Air Navigation Services
of the Czech Republic

Tender Technical Specification

Czech
VoIP Voice Communication System
(VoIP VCS)

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INTRODUCTION

This Part covers the technical requirements related to

- General system performance
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IP based Voice Communications Systems (VoIP VCS) are based on standards for VoIP systems, in which the nodes are interconnected through a local area network and interconnection with other voice communication systems is made through an IP WAN. The common name for both dedicated ATS IP Network components is AGVN – ATS Ground Voice Network.
For ATS communication, the following series of EUROCAE documents have been developed and are mandatory:

t-tech-1. **ED-136 VoIP ATM System Operational and Technical Requirements** – This document defines a series of high level Telephone, Radio, Recorder interface requirements plus supervision requirements..

t-tech-2. **ED-137B Interoperability Standards for VoIP ATM Components –** This document is now defined in the following 5 volumes:
Volume 1: Radio:
This volume for Radio Interoperability defines Audio, SIP signaling procedures, R2S-Keepalive protocol, RTP procedures as well as management procedures to be employed between VCS and Remote Radios Equipment in order to achieve complete radio functionality over a private ATS- IP network.
Volume 2: Telephone:
This volume for Telephone Interoperability defines Audio and SIP-SIP signaling procedures in order to achieve complete telephone functionality over a private ATS-IP network.
Volume 3: European Legacy Telephone Interworking:
This volume defines SIP – ATS-QSIG telephone gateway signaling procedures, SIP-ATS MFC-R2 telephone gateway signaling procedures, SIP – ATS No.5 telephone gateway signaling procedures in order to achieve complete telephone functionality interworking with a private ATS-IP network.
Volume 4: Recording:
The volume for Recording Interoperability defines a profile standard for the use of RTSP to establish, terminate and modify recording sessions of the Ground Telephone Service and the Radio Service in an Air Traffic Services Ground Voice Network (AGVN).
Volume 5: Supervision:

This volume for Supervision System Interoperability defines a centralized system capable of performing supervision and monitoring tasks of several components involved in the Voice Communications System for Air Traffic Services.

t-tech-3. **ED-138 Network Requirements and Performances for VoIP ATM Systems.** This document specifies the technical requirements and capabilities of network services - including IP Addressing and Security - that are to provide the necessary high levels of availability, integrity, performance and Quality of Service (QoS) for VoIP in ATM applications.
This document is now defined in the following 2 parts:
Part 1: Network Specifications
Part 2: Network Design Guidelines

The VoIP Voice Communications System will consist of

t-tech-4. 3 operational VoIP VCS installed in BRNO, OSTRAVA and KARLOVY VARY Airports and

t-tech-5. 1 Test VoIP VCS

t-tech-6. 1 Configurable redundant SIP / ATC MFC-R2 interworking gateway in cluster mode installed in PRAHA Airport

Each VoIP Voice Communications System will consist of the following physical elements:

- Control Working Positions (CWP)
- Redundant communication servers
- Redundant management servers
- Management positions.
- Redundant Remote Control and Monitoring System
- Network elements (lines, switches, routers) supplied by ANS CR

All elements shall support the Ethernet implementation of layer 2 and the IP implementation of layer 3 networking protocols.

Network components such as switches, routers and firewalls will be provided by ANS CR.

All network nodes will be interconnected with two independent lines and AGVN will be a dedicated VoIP ATS communication domain

t-tech-7. Through configuration it shall be possible to create a virtual VoIP VCS from 2 or all 3 individual VoIP VCS's and dynamically assign CWPs and roles to any individual VCS's, without restrictions.

t-tech-8. Through configuration it shall be possible to allocate to virtual VoIP VCS's any available servers. The servers (communication and management) will operate on some occasions in dual configuration (main/standby for virtual) and on other occasions will serve only individual VoIP VCS's.

t-tech-9. Degradation is from virtual to individual configuration. Details will be specified in the System Design Document (SDD).

GENERAL SYSTEM PERFORMANCE

General audio requirements

t-tech-10. The Tenderer shall specify in detail all system performance data related to audio paths in the VoIP VCS included in the tender.

Specific audio requirements

The following specific system performance requirements are in general valid for radio as well as telephone.

If the requirements stated are valid only for either radio or telephone, this is mentioned explicitly.

All values stated in the following are measured against a nominal level of 0 dBm and a single tone of 1000 Hz.

Frequency response

a-tech-11. The frequency response shall be measured from input at the position plug panel to any other appropriate audio interface.

a-tech-12. The amplitude of the audio signal between 300 to 3400 Hz shall be within ±2 dB relative to the level at 1000 Hz.

Noise

a-tech-4b The signal-to-noise ratio in any single audio channel in the system shall be ≥ 65 dB measured with a CCITT psofometric weighting filter.

Distortion

a-tech-13. The total harmonic distortion measured between any position plug panel and any system audio interface shall not exceed 5%.

a-tech-14. The measurement shall be carried using a single tone between 300 and 3400 Hz with an input level of 10 dB below the nominal level.

Crosstalk

a-tech-15. The measured crosstalk isolation between any two radio channels, telephone channels and controller positions shall be greater than 75 dB in the frequency range 300 - 3400 Hz.

AGC/limiter

a-tech-16. In order to compensate for CWP variations of incoming voice levels the VoIP VCS shall provide automatic gain control (AGC).

a-tech-17. It shall be possible to select or deselect the AGC function per line interface.

t-tech-18. The Tenderer shall in the tender specify characteristics of the above functions.

Audible tones

a-tech-19. The audible tones referred to in this section shall be generated in the telephone part of the VCS only.

a-tech-20. Where applicable the tones shall be sent to the local operators or the external lines or network.

Response times

The Customer attaches great importance to system performance relating to start and restart times as well as processing times.

General Requirements

a-tech-21. The processing times in the systems shall be such that they never act as a obstruction to the user.

a-tech-22. In particular, the user shall be able to continue making inputs without having to wait for the system. The aim is to provide immediate response whenever possible.

a-tech-23. All response times shall be reviewed in the SDD.

a-tech-24. Compliance with response time requirements shall be verified during Factory and Site Acceptance Testing

a-tech-25. Furthermore, compliance and correlation shall be subject to monitoring/verification during any warranty period.

a-tech-26. Measurements of response times and verification of compliance with response time requirements shall be performed independently on each individual VoIP VCS.

Specific Requirements

System Processing Times

a-tech-27. The delay caused by the radio system from activation of the push-to-talk switch until the radio line interface starts signalling shall not exceed 25 milliseconds.

a-tech-37b. The squelch indication delay caused by the radio system shall not exceed 250 milliseconds.

a-tech-28. For any internal telephone connection the call set-up delay caused by the telephone system shall not exceed 200 milliseconds.

a-tech-29. For any internal telephone connection the call acceptance delay caused by the telephone system shall not exceed 100 milliseconds.

a-tech-30. The delay caused by the telephone system from activation of any DA-key until the start of signalling shall not exceed 200 milliseconds.

a-tech-31. TED touch response time shall be 25 milliseconds or less.

Note: Touch response time is the time until a touch input is recognised and acknowledged by feedback to the user.

a-tech-32. The TED shall have a paging time of 250 milliseconds or less.

b-tech-33. The TED should have a paging time of 100 milliseconds or less.

Note: Paging time is the time the system needs from the moment a touch input is recognised until a new image or page is presented to the user.

a-tech-34. When changing the TED set-up in connection with a shift from one operator role to another, the time during which the TED cannot be used shall be maximum 1 sec. from when the operator accepts the new role.

