to Weather Radar System specification

This Weather Radar System (WRS) specification is divided into the following Chapters:

- CHAPTER 1 Introduction to Weather Radar System specification**
- CHAPTER 2 WRS Requirements**
- CHAPTER 3 Theoretical Calculations**
- CHAPTER 4 Remote Control and Monitoring System, Weather Data Display**
- CHAPTER 5 General Design Requirements**
- CHAPTER 6 WRS Infrastructure**
- CHAPTER 7 Documentation, Training, Warranty and Support**
- CHAPTER 8 Verification and Acceptance Tests**
- CHAPTER 9 Project Management**

1.1 Scope

The company Letové prevádzkové služby Slovenskej republiky, štátny podnik (LPS SR) is in the course of modernizing its Air Navigation Services facilities. LPS SR intends to purchase WRS located at the site of Poprad-Tatry Airport. Other equipment necessary for the reliable functioning of the WRS (Remote Control and Monitoring System (RCMS), etc.) will be offered and delivered as well.

The Tenderer **should** investigate this site prior to his bid and confirm feasibility of the technology offered by him.

LPS SR **requires** that logistical support items such as a spares package, training and documentation and a maintenance and support service agreement(s) will be included.

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| 1.2 General Requirements | |
| GEN 1 | The specified system elements and performance characteristics are those required by the LPS SR, and Tenderer's shall offer equipment satisfying these requirements. |
| GEN 2 | The antenna, the WRS sub-systems with data communication equipment, RCMS, WDD (Weather Data Display) and any other related equipment shall be brought together in a unified solution to provide an integrated WRS which is able to perform all functions specified in this document. |
| GEN 3 | The WRS shall be used by the Tower and Approach Control Unit for the provision of the following services: <ul style="list-style-type: none"> • Providing current weather information on demand, • Supporting aircraft to avoid heavy showers and thunderstorms, • Alerting pilots on the final approach if severe weather occurs. Further, the information derived from the new WRS will be used as an input to the existing ATC (Air Traffic Control) Systems. |
| GEN 4 | The Tenderer should , during the period up to Tender submission, carry out an initial site survey of the WRS site and its environs in order to: <ul style="list-style-type: none"> • confirm the intended technology for the achievement of the Operational and Technical Requirements, • make theoretical predictions of the WRS area coverage. |
| GEN 5 | The WRS shall be designed for unattended, remote controlled operation. The other systems shall in normal operation also be unattended. Therefore, particular importance shall be attached to integrity and reliability of the systems. RCMS equipment will be provided so that the major parts of the system shall be monitored and controlled from a remote point. |
| GEN 6 | The equipment shall therefore be capable of remote control of all main functions from a central point in the ATC Centre. |

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| GEN 7 | <p>The equipment shall at least consist of following elements:</p> <ul style="list-style-type: none"> • X-band transceiver, • X-band antenna, • Signal Data processor, • Remote Monitoring and Control System (RCMS) and Weather Data Display (WDD), • Radome covering antenna, • Spare parts, • Training, • Documentation. |
| GEN 8 | <p>The WRS will act as weather data source for the ATC systems and shall provide weather data, in the form of precipitation using ASTERIX cat 008.</p> |
| GEN 9 | <p>The intended WRS site is equipped with UPS power supplies. The WRS shall be capable of operating from mains supply of 230 V. The Contractor shall investigate the local power supplies and propose any additional mains stabilization equipment necessary for the continuous and correct functioning of his equipment.</p> |
| GEN 10 | <p>WRS shall be capable of being installed on the tower/ mast, supporting equipment (if any) should be installed next to the WRS tower. The Contractor shall design, deliver and install a WRS tower or platform suitable for the installation and operation of the WRS.</p> |
| GEN 11 | <p>The Contractor must ensure the construction of the underground connection infrastructure, including the connection cabinets.</p> |

1.3 Definitions

In this document the following standard terminology is used to indicate the status of requirements:

shall - indicating a mandatory requirement,

should - indicating a desirable requirement,

may - indicating requirements that are optional or involve choices,

Tenderer - an economic entity submitting a tender.

Contractor - the successful tenderer, i.e. the entity which, on the basis of the contract concluded as a result of this procurement procedure, shall provide the services and/or supplies.

CHAPTER 2. WRS Requirements

2.1 Introduction

This Chapter defines the minimum required performance parameters for a WRS and all related equipment.

2.2 Operational and Functional Requirements

2.2.1 Communication Protocols and Interfaces

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| SYSTEM 1 | The WRS shall provide weather precipitation information using ASTERIX cat 008, at least version 1.3 (In accordance with the document: EUROCONTROL Specification for Surveillance Data Exchange ASTERIX, Part 3 Category 008 Monoradar Derived Weather Information). |
| SYSTEM 2 | For each output data service (defined in paragraph 2.2.2) these parameters shall be configurable: <ul style="list-style-type: none"> • Protocol TCP/IP and UDP/IP, • Port TCP/UDP (local and remote), • Destination IP address (unicast or multicast), • Time to live , • TCP/UDP block size , • SAC, SIC code. |
| SYSTEM 3 | The weather data stream in ASTERIX format shall be configurable with the following items: <ul style="list-style-type: none"> • Maximum size of the data blocks to be sent, • The minimum time between two data blocks, • The maximum number of data blocks, • The minimum time between the weather pictures, • The order in which the precipitation levels are sent (highest level first or lowest level first). |
| SYSTEM 4 | The precipitation zones shall be transmitted as a sequence of contour points (ASTERIX cat 008, item I008/050). |
| SYSTEM 5 | If no Weather data is available (clear sky), data with zero contour serial number shall be output at a regular update time. |
| SYSTEM 6 | Maximum number of contour points in ASTERIX cat 008 as filter level parameter shall be configurable. |
| SYSTEM 7 | The User Application Profile (UAP) defined in the ASTERIX Standard should be available for the above mentioned data categories. Modification of the particular |

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| | UAPs and their adaptation shall be performed during the WRS installation and tuning. |
| SYSTEM 8 | Modification of the particular UAPs and their adaptation should be performable by LPS SR personnel. |
| SYSTEM 9 | The WRS shall support time synchronization by NTP protocol, version 4. NTP Server and connection at the site will be provided by LPS SR. |
| SYSTEM 10 | When all NTP services are lost, the WRS shall continue in operation on the internal clock. There shall be alarm on RCMS when NTP service is lost. |

2.2.2 Output data services

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| SYSTEM 11 | The weather processing system shall have user configurable output services based on ASTERIX cat 008. |
| SYSTEM 12 | It shall be possible to configure at least eight (8) separated output services, which are each independently configurable. |
| SYSTEM 13 | In each output service, the number of individual intensity levels shall be user configurable from 2 to 8. |
| SYSTEM 14 | In each output service, the upper and lower limits of the individual intensity levels shall be user configurable. |
| SYSTEM 15 | Limits of the intensity levels shall be configurable in values of dBZ . |
| SYSTEM 16 | The input data source for the output data services shall be the, at minimum, CMAX meteorological product (maximum reflectivity in a vertical column) and CAPPI (with 1 km vertical resolution / step). |

2.2.3 General

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| SYSTEM 17 | The update rate of meteorological information at the output of the WRS, obtained in real time across the entire WRS coverage area (SYSTEM 24 and SYSTEM 25), shall be within the range of 90 - 120 seconds. |
| SYSTEM 18 | There should be configurable filters in place to minimize the effect of ground clutter, wind turbine clutter, anomalous propagation and fog on the current weather picture. |
| SYSTEM 19 | The MRS shall be capable of the adjustment of sector and elevation transmission control in order to eliminate the potential negative impact of the MRS on other communication technologies operated by LPS SR. |
| SYSTEM 20 | All configuration parameters shall be user definable and adaptable without recompiling the software/firmware. |
| SYSTEM 21 | The equipment shall operate in one the following two modes: |

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| | <p>1. Operational: the equipment is used operationally (unit contributes to operational output services),</p> <p>2. Maintenance: the equipment is under maintenance and is not available for operational use, no data shall be send to the outputs of the WRS.</p> |
| SYSTEM 22 | <p>There shall be different authentication levels to login the system:</p> <p>Login as Administrator: for control, monitoring, maintenance and system management functions.</p> <p>Logins as Technician: for control, monitoring and maintenance functions (changes at application level only).</p> |

