ATIS/D-ATIS VOLMET/D-VOLMET

System Technical requirements

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1. GENERAL REQUIREMENTS

Design Criteria

For an Automated Terminal Information Service at any airport, it is imperative that the safety issues are brought into forefront. In addition, a clear and easy-to use operator interface is an essential part of a working ATIS system. The design criteria for an ATIS are summarized as follows:

System ergonomics shall facilitate easiest possible operation, maintenance and management of the ATIS. This includes the possibility of assigning different logical functions to workstations within each ATIS system.

The ATIS shall be compliant with all relevant International Civil Aviation Organization (ICAO) standards and recommendations, including the latest amendments.

Regulations and standards

The ATIS System capability shall support the requirements of:

- ICAO Annex 11, Chapter 4.3.4 - Voice ATIS
- ICAO Annex 11, Chapter 4.3.4 - Data link D-ATIS
- ICAO Annex 11, Chapter 4.3.5 - Data link D-ATIS
- ICAO Annex 11, Chapter 4.3.6 - Voice and D-ATIS
- ICAO Annex 11, Chapter 4.3.7 - ATIS for arriving and departing aircraft
- ICAO Annex 11, Chapter 4.3.8 - ATIS for arriving aircraft
- ICAO Annex 11, Chapter 4.3.9 - ATIS for departing aircraft
- ICAO Annex 3, Chapter 4.5 - Contents of reports
- ICAO Annex 3, Chapter 4.6 - Observing and reporting meteorological elements
- ICAO Annex 15, Appendix 2 - SNOWTAM Format, Amendment 39-B, Circular 355: Assessment, Measurement and Reporting of Runway Surface Conditions
- ICAO DOC 9837 Chapter 3.3.9 - Reporting wind direction in local reports and METAR/SPECI
- ICAO Doc 9426 - AN/924 -1984 Chapter 1-2-2

ATIS Message content

2. ATIS SYSTEM

The ATIS messages include the following elements of information in the order listed below: The ATIS messages can be created and scheduled via configuration. The administrator has the possibility to change, add or remove the schedule, the locations, their sequence and types of information:

1. Name of aerodrome;
2. Arrival and/or departure indicator;
3. Contract type, if communication is via ATIS;
4. Designator;
5. Time of observation, if appropriate;
6. Type of approach(es) to be expected;
7. The runway(s) in use; status of arresting system constituting a potential hazard, if any;
8. Significant runway surface conditions based of the GRF format. if appropriate, braking action;
9. Holding delay, if appropriate;
10. Transition level, if applicable;
11. Other essential operational information;
12. Surface wind direction and speed, including significant variations and, if surface wind sensors related specifically to the sections of runway(s) in use are available and the information is required by users, the indication of the runway and the section of the runway to which the information refers;
13. Visibility and, when applicable, RVR,
14. Present weather;
15. Cloud below 1500 m (5000 ft) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility when available;
16. Air temperature and dew point temperature;
17. Altimeter setting(s);
18. Any available information on significant meteorological phenomena in the approach and climb-out areas including wind shear, and information on recent weather of operational significance;
19. Trend forecast, when available; and
20. Specific ATIS instructions.

The fields 13, 14 and 15 shall be replaced by the term "CAVOK", if the conditions as specified in the PANS-ATM (ICAO Doc 4444), Chapter 11 prevail. If a correct message is not received within the

defined normal update interval, System shall automatically broadcast a "MET REPORT NOT AVAILABLE" phrase, describing an unavailable message, in place of the field items 12 to 20.

Functional requirements

MODES OF OPERATION

The System shall have 2 main operating modes to support real-time operations. Manual and Automatic Mode. In Automatic mode, the System will automatically validate and compile the Met data received from the AFTN/AMHS line with the supplementary ATC information keyed in by the operator and process them into an ATIS report.

This report shall be automatically generated and broadcasted without the need of operator intervention.

In Manual mode, the System shall allow the operator to manually input and edit the Met data (e.g. in the case when the AFTN/AMHS link is down), before validating and compiling with the supplementary ATC information keyed in by the operator. Basically, the generation and broadcasting of the ATIS report will be manually intervened and controlled by the operator. The System shall allow the operator to key in supplementary ATC information in both Automatic and Manual modes.