Start/Restart

a-tech-35. The VoIP VCS system and part of the IP VCS system shall be able to restart automatically after a power failure.

a-tech-36. The VoIP VCS system and part of the IP VCS system shall be able to restart automatically after an error in the hardware or software.

a-tech-37. It shall be possible to inhibit automatic restart of the system.

t-tech-38. In the Tender the Tenderer shall include all relevant time values for start or restart of the different VoIP VCSs parts on the complete system as well as on the subsystem level (position equipment (CWP) etc.). The information given shall at least include, but not be limited to, worst case as well as normal case values for the following items:

- Cold start or restart of the VoIP VCS (VCMS not included), which is defined as the time from the moment power is switched on until full functionality of the VoIP VCS is achieved. It can be assumed that the same configuration is used as before power was switched off.
- Cold start or restart of the VoIP VCS (VCMS included), which is defined as the time from the moment power is switched on until full functionality of the VoIP VCS and VCMS is achieved. The time information shall include transfer of the full configuration from the VCMS
- Start or restart of a single position (CWP) using the same configuration as before the start or restart.

b-tech-39. In the worst case, the time from the moment a complete VoIP VCS restart (cold) is initiated until full functionality of the system is achieved should not exceed 1 min. (VCMS not included).

Reconfiguration of Test VoIP VCS

t-tech-40. The Test VoIP VCS must be identical to the operational VoIP VCS

POSITION EQUIPMENT

General

Position equipment (CWP) is defined as VoIP VCS equipment - radio as well as telephone equipment - required at a working position.

The following requirements are considered to be of a general character.

a-tech-41. All panels used by the operators shall be built into the operator's consoles.

a-tech-42. As regards mechanical dimensions and colours, all panels used by the operators shall match the Customer requirements.

a-tech-43. The equipment shall be well adapted for its purpose and maintain excellent fitness for use.

a-tech-44. The equipment shall be designed in such a way as to prevent service measures on one operator's equipment from disturbing other operators or other parts of the total system.

a-tech-45. The position equipment shall be easily and quickly replaceable, as far as possible without tools except a screwdriver.

a-tech-46. All interconnections between the position electronics and the different VCS panels shall be made as plug/socket connections.

Control panel

Introduction

The control panels (TID's) are the operator's interface for controlling voice communication, radio and telephone.

a-tech-47. In order to make provision for future developments and requirements it shall be possible, without modification, to replace existing control panels with other types of equipment, using the same interface.

Touch input display panels (TIDs)

a-tech-48. The TID panels shall fulfil the functional requirements stated in Functional Requirements of the Tenderer Requirements.

t-tech-49. The Tenderer shall in the tender describe in detail the technology which will be used in order to fulfil the requirements.

The description shall at least cover, but not be limited to, the following information:

- display type
- touch sensor type
- processor and controller type
- type of interface to the system
- display resolution
- pixel format
- number of colours
- brightness incl. touch sensor
- contrast ratio

- viewing angle range incl. touch sensor
- backlight system (if any)
- actuating force
- power consumption
- dimming range
- lifetime of backlight system
- lifetime of display and touch sensor

Mechanical requirements

a-tech-50. The size of the display screen used for the control panel shall be 12”

a-tech-51. The physical dimensions of the TID front panels shall comply with the Customer’s standard and colour

a-tech-52. The maximum depth of the TID and panels (radio as well as telephone) shall be 100 mm incl. plugs/sockets

a-tech-53. Due to space limitations in the operator consoles the Tenderer is required to:

- supply detailed mechanical drawings and
- lend samples of used TID’s

Other requirements

a-tech-54. The TID shall be equipped with no internal cooling system.

a-tech-55. The TID shall provide flicker-free presentation.

Plug panel

a-tech-56. Two plug panels shall be installed in each CWP.

a-tech-57. The plug panels shall be mounted on each side of the front edge of the CWP desk area, See drawings – Attachments A,B and C

a-tech-58. The connectors used for the connection of headset, handset or hand microphone to the plug panel shall be LEMO connectors.

Loudspeaker panel

a-tech-59. Up to 3 loudspeakers shall be installed in some CWP’s. See drawings – Attachments A,B and C

a-tech-60. In order to achieve good readability with minimum distortion the loudspeaker shall have excellent acoustic performance.

Bell panel

a-tech-61. A bell panel shall be installed in each CWP having a control panel for the telephone system.

a-tech-62. The sounding body on the bell panel shall be a small high quality loudspeaker or similar device.

Other panels

Various level control facilities e.g. volume controls, intensity controls etc. are mentioned in Functional Specifications.

t-tech-63. The Tenderer shall in the tender propose solutions for the realisation of such controls.

Headset

a-tech-64. It shall be possible for the operators/coaches to use at least 3 different types of headsets.

Note: This requirement covers the use of a mixture of dynamic and electret microphones with different sensitivities.

a-tech-65. It shall be possible to use the headset in connection with radio as well as telephone functions.

Headsets will be supplied by the Customer.

Note: At present the following type of headset is used: Sennheiser HMD 45-6

At present the following type of connector is used: LEMO PFG.2B.310.CLLD52

Handset

a-tech-66. It shall be possible for the operators/coaches to use at least 2 different types of handsets.

Note: This requirement covers the use of a mixture of dynamic and electret microphones with different sensitivities.

a-tech-67. The handset cradle shall be on the horizontal part of CWS.

a-tech-68. The handset shall be used for the telephone only.

Handsets will be supplied by the Tenderer.

Hand microphone

a-tech-69. It shall be possible for the operators/coaches to use at least 3 different types of hand microfones.

Note: The requirement covers the use of a mixture of dynamic and electret microphones with different sensitivities.

a-tech-70. The hand microphone shall be used for the radio only.

Hand microphones will be supplied by the Customer.

Note: At present the following types of hand microphones are used: Peiker TM67/11/TTF

Footswitch

a-tech-71. It shall be possible to use a footswitch to key the transmitters of the radio channels in traffic mode.

a-tech-72. The footswitch will be supplied by the Customer, but the footswitch connection to the position electronics shall be supplied by the Tenderer.

Position electronics

a-tech-73. The position electronics for the radio and telephone shall be common.

a-tech-74. The position electronics, including 2 power supplies (preferably -48V DC), shall be mounted in one standard 19” basket with a maximum height of 3U.

a-tech-75. It shall be possible to install this 19” basket in the CWP - horizontally as well as vertically.

Modular standard and colour

a-tech-76. The control panels for the VCS’s shall be placed in consoles to be supplied and installed by the Customer.

a-tech-77. The mechanical requirements concerning front panel accuracy (tolerances) etc. shall be finally decided and approved by the Customer.

a-tech-78. Removal/installation of all control panels shall be possible from both the front and back part of the consoles.

a-tech-79. Cable connections to individual panels shall be established via plugs/sockets mounted on the back of the panels.

a-tech-80. To accommodate these requirements the control panels shall be designed for mounting at any angle between 0 and 90 degrees in relation to the horizontal level.

a-tech-81. The maximum depth of the individual panels shall be 100 mm inclusive of plugs/sockets, measured from the back of the front panel.

a-tech-82. The panel fronts shall be painted in a colour matching that of the console and other equipment installed in the console. The type of paint and the colour will be decided at a later date.

Workmanship

a-tech-83. The equipment used by the operators shall have no sharp edges or protruding parts to cause wear on clothing or to disturb work.

a-tech-84. The equipment surfaces shall be pleasant to the touch.

a-tech-85. The equipment shall be wear resistant and give no light reflections.

a-tech-86. The equipment shall be able to tolerate normal cleaning. It shall be easy to clean and to keep clean.

a-tech-87. Any engraved markings shall be durable and resistant to wear.

a-tech-88. The equipment shall not cause allergic reactions from nickel alloys or other agents.

a-tech-89. The panels shall be designed to be proof against liquid spills.

a-tech-90. The equipment shall have no static electricity build-up to cause shocks.

TELEPHONE LINE INTERFACES AND SIGNALLING

Introduction

This section includes requirements for the telephone part of the VoIP VCS.