2.2.4 Coverage and Resolution

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| SYSTEM 23 | The WRS shall detect precipitation at all system reflectivity levels to a range of at least: 60 NM . |
| SYSTEM 24 | The WRS shall provide continuous 360-degree coverage in horizontal plane. |
| SYSTEM 25 | The WRS shall provide coverage from -1° to 90 ° in vertical plane with respect to the antenna beam width. |
| SYSTEM 26 | The minimum cell range resolution shall be 0.05 NM or better. |

2.3 Performance Requirements

2.3.1 General

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| SYSTEM 27 | Computer servers used in the WRS for each CPU core shall have an average load not higher than 50%. A protection shall be incorporated to prevent all the CPU's in a multicore environment from overload. |
| SYSTEM 28 | Computer servers used in the WRS shall always have a maximum hard-disk occupation of 80%. A protection shall be incorporated to prevent all hard-disks from overload. |
| SYSTEM 29 | Computer servers used in the WRS shall have a protection incorporated to prevent memory from overload. |
| SYSTEM 30 | A user configurable filter shall be implemented which reduces the amount of output data to prevent the ATC system from overload. |
| SYSTEM 31 | A smoothing algorithm shall be implemented to avoid an excessive number of contour points in the ASTERIX cat 008 output. |

2.3.2 Detection Performance

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| SYSTEM 32 | Minimum detectable signal: WRS shall detect hydrometeors with the reflectivity of 20 dBZ in the distance of 60 NM . |
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| SYSTEM 33 | WRS shall detect hydrometeors with reflectivity from 10 dBZ (or less) up to 65 dBZ (or more) . |
| SYSTEM 34 | The calibration of the weather intensity levels shall be performed according to the thresholds defined in the WMO (World Meteorological Organization) in the dBZ scale. The Tenderer shall state how his equipment is calibrated against the WMO levels. |

2.3.3 Interference

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| SYSTEM 35 | It is to be noted that one S-band PSR (Primary Surveillance Radar) is already operating within the airport boundaries and also another WRS located in Gánovce, near Poprad. |
| SYSTEM 36 | The level of signal generated out of the dedicated frequency band shall be as minimal as possible. The offered and delivered system shall not be a source of interference. |

2.4 Technical Requirements

2.4.1 WRS Operating Frequency

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| SYSTEM 37 | The WRS shall operate in X-Band. |
| SYSTEM 38 | The operating frequency band shall be minimized. |
| SYSTEM 39 | The operating frequency allocation shall be made according to ITU (International Telecommunication Union) regulations. |
| SYSTEM 40 | The Contractor shall provide the documentation required for submitting an application for a frequency usage permit no later than 2 weeks from the effective date of the contract. The application for the permit will be submitted by the LPS SR to the Regulatory Authority for Electronic Communications and Postal Services. |

2.4.2 WRS Antenna

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| SYSTEM 41 | <p>The Contractor shall supply copies of the horizontal and vertical polar diagrams (can be included in documentation), together with following performance characteristics:</p> <ul style="list-style-type: none"> • Materials used in Antenna construction, • Antenna dimensions and weight, • Horizontal and vertical characteristics, • Antenna gain. |
| SYSTEM 42 | The Contractor shall describe and deliver all facilities provided for easy and safe access to the Antenna assemblies (for repair and maintenance). |

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| 2.4.3 Antenna Turning Assembly and Rotary Joint | |
| SYSTEM 43 | The Gearbox Assembly and sub-assemblies shall be designed in such a manner as to facilitate corrective and preventive maintenance. |
| SYSTEM 44 | Greasing of assemblies should not be necessary more than once every 12 months. |
| SYSTEM 45 | The Tenderer shall provide details of rotary joint used in WRS (e.g.: type, principle, main parameters, transmitted signals/ power paths...) |
| 2.4.4 Transmitter | |
| SYSTEM 46 | PRF (Pulse Repetition Frequency) shall be minimized taking into account the environmental conditions and the requirements for detection. |
| SYSTEM 47 | There shall be a possibility to switch on/off the antenna and output power of the transmitter both from the RCMS position and from transmitter position. |
| SYSTEM 48 | If the antenna rotation is stopped, the MRS shall disable the transmission (does not apply for calibration, tuning, etc.). |
| SYSTEM 49 | The Contractor shall provide following details: <ul style="list-style-type: none"> • Transmitter operating philosophy, including frequency source details, • Transmitter peak power and duty cycle, • Pulse width(s), • Pulse Compression and De-compression type and technique, if appropriate, • Transmitter spectrum characteristics and purity, • Normal PRI (Pulse Repetition Interval) range. |
| 2.4.5 Receiver | |
| SYSTEM 50 | The Contractor shall state the receiver dynamic range. |
| SYSTEM 51 | The Contractor shall clearly state the Minimum detectable signal level of his receiver, together with the receiver noise factor for this parameter. |
| SYSTEM 52 | The Contractor shall provide following details: <ul style="list-style-type: none"> • Receiver operating philosophy, • Receiver(s) pass-band characteristics and out of band suppression. |
| 2.4.6 Equipment Performance and Status Monitoring | |
| SYSTEM 53 | The overall WRS system shall include extensive performance and status monitoring equipment. |

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| 2.4.6.1 Transmitter Status Monitoring | |
| SYSTEM 54 | The Transmitter shall internally monitor all major parameters (e.g. output power, internal temperature...). |
| 2.4.6.2 Receiver Status Monitoring | |
| SYSTEM 55 | The Receiver shall internally monitor all major parameters (e.g. noise level, internal temperature, overload status...) |
| SYSTEM 56 | A direct indication of the fault nature shall be available on the RCMS. |
| 2.4.6.3 Signal Processor Status Monitoring | |
| SYSTEM 57 | The Signal Processor shall internally monitor all major functions (e.g. reference signal test, processor load...) by means of comprehensive self-test facilities. |
| 2.4.6.4 Antenna Status Monitoring: | |
| SYSTEM 58 | The Contractor shall clearly state the capabilities of his equipment for monitoring on-line and off-line, the correct antenna functioning. The monitoring shall under no circumstances impair the system operational status. |

CHAPTER 3. Theoretical Calculations

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| 3.1 General | |
| CAL 1 | The Tenderer shall include in his Tender a section wherein the performance of the offered system is theoretically calculated and predicted by supplying all the elements, diagrams, calculations and information stated in the following paragraphs of this Chapter. |
| CAL 2 | The theoretical coverage diagrams shall be provided with respect to the site, terrain and obstacles. |
| 3.2 Theoretical calculation of weather detection performance | |
| CAL 3 | <p>The Tenderer shall provide any available data (derived from trials, simulations, tests, use of special tools, recordings etc.), that quantify the performance of the offered WRS, in the following areas:</p> <ul style="list-style-type: none"> • Lowest detectable weather intensity/level, • Ability to reject ground clutter, • Ability and method used to calibrate meteorological intensity levels according to WMO standards, • Relation in use, between the reflectivity (Z) and the precipitation rate (R). |

CHAPTER 4. Remote Control and Monitoring System, Weather Data Display

4.1 Introduction

This Chapter defines the required performance parameters for an RCMS and WDD. The system is intended mainly to monitor and control the sensors installation. The Weather Data Display is intended to display current/past weather situation, meteorological product generation, data visualization etc. The Contractor may deliver combined RCMS/WDD.