GENERAL SYSTEM FUNCTIONAL REQUIREMENTS

- The system shall have the provision to import the last valid ATIS report from database. In the case of recovering from a fault, the Workstation shall have the provision to import the last valid ATIS report and generate an alert message to prompt the operator to edit and perform checks on the retrieved data. The operator shall have to activate manual transmission of the message upon verifying the accuracy and validity of the data.
- Broadcasting of a new ATIS report shall only take place upon the completion of the current ATIS broadcast. There shall be no such cases where by the new ATIS report abruptly interrupts the ongoing existing ATIS broadcast.
- The operator can amend and update the ATIS report by manually editing the current transmitted report without affecting the ongoing real-time broadcast. The system shall support the latest formats of these meteorological messages as specified in the latest amendment and edition of ICAO Annex 3, which shall include, but not limited to, the following:

(a) Local routine reports (MET REPORT/SPECIAL)

(b) Aerodrome reports (METAR/SPECI)

(c) Aerodrome Warning

(d) Wind shear Warning

- in Tbisili international airport in operative mode is VAISALA AVIMET Application. The developer (bidder) shall do all configuration work of existing MET system to provide the redirections above mentioned meteorological REPORTs into the new ATIS/D-ATIS/VOLEMET/D-VOLMET system for further radio podcasting. In Met office in operative mode is MICROSTEP IMS as AMSS system, which Collect and disseminate meteorological reports: SIGMET, TAF, METAR and so on. The supplier can inquire meteorological reports from this system too (excluding METREPORTS).
- The system shall be possible to be configured for the reception of either local routine reports. MET REPORT/SPECIAL or aerodrome reports METAR/SPECI (with trend). The system shall provide the following manual entry methods for the operator to choose for the manual input of the meteorological information. A group of predefined fields used for the local routine report or aerodrome report dependent of configuration;
- The system VOLMET/D-VOLMET shall have possible to compiled METAR/SPECI (with trends) bulletins (plus SIGMET and/or TAF) receiving in the existing IMS system from Microstep. The supply shall provide redirection these meteorological bulletins into the VOLMET/D-VOLMET system.
- The digital ATIS/VOLMET information can also be sent to the flight deck of an aircraft via the Datalink service provider (SITA or ARINC) through LAN or WAN. (D-ATIS / D-VOLMET).
- The System shall have the provision to allow the operator to manually key in an independent free text related to the meteorological information.
- The System shall have the provision to allow the operator to manually key in an independent free text related to the operational information.
- The System shall provide automatic input and output checking functions to ensure that the final ATIS report is has no errors (e.g. invalid parameter, out-of-range data, syntax error, format error, sequence error, unrecognizable information, etc.) and that all the mandatory ATIS fields have been filled before the message is transmitted. Incorrect input/output data shall be rejected and accompanied by an audio alarm and an alert message to indicate the problem clearly to the operator. The error should be visibly highlighted and pinpointed, together with the explanation of the problem and expected parameter setting (e.g. invalid parameter, out-of-

range data, syntax error, format error, sequence error, unrecognizable information, etc.) shown to the operator.

- The System shall automatically retrieve and display the last ATIS report that was being transmitted before the shutdown/failure occurred.
- Upon recovery from a System failure, the System shall automatically retrieve and display the last ATIS report that was being transmitted before the shutdown/failure occurred.
- The System shall also generate an alert message on the OWP to prompt the operator to edit and perform checks on the retrieved data. The operator shall have to activate manual transmission of the message upon verifying the accuracy and validity of the data.
- The System shall support up to 3-runway operations defined by configuration.
- The runway-in-use configuration, as well as the set(s) of wind data to be used for approach and take-off operations, shall be customizable.
- The System shall categorize the various information into multiple pages for display on OWP. Each page shall have a header to indicate the type of information being displayed. The pages shall display, but not be limited to, the following information:
- ATIS information page containing the latest Meteorological Information with specific ATIS fields to allow the operator to add in supplementary ATC information to the report before validation by the operator;
- All messages exchanged between the System and external systems;
- All messages exchanged between the System and the datalink network including the type of messages requested and transmitted, aircraft ID, link status and errors;
- Final outgoing Voice-ATIS message in text form before they are sent to the VHF Radio Transmitters for broadcasting;
- Critical information regarding the status of the System and it external links;
- Error messages generated within the System or received from external sources;
- The operator shall be able to switch between different pages on the OWP for viewing of different sets of information using either the mouse or specially defined buttons on the keyboard.
- The latest incoming message from the external met source and the latest outgoing broadcast message to the VHF Radio Transmitters for the last 24

hours shall be displayed on one of the pages in their entirety. All the displayed incoming and outgoing messages shall be sortable in both ascending and descending order based on message time stamp. Filtering function shall be provisioned to display only the incoming messages, or only the outgoing messages, or both incoming and outgoing messages.