Line Interfaces and Signalling

General requirements

The VoIP-VCS will be developed for IP networks and shall communicate:

b-tech-91. - Among SIP CWPs connected directly to the ATS-IP network (AGVN) preferably without going via a traditional VCS
- With all 3 VoIP VCS (supplied as a part of the contract) connected directly to the ATS-IP (AGVN) -
- With other VoIP VCS's connected directly to the ATS-IP (AGVN) – not supplied as a part of the contract (e.g. Military now and foreign ANSP in the future)
- With standard SIP telephone sets directly connected to the ATS-IP (AGVN). A list of compatible sets will be part of the offer
- With a traditional GAREX VCS in Prague connected to the ATS-IP (AGVN) through an SIP MFC interworking gateway installed in Prague close to the GAREX VCS and supplied as a part of the contract
- With foreign traditional VCS's onnected to the ATS-IP (AGVN) through GAREX VCS and SIP MFC interworking gateway installed in Prague
- With SIP PBX's operated in each regional Airport. The SIP PBX will play the role of an interworking gateway towards subscribers in the PBX and fixed and mobile public telephone networks

b-tech-92. VoIP VCS uses a SIP Comm Server should be in preference to a traditional VCS. All CWPs are directly connected in an Ethernet Switch supplied by ANS CR.

b-tech-93. The SIP Comm Server of the VoIP VCS provides the entire essential call control and signaling normally provided by the software of a traditional VCS. The call processing software resides on a dedicated telephony server connected to the IP network and provides call handling (e.g. routing of internal and external calls) as well as supplementary services (e.g. call transfer, call forwarding etc).

b-tech-94. A typical SIP server can consist of a SIP Proxy application (configured as either stateful stateless), a SIP Redirect application and a SIP Registration application all integrated on the same platform. It is capable of using both the User Datagram Protocol (UDP) and the Transport Control protocol (TCP).

b-tech-95. With respect to call routing, SIP Proxy Server can interrogate DNS servers for addresses, use external Telephone Numbering Mapping or have its routes statically configured.

b-tech-96. The SIP Server platforms shall handle minimum 100 calls per second.

b-tech-97. The voice media is transmitted end-to-end between CWPs. The CWPs have the capabilities of different Voice Codec's and use SDP within SIP to nominate a codec while exchanging media capabilities for the communication.

b-tech-98. The introduction of further interfaces and signaling systems should be supported by a modular implementation of hardware- and/or software equipment.

a-tech-99. All requirements with respect to technology, physics and all recommendations covering these matters, shall be stated for the appropriate interfaces. All delivered interfaces shall comply with the relevant requirements stated in the Authority Requirements chapter.

8-wire analogue Interface

a-tech-100. No 4 wire + E&M interface is required

4-wire analog MFC-R2 Interface

a-tech-101. The SIP environment **SHALL** need to interwork with ATS MFC-R2 / AGVN in order to support calls originating in one environment and terminating in the other.

a-tech-102. The 4-wire interface for MFC-R2 shall be supplied as a part of the SIP/ MFC-R2 interworking gateway installed in Prague. No MFC-R2 interfaces - as a part of IP-VCS - are requested.

This physical interface is to be based on the analogue MFC-R2 signalling as specified by the Eurocontrol Guidelines for “Implementation of The Automatic ATS Voice Communication Network” COM-GUI-01-01 Edition 1.0, 15 March 96.

The Eurocontrol Guidelines are based on CCITT recommendations.

ED-137B Volume 3 Telephone Gateway defines SIP v MFC-R2 interworking

a-tech-103. One standalone active (cluster mode) redundant SIP / MFC-R2 interworking gateway with capacity of 12 MFC R2 lines (each) shall be installed.

2-wire analogue Interfaces

a-tech-104. No 2 wire analogue interface is required

a-tech-105. Interwork with 2 wire analogue interface subscribers will support the existing SIP PBX

Digital Interfaces

a-tech-106. Neither ISDN BRI nor PRI are required.

a-tech-107. Interwork with both ISDN BRI and PRI digital interface subscribers will support the existing SIP PBX

Line supervision

a-tech-108. Automatic supervision shall be performed on all lines/trunks, where such supervision is possible.

a-tech-109. Whenever a fault is present on a line/trunk the system shall automatically select an alternative routing, if such a routing is available.

RADIO LINE INTERFACES

Introduction

This section describes requirements for the radio part of the VoIP VCS.

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Line interface types

General requirements

The work being performed by EUROCAE WG67 in the definition of future VoIP specifications for the ATS environment has resulted in the first Common Radio Interface and signaling protocol for the ATS domain.

Radios containing SIP User agents are becoming more intelligent. They are now able to manage SIP/SDP/R2S/RTP/UDP/IP etc, have built-in call control and may use a range of different audio codecs.

a-tech-110. The introduction of further interfaces shall be supported by the modular implementation of equipment.

a-tech-111. It shall be possible to establish up to 7 SIP sessions with the radio from different SIP user agents each identified by a different SIP address. The establishment of an SIP session does not imply that voice is being transmitted and received, only that the session is ready to transmit and/or receive voice.
Response:

a-tech-112. Radios with built-in SDP shall able to negotiate a wide range of parameters with the IP-VCS endpoints that are to be adopted during communication. These include Codec type, Best Signal Selection method, Call type (Radio-Rx, Radio-TxRx, Coupling), Keep-alive packet intervals, Radio Type (Tx/Rx, Tx, Rx). Frequency Identity checks etc.
Response:

a-tech-113. Audio should be transmitted as for Ground Telephony networks, using RTP over UDP over IP. The preferred voice codec between VCS and Radio is ITU-T G.711 PCM –A or u-law (Payload Types 8 or 0). The optional ITU-T G.729 CS-ACELP codec could also be used to provide good quality voice at 8kbps.

a-tech-114. It shall be possible from the VCMS to allocate a minimum of 3 independent radios in voting operation mode.

a-tech-115. It shall be possible from the VCMS to define main/standby operation modes:

- to define 2 or more individual radio buttons or
- to define one radio button only (frequency), with automatic switching of individual radios

a-tech-116. Tenderer shall propose a remote control and monitoring system in common for both VoIP VCS and radio

4-wire E&M

a-tech-117.	The 4 wire analogue interface is not required
a-tech-118.	Only ED 137 B volume 1 radios will be supported

EXTERNAL SYSTEM INTERFACES

Introduction

This section contains interface specification details for the external system. The interfaces are between the VoIP VCS and different external systems that are not part of the VoIP VCS supply.

The following external interfaces to the VoIP VCS system are described:

a) Control and Monitoring System – central monitoring system operated by ANS ČR, named “CMOS”

b) Legal Recording System

c) VoIP Private Branch Exchange (VoIP PBX)

In general the external systems described are operated and maintained by the Customer.

a-tech-119. The Tenderer shall, for each applicable interface, in co-operation with the Customer, define the exact external interface in an Interface Control Document (ICD).

a-tech-120. All ICDs shall, at minimum include exact descriptions of :

- Physical cabling and plugs
- Electrical specifications
- Protocols e.g. relating to the OSI seven layer reference model
- Configurations of the above.

Control and Monitoring System (CMOS)

In addition to the VoIP VCS remote monitoring and control system, the VoIP VCS shall interface to an ANS CR central monitoring system (CMOS) according to the requirements below.

a-tech-121. The VoIP VCSs shall support the exchange of management information by the use of IETF Simple Network Management Protocol (SNMP) version 2 and higher.

a-tech-122. Description of the management information base by the use of MIB-II (Management Information Base ver. 2) shall be supported - as a vendor specific MIB, if standard MIBs are not applied.

a-tech-123. The VoIP VCS system and radio shall support the exchange of data with the CMOS via the TCP/IP network

CMOS shall be capable of:

a-tech-124. Basic monitoring - receives info from the VoIP VCS and radio to assess its overall condition in order to decide if it can be used operationally

.

t-tech-125. Basic control **-** sends commands to the VoIP VCS and radio to change its operational settings

t-tech-126. Detailed information about SNMP Agent Requirement Specifications can be found in attachment:

VoIP VCS SNMP Agent Requirements Specification

t-tech-127. Independent, separate **RCMS** for the VoIP VCS and Radio will still exist and is a part of the delivery

t-tech-128. In the Tender, the Tenderer shall describe the analogous solution already supplied or developed.