4.2 Functional and Performance Requirements

4.2.1 Description of RCMS Philosophy

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| RCMS 1 | The Contractor shall describe the RCMS philosophy used and the system elements, functions, parameters to be monitored and controlled. |
| RCMS 2 | Overall functionality of two RCMS connected to WRS shall be demonstrated. |
| RCMS 3 | Failures in the monitoring and control systems shall have no impact on the operational behaviour and performance of the WRS. |
| RCMS 4 | If mode in which control of the WRS is possible (e.g. antenna rotation control, transmission control) only one user logged in at one RCMS station can have this control at time. |
| RCMS 5 | The RCMS shall be capable of monitor and control all system elements, functions and parameters. |
| RCMS 6 | Access control requirements: By default, the RCMS shall contain one (1) password protected administrator (root) user. |
| RCMS 7 | There shall be possible for administrator user to define at least ten (10) user accounts with different privileges. Newly created users shall not be able create other user accounts. |

4.3 Technical Requirements

4.3.1 General

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| RCMS 8 | The WRS shall be capable of being monitored and controlled from a remote location. |
| RCMS 9 | The system shall monitor the status of critical system parts. An alert shall be generated if an error occurs. |

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| RCMS 10 | The Tenderer shall describe the capacity of his offered RCMS to handle other parameters and alarms related to the WRS station (e.g., fire, mains failure...). |
| RCMS 11 | All equipment failures and change information shall be logged in a user accessible file which shall include the exact date and time of the event and a clear indication of the alert/ failure/ event type. |
| RCMS 12 | The log files shall contain information for at least 6 months. |
| RCMS 13 | It shall be possible to copy log files, images, animations, screenshots and other relevant information on an external device (e.g. DVD, USB stick) in a format that can be opened on a standard Linux or Windows PC. |
| RCMS 14 | The WRS shall record and replay the weather data on the WDD for at least 60 days. |
| RCMS 15 | The WDD shall display at least the following meteorological products: <ul style="list-style-type: none"> • CAPPI: Constant Altitude Plan Position Indicator (with 1 km vertical resolution / step). • Echo Top: The highest altitude where specific reflectivity is detected. • PPI: Plan Position Indicator showing reflectivity at a single elevation angle. • CMAX: Maximum reflectivity value within a vertical column. |
| RCMS 16 | The WDD shall display data from output services (as defined in the Section 2.2.2) by allowing the selection of a specific service from all those that are configured and active. |

4.3.2 RCMS/WDD Consoles

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| RCMS 17 | The contractor shall deliver 3 RCMS/WDD terminals. |
| RCMS 18 | The RCMS/WDD consoles shall be provided with (in accordance with the Tenderer's design philosophy) a desktop PC, multi-function keyboard, mouse, etc., and a color (≥ 24 inches) LCD monitor with min. FHD resolution. |
| RCMS 19 | The RCMS/WDD consoles shall be interconnected with the sensor using by Ethernet interface(s). |
| RCMS 20 | The Contractor shall install the RCMS/WDD system in the Technical room at Poprad-Tatry Airport. |

4.3.3 Control

4.3.3.1 On the Equipment

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| RCMS 21 | Control functions shall be selectable at equipment level (directly on equipment and/or using connection of computer) In the case of maintenance action, tests, etc., the selection of "local control" shall lock out, in the interest of safety of technical personnel all other remote control consoles, positions, etc. |
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| 4.3.3.2 At Console Level | |
| RCMS 22 | The monitoring console shall have the possibility, by selection of a special operating mode, of controlling all major system elements. |
| 4.3.4 SNMP Message Transmission | |
| RCMS 23 | LPS SR operates a Central Monitoring System (CMS) using SNMP messages transmission. The Sensor(s) or RCMS shall send SNMP messages to the CMS of LPS SR and relevant Management Information Base (MIB) shall be described and stated in documentation. |
| RCMS 24 | The separate and independent Ethernet interface shall be assigned for this purpose. Parameters of the interface shall be configurable by LPS SR personnel. |

CHAPTER 5. General Design Requirements

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| 5.1 Design Life | |
| GDR 1 | A design life of minimum 10 years shall be established as an overall system objective. |
| 5.2 Reliability | |
| GDR 2 | System and subsystems shall be designed for continuous operation with a minimum of down-time. |
| GDR 3 | System and subsystems shall be designed for continuous operation in local climatic conditions (taking into account the temperature range, wind etc.) |
| GDR 4 | After power failure the system shall automatically restart at power return and recover normal operation. All diagnostics and parameters shall be down-loaded and restored (to the values before interruption) automatically. |
| GDR 5 | The operational availability of the WRS shall be better than 99 % . |
| GDR 6 | The Mean Time Between Failures (MTBF) shall be at least 5,000 hours . |
| GDR 7 | The Mean Time to Repair (MTTR) of each part of the WRS shall not exceed 8 hours . |
| GDR 8 | The Tenderer shall state: <ul style="list-style-type: none"> • the Mean Time Between Critical Failures (MTBCF), • the Mean Time Between Failures (MTBF), i.e. where the failure does not affect the operational performance of the equipment. |
| GDR 9 | All equipment and especially the display equipment (when applicable) shall be capable of normal operation in an electromagnetic interference (EMI) environment resulting from the installation of any external radio equipment in the vicinity and/or in adjacent rooms. |
| 5.3 Cybersecurity Requirements | |
| GDR 10 | Cybersecurity requirements for information systems and related infrastructure are specified in Annex No. 5 - Cybersecurity-related requirements for information systems and related infrastructure. |

5.4 Electrical Design

5.4.1 Power Supply

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| GDR 11 | <p>The following AC power supply is available: 230 V (+ 10% - 10%), 50 Hz +/- 2%., single phase, three wiring (P-E-N); Only these voltages shall be feeding all electrical appliances. This power supply capability shall be also used for the appliances and the tools during installation.</p> <p>Additionally the Contractor shall supply all further power cabling, power distribution boards, surge protections, switch gear, etc., required for the system.</p> <p>The electrical components and installation shall comply with the EU standards and rules for electrical installation valid in Slovak republic.</p> <p>After completing the electrical installation, the Contractor shall carry out an initial electrical inspection and testing and submit the report to the LPS SR.</p> |
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5.4.2 Lightning Protection and Transients

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| GDR 12 | The entire system shall be protected by means of suitable lightning arrestor and/or other devices. |
| GDR 13 | Further to the standard lightning protection offered by the lightning arrestor, the suitable protection shall be incorporated into parts of the equipment which can be damaged by phenomena such as lightning-induced-transients in signal cables etc. |
| GDR 14 | The Contractor shall specify external lightning protection. |

5.4.3 Cables

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| GDR 15 | The outside connections lines shall be efficiently protected against weather conditions, solar radiation and mechanical damages. |
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5.4.4 Grounding Practices

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| GDR 16 | The LPS SR will furnish in co-operation with the Contractor the earth/ground points at its installation locations. The Contractor shall furnish all other grounds as required by this specification. |
| GDR 17 | The Contractor shall submit for approval his grounding plan, as required by this specification, for all installation locations prior to incorporation in his design and installation specifications. |
| GDR 18 | All equipment supplied by alternating current shall be grounded in accordance with local regulations. |

5.5 Personnel Safety

GDR 19 The equipment **shall** be designed so as to provide maximum safety for personnel.

5.6 Directives and standards

GDR 20 All electrical and electronic equipment **shall** comply with the objectives of the Directive:

- 2014/30/EU,
- 2014/35/EU,
- 2014/53/EU.

GDR 21 Radiation and EM field emitted by displays **shall** be in accordance with IEC (International Electrotechnical Commission) standard limits.

GDR 22 For electromagnetic discharge requirements of the IEC standard **shall** be applied.

GDR 23 The Contractor **shall** submit all declarations of conformity with the relevant standards in accordance with the requirements specified in documents according to GDR 20.

5.7 Installation Materials

GDR 24 All materials necessary for the installation of the equipment offered **shall** be included in the bid and delivered by the Contractor.