Provision shall be made at the OWPs and Maintenance workstations for the operator and maintenance staff to listen to:

- Final processed voice message in the System prior to broadcast, for testing and verification purposes; and Actual broadcast in the air, via VHF Radio Receiver monitoring lines, for real-time off air verification purposes.
- The System shall provide for manual voice recording of the ATIS report by the operator. The operator shall be allowed to perform human voice recording of the ATIS report without affecting the ongoing real-time broadcast. Upon successful validation of the voice recording, the operator shall be allowed to broadcast the voice recording manually upon completion of the current broadcast.
- The recorded voice messages (i.e. Voice-ATIS messages) shall be manually broadcasted via VHF Radio Transmitters. Provision shall be made at the OWPs and Maintenance workstations for the operator and maintenance staff to listen to:
- Final recorded voice message in the System prior to broadcast, for testing and verification purposes; and Actual broadcast in the air, via VHF Radio Receiver monitoring lines, for real-time off-air verification purposes.
- Voice-ATIS messages shall be transmitted continuously and repetitively and shall be updated at each routine transmission update, on a half hourly basis. The update of a significant change in operational environment or meteorological conditions will only be broadcasted upon the completion of the current Voice-ATIS broadcast.
- All client workstations shall be provided with volume control adjustment to allow listening to the generated speech.
- The System shall be provisioned with a facility to time the length of the final Voice-ATIS broadcast message (in seconds) before transmission so that the message broadcast duration can be reviewed to avoid lengthy transmission.
- The System shall automatically validate and compile the meteorological report received from the Met source (Vaisala Avimet and/or Microstep IMS) and

the supplementary information keyed in by the operator and process them into an ATIS report for conversion into Voice-ATIS and D-ATIS messages for transmission. The information contained in the Voice-ATIS and DATIS shall be identical in content.

- Upon the expiry of Aerodrome and Wind shear warnings, the ATIS report shall be reprocessed automatically for retransmission.
- The System shall uniquely identify each individual ATIS message with an alphabet, in sequential order.
- The System shall automatically generate and increment the ATIS alphabet with every update of the message, beginning with the alphabet. Designators assigned to consecutive ATIS messages shall be in alphabetical order (e.g. A, B, C, etc). When the last alphabet Z is reached, the subsequent message will start again with the alphabet A. The operator can manually change the alphabet identifier, if required.
- For each message received from the Met source (Vaisala Avimet and/or Microstep IMS), the System shall compare it with the previous received message. If the content of the two messages are completely identical, the System shall not update the ATIS report, but shall instead generate an audio alarm and an alert message on the OWP for operator intervention. If the content of the two messages are different, the System shall automatically update the ATIS report and append it with a new alphabet in sequential order.
- The System shall automatically perform TTS translation to separately generate the Voice-ATIS broadcast using computer-controlled voice in the English Language following ICAO requirements.

LOGICAL ROLES AND FUNCTIONS

- The physical client workstations shall have the provision to be configured with a Logical Role. Each Logical Role shall have the provision to be configured with a set of specific functions for that role. Each specific function shall be possible to assign to user groups. A user which does not have access to a specific function available in a Logical Role shall be prompted for appropriate credentials in order to access that function. There shall not be any limits to how many users and user groups that can be configured.
- The System can be configured with a few Logical Roles and each Logical Role can only be assigned to one client workstation within the same

partition. No more than one workstation shall be activated with the same Logical Role at same time (e.g. no duplicate OWP with Airport1 configuration) within the same partition.

- The Logical Role and associated functions shall be possible to configure from a management system accessible at any workstation within the system using administrator credentials.

USER ACCESS CONTROL AND DATALOGGING

- All user actions shall be logged The client workstation shall incorporate user login/logout function to restrict the usage of the System to only authorized personnel (e.g. administrator, operator, maintenance agent, etc). In logout state, the System shall operate in mode, when operator has restricted permission - broadcast message viewing access only.
- In the logout state, the application shall only have viewing access. No modification to the data or setting is allowed.
- All login and logout details (e.g. user name and time) shall be logged.

Monitoring

- It shall be possible to monitor the ATIS Systems internal components.
- All critical system statuses shall be available as a part of the list of items to be monitored by an external system.
- The system shall support external monitoring too.

Synthetic speech generation and translation dictionary

- The speech generated by the System shall use „voice speech technology" and shall be exceptionally clear, consistent and natural.
- The System shall allow easy and instant customization of the speed, tone and pronunciation of the speech engine without software modification and apply the setting system-wide without restart of any components or modules. Several voice models shall be available (for ex. METAR and SIGMET voice shall be possible to transmit with different voice).
- The System shall comprise an extensive vocabulary for text-to-speech conversion, with a dictionary that is user-expandable to cater for different types of weather, different conditions of navigational aids and airfield surface, and other ATC related messages.
- The administrator shall have possibility add, delete or edit words in the vocabulary dictionary. Any vocabulary expansion or amendment shall be

simple, immediate and not require programming knowledge or software modification.