Legal Recording System

General The legal recording system is not a part of the VoIP VCS. The recording system, hereinafter referenced as "Recorder" will be supplied by ANS CR.

a-tech-129. The EUROCAE WG67 has defined Recording Interoperability Specification (ED-137/4B "Interoperability Standard for VOIP ATM Components – Volume 4: Recording", hereinafter referred to as "ED-137/4B"). Supplied VoIP VCS and radio shall comply with this Standard.

a--tech-130. The supplied VoIP VCS and radio shall support SIP for exchange of capabilities and connection information between the VCS and the recording system (SIP User Agent Client is within the Recorder).

a-tech-131. The supplied VoIP VCS and radio **shall** support recording on a Recorder which supports the following protocols: SIP/SDP/RTSP/RTP/RTCP, TCP/IP.

a-tech-132. The supplied VoIP VCS and radio **shall** support recording on a Recorder which allows multiple sessions to be established from different VCS or GRS SIP user agents (via VoIP VCS SIP infrastructure) sending mixed incoming and outgoing audio.

a-tech-133. The supplied VoIP VCS and radio **shall** support multiple Speech codecs, at least G.711 (A-law) and G.729.

a-tech-134. The supplied VoIP VCS and radio **shall** support both the Real Time Streaming Protocol (RTSP) and Real-time Transport Protocol (RTP) over TCP as reliable delivery service for recording of all voice packets without losses on the Recorder.

a-tech-135. Recording to the recording system supplied by ANS CR **shall** be possible without any further interfaces than those mentioned in ED-137/4B.

a-tech-136. The supplied VoIP VCS and radio **should** support the Call Detail Record according to chapter 2.8 "REFERENCING CALL SCENARIOS" of ED-137/4B.

VoIP Private Branch Exchange (VoIP PBX)

The VoIP PBX is the only gateway for telephone communication between VoIP VCS and "standard telephone world".

a-tech-137. The VoIP VCS supports only ATS SIP and SIP interfaces. It was decided not to implement, as a part of the VoIP VCS project, any standard telephone interface already supported by the VoIP PBX. Therefore the integration of VoIP VCS and VoIP PBX is the key task of the project.

a-tech-138. The core of the VoIP PBX – Cisco Unified Communication Manager (CUCM) is installed in Prague and remote sites - Brno, Ostrava and Karlovy Vary airports are attached to gateway routers (VGW).

a-tech-139. Gateway routers communicate with the Cisco Unified Communication Manager over the WAN called MIS which is independent from the AGVN

a-tech-140. Gateway routers support SRST (Survivable Remote Site Telephony). This function is activated when the redundant WAN links or redundant Cisco Unified Communication Manager goes down.

a-tech-141. The Current VoIP PBX is based on CUCM 6.1., but before installation of VoIP VCS it will be upgraded to version 9.x.

a-tech-142. The supplied VoIP VCS shall support interconnection using IP trunk and SIP signalling protocols

a-tech-143. The VoIP PBX supports the following standards on the SIP trunk: RFCs 2833, 2976, 3261, 3262, 3264, 3265, 3311, 3323, 3325, 3515, 3842, 3856, 3891.

a-tech-144. In the event that a VoIP VCS Supplier is unable to support all the above mentioned standards he shall specify which SIP trunk features he is able to support in order to be able to define the integration of both systems.

a-tech-145. The VoIP VCS at each airport shall support 4 SIP trunk connections as follows:

- 2x to the CUCM in Prague and
- 2x to the VGW (SRST) at the corresponding Airports

a-tech-146. Support of 4 SIP trunks on the VoIP VCS will allow the configuration of successive connection attempts – initially to the first CUCM, then to the second CUCM, thereafter locally to the first VGW (SRST), and finally to the second VGW (SRST).

CAPACITY OF THE SYSTEMS

General

This section defines and states the size of the VoIP VCS for Brno, Ostrava and Karlovy Vary airports.

Capacity

General

a-tech-147. As regards the number of operator positions (CWP) and radios the VoIP VCS shall easily accommodate any future expansion. Tenderer shall describe the limits of any proposed system regarding the number of CWP's, radios and telephone capacity.

Response:

a-tech-148. The main expansion is expected when the current traditional VCS in Prague is replaced by VoIP VCS.

Operator positions

a-tech-149. In respect to the number of operator positions, all 3 VoIP VCS's shall be dimensioned as shown in the following table.

a-tech-150. Drawings of each position arrangement stated in the table under the column **List of CWP** can be found the following attachments:

VoIP VCS Operator Positions LKTB

VoIP VCS Operator Positions LKMT

VoIP VCS Operator Positions LKKV

a-tech-151. The meanings of markings on the position arrangement drawings are as follows:

- ***TID – TEL+RAD*** – Touch Input Device with layout for both telephone and radio functions
- ***HANDSET*** – handset and cradle with automatic hang up feature
- ***T/R*** - connector for headsets supporting both telephone and radio communication
- ***TEL*** - connector for supporting telephone-only handsets
- ***LS TRAFIC*** – loudspeaker for frequencies in traffic mode
- ***LS MONIT*** - loudspeaker for frequencies in monitor mode (reception only). This loudspeaker can be used also for **permanent monitoring of 121,5** in in the event of a problem with another loudspeaker.
- ***LS ST REC*** - loudspeaker for short term recording. This loudspeaker can also be used for audio signalling (e.g. ringing). In case of problems a separate dedicated unit can be provided

a-tech-152. All boxes marked yellow on the position arrangement drawings are to form part of the delivery. Non-marked boxes represent other equipment – not part of the delivery.

Number of positions (CWP)

Airport	Number of CWP	List of CWP
Brno	12	TWR – TEC, GEC, TASO APP – AEC, DIR, AASO, SC ARO – ARO TECH – TS1, TS2, ADMINISTRATOR, SPARE
Ostrava	11	TWR – TEC, TASO, SC APP – AEC, APC, SC ARO – ARO TECH – TS1, TS2, ADMINISTRATOR, SPARE
Karlovy Vary	7	TWR/APP – TEC, AEC, APC ,TASO TECH – TS1, TS2, ADMINISTRATOR,
Test VoIP VCS	4	TWR – TEC APP – AEC TECH – TS1, TS2,

Frequencies

a-tech-153. The interconnection of Tx/Rx sites and VoIP VCS at each airport is shown in the attachment called: VoIP VCS Radio Network

Number of frequencies

Airport	Frequency	Function	Note
Brno	121,500 119,600 125,425 121,700 122,550 119,900 131,100 XXX,XXX XXX,XXX	Emergency Tower Ground Mobile Radar Director ATIS Multichannel SNS	**SNS** frequency is installed both in local and 2-3 remote sites. Remote sites are accessible via AGVN Other Tx and Rx are installed **in different** local sites On each site: 2 independent optical connections are available 2 independent IP switches will be installed 2 transmitters/receivers on each side will be configured on VoIP VCS as Main/Standby
Ostrava	121,500 120,800 121,700 125,100 118,700	Emergency Tower Mobile Radar Backup	**SNS** frequency is installed both in local and 2-3 remote sites. Remote sites are accessible via AGVN Independent Tx and Rx are installed **in the same** local site. 2 independent optical connections are available

	118,050 XXX,XXX XXX,XXX	ATIS Multichannel SNS	2 independent IP switches will be installed 2 transmitters/receivers on the side will be configured on VoIP VCS as Main/Standby
Karlovy Vary	121,500 121,225 121,700 119,950 118,950 XXX,XXX XXX,XXX	Emergency Tower Mobile Radar ATIS Multichannel SNS	**SNS** frequency is installed both in local and 2-3 remote sites. Remote sites are accessible via AGVN Independent Tx and Rx are installed **in the same** local site. 2 independent optical connections are available 2 independent IP switches will be installed 2 transmitters/receivers on the side will be configured on VoIP VCS as Main/Standby

a-tech-154. One more frequency for super low sector (SNS) will be allocated till the end of the year 2013 for each Airport. This frequency will be operated from minimum 2 remote Tx/Rx locations in Offset (Climax) or coupling mode, what will be operationally advantageous.

a-tech-155. In the worst case all 3 SNS frequencies will be operated from one Airport – see consolidation concept requirements in the Functional specification.