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CHAPTER 6. WRS Infrastructure

6.1 Introduction

This Chapter defines the requirements regarding WRS installation and infrastructure location. The supply and installation of the WRS tower, radome and connection infrastructure is the responsibility of the Contractor for WRS Poprad. The installation site, together with visualizations of the MRS and the connection infrastructure, are provided in Annexes No. 1– 4.

| 6.2 WRS tower | |
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| INFR 1 | WRS should be capable of being installed at location with GPS coordinates: 49.0713719N, 20.2509600E. The connection infrastructure must be routed to the former navigation system building (the so-called OGP building, GPS coordinates: 49.0717286N, 20.2513892E), located approximately 50 meters from the MRS installation site. |
| INFR 2 | Based on the site survey or/and simulations, the Tenderer shall confirm suggested site. |
| INFR 3 | Based on serious arguments resulted from simulations and site survey, the Tenderer may propose alternative site in the airport airside according to requirements in Regulation (EU) No 139/2014 and Certification Specifications and Guidance Material for Aerodrome Design (CS-ADR-DSN). |
| INFR 4 | Tenderer shall design the WRS tower with suitable platform for the installation and operation of the WRS with respect to the local conditions and requirements in Regulation (EU) No 139/2014 and Certification Specifications and Guidance Material for Aerodrome Design – chapter 6 - visual aids for denoting obstacles (CS-ADR-DSN.Q). |
| INFR 5 | In WRS tower and radome design, special attention shall be given to used marking color and method in accordance with: CS-ADR-DSN.Q.845 - Marking of fixed objects. |
| INFR 6 | In WRS tower and radome design, orange (RAL 2004), alternatively red (RAL 3020) and white color shall be used. |
| INFR 7 | Total maximum height of the object (tower+radar+radome+obstruction lights) shall not exceed 6 meters. |
| INFR 8 | In WRS tower and radome design, special attention shall be given to used lighting system in accordance with: CS ADR-DSN.Q.846 Lighting of fixed objects. |
| INFR 9 | The Contractor shall deliver and install WRS tower as well as foundations including groundings. |

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| INFR 10 | The Contractor shall obtain all necessary permits required for the construction of structures (tower, foundations, grounding and connection infrastructure) in accordance with the applicable legislation of the Slovak Republic, including permits for access and entry into the restricted security area of the Poprad Airport. |
| INFR 11 | The MRS tower and infrastructure is classified as a reserved construction under Act No. 25/2025 Coll. on Construction and on Amendments and Supplements to Certain Acts (hereinafter referred to as the “Construction Act”). |
| INFR 12 | The tower shall include a cable pathway for the safe placement of the power supply and network cables. |
| INFR 13 | <p>According to agreed time schedule, not later than two (2) weeks after the contract is signed the Contractor shall provide all necessary information and data concerning power supply requirements such as:</p> <ul style="list-style-type: none"> • inrush power, • average power consumption, • characteristics of voltage, • requirements for network communication interfaces (Ethernet). <p>The power supply and network communication connectors or interfaces will be provided by LPS SR based on such data.</p> |

6.3 Connection Infrastructure

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| INFR 14 | The Contractor shall ensure the construction of an underground connection infrastructure routed from the OGP building to the MRS installation site. |
| INFR 15 | The underground connection infrastructure shall include two pairs of Ethernet cables of at least Cat 6A type and S/FTP type, suitable for installation in a conduit laid underground. |
| INFR 16 | The underground connection infrastructure shall include a five-core power cable (3×L + N + PE) suitable for underground installation or installation in a conduit. The cross-section of each conductor shall be at least 25 mm ² . |
| INFR 17 | The power and communication cables placed underground shall be routed with a minimum separation distance of 30 cm between them. |
| INFR 18 | On the MRS tower side, the cable routing shall terminate in a connection cabinet containing surge protection devices for both the communication and power cable routes. The connection cabinet shall be installed on the structure of the MRS tower. |
| INFR 19 | On the OGP building side, the cable routing shall terminate in a connection cabinet containing surge protection devices for both the communication and power cable routes. |
| INFR 20 | The connection cabinet shall be installed watertight on the façade of the OGP building. |

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| INFR 21 | The connection cabinets shall have a protection rating of at least IP66. |
| INFR 22 | The above-ground sections of the cable routes shall be routed in a rigid protective conduit resistant to UV radiation (e.g., PVC-U cable conduit). |
| INFR 23 | The cable connection from the OGP building to the external cabinet will be provided by the LPS SR. |

6.4 WRS ancillary equipment

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| INFR 24 | If the WRS system contains any equipment (e.g. transmitter/ receiver/ signal processor/ power units) that needs to be located outdoors near/ at the base of the WRS tower, its installation and shelter (or outdoor rack) delivery shall be the responsibility of the Contractor. |
| INFR 25 | If the WRS system contains any auxiliary equipment (e.g. computer server) that is not located in the immediate proximity of the radar and must be located indoors , this equipment should be rack-mountable (19”). |
| INFR 26 | The Contractor shall not later than two (2) weeks after the contract is signed specify network connectivity (e.g. LAN interface speed, ports) and power requirements for any ancillary equipment. |

CHAPTER 7. Documentation, Training, Warranty and Support

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| 7.1 Documentation | |
| 7.1.1 General information | |
| DTS 1 | The Contractor shall provide two (2) complete sets of WRS documentation and documentation in printed form and also in electronic form in PDF format. |
| DTS 2 | Each document shall be technically correct. The contents shall be structured in a logical way, primarily based on functions. |
| DTS 3 | All documents shall be written in Slovak or Czech or English language. |
| DTS 4 | The international SI measurement system shall be used. |
| DTS 5 | The Contractor shall deliver complete sets of documentation no later than on the day of delivery of the WRS. |
| 7.1.2 Installation Documentation | |
| DTS 6 | All relevant information and drawings concerned with the installation of the equipment shall be included. Diagrams shall be provided for cabling, wiring, interconnection and mounting as well as information concerning unpacking, foundations, power requirements etc. and special environmental considerations shall be explained in detail. |
| 7.1.3 Maintenance Documentation | |
| DTS 7 | Maintenance documentation shall describe system functions and equipment; maintenance manuals shall describe the technical functions and maintenance procedures for the equipment not working in the normal operational mode. |
| DTS 8 | The instructions shall contain: <ul style="list-style-type: none"> • general directives for measurements, functional check etc. • preventive and corrective maintenance procedures and influence on operation and workload, • list of facilities and aids required, • checks for maintenance steps and when to be performed, referenced to detailed check-lists, • detailed check-lists, • special procedures, comprising directions for setting up and adjustment of defined parameters or directives for the exchange of critical items, • basic information for connections, schematic diagrams etc. |

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| DTS 9 | Maintenance check-lists shall be provided for all parts of the equipment. These check-lists will be in the form of easily-copied test sheets giving details of the part of the equipment, maintenance manual reference, test point, etc. |
| DTS 10 | The typical value for each parameter shall be extracted from the provisional acceptance inspection documentation for that test. Taken as a whole, correspondence of measured and reference values (within tolerance limits) will verify that the equipment is working according to its technical specifications. |

7.2 Training Requirements

7.2.1 General

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| DTS 11 | The objective of the trainings shall be to enable LPS SR staff to learn about, operate and maintain the system without the assistance of the Contractor. |
| DTS 12 | The Contractor shall provide training courses at LPS SR premises, at its own premises, and, if necessary, at the WRS installation site. Any training at the installation site shall be completed before the start of the SAT. |
| DTS 13 | The training on system operation and maintenance shall be provided for a number of engineers or technicians. The emphasis of this training shall be placed on practical training. |
| DTS 14 | All the courses shall be conducted in the Slovak or Czech or English Language and therefore all accompanying material (trainee documents, audio-visual aids, manuals, etc.) shall be in the particular language as well. |
| DTS 15 | Any technical intervention by LPS SR personnel that has been the subject of practical training (e.g. preventive maintenance or repair) shall not lead to loss of warranty. |

7.2.2 Training Courses

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| DTS 16 | Two types of courses are required : <ul style="list-style-type: none"> • General system course (for about 5 – 10 LPS SR employees, classroom, approximately: 1 day, shall be held no later than 1 day before the start of the SAT tests) • System operation and maintenance course (for about 8 – 10 LPS SR employees, classroom training combined with training at the Contractor's premises, approximately: 3 - 4 days, shall be held prior to the FAT tests) |
| DTS 17 | General system course shall cover system description including general aspects of installation and testing, operation and maintenance. It shall also include the capabilities of the system, hardware and software concepts and interworking/interfaces requirements. |
| DTS 18 | System operation and maintenance course shall cover subjects such as: <ul style="list-style-type: none"> • basic weather terminology related to WRS • detailed system description, |

- system control operations,
- use of operation manuals,
- man-machine interface,
- modification and set up of system configuration,
- administration and management of the system,
- other relevant aspects related to the operation and maintenance of systems and operational display equipment,
- procedures for the preventive and corrective maintenance, repair and recovery of the system,
- use of maintenance manuals,
- block diagrams and description of individual blocks,
- requirements for routine maintenance of different parts of the system,
- hardware and software fault finding and diagnostics,
- system shut-down and start-up,
- software loading,
- handling all alarm types,
- system break-down handling procedures,
- use of external (standard or special) test equipment/tools.