- A facility shall be provisioned to allow adding of new words into the vocabulary dictionary to be synthesized and generated into voice automatically without requiring human voice recording.
- Time of creation, the creator and a remark field shall be logged. The display of the words shall be sorted in alphabetical order with search function. Playback of the word in the same page shall be supported.
- There shall be a shortcut or command button at the OWP to allow the operator to access the vocabulary dictionary, make changes and validate playback quickly and easily. After accessing the vocabulary dictionary, the operator can perform a search function with various search attributes in order to search for one word or a string of a few words at a time.
- The supplier shall be responsible to port in the existing vocabulary list from the existing ATIS system into the new ATIS System, validate and customize the pronunciation on the new ATIS System.
- Any changes to the vocabulary list done on any one server in the System shall be automatically updated system-wide to ensure database consistency. The Printer shall print the complete list of System vocabulary when required by the operator.

DATA LOGGING

- The System shall have the capability of maintaining an updated log of all the received meteorological information from Met Source for archival and immediate retrieval purposes and also for generation of statistical and other reports in ad-hoc formats.
- Data management facility shall be provided in the System to continuously archive, but not limited to, the following system logs All messages exchanged between the System and external systems;
- All messages exchanged between the System and the datalink network including the request and reply messages, associated aircraft ID, link status and errors;
- All supplementary ATIS information updates and inputs made by the operator;

- User login and logout information with time-stamp; Final outgoing Voice-ATIS message in text form before they are broadcasted via VHF and D-ATIS messages before they are transmitted over datalink.
- For all incoming and outgoing messages exchanged between the System and the external systems, there shall be an indication of the source of the message with date and time-stamp for identification purpose.
- Redundancy shall be provided for the data storage facility to ensure that the System can continue to perform its archiving function, with no loss of data.

The System shall meet, but not be limited to, the following requirements:

- The capacity of the online data storage facility shall be large enough to allow all the System logs and data to be stored for at least twelve (12) calendar months; Once the data storage capacity exceeds 70% of its maximum capacity, an error/alert message shall be generated at the Maintenance workstation or Server to allow timely intervention by the maintenance staff to archive the System logs and data into an offline secondary storage; The contents of the System logs shall be presented in a readable text form in the English Language;
- All archived logs shall be time-stamped with UTC Date/Time and automatically saved using file names that are related to the contents for ease of identification and retrieval;
- System logs shall be retrieved for viewing on-screen at the relevant workstations. Provision of search function to allow for easier and aster retrieval of System logs. The search function may be performed using different combinations of search attributes such as Year, Date, Time and Type of report (e.g. ATIS, D-ATIS, Error-log, etc).
- Provision of retrieved System logs and data to be exported to other physical media (e.g. USB storage, etc) and other file formats (e.g. ascii text, csv, etc) at the relevant workstation.
- Provision of archived System logs and data to be imported into the System (e.g. Offline Development Subsystem) for report generation, training, etc.

D-ATIS

- In the event of no datalink service due to faulty link or any reason, the ATIS System shall still function properly to provide real-time Voice-ATIS broadcast to pilots. All the other interface functionalities should not be affected as well.

- Statistics of the uplink and downlink messages via the data link shall be available for view in the ATIS system.
- The System shall provision a facility to access, display and print the statistics in the form of report.

User interface

- All related ATIS fields shall be displayed on one single page to avoid the need for the operator to constantly switch pages to view critical information;
- For each alert message displayed, a clear explanation of the problem shall be provided. An acknowledgement by the operator to the alert message shall be required before the alert can be deactivated;
- Visual alarms for fault indications shall be displayed with clear distinctive colors. Visual alarms shall remain activated until the relevant fault has been rectified;
- An audio alarm shall accompany each alert message and visual alarm displayed. The audio alarm shall be volume adjustable incorporating enable/disable functions only accessible by the administrator;
- Operator can view and print the ATIS reports. Operator can also access the ATIS report using common text editors (e.g. Microsoft Excel, Notepad, etc).
- The User Interface shall provide a facility for the operator to select the following fields on the OWP for keying in of supplementary information The User Interface shall provide a facility for the operator to select, but not limited to, the following fields on the

OWP for keying in of supplementary information.
Header for Broadcast;
Runway-In-Use;
Runway Surface Conditions;
Approach-In-Use (is associated with Runway-In-Use and
RVR fields);
Holding Delay;
Transition Level;
NOTAM containing essential operational information;
Significant Weather (e.g. Wind shear Warning);
Specific ATIS Instructions; and
Footer for Broadcast.