Management system (VCMS)

a-tech-156. It shall be possible to operate the VCMS from different locations connected to the AGVN.

a-tech-157. The VCMS at each airport will be duplicated – two servers running in main and stand-by modes.

a-tech-158. It shall be possible to remotely connect to the VCMS's from min. 5 VCMT's (terminal, only SW is required). The VCMT will have the same functional possibilities.

a-tech-159. PC for VCMT and IP infrastructure is not part of the VoIP VCS project supply.

Cabling

a-tech-160. Ethernet cabling both from the central servers and servers installed in CWP's to the termination point in the IDF will be provided by ANS CR

a-tech-161. Cables (including connectors) inside CWP's - e.g. interconnection of CWP server with the TID, loudspeakers, headset, handset, standalone microphone and PTT connectors shall be provided by the supplier

a-tech-162. The structured cabling network will be category 5 (CAT5) or higher

a-tech-163. Central servers shall be housed in standard 19-inch cabinets placed in the equipment room.

a-tech-164. Position servers shall be housed in standard 19-inch racks prepared by ANS CR in each console.

SOFTWARE REQUIREMENTS

a-tech-165. The software included in the VoIP VCS shall - as far as possible - be commercially available or be based upon commercially available components.

a-tech-166. All the software in the System shall be documented such a way as to enable the Customer or a third party to perform maintenance, corrections, additions etc.

a-tech-167. The software shall be coded and structured in modules which facilitate reading, understanding and modification.

a-tech-168. The number of programming languages shall be kept to a minimum.

a-tech-169. The Customer's possibilities for performing maintenance, corrections, additions etc. shall not be restricted by limitations to software rights.

a-tech-170. The application software shall - to the highest extent possible - be controlled by user defined and maintained parameter values, thus eliminating the need for recompilation after any change of parameter values.

a-tech-171. The parameter values shall be printed out on demand in a user friendly report layout.

a-tech-172. Any illegal parameter value user input shall not interrupt the System but result in meaningful error handling and an appropriate message.

a-tech-173. All software components shall comply to international de jure and de facto standards, including the operating system, network and communication interfaces.

a-tech-174. Database software shall comply to SQL.

a-tech-175. The software for Management and Statistics shall run under different hardware platforms

a-tech-176. In the Tender, the Tenderer shall describe and detail, in full, all characteristics of the proposed software in relation to the above presented requirements.

RELIABILITY, AVAILABILITY & MAINTAINABILITY

General Requirements

a-tech-177. The requirements for reliability, availability and maintainability shall be fulfilled for all parts of the system.

a-tech-178. The system or any part thereof shall be considered non-reliable and non-available if any essential defect is encountered.

a-tech-179. The system shall be considered non-reliable and non-available from such time as any essential defect is identified until it is repaired and normal operation is re-established.

a-tech-180. The Tenderer shall refer to generally accepted definitions of terms for reliability and maintainability, e.g. MIL-STD-721C "Definitions of Terms for Reliability and Maintainability."

a-tech-181. The Tenderer shall comply with MIL-STD-756B “Reliability, Modelling and Prediction” for methods of calculating the reliability of the system.

a-tech-182. For all reliability and availability requirements, operational hours shall be defined as 24 hours a day, every day of the year.

a-tech-183. The period for calculating reliability, availability and maintainability shall be a sliding window of not more than 12 months.

a-tech-184. The system shall operate based on redundancy and fault tolerance, being able to establish alternative means for continued error-free operation in order to obtain the best possible performance.

a-tech-185. The system design shall ensure that there is no single point of failure.

a-tech-186. The system shall include the capability to detect and report defects.

t-tech-187. In the Tender, the Tenderer shall include key figures and other information describing guaranteed reliability, availability and maintainability.

Reliability

Reliability is expressed by the Mean Time Between Failure (MTBF), which illustrates the mean time between defects in the system or a functional part thereof, taking redundancy into consideration.

t-tech-188. In the Tender, the Tenderer shall include key figures and values as shown in the table below, covering, but not limited to, the listed functional parts of the system, expressed in block diagrams showing the breakdown to the LRU level for the different functional parts.

a-tech-189. All key figures and their connected assumptions, methods and calculations shall be maintained during the project. This shall include a description of the methods used for obtaining fault tolerance, redundancy etc.

a-tech-190. It shall be a general part of the Tenderer’s maintenance obligations to modify or replace components or subunits (hardware as well as software) if defects are repeatedly encountered therein and if the actual calculated MTBF is less than 40% of the warranted MTBF.

Availability

The availability of the system is to be equal to or greater than 0,999995.

Non-available time is expressed by the Mean Down Time (Time, calculated as the sum of Mean Time To Repair (MTTR) and Mean Logistic Down Time (MLDT)

a-tech-191. Availability calculations shall be based on an MLDT of 2 hours.

Maintainability

a-tech-192. Maintainability is expressed by the Mean Time To Repair (MTTR), which is defined as the time elapsed between the time of the identification of a defect and the time when full operation is restored - exclusive of the waiting time for maintenance resources (MLDT).

a-tech-193. The MTTR shall not exceed 30 minutes at the LRU level.

a-tech-194. When on-line replacement of a failed part is possible, the time for this action shall not exceed five minutes.

a-tech-195. Corrective maintenance shall not affect any other unit

Documentation

a-tech-196. The Tenderer shall prepare and maintain documentation covering methods, assumptions and calculations of reliability and availability figures.

a-tech-197. The documentation shall be approved by the Customer.

a-tech-198. The documentation shall include detailed block diagrams showing breakdowns to the LRU level for the different functional parts - and comprising reliability and availability considerations and calculations.

a-tech-199. Each component in the block diagram shall be identified by part name and quantity.

a-tech-200. The documentation shall include redundancy and fault tolerance considerations and actions.

a-tech-201. The Tenderer shall maintain the documentation until the FA and describe therein any changes imposed by a change in the system implementation.

Operational Efficiency

a-tech-202. As a general part of the Tenderer's maintenance and warranty obligations, the Tenderer shall warrant availability in terms of warranted *operational efficiency* - where the following definitions shall apply:

- The warranted operational efficiency is regularly compared with the achieved *actual operational efficiency* - cf. the Contract.
- The actual operational efficiency is calculated as the percentage relation between the *available* and the *operational system time*:

  (Available System Time/Operational System Time) x 100
- Available System Time is defined as Operational System Time minus Non-available System Time.
- Operational System Time is defined as 24 hours a day every day of the year.
- Non-available System Time is defined as the period of time in which one or more defects affects more than one working position or more than one line. When normal operation is re-established the non-available system time terminates.

a-tech-203. The actual operational efficiency is measured in total for a period of 12 months (counted backwards from the time of measurement), defined as the period of measurement. For the first 3 months after the signing of SAT and/or the coming into force of a maintenance

agreement, however, the period of measurement is 3 months. The second period of measurement is 6 months and the third period is 9 months.

t-tech-204. In the tender the Tenderer shall state the warranted operational efficiency.