7.2.3 Training Documents

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| DTS 19 | Each participant (trainee) shall obtain a complete, correct and updated set of training documentation when the course starts. |
| DTS 20 | The LPS SR shall have the right to use this material to further train its own personnel. |

7.2.4 Facilities for On-Site Courses

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| DTS 21 | The Contractor shall , for the duration of the on-site training, provide adequate facilities as required (including training materials, technical equipment, etc.). |
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7.3 Technical Support, Maintainability, Guarantee

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| DTS 22 | Initial software/firmware shall be delivered and installed without patches. |
| DTS 23 | All scripts, executables and parameter files, which are used in the system, shall be available, listed with name and version number. |

7.3.1 Concept of Technical Support and Maintenance

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| DTS 24 | The Contractor shall present their own concept of the approach to technical support and maintenance, which shall comply with at least the minimum |
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| | requirements set out in this document. |
| DTS 25 | The Contractor shall guarantee technical support, as well as the supply of spare parts during the expected lifetime of the equipment, in any case at least 10 years . (See also 5.1 Design Life). |
| DTS 26 | The technical support provided by the Contractor shall include fault finding, repairing, setting, logistics support, training, software support, assistance in corrective maintenance, etc. |
| DTS 27 | In the case of a service intervention, any of the following approaches may be applied as needed: <ul style="list-style-type: none"> • Remote repair, • On-site repair. |
| DTS 28 | The start of a service intervention shall be understood as the moment when a competent Contractor's employee contacts (e.g.: by letter, e-mail, helpdesk) and discusses the issue with the LPS SR employee after the problem has been reported, or when a competent Contractor's employee logs into the system via remote access. |
| DTS 29 | Response times for the start of a service intervention by the Contractor for warranty and post-warranty service: <ul style="list-style-type: none"> • Critical faults: the following working day after the fault is reported, • Non-critical faults: 3 working days after the fault is reported. |
| DTS 30 | Fault categorization: critical (emergency) and non-critical system faults. The LPS SR reserves the right to assign each fault to the appropriate category: <ul style="list-style-type: none"> • Critical system faults represent a situation where the fault affects the availability of output data, • Non-critical system faults represent faults related to individual devices that do not affect the availability of output data. |

7.3.2 Preventive Maintenance

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| DTS 31 | For all relevant equipment in WRS the Contractor shall submit the following information: <ul style="list-style-type: none"> • short description of preventive maintenance activities (performance tests, lubrication, etc.), • estimated periodicity (time interval) during operation and impact on system operation. |
| DTS 32 | The preventive maintenance will be performed by LPS SR personnel, and its performance, based on procedures in documentation or practical training, shall not result in the loss of warranty. |

7.3.3 Corrective Maintenance (Repairs)

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| DTS 33 | For all relevant equipment in WRS the Contractor shall submit the following information: |
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| | <ul style="list-style-type: none"> • description and procedure of corrective maintenance (e.g. component replacement procedure), • The estimated duration of corrective maintenance (e.g. component replacement time) |
| DTS 34 | The corrective maintenance performed by LPS SR personnel, based on procedures in documentation or practical training, shall not result in the loss of warranty. |

7.3.4 Maintenance Tools

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| DTS 35 | The Contractor shall provide a list and deliver the necessary standard tools (commercially available) that are required for the standard maintenance of the offered system. |
| DTS 36 | The Contractor shall provide a list and deliver the necessary non-standard (specific) tools that are required for the maintenance of the offered system. This concerns all the facilities especially developed to repair or to adjust units of the equipment supplied. Typical examples are test benches or special tools necessary for the setting and testing of the equipment according to the manufacturer's handbooks. |

7.3.5 Maintenance Instructions

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| DTS 37 | If documentation does not contain maintenance instructions (part 7.3.2 and 7.3.3), the Contractor shall provide these separately. |
| DTS 38 | Maintenance plans shall describe system functions and equipment; maintenance manuals shall describe the technical functions and maintenance procedures for the equipment not working in the normal operational mode. |
| DTS 39 | <p>The instructions shall contain:</p> <ul style="list-style-type: none"> • general directives for measurements, functional check etc., • maintenance procedures and influence on operation and workload; list of facilities and aids required, • checks for maintenance steps and when to be performed, referenced to detailed check-lists, • detailed check lists referred to, • special procedures, comprising directions for setting up and adjustment of defined parameters or directives for the exchange of critical items, • basic information for connections, schematic diagrams etc. |

7.3.6 Remote Repair

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| DTS 40 | Remote repair involves the Contractor remotely connecting to the system to analyze the cause of the problem, developing SW fixes (in the case of a real SW fault), and implementing them after coordination with LPS SR staff or recommending procedures to prevent the issue from reoccurring. |
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| DTS 41 | The central RCMS shall enable remote access (Remote Desktop/SSH, etc.) for the Contractor. LPS SR shall provide the VPN client service to enable the Contractor to log in remotely. |
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| DTS 42 | The Contractor shall connect to the system and propose corrective actions based on the request. |
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7.3.7 On-Site Repair

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| DTS 43 | <p>On-site repair of the MRS shall be carried out in one of the following ways:</p> <ul style="list-style-type: none"> • Repair by an LPS SR technician based on the procedures from the documentation or practical training, • Repair by an LPS SR technician in collaboration with the Contractor (using remote access or phone/email support), • Repair by the Contractor in the presence of an LPS SR technician. |
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7.3.8 Warranty Service

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| DTS 44 | During the warranty period of 2 years, the Contractor shall , at their own expense, provide the necessary expertise and repair, either on-site or elsewhere, all system components whose properties deviate from the specification, provided that the faults are not due to insufficient maintenance or incorrect operation as specified in the manuals. The Contractor shall bear the costs of transporting and insuring system parts from the installation site to the factory and back. |
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| DTS 45 | If a design or software fault occurs during such period of time, the Contractor shall fix the fault at their own expense. Furthermore, the Contractor shall replace any faulty units or components. |
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| DTS 46 | If a fault analysis reveals that the fault is caused by malfunctioning and/or a failure to meet the specification requirements of the equipment supplied by the Contractor, the Contractor shall perform the necessary corrective work to eliminate such faults, and the warranty period shall be extended accordingly. |
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| DTS 47 | The Contractor shall inform LPS SR upon identification of any software vulnerabilities in the system and shall apply the necessary security measures. |
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7.3.9 Post-Warranty Service

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| DTS 48 | The Contractor shall provide post-warranty service after the end of the warranty period and signing the FA protocol for a minimum of 8 years . |
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| DTS 49 | <p>The post-warranty service shall include:</p> <ul style="list-style-type: none"> • Reporting issues – by phone or email, |
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| | <ul style="list-style-type: none">• Service intervention via:<ul style="list-style-type: none">○ phone consultation,○ email,○ remote access to the system.• On-site service intervention by the Contractor at the radar site ,• Notifying the identified software vulnerabilities in the system and applying security patches,• Notifying and fixing the identified software bugs. |
| DTS 50 | If an on-site service intervention at the radar site is required, the LPS SR shall perform the actions necessary to repair the equipment, e.g. by replacing components, following the Contractor's instructions. |