- The contents of the supplementary information to be keyed in by the operator shall not be limited to handle only factory pre-programmed text
- The contents of the supplementary information to be keyed in by the operator shall not be limited to handle only factory pre-programmed text but also cater for vocabulary variation and expansion. The administrator shall perform vocabulary variation and expansion immediately at the workstation without any Software modification.
- The User Interface shall allow the administrator to save the contents of any supplementary information.
- The System shall allow the administrator to save the contents of any supplementary information (hereinafter called prepared text), to avoid the need of having to retype the same information again whenever a similar operational or environmental condition occurs in future.
- The administrator shall add, modify or delete the prepared text easily.
- The contents to be keyed in by the operator into the NOTAM and Specific ATIS Instructions fields shall consist of free-text field and pulldown menu with prepared text.
- The System shall not impose restrictions to the vocabulary or the length of the free-text allowed, or alternatively the free-text length shall be user-definable (as system parameter).
- It shall also allow to re-sequence the order of the selected prepared text of these fields.
- The operator shall playback the prepared text for testing and verification purposes prior to broadcasting, if desired.
- For each supplementary ATIS field selected, a complete list of its prepared text shall be displayed on a pull-down menu sorted in alphabetical order with alphabetical navigation feature. In the case of long prepared text, the pull-down menu shall allow horizontal scrolling with tool tip displayed when mouse over the selected prepared text.
- The operator shall scroll to select any one of the prepared texts to view its complete contents or to amend its internal contents. The operator may also choose to select a prepared text to be added to the final ATIS report without viewing its internal contents by alphabetical navigation method.
- All supplementary ATIS fields shall be configurable to either enable or disable state by administrator.
- All supplementary ATIS fields shall be configurable with a start time and end time for the broadcast.

- Some ATIS information may contain a few different pieces of information within each sentence. In these instances, there may be a requirement to break up the information with a short pause in between them so that pilots can decipher the transmission distinctly. As such, there shall be a simple means to allow the operator to create a short pause in between any desired parts of the supplementary information being keyed in (e.g. by the use of special characters like semi-colon to denote a short pause).
- The User Interface shall be able to display the duration of the broadcast length in MM:SS
- The User Interface shall be able to display current UTC time synchronized with the GPS master clock
- The User Interface shall be able to display the ATIS information (A, B,) in a bigger font then the rest of the HMI text/label.
- The ATIS information is incremented automatically in AUTO mode between each broadcast and editable during Manual Operation
- The User Interface shall have a quick selection feature for choosing between pre-configured RWY operation templates.
- It shall be possible to override individual settings in the operational settings after a pre-configured RWY operation template has been selected.
- These RWY operation templates shall be possible to configure according to the different RWY configurations used in normal operation, i.e. RWY in use, Navaids in use, departure RWY etc...
- There shall be no limitations to how many RWY operation templates that can added to the system.
- Each RWY operation template shall support the configuration of up to 3 RWYs simultaneously.

3. VOLMET/D-VOLMET Product introduction

- The VOLMET system shall be is based on COTS (Commercial-off-the-shelf) components and a user-friendly HMI to enable the provision of meteorological information to aircrafts in flight.
- The VOLMET system can be either transmitted via radio, normally VHF radio, or via datalink, D-VOLMET.
- It shall be for synthetic speech generation.
- provide natural and authentic sounding voices for the VOLMET sent via radio.
- D-VOLMET shall be transmitted according to ED 89A to the appropriate datalink service provider.
- The system can receive data input from meteorological reports such as SIGMET, TAF and METAR/SPECI, via AFTN (or AMHS) network.
- The VOLMET/DVOLMET system can identify several METAR/SPECI reports coming for regional airports and adjacent FIRs to be included in the message.

Additional VOLMET modules

- System events received data and transmitted messages shall be time stamped and stored in the system database(s).
- The information can be retrieved and analyzed when required.
- Examples of such information are:

Server events (connection, Main/Standby)

Database connectivity events

Broadcast events (speech engine, audio device(s))

External system connectivity events

Reception of meteorological reports from AFTN/AMHS

Datalink VOLMET messages sent to aircraft

Storage of VOLMET broadcasted audio files with configurable time interval

4. DATALINK MESSAGE HANDLER

Functional requirements

DATALINK

The Datalink Message Handler shall integrate with the datalink network provided by Datalink Service Provider (e.g. SITA and ARINC) via TCP/IP connection.