ENVIRONMENTAL CONDITIONS

Introduction

This chapter provides requirements for the VoIP VCS equipment with regard to aspects of the environmental conditions in which the equipment is to function.

These requirements are common to the various system components of the voice communication systems.

Environment refers to both the technical environment and the working environment.

Environmental conditions for the manufacture, transport, storage, installation and operation of the equipment are specified below.

General Requirements

a-tech-205. The Tenderer shall ensure that the VoIP VCS can operate in the Tower building premises of all 3 airports.

a-tech-206. The Tenderer shall ensure that the VoIP VCS fulfils all legal environmental requirements in the following areas:

- Technical Environment, operating state.
- Working Environment, operating state.
- Environmental Conditions, non-operating state.

a-tech-207. The equipment shall be constructed in such a way that the quality is not reduced during transport and handling in accordance with the conditions stated in the following and on condition that it is kept in its original packing.

a-tech-208. If the equipment cannot satisfy these requirements at a reasonable cost, or for any other reason, this shall be clearly stated in the tender and special measures shall be taken as regards packing, transport and handling of the equipment.

a-tech-209. The equipment is intended for installations which are located inside the area of 3 regional airports. Therefore radar stations, navigation aids, VHF and UHF radio transmitters and receivers on the ground or on board aircraft can be operating in the immediate vicinity. Serious attention shall be paid to ensureelectromagnetic compatibility with other electronic equipment.

Technical environment

Climatic environment

Transport and storage:

a-tech-210. The functionality of the VCS equipment shall not be affected by transportation and storage under the following climatic conditions:

- temperature - 40 .... +70 degrees C
- humidity, high < 75% RH for 70% of the time
  75 ..... 95% RH for 30% of the time
  < 20% RH for max. 6 months continuously
- rapid change of

temperature: - 40 .... +20 degrees C

+70 ....+20 degrees C

Operation

The following requirements define the environment to which the equipment may be exposed during operation.

a-tech-211. The various system components shall be able to operate under the following temperature conditions:

- Low +10 degC
- High +40 degC

a-tech-212. The various system components shall be able to operate under the following humidity conditions:

- 10% - 90% RH

Mechanical environment

Transport

The equipment may, during transport, be subjected to environments defined by the following requirements.

a-tech-213. The various system components shall not be affected by transportation in an environment where free fall in accordance with the following specification may be experienced. Equipment will be wrapped.

- =< 5 kg, 500 mm
- > 5 kg, 250 mm

a-tech-214. All equipment shall comply with IEC 68-2-29 test Ed.

a-tech-215. The various system components shall not be affected by transportation in an environment where bumps in accordance with the following specification may be experienced. Equipment will be wrapped.

- 245 m/s^2 (25 G), 6 ms

a-tech-216. Test Methods shall comply with IEC 68-2-29 Eb, 1000 bumps.

a-tech-217. The various system components shall not be affected by transportation in an environment where vibration in accordance with the following specification may be experienced. Equipment will be wrapped.

- 0.5 mm 5-10 Hz
- 0.1 G peak 10-500-10 Hz
- 0.5 mm 10-5 Hz

a-tech-218. All equipment shall comply with IEC 68-2-6 test Fc.

a-tech-219. The various system components shall not be affected by transportation in an environment where air pressure will meet a minimum of 20 kPa.

a-tech-220. All equipment shall comply with IEC 68-2-13 test M -55 degC 24 h.

Maintenance

In addition to the requirements specified under transport, the following applies to maintenance.

a-tech-221. Equipment shall not be affected in a maintenance environment where the following drop conditions will be experienced. Equipment will be unwrapped:

- Drop on to a face 50 mm or 30 deg IEC 68-2-31. Test Ec

or

- Drop onto a corner 50 mm or 30 deg, IEC 68-2-31. Test Ec

This requirement is valid for complete equipment (hardware elements) as well as subcomponents, except displays.

Electrical environment

Power supply

a-tech-222. The VoIP VCS central and position equipment (equipment used for the VCMS can be excluded) shall be designed for connection to a -48V DC power supply, which is provided by the Customer.

The Tenderer shall include information concerning:

- nominal DC voltage with permitted tolerances
- maximum DC current at the minimum voltage
- maximum levels of noise from the DC supply.
- any other relevant information.

a-tech-219a. If the offered VoIP VCS equipment is not designed for DC operation, it shall be able to operate without showing any malfunction with the following tolerances on the power supply:

- mains voltage: 230 V ± 10%, 1 phase, N, E
- frequency: 50 Hz ± 6%
- frequency change: ≤ 0.25 Hz/s
- harmonic content: ≤ 6%
- power factor: ≥ 0.6
- interruption mains voltage: ≤ 10 ms

a-tech-223. VoIP VCS, position equipment and VCMS shall be equipped with 2 power supplies. Each will be connected to an independent DC or AC network depending on the type of power supply.

a-tech-224. Disconnection of one of the DC or AC networks or failure of one power supply shall have no influence on the proper operation of the equipment concerned for an unlimited time.

a-tech-225. The 230 VAC supply will in all cases be from a power supply system built in accordance with a 5-wire system, where protective earth and neutral shall not be interconnected in the equipment.

Electromagnetic and electrostatic environment

General

a-tech-226. The equipment installed shall comply to the EU EMC Directive 89/336, e.g. by fulfilling the generic standards for "Residential, commercial and light industry" EN 50081-1 and EN 50082-1.

Note: Fulfilment of the above standards is not sufficient to assure proper and reliable operation of electronic equipment placed at the Customer's premises in Praha Airport and IATCC. This is due to the fact that not all tests specified in the following are covered by these standards.

Immunity requirements

a-tech-227. The equipment installed shall fulfil the following immunity requirements:

Radiated electromagnetic field.

Test level: 3 V/m (1 kHz, 80% AM) in the frequency range 100 - 10000 MHz. Vertical and horizontal field direction and from all directions of the equipment.

Test set-up in accordance with IEC 801-3 or IEC 1000-4-3 or EN 61000-4-3.

a-tech-228. The equipment shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed.

Conducted electromagnetic field.

Test level: 3 V RMS (1 kHz, 80% AM) in the frequency range 150 kHz - 100 MHz. All cables having a total length of 3 meters or longer must be tested.

Test set-up in accordance with IEC 1000-4-6 or EN 61000-4-6.

a-tech-229. The equipment must continue to operate as intended during the test. No degradation of performance or loss of function is allowed.

Burst - fast transient.

Test level: AC power: 1000 V

Signal and other cables with total length > 1 m: 500 V

Test set-up in accordance with IEC 801-4 or IEC 1000-4-4 or EN 61000-4-4.

a-tech-230. The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed during the test, unless agreed upon by the Customer.

Surge - transients.

Test level Common Mode:

AC power/DC power: 1000 V

Signal and other cables with a total length > 30 m: 500 V

Test level Differential Mode:

AC power/DC power: 500 V

Signal and other cables with a total length > 30 m: 500 V

Test set-up in accordance with IEC 1000-4-5 or EN 61000-4-5.

a-tech-231. The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed during the test, unless agreed upon by the Customer.

Electrostatic discharge, ESD.

Test level: 4 kV contact and 8 kV air discharges, both polarities, to all touchable parts during normal use and user maintenance.

Test set-up in accordance with IEC 801-2 (1991) or IEC 1000-4-2 or EN 61000-4-2.

a-tech-232. The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed during the test, unless agreed upon by the Customer.

Power frequency magnetic fields.

Test level: 3 A/m, 50 Hz, from all directions of the equipment.