CHAPTER 8. Verification and Acceptance Tests

| 8.1 Factory Acceptance Tests (FAT) | |
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| TEST 1 | The Contractor shall perform Factory Acceptance Tests in the factory to verify that the equipment complies technically with the requirements of the specifications. |
| TEST 2 | During FAT, the contractor shall test the maximum possible load in simulated operational conditions. |
| TEST 3 | The Contractor shall describe verification method of SYSTEM 32 and SYSTEM 33. During FAT and SAT, the Contractor shall perform the verification. |
| TEST 4 | The Contractor shall provide Quality Control Certificates signed by qualified staff. |
| TEST 5 | Non-compliant equipment shall be resubmitted by the Contractor for FAT after the implementation of corrective measures. |
| TEST 6 | <p>The Contractor shall furnish detailed procedures for managing and controlling the factory acceptance testing which shall among other things include and cover the following:</p> <ul style="list-style-type: none"> • Test Specifications which shall define the features and characteristics that are to be verified for product qualification and acceptance. • Test Plans which define the sequence of tests, the responsibilities for their conduct, the location of the tests and test procedures to be used. • Test Procedures which describe how the tests specified in the tests specification are to be conducted together with the tools and test equipment to be used and the data to be recorded. • Configuration Description (as part of the Configuration Management task) which shall describe the configuration of system under test in terms of its design standards, possible deviations, temporary non-conformances, and design changes. |
| TEST 7 | The Test Specification shall cover all possible testable items, parameters, functions and performances according to the Technical Specification. |
| TEST 8 | <p>The Contractor shall submit the documents related to final FAT (TEST 3, TEST 6) to the LPS SR 8 weeks before the tests will start.</p> <p>Documents will be, if necessary, amended and be approved by both parties within 4 weeks of the receipt of these documents.</p> |
| TEST 9 | In the event that the FAT documentation is not delivered by the Contractor on time, is not relevant to the equipment under test, or is generally unsatisfactory, LPS SR may refuse to commence the FAT |
| TEST 10 | Prior to the commencement of testing, the Contractor shall conduct test reviews to ensure that the products, equipment, tools, documentation, and the personnel |

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| | involved are in a state of operational readiness. |
| TEST 11 | The system, subsystem, equipment (or unit) under test shall have successfully passed all planned in-process and assembly inspections and tests (as specified in the corresponding Quality Manual and related procedures), prior to its submission to the FAT. |
| TEST 12 | Taking into account the possible variety of equipment, the Contractor can perform the FAT separately for different groups of equipment. In this case all equipment and sub-units shall be fully interconnected and built up into the system's configuration. Specific tests considered as impractical in the system configuration may be performed using simulated inputs or on a test bench when specifically approved by the LPS SR. |
| TEST 13 | The Contractor shall be record all data used for testing purposes prior to and subsequent to the FAT. |
| TEST 14 | The factory acceptance tests shall be witnessed by the LPS SR. |

8.2 Site Acceptance Tests (SAT)

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| TEST 15 | Site Acceptance Testing is a series of tests carried out by the Contractor and witnessed by the LPS SR, designed to verify the correct operation of the entire system, in accordance with the requirements outlined in this Specification. The SAT shall cover the entire delivery of the system, installed, fully tested and in working order. |
| TEST 16 | An endurance test (at least 7 days) on the equipment shall also be included in the SAT. |
| TEST 17 | An endurance test should be scheduled for a period in which significant rainfall or storms are forecasted. |
| TEST 18 | Declaration of site acceptance of the system shall be subject to the satisfactory completion of the following activities (list not exhaustive): <ul style="list-style-type: none"> • Successful factory testing, • Installation of the equipment to be supplied, • Successful presentation of all defined tests, • Delivery and acceptance of tools, components and spare parts for maintenance, • Delivery and acceptance of test systems and test software (if necessary). |
| TEST 19 | The Contractor shall submit to the LPS SR a document with the specification and the schedule of the SAT to be carried out on the equipment at least 1 month prior to the start of the tests. |
| TEST 20 | This document will be approved by the LPS SR and, if necessary, modifications and/or additions shall be stipulated for incorporation into the text. |

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| TEST 21 | <p>The schedule of the SAT shall be prepared by the Contractor in co-operation with the LPS SR and concerns the site activities for provisional acceptance.</p> <p>It shall contain in particular the following items:</p> <ul style="list-style-type: none"> • the procedure to be followed for the good conduct of the acceptance tests; • a plan of all actions to be taken for the testing of various parts of the system and the full system; • the specifications of all acceptance tests; • the form of documentation for the tests. |
| TEST 22 | <p>The acceptance test specifications shall be a detailed description of all the tests and define for each test to be executed:</p> <ul style="list-style-type: none"> • the objective of the test, • the state of the (sub)-system prior to the execution of the test, • the correct execution of the test, • maintenance set-up and interventions during execution, • the measures to be taken to record the test results, • the predicted test results and/or the results of pre-acceptance tests. |
| TEST 23 | <p>The Contractor shall, before submitting his equipment for site acceptance, carry out all the tests defined in the SAT schedule and enter the figures for these tests into the SAT document.</p> |
| TEST 24 | <p>The SAT shall be executed in accordance with the schedule and shall principally comprise of the following:</p> <ul style="list-style-type: none"> • Checking that the equipment is present and fully installed, • Verification of all system parameters, • Verification of all system functions and related performance limits, • Continuous operation of the entire system for a period of 7 days under normal operational conditions without intervention of LPS SR staff. |
| TEST 25 | <p>In the event of a test failure the Contractor shall resubmit his equipment for acceptance as long as the malfunction/error has been detected and corrected together with a report detailing the causes and consequences of this malfunction/error.</p> |
| TEST 26 | <p>Additional to the above tests the LPS SR may request according to its judgement any further justifiable tests in order to verify in a more detailed way the conformity of the system with the technical specifications.</p> |
| TEST 27 | <p>If any part of the system fails to pass the site acceptance, i.e. it is "rejected", the Contractor shall re-submit his equipment for site acceptance after an agreed period.</p> |

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| TEST 28 | The Contractor shall be obliged to supply a detailed report in which he describes the reason for the failure or non-compliance of the equipment and the corrective actions carried out. |
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| TEST 29 | After completion of the SAT tests, a trial operation period of 3 months shall follow. |
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8.3 Final Pre-Operational Acceptation (FPA)

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| TEST 30 | The Final Pre-Operational Acceptance (FPA) of the system shall be declared after the issuance of the occupancy permit, and subject to the condition that the Contractor has completed all activities required to eliminate any faults or deficiencies affecting the hardware or software of the equipment, as reported by LPS SR, š. p., during the trial operation period. |
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| TEST 31 | The condition for FPA is the provision of documents necessary for the operation and use of the structure, which shall be obtained by the Contractor. |
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| TEST 32 | The Final Pre-Operational Acceptation Protocol (FPA protocol) shall be drafted by the Contractor and approved by LPS SR, š. p. |
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| TEST 33 | The FPA protocol shall be signed by both parties following the issuance of the final and legally effective occupancy permit. |
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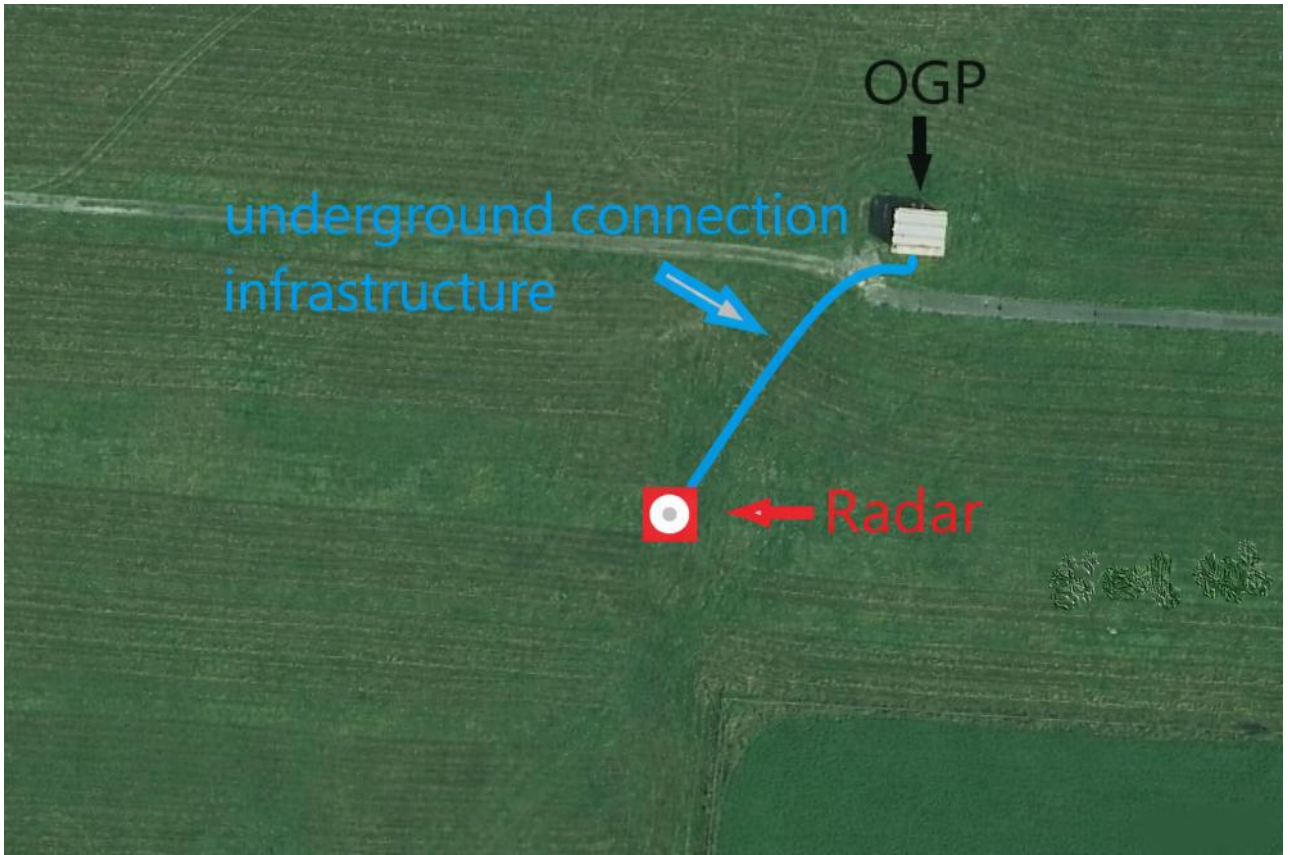
CHAPTER 9. Project Management