- The message exchange format between the Datalink Message Handler and the datalink network must be in compliance with the ARINC-620, ARINC-622, ARINC-623 and SITA proprietary formats.
- Statistics of the uplink and downlink messages via the data link shall be logged and archived in the System database.
- The Datalink Message Handler shall check the City Locator and the UTC Date/Time specified in the requesting message. The System shall not service the request under the following conditions:

(a) Wrong City Locator is specified; and

- (b) UTC Date/Time specified exceeds the limit stated in the system parameter. This parameter shall be variable between 0 to 60 minutes. When the value is set to 0, the System shall service all requests.
- The System shall support ICAO (4 letters) City Locators
- The Datalink Message Handler shall operate as a separate service in parallel to the ATIS System;
- The Datalink Message Handler shall contain identical information to the latest Voice-ATIS broadcast
- The Datalink Interface shall communicate with the datalink network via a dual redundant set of communication devices and data links. The links will be split into DL-A and DL-B, where DL-A will function as the main link and the DL-B will function as the standby link.
- The Datalink Message Handler shall operate independently of the ATIS system.
- The Datalink Message Handler shall be able to handle DATIS messages from up to 50 independent D-ATIS systems
- The Datalink Message Handler shall have a web interface to show statistics of all message transactions.

5. TECHNICAL CONTROL AND MONITORING SYSTEM (TCMS)

Functional requirements

The TCMS shall interface to various D-ATIS/ATIS/VOLMET/D-VOLMET software, hardware and equipment through Standard protocols:

-SNMP (v1, v2 and v3)

-MODBUS

-OPC

-etc.

- The TCMS shall monitor in real time D-ATIS/ATIS/VOLMET/D-VOLMET equipment included in the delivery and display their related statuses in homogeneous and user-friendly way.
- The TCMS shall be expandable in terms of equipment, hardware and software to monitor.
- The TCMS shall present the monitored items into hierarchal levels. There shall be no limitation in terms of the number of levels and their decomposition configuration (example: systems/subsystems/items/item-details).
- The TCMS Client HMI shall present to the user an audible and visual alert when a monitored equipment status change occurs. The visual alert shall clearly point to the concerned equipment (flashing indicator).
- The equipment status types (alarm severity), equations and color code shall be configurable.
- The TCMS client shall incorporate user login/logout function to restrict the usage of the System to only authorized technical personnel.
- The TCMS shall support dualized architecture to ensure fault tolerant operation.
- All user login/logout and actions shall be logged in the system database.
- All software, hardware and equipment's status change and link failure events shall be logged and archived in the system database.
- Any TCMS system internal failure shall not affect the monitored components.
- The historical data viewer function shall be available in the TCMS Client to provide the technical user the possibility to filter/search the logged events and generate/print reports when needed.
- Maintenance notification function shall be available to provide the technical administrator to assign equipment maintenance responsibility to the

qualified/available technicians. When alarm occurs on a specific equipment, the assigned technician will be notified with the equipment name/id, alarm type/description and date/time.

- Current Fault table shall be available in the TCMS Client to display all current faulty equipment to the technical user.
- The table can be sorted with different criteria (time of occurrence, alphabetic order, type of equipment, etc) or filtered by typing a key word.
- By double clicking the desired fault in the table, the HMI shall point the related equipment in the hierarchal view.
- Statistic function shall be available in the TCMS Client to provide the technical user the generation of statistic report from the logged events.

6. Server Redundancy

Server part shall be configured as Master/Slave. ATIS/VOLMET software installed on both Servers shall monitor "health" status of each other. In case if failure detected on Master Server, Slave Server shall take the role of Master immediately. Dedicated alarm shall be sent to technical position.

7. Factory Acceptance Test

- the Supplier shall perform a Factory Acceptance Test (FAT) to demonstrate the compliance of the System to this Specification and that the System is ready for Commissioning.
- The Supplier shall carry out the FAT in accordance to the FAT Procedures which have been agreed (all contextual part) upon with SAKAERONAVIGATSIA in advance.
- The Supplier shall send the FAT Procedures to SAKAERONAVIGATSIA for approval at least thirty (30) days in advance of the commencement of the FAT.

8. Site Acceptance Test

- After the completion of the installation of the System, the Supplier shall perform a Site Acceptance Test (SAT) to demonstrate the compliance of

the System to this Specification and that the System is ready for Commissioning.

- The Supplier shall carry out the SAT in accordance to the SAT Procedures which have been agreed (all contextual part) upon with SAKAERONAVIGATSIA in advance.
- The Supplier shall send the SAT Procedures to SAKAERONAVIGATSIA for approval at least thirty (30) days in advance of the commencement of the SAT.
- SAT document shall include preliminary at least 72 hours the system Run TEST.
- when the SAT has been satisfactorily completed (may be exist only not eccencial remarks, not concerning the main functionality of the system), as agreed by SAKAERONAVIGATSIA's representatives, the Supplier shall issue the SAT Report which will be signed by both the representatives of the Supplier and SAKAERONAVIGATSIA.
- Successful completion of the SAT shall indicate that the System has been commissioned and both parts sign take-over certificates.