Test set-up in accordance with IEC 1000-4-8 or EN 61000-4-8.

a-tech-233. The equipment shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed.

Emission requirements

a-tech-234. The equipment installed shall fulfil the following emission requirements:

Electromagnetic fields. General limits

EN 55022 Class B:

30 MHz - 230 MHz:	30 dBμV/m measured from 10 m distance
230 MHz - 1000 MHz:	37 dBμV/m measured from 10 m distance

a-tech-235. The limits shall be fulfilled on the total system in every functional state.

Electromagnetic fields. Specific limits.

a-tech-236. The following specific limits covering the frequency range 118 - 137 MHz shall be fulfilled:

20 dBμV/m measured from 10 m distance.

EN 55022 Class B:

150 kHz - 500 kHz:	66 - 56 dBμV quasi peak
	56 - 46 dBμV average
500 kHz - 5 MHz:	56 dBμV quasi peak
	46 dBμV average
5 MHz - 30 MHz:	60 dBμV quasi peak

50 dBμV average

In the frequency range 150 - 500 kHz the limits decrease linearly with the logarithm of the frequency.

a-tech-237. The limits shall be fulfilled on the total system in every functional state.

Emission from display units

General

If display units are part of the VoIP VCS equipment, they shall meet the requirements below.

X-rays

a-tech-238. No measurable emission of X-rays shall be detected.

Electrostatic potential

a-tech-239. The equivalent surface potential shall be within the voltage range +/-500 V.

Alternating electric field, measuring distance 50 cm

a-tech-240. The measured values in the very low frequency (VLF) band shall, when measured in 4 directions, be less than 1V/m at all measuring points.

Alternating electric field, measuring distance 30 cm

a-tech-241. The measured value in the very low frequency (VLF) band shall, when measured directly from the front, be less than 1V/m.

a-tech-242. The measured value in the extremely low frequency (ELF) shall, when measured directly from the front, be less than 10 V/m.

Magnetic field, measuring distance 50 cm

a-tech-243. The measured values in the VLF band shall, when measured all around the unit, be less than 25 nT at all measuring points (48 points).

a-tech-244. The measured values in the ELF band shall, when measured all around the unit, be less than 200 nT at all measuring points (48 points).

Magnetic field, measuring distance 30 cm

a-tech-245. The measured values in the ELF band shall when, measured directly from the front, be less than 200 nT.

a-tech-246. All emissions shall cease when the display is on stand-by.

Other environmental conditions

Sand and dust

a-tech-247. The various system components shall be able to operate normally in an environment where cleanliness does not exceed the following values of number of particles/litre of air:

Technical room:

Particle size	> 5.0 micro m	25 particles
	> 0.5 micro m	3500 particles

Other rooms:

Particle size	> 5.0 micro m	69 particles
	> 0.5 micro m	10000 particles

The quantity of particles (sand and dust) in the environment during operation can be max. 50 $\mu g/m^3$. In this case all equipment shall function satisfactorily.

Audible sound

a-tech-248. If the equipment generates continuous sound, the level coming from equipment placed in the operators' room shall not exceed 35 dB(A), and the level from system parts placed in the equipment rooms shall not exceed 50 dB(A). These levels shall be measured at a distance of 1 meter with a sound level meter.

a-tech-249. The equipment shall not emit disturbing levels of infrasonics or ultrasonics, nor shall it emit sound on a single frequency or within narrow-frequency bands.

Power consumption and heat dissipation

t-tech-250. The Tenderer shall specify the electrical power consumption as well as heat dissipation of all individual equipment. Racks, equipment in working positions, free-standing terminals, printers, etc. are defined as individual equipment.

Equipment weight

t-tech-251. The Tenderer shall specify equipment weight in terms of load distribution on the floor. The load distribution will be of concern for installations on false floors.

Environmental Tests

General

a-tech-252. The Tenderer shall provide the Customer with certification that the equipment has been environmentally tested for temperature, heat, noise, and radiation and fields from displays as well as where and when such tests were carried out.

a-tech-253. The results and test methods used shall be included.

Environmental Considerations at Purchase

The Czech Republic aims at a green purchasing policy, and public institutions like ANS CR have an obligation to buy products

- That pollute as little as possible
- With a long life cycle
- That can be reused.

This is the background for the requirements listed in this section.

Removal of Packing

a-tech-254. The Tenderer shall take back used packing materials including packing materials used for consumable goods.

a-tech-255. All packing shall be made of recycled or recyclable material.

Removal of Equipment

a-tech-256. The Tenderer shall describe how the equipment can be removed in an environmentally friendly manner.

a-tech-257. The Tenderer shall describe how to recycle worn out equipment.

Content of Environmental Damaging Materials

a-tech-258. The Tenderer shall list all environmentally damaging materials contained in the equipment.

a-tech-259. The Tenderer shall describe how the environmental damaging materials will be removed in an environmental friendly manner.

AUTHORITY REQUIREMENTS

General Requirements

a-tech-260. The Tenderer shall, at his own expense, take all necessary steps to ensure that the VoIP VCS equipment complies with all relevant regulations issued by European or Czech authorities and in force at the time in question.

a-tech-261. The Tenderer shall obtain written approval from CAA of the Czech Republic for development, installation and maintenance of VoIP VCS's in aviation.

MANAGEMENT SYSTEM

Introduction

It is the Customer's intention to be able to perform management of the system in operation.

The management systems shall cover at least system control, monitoring and configuration.

All dedicated management systems are hereafter identified by the abbreviation VCMS (Voice Communication Management System).

The VCMS shall include all software and hardware components necessary for the implementation of management functionality.

General

a-tech-262. Due to availability considerations the VCMS shall be duplicated.

a-tech-263. The VCMS shall also support connection from VCM Terminals (VCMT).

a-tech-264. The VCMS shall include facilities for the customisation and automation of management routines.

a-tech-265. The VCMS shall support management functions by using a standard graphical user interface.

Management functions

t-tech-266. The Tenderer shall in the tender describe in detail the management functions of the offered VCMS. This functionality shall at least cover - but not be limited to - the functions described below.

Monitoring and control

a-tech-267. The VCMS shall provide facilities for status monitoring of all vital functions and components of the VoIP VCSs.

a-tech-268. The VCMS shall provide facilities for the performance monitoring of individual functions of the VoIP VCS both as momentary data and as the collection of data over time.

a-tech-269. The VCMS shall be able to present data on error situations in an explanatory and intelligible way.

b-tech-270. The VCMS should be able to classify errors in at least 3 levels presented in a visually distinct way.

a-tech-271. The VCMS shall be able to propose or automatically perform remedial actions.

a-tech-272. Any deviation from normal operation shall be presented to the VCMS operator, who will eventually be supplied with a status regarding any proposed or automatically performed remedial actions.

a-tech-273. The VCMS operator shall be able to overrule automatic error handling in every operational situation.

a-tech-274. The VCMS shall be able to maintain logs on system status and events including data on automatic and manual remedial actions.

Configuration management

a-tech-275. The VCMS shall support all functions concerning system configuration as well as role and scenario configurations of the VoIP VCS.

a-tech-276. It shall be possible to prepare new parameter sets autonomously without affecting or being affected by the VoIP VCSs.

a-tech-277. Implementation of new parameter sets shall be performed with the VoIP VCSs in full running mode.

a-tech-278. It shall be possible to prepare a new operator role/scenario or edit an already existing role/scenario autonomously without affecting or being affected by the VoIP VCSs.

a-tech-279. Implementation of a new or edited role/scenario shall be performed with the VoIP VCSs in full running mode.

a-tech-280. Automatic implementation of a new or edited role shall be possible at a predefined time and date.

a-tech-281. It shall be possible, via the VCMS, to maintain or edit all lists or tables used in the VoIP VCSs, for instance:

- short number lists
- frequency lists
- telephone number allocation to roles
- translation of A- and B-party numbers to plain text
- telephone directory
- etc.

a-tech-351b. It shall be possible, via the VCMS, in an illustrative way, to view and edit DA key allocations and frequency allocations for the different roles in the VCS.

a-tech-351c. Editing of the different roles shall be done with the minimum of actions.

a-tech-351d. It shall be possible from the VCMS to make print-outs - in colour were relevant - of lists, tables, DA and frequency allocations.