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| 9.1 Project Manager | |
| PMAT 1 | The Contractor shall appoint a Project Manager. This Project Manager will be the intermediary between the Contractor and the LPS SR for all decisions relating to the Contract. |
| PMAT 2 | The Project Manager shall be responsible for project co-ordination and shall take all necessary actions to ensure that the project progresses normally. The Project Manager will, in addition, be responsible for all arrangements on the part of the Contractor with regard to meetings and the personal contacts that have to be made, and for the decisions to be taken in concert with the LPS SR. |
| 9.2 Progress Chart and Meetings | |
| PMAT 3 | The Contract shall be executed in accordance with a project timeline. The unit of time will be one working week, and the starting date is to be the effective date of the Contract between the LPS SR and the Contractor. |
| PMAT 4 | The project timeline will be part of the contract and will be prepared by LPS SR. |
| PMAT 5 | The first meeting („Kick-off meeting”) between the Contractor and LPS SR shall take place within 2 weeks from the effective date of the contract. At this meeting, the periodicity of the subsequent meetings shall be agreed. |
| PMAT 6 | The meetings shall be held on the premises of LPS SR, except in cases where a prior agreement between LPS SR and the Contractor is made for the meeting to be held elsewhere or online. The persons required to be present at the meetings are: <ul style="list-style-type: none"> • the Contractor's representative (i.e. the project manager), • the LPS SR's representative, • any other persons which the above representatives consider should be present. |
| PMAT 7 | After each meeting, a report will be prepared by the Contractor and submitted to the LPS SR for its approval within two (2) weeks from the end of the meeting. |

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Annex No. 1 – Map with the Approximate WRS Location and Infrastructure.



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Annex No. 2 – OGP Building and Visualization of the Connection Box and Connection Infrastructure.



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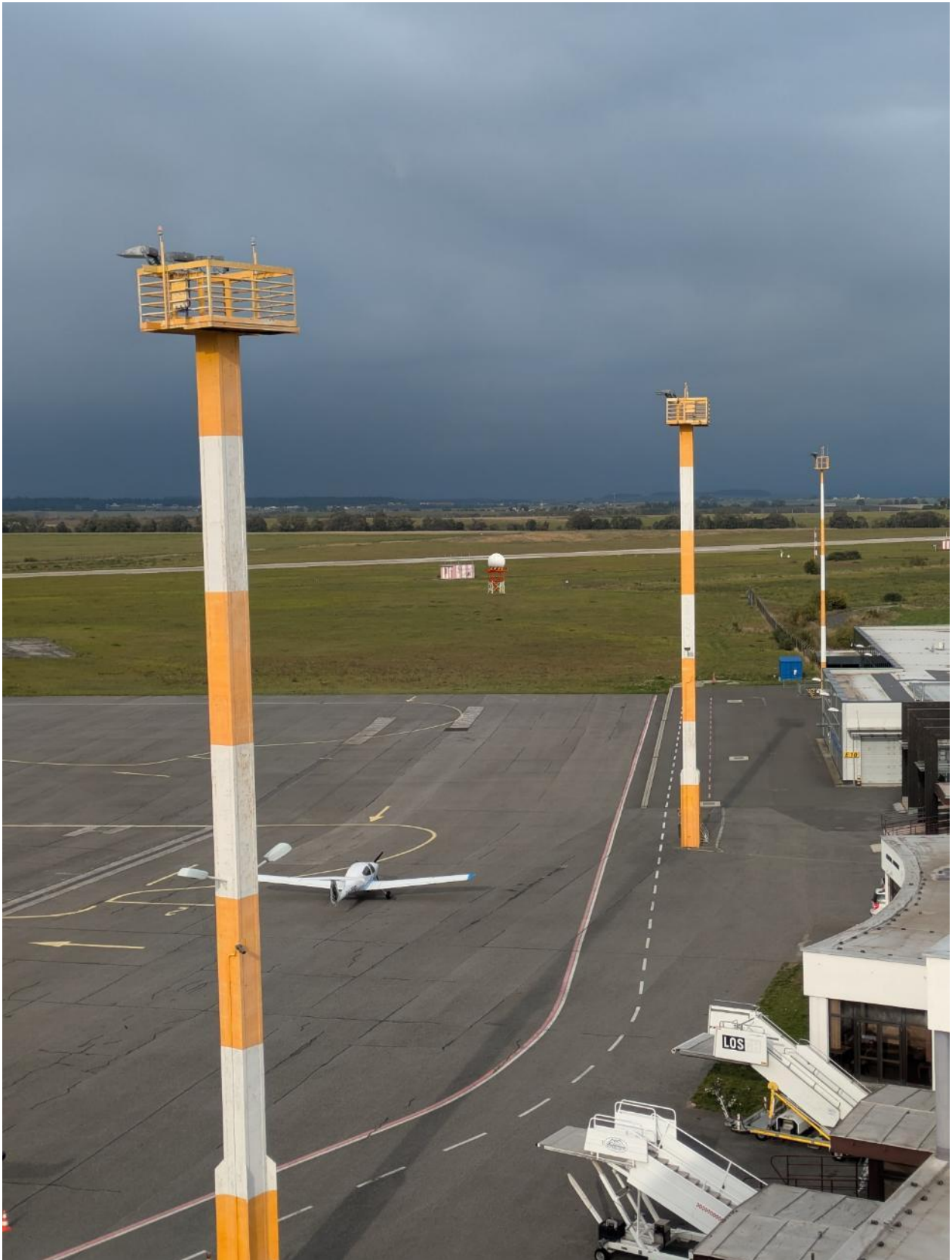
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Annex No. 3 – OGP Building and Visualization of the WRS and Connection Infrastructure.



Annex No. 4 – View from the Airport Control Tower with WRS visualization.



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Annex No. 5 – Cybersecurity-related requirements for information systems and related infrastructure

Cybersecurity-related requirements for information systems and related infrastructure

Platforms with OS Windows or Unix/Linux

Created: Ing. Michal Poľaško, PhD. And BIKT

Approved: Ing. Ján Buršík, PhD.

Date: 10.2.2025

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1. Purpose of the document

The present document contains a list of cybersecurity-related requirements for information systems and related infrastructure that are supplied to LPS SR and implemented on platforms with OS Windows or Unix/Linux.