9. Training

- The Supplier shall conduct a training program to cater to the needs of:
- Technical personnel who will be responsible for the system administration, fault diagnosis and maintenance of the System.
- Operators of the system who are responsible for creation and monitoring of ATIS/VOLMET broadcasts and D-ATIS/D_VOLMET messages.
- All training courses shall be conducted by personnel who are fully conversant with the subject they are teaching, and have good command of the English language.
- All training instructions and documentation shall be in English (electronic and hard copies).
- The training courses shall combine theoretical content with practical hands-on experience with the System.
- After training course attendees shall be awarded with Certificates.
- The following courses shall be provided:
  MET Technical Training (Onsite training, in Factory - 3 person)
  Operational Training (Onsite training, In Factory - 3 person)
  Com. Technical Training (in Factory - 3 person)

10. Hardware

- Dual Server in Master/Slave configuration. Servers shall have two power sources, at least two LAN ports and analog audio output
- Audio matching devices with 1V output for each Server
- Two (2) managed network switches shall be provided at the main system location at Tbilisi airport to establish a redundant local area network (LAN) between the System's hardware components at the airport. Switches shall have two power sources or automatic power transfer switch shall be provided for all equipment in the rack having no dual power input
- One LAN switch dedicated to AFTN over IP
- Workstation Computers:
  for operator: one for ATIS, one for VOLMET
  for Technician: one for both ATIS/VOLMET system
  one spare workstation with preinstalled software
- Rack including sufficient number of protected power outlets or outlets with separate protectors organized in two independent power lines
- Rack-mount KVM Console with sufficient number of inputs
- GPS time Clock redundancy (two) channel;

11. Documentation and user manuals

- (all documentation is in English version. Both hard copy and electronic versions)
- Technical manual
- Operator manual

12. Delivery

- Site 1 – Kopitnari (VOLMET) all equipment shall be deliver in Kutaisi international airport (DAP Tskaltubo region, Kopitnari, Kutaisi International Airport)
- Site 2 – Thales 1100 (VOLMET) all equipment shall be deliver in Kvishiana mountain. (DAP Gardabani, Norio, Mountain Kvishiana, 1100)
- Site 3 – MRL 1100 (ATIS) all equipment shall be deliver in Kvishiana mountain. (DAP Gardabani, Norio, Mountain Kvishiana, 1100)
- The servers and workstations (ATIS/VOLMET) and all spare parts shall be deliver to the Tbilisi international airport. (DAP territory of Tbilisi International Airport)

13. RADIO BROADCAST

See annex 1 and annex 2, for the detailed technical specifications Concernng the Radio broadcasting.

annex 1

List of Equipment

Site 1 – Kopitnari (VOLMET)

Name	Q-ty
VHF Transmitter for Volmet	2
VHF Single cavity band-pass filter	2
Antenna switching system	1
Battery backup system	1
Respective quantity of Cabinets fully wired with power distribution panel, rack-mounted Switches and Punch-down blocks for 4W E&M & VoIP connections.	1

Site 2 – Thales 1100 (VOLMET)

Name	Q-ty
VHF Transmitter for Volmet	2
VHF Single cavity band-pass filter	2
Antenna switching system	1
Battery backup system	1
Respective quantity of Cabinets fully wired with power distribution panel, rack-mounted Switches and Punch-down blocks for 4W E&M & VoIP connections.	1

Site 3 – MRL 1100 (ATIS)

Name	Q-ty
VHF Transmitter for ATIS	2
VHF Single cavity band-pass filter	2
Antenna switching system	1
Battery backup system	1
Respective quantity of Cabinets fully wired with power distribution panel, rack-mounted Switches and Punch-down blocks for 4W E&M & VoIP connections.	1

Remote Control and Monitoring System

Name	Q-ty
RCMS	1

Spare

Name	Q-ty
VHF Transmitter with KRONE connectors and signal cables	2
Antenna switching system	1
1/2"R Flexible Feeder Cable, Impedance - 50 Ohm, Attenuation - <3db/100m for 150 MHz	200m
N-Male Connectors for 1/2"R Flexible Feeder Cable, Impedance - 50 Ohm	20
Grounding kit for 1/2"R Flexible Feeder Cable	10