Security Management

t-tech-282. The Tenderer shall in the tender describe how suitable system security will be implemented.

a-tech-283. A minimum of 3 levels shall be implemented based on authentication

Interface to CMOS

a-tech-284. The VCS shall support management performed by the CMOS, whenever appropriate.

a-tech-285. It shall be possible to communicate all alarms from the VCMS to the CMOS.

a-tech-286. Selected management commands to the VoIP VCSs shall be possible from the CMOS.

Time synchronisation

a-tech-287. For time synchronisation the VCMSs shall be able to receive synchronisation signals from an external source using the Network Time Protocol (NTP).

TRAFFIC STATISTICS

The Customer requires continuous monitoring of traffic offered by the VoIP VCS as well as traffic handling and system performance in general.

For this purpose the Customer requires a tool for the generation and production of a number of statistics by means of calculation of recorded traffic data.

In order to meet the Customer's need for statistics with or without a minimum of additional processing, this must be a powerful tool with regard to at least the following subjects:

- Calculation of statistics
- Presentation of statistics
- User interface
- Automation

General

a-tech-288. The system used for the generation of traffic statistics shall be a *separate* tool consisting of its own hardware and software. This tool is hereafter referred to as the Traffic Statistic Tool.

a-tech-289. Utilisation of the Traffic Statistic Tool shall not affect the correct functionality and capacity of the VoIP VCSs.

a-tech-290. Faults in the Traffic Statistic Tool shall not affect the correct functionality and capacity of the VoIP VCSs.

a-tech-291. The Traffic Statistic Tool shall be based on a COTS graphical user interface.

a-tech-292. The tool shall operate with COTS file formats as well as 3rd party database technology and products.

Traffic data

Transfer and storage

a-tech-293. All traffic data shall be transferred to and stored on COTS storage media by use of a recording method providing the greatest possible level of security against loss of data.

a-tech-294. The capacity of the media shall allow the storage of at least 30 days' data.

a-tech-295. Access to data on the storage media shall be rapid.

a-tech-296. The collection, transfer and storage of data shall not affect the correct functionality and capacity of the VoIP VCSs and VCMSs.

a-tech-297. Data shall be retained for immediate processing and calculation for at least the preceding 7 days

a-tech-298. Data storage of shall be controlled by the Traffic Statistic Tool.

Data content

a-tech-299. Recorded traffic data shall be include all necessary information needed for the calculation of statistics (call information logging, radio information logging etc.).

Note: It is important that the transfer of traffic data is sufficient to cover:

- *Comprehensive calculations of statistics on telephone calls among CWP's, within the VoIP VCS and between the VoIP VCS and classic VCS (via MFC R2 GW) and VoIP VCS and PBX*
- *Comprehensive calculations of statistics on radio calls among CWP's and radios*

b-tech-300. Data should be recorded in such a way as to cover the possibility of linking the operator role to the position which is initiating/receiving the call, in order to create statistics on specified roles (Role ID).

Manipulation of data

a-tech-301. The statistic tool shall include the necessary filtering and sorting capabilities for further processing.

a-tech-302. The application shall, therefore, be able to perform independent successive filtering on all types of information contained in the fundamental data.

Note:
The following shows an example of a "manipulation sequence"

select required time interval
↓
select required A-number interval(s)
↓
select required B-number interval(s)
↓
Calculate statistics on the selected data

Statistics generation

a-tech-303. A number of standard set-ups which include traffic data in relevant relations fortelephone as well asradio shall be included.

a-tech-304. It shall be possible for the user to define specific set-ups with user defined selections (sorting and filtering).

a-tech-305. It shall be possible for the user to define specific set-ups, where the user selects the required traffic data.

b-tech-306. In the different set-ups the user should have the possibility to define threshold values which are automatically marked during the creation of reports.

a-tech-307. It shall be possible to calculate statistics by the use of recorded data while recording is in progress.

Specific requirements for telephone:

a-tech-308. The standard set-ups for traffic statistics for the telephone system shall cover - but not be limited to - the following content:

<u>Position/role/group statistics</u>

- A-party ID (identity of calling party)
- B-party ID (identity of called party)
- date/time (day/hour/min)

- call volume and dir. (total number of calls and their direction)
- traffic volume (total volume of calls on defined position/role/group of positions)
- call succeeded (total number of completed calls)
- call lost (total number of lost calls)
- Summary information

Line/trunk statistics

- A-party ID (calling party)
- B-party ID (called party)
- line/trunk ID (flexible selection of lines/trunks)
- date/time (day/hour/min)
- traffic offered (including number of calls and their duration)
- traffic handled (including number of calls and their duration)
- trunk occupied (number of times and duration for which all units in a given trunk are occupied)
- traffic congestion (total number andduration)
- transit information (number of transit calls, their direction and duration)
- detour information (number of re-routings initiated by the VoIP VCS, including identification of intended and actual route)
- call lost (total number of lost calls)
- 1. / 2. -leg congestion (B-part lost calls (e.g. MFC-R2 calls))
- summary information

a-tech-309. It shall be possible to calculate Busy Hour statistics for positions/roles/groups resp. line(s)/trunk(s).

Specific requirements for the radio

a-tech-310. The standard set-ups for traffic statistics for the radio system shall cover - but not be limited to - the following content:

Position/role/group statistics

- Position/role/group ID
- Date/time
- traffic volume (number and duration of transmissions and receptions on channels in traffic mode)
- Retransmission (number and duration of retransmissions)
- Summary information

Frequency statistics

- Frequency ID
- Date/time
- traffic volume (number and duration of transmissions and receptions)
- summary information

a-tech-311. It shall be possible to calculate Busy Hour statistics for positions/roles/groups or, as the case may be, frequencies/radio lines

Presentation

a-tech-312. In the presentation of the calculated statistical values it shall be possible to choose between tabular and graphic presentations.

a-tech-313. The layout of the tabular forms (reports) shall be well-arranged and graphical presentation shall typically be based on bar charts.

a-tech-314. It shall be possible to detail the presentation of the results in different levels, for instance in detailed reports and summary reports.

a-tech-315. It shall be possible to make soft copies (on disk or diskette) as well as hard copies of the results (reports as well as graphics).

a-tech-316. The application shall be able to present the results of the statistical calculations in standard units, such as [second], [%], [Erlang] etc.

Automation

a-tech-317. It shall be possible - by a single command in the statistics system - to initiate a string of measurements (calculations) which can be performed, stored and/or printed out

a-tech-318. It shall be possible to define the automatic performance of specific strings of measurements or single measurements at predefined times and time intervals.

INSTANT RECALL/REPLAY FEATURE

General

o-tech-319. An Instant Recall/Replay System (Short Term Recording –STR) shall be offered. The Radio voice on each CWP shall be recorded on the STR.

Technical requirements

a-tech-320. The STR shall be equipped with a dedicated loudspeaker on each radio equipped CWP.

a-tech-321. Control of STR shall be performed from the TID.

ATTACHMENTS

List of documents related to the technical and functional specification:

- VoIP VCS Tender Functional Specification
- VoIP VCS Tender Technical Specification
- VoIP VCS Operator Positions LKTB
- VoIP VCS Operator Positions LKMT
- VoIP VCS Operator Positions LKKV
- VoIP VCS Radio Network
- VoIP VCS Telephone Network
- VoIP VCS SNMP Agent Requirements Specification