The present document is supposed to be a part of the specification of technical requirements in the procurement of systems. The requirements contained in the Chapter 6 are supposed to be a subject of discussion about a service contract with the supplier of the solution.

2. General requirements

- a) The solution shall use only such settings of TLS protocols, cryptographic algorithms, cryptographic keys, hash functionalities and other security components and solutions that are considered safe according to decisions of relevant institutions (NIST, PCI SSC, NSA, and National Security Authority).
- b) The solution shall assign a unique identifier to every user for authentication of their entry in the information system.
- c) Parameters of a strong password that is generally used in the authentication process are as follows: the strong password shall have at least ten characters, and contain upper and lower case and digits.

3. Hardening

The supplied solution shall

- a) be installed with the minimum necessary configuration of the operation system, e. g. *Server Edition or Server Core*;
- b) have all such processes and services uninstalled that are not necessary for the operation of the solution's applications;
- c) have all such implicit processes and services deactivated that are not necessary for the operation of the applications, including
 - i. OS Windows Client for Microsoft Networks
 - ii. OS Windows File and Printer Sharing for Microsoft Networks
 - iii. OS Windows Link Layer Topology Discovery;
- d) have all unnecessary system accounts removed;
- e) have all unnecessary implicit system accounts deactivated;
- f) have local firewall activated, configured with the "least privilege" principle for all active services accessible via the network, including implicit services such as Microsoft RPC, DFS, etc. The local firewall rules shall be tuned to the smallest possible extent during the Site Acceptance Tests (SAT) stage;
- g) have passwords for all system accounts set to values meeting the strong passwords parameters, see clause 2c) above;
- h) have passwords changed for all software components of the system from default values to passwords that meet the strong password parameters, see clause 2c) above;

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- i) in the case of OS Linux that enables to activate the name-based mandatory access controls function, e. g. with the use of the AppArmor module, such module shall be activated in the *enforce* mode and all system applications accessible via the network shall have their own security profile activated therein;
- j) have automatic logout functionality activated to log the user out after a defined idle time;
- k) have Linux Audit framework activated in the case of OS Linux. Additional specific Audit rules (e. g. monitoring the access to configuration files) may be implemented during the Site Acceptance Tests (SAT) stage;
- l) be time-synchronized with the determined local NTP server;
- m) if HW components (e. g. servers) are supplied as a part of the solution, they shall be supplied with the latest versions of their firmware;
- n) if HW components (e. g. servers) are supplied as a part of the solution, all passwords for their firmware shall be set to values meeting the strong passwords parameters, see clause 2c) above;
- o) enable monitoring of the CPU load, memory and disc space of the system. If the defined load values are exceeded, notification shall be sent to the system administrator.

4. Logging

The supplied solution shall:

- a) ensure a sufficient disc capacity for storing system and application logs for a period of time determined by the company, in any case at least 6 months;
- b) ensure access rights to log files limited to minimum;
- c) enable to configure the integration of application logging to the operation system logger framework (e. g. syslog for solutions on the Unix/Linux platform);
- d) have generation of log messages activated at the operation system level; log messages shall contain information about occurrences such as user's successful or failed attempts to log in the system, to escalate privileges, to start/stop a service, to create/remove a user or a group of users;
- e) have configuration activated for sending system and application logs for selected message categories in the syslog, Windows Event Forwarding (WEF) or MSE (Microsoft Security Event) transmission mode to an external log server.

5. Application requirements

5.1 Log in to the application

If the application implements its own user database and the process of authentication of user log-in to the application, the application shall meet the following requirements:

- a) The application shall ensure that no identifiers are displayed during the log-in until the log-in process has finished;
- b) The application shall ensure that a warning text may be set for unauthorized application use
(e. g. before the user logs in the application);
- c) The application shall ensure that no supporting information is displayed during the sign-in. If the sign-in is not successful, the application shall not indicate which part of the credentials is incorrect;
- d) The application shall ensure that the password text is not displayed when the password is being entered;
- e) The application shall ensure that after a defined idle time the user is logged out automatically
(idle timeout);
- f) The application shall ensure that a user's account is locked after a defined number of failed login attempts;
- g) The application should ensure that the date and time of the previous successful login is displayed after the user has logged in.

5.2 Application user passwords

If the application implements its own user database and the process of authentication of users logging in the application, the application shall meet the following requirements:

- a) The application shall enable all users to set their own passwords;
- b) The application shall enable regular password change and setting of a time interval to enforce password change;
- c) The application shall request the old password when a new one is being set;
- d) The application shall request a new password to be entered two times when it is being set;
- e) The application shall use standard and safe hash algorithms for password saving;
- f) The application shall have passwords for all system accounts set to values meeting the strong passwords parameters, see clause 2c) above;
- g) The application should request a password change after the first sign-in.

5.3 Logging

- a) In its logs the application shall record the following occurrences in its logs:
 - application start or restart with information about the software version of the application that is being launched and the loaded configuration files;
 - If the application implements its own user database and the process of authentication of users logging in the application, the application shall record the following occurrences in its logs:

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o successful and failed user logins in the application; o successful and failed creation, modification or deleting of a user or a group; o user's request for password change in the application.

b) The application should record the following occurrences in its logs:

- application configuration changes;
- error and other major occurrences of the application.

Any application log entry should contain the following fields:

- Activity/action type or code (e. g. authorizing, creating, updating, deleting, accepting a network connection request, etc.);
- The sub-system performing the activity (e. g. process/transaction name or identifier);
- Identifiers of the subject on which the activity was performed (e. g. username, computer name, IP address, MAC address, etc.);
- Identifiers of the object on which the activity was performed (e. g. file names, identifier of an entry in a table, username, computer name, IP address, MAC address, etc.);
- Change (parameter value before and after the activity was performed);
- Date and time of performing the action including relevant information about the format and time zone, if they are not in a coordinated universal time; - Activity result (e. g. if the activity was performed or denied); - Activity denial reason description/code.

5.4 Application network profile

- a) The solution shall contain a list of the used network communication, with details on the used network protocols (TCP/UDP ports, etc.).

6. Requirements for operating the solution in the LPS SR's environment

This part includes requirements for operating the solution in the environment of LPS SR, that are supposed be a subject of discussion about a service contract with the supplier.

6.1 Security updates of the operation system

The supplied solution shall enable installation and activation of any published security updates of the operation system. If any operation system security update caused malfunction of the application, the supplier of the solution shall ensure any necessary adjustments of the application so that the published operation system security update may be installed and activated. The timeframe for installation and activation of the security update shall be agreed upon by the supplier and LPS SR.

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6.2 Security updates of third-party software components

The supplied solution shall enable installation and activation of any published security updates of third-party software components (software libraries) used in the application. If any security update of such components caused malfunction of the application, the supplier of the solution shall ensure any necessary adjustments of the application so that the published security update of the components may be installed and activated. The timeframe for installation and activation of the security update shall be agreed upon by the supplier and LPS SR.

6.3 Upgrade of the operation system

The supplied solution shall enable upgrade of the operation system, if the current version of the operation system is not supported by the operation system producer any longer and the version contains published vulnerabilities which there are no security updates for. If the upgrade of the operation system caused application malfunction, the supplier of the solution shall ensure any necessary adjustments of the application so that the upgrade may be performed. The timeframe for installation and activation of the operation system upgrade shall be agreed upon by the supplier and LPS SR.

6.4 Security updates of application

The supplied solution shall provide security updates for application vulnerabilities that are identified by the supplier in their internal security analyses. If any security update caused malfunction of the application, the supplier of the solution shall ensure any necessary adjustments of the application so that the security update of the application may be installed and activated. The timeframe for installation and activation of the security update shall be agreed upon by the supplier and LPS SR.

Distribution of security updates of the application shall be performed in a secure manner, through a communication channel that ensures verification of the update integrity and authenticity.

6.5 Security updates of firmware

If the solution includes delivery of HW components (e. g. servers), the supplied solution shall enable installation and activation of the published security updates for the software of such HW components. If any security update of such components caused malfunction of the application, the supplier of the solution shall ensure any necessary adjustments of the application so that the published security update of the components may be installed and activated. The timeframe for installation and activation of the security update shall be agreed upon by the supplier and LPS SR.

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