Services

Name	Q-ty	

FAT (Factory Acceptance Test), 6 attendees, excludes travel and accommodation	1	
Training at Factory excludes (6 attendees) excludes travel and accommodation	1	

annex 2

REF	VHF Transmitter
1	**General Requirements**
1,1	**The VHF Transmitter shall comply with the following standards:**
	ICAO Annex 10
	ETSI EN 301 489
	ETSI EN 300 676
	ETSI EN 301 841
	EUROCAE ED-137 B
1,2	**Radio Interfaces**
	Radio units shall be equipped with following interfaces:
	Analogue 600 Ω voice interface for audio and signaling (4 W E&M)
	Connection for local microphone with PTT, and front panel PTT switch
	Ethernet interfaces for VoIP and RCMS (Remote Control and Monitoring) and SNMP (Supervision)
	It shall be possible to operate the radio, simultanously over:
	Analogue 4W E&M
	VoIP
1,3	**Frequency ranges, channel spacing, modulation modes and climax offset**
	VHF Frequency range: 118-137 MHz
	VHF channel spacing: 8.33 and 25 kHz
	VHF Climax offset: Up to 5 carrier for 25 kHz and up to 2 carriers for 8.33 kHz
	VHF modulation modes: AM, AM-MSK, D8PSK (VDL-2) Selectable.
1.4	**Power supply, AC and DC operation**
	All radio units shall be equipped with AC and DC power supply with DC Cable Connectors for providing reliable contact between Radio units and Battery Backup System. AC shall be used as primary power supply and DC as secondary power supply. Both power supplies shall be in parallel configuration with an uninterruptible switch-over from AC to DC. Both power supplies shall be Rack-mounted
	AC input range: 185 – 264 VAC, 47 to 63 Hz
	DC input range: 21.6 – 31.2 VDC
1.5	**Radio startup time**
	Time: < 45 seconds
1.6	**Supported protocols**
	The following protocols supported by the radio shall include:
	SIP and RTP for VoIP ED137 B
	TCP/IP (For control of the radio)

1.7	**Radio BITE (Built In Test Equipment)**
	The following parameters shall be monitored from the radio:
	Forward power
	VSWR
	Modulation depth
2	**Transmitter requirements**
2.1	**Output power**
	Output power shall be adjustable from 1 to 50 W in 1W steps or less
2.2	**Modulation depth and harmonic distortion**
	Modulation depth shall be adjustable in steps of min 5% to a limited maximum of 95%
2.3	**Transmitter duty cycle**
	Transmitter duty cycle shall be 100%.
2.4	**Conducted spurious emission**
	For VHF TX (non harmonics): <-46 dBm according ETSI - 300676-1
	For VHF TX (harmonics): <-36 dBm according ETSI - 300676-1
2.5	**Audio frequency input interface**
	AF input impedance: 600 Ω balanced
	AF input level, configurable range: -30 to + 10 dBm
2.6	**Transmitter PTT interfaces**
	The transmitter shall support the following key commands:
	Locally from a PTT style microphone
	Remote via a contact to ground
	Remote via configurable in band tone signalling
	Remote via IP
3	**Filter requirements**
3.1	**Electrical Specifications**
	Frequency Band (MHz): 118 ÷ 137
	Insertion Loss with adjustable loop (dB): 1 ÷ 3
	Max continuous Power (W): < 200
	Impedance (Ω): 50
3.2	**Mechanical Specifications**
	Input Connector: Nf
	Output Connector: Nf
	Tuning control posibility
4	**Battery Backup System requirements**
4.1	**General Specifications**
	AC input range: 185 – 264 VAC, 47 to 63 Hz
	Output Voltage : 27 – 31 V DC adjustable
	Backup power supply shall provide continuous functionality of each Transmitter and Receiver (working condition: 10%Tx/90%Rx) during ≥2 hour when AC is switch-off
	Local and remote monitoring via SNMP, Ethernet or Web
4.2	**Mechanical Specifications**

	Connections:
	Network/TCP/IP: RJ45 female
	Input AC: Std. Europlug (Male)
	19" rack mountable + 19" brackets
5	**Antenna switching system requirements**
	Logic outputs: Relay, dry contact that closes when active
	RF input connectors: 50ohm, N-Connector
	RF output connectors: 50ohm, N-Connector
6	**RCMS requirements**
	The radios shall be connected to a Remote Monitoring and Control System (RCMS) via Ethernet (WAN/LAN). The radios shall use SNMP v3 with encryption for the communication with RCMS
	The following functionality of the RCMS is expected:
	Parameter monitoring
	Parameter setting
	Alarm and warning detection
	Eventlog files
	All parameters and settings that can be configured and monitored from the front panel of each radio shall be accessible from the RCMS. It shall be possible to change the configuration of the radios from the RCMS. The access to the RCMS shall be password protected.