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Place du Portage , Phase III
Core 0A1 / Noyau 0A1
Gatineau
Québec
K1A 0S5
Bid Fax: (819) 997-9776

LETTER OF INTEREST
LETTRE D'INTÉRÊT

Title - Sujet
HF AUDIO EQUIP. REPLACEMENT FY13/14

Solicitation No. - N° de l'invitation	Date
W8474-136546/B	2013-11-22
Client Reference No. - N° de référence du client	**GETS Ref. No. - N° de réf. de SEAG**
W8474-136546	PW-$$QE-450-24138
File No. - N° de dossier	**CCC No./N° CCC - FMS No./N° VME**
450qe.W8474-136546	

Solicitation Closes - L'invitation prend fin
at - à 02:00 PM
on - le 2013-12-16

Time Zone
Fuseau horaire
Eastern Standard Time EST

F.O.B. - F.A.B.
Plant-Usine: ☐ **Destination:** ☑ **Other-Autre:** ☐

Address Enquiries to: - Adresser toutes questions à:	Buyer Id - Id de l'acheteur
Guilderson, Greg	056qe
Telephone No. - N° de téléphone	**FAX No. - N° de FAX**
(819) 956-0564 ( )	(819) 956-0740

Destination - of Goods, Services, and Construction:
Destination - des biens, services et construction:
N/A

Comments - Commentaires

Instructions: See Herein

Instructions: Voir aux présentes

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Raison sociale et adresse du fournisseur/de l'entrepreneur

Delivery Required - Livraison exigée	Delivery Offered - Livraison proposée

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Name and title of person authorized to sign on behalf of Vendor/Firm (type or print)
Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)

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K1A 0S5

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Annex A Statement of Work

1. Purpose

The Department of National Defence (DND) has a potential requirement to acquire High Frequency (HF) Audio Equipment..

The objective of this Letter of Interest (LOI) is to:

a) advise industry of this potential requirement and provide industry with general and draft technical information;
b) provide industry with a preliminary set of high level specifications, deliverables, schedule, and project scope information;
c) enable Canada to engage industry and obtain information regarding solutions, including indicative, non-binding cost information for project planning purposes; and
d) allow Industry to assess and comment on the adequacy and clarity of the requirements as currently expressed; offer suggestions regarding potential alternative solutions that would meet requirements.

2. Background

The Department of National Defence (DND) has a requirement for Military off the shelf (MOTS)High Frequency (HF) Audio Equipment and associated ancillaries to replace the legacy systems which are currently in use.

The purpose of this SOW is to define the work to be performed by the contractor to deliver, install and replace the HF Audio Systems and their associated interface and control networks with a new system of audio equipment, operator processors, control processors, associated interfaces and control networks. The work includes provision of operator, technician and instructor training on the new HF Audio Systems. This SOW provides an overview of the HF Audio System functionality within the CAF Strategic HF Systems, describes the equipment and work required to replace the HF Audio Systems, describes the elements of the HF Audio System Replacement Program, and defines the administrative details of the program. The HF Audio System and associated network interfaces are components of the Military Aeronautical Communications System (MACS), the MARCOM AGA systems located at the Naval Radio Stations (NRSs), the Joint Task Force North (JTFN) HQ HF system, and in two HF system support facilities.

3. Project Scope

Should a Request for Proposal (RFP) be released in the future, the following represents the potential project scope:

a) The Audio Equipment Suite for various sites in accordance Annex A - Statement of Work;

b) associated ancillary equipment and spare parts in accordance with Annex A - Statement of Work;
c) Training as outlined in Annex A - Statement of Work;
d) Publications as outlined in Annex A - Statement of Work;
e) Support Services as outlined in Annex A - Statement of Work.

4. Security

No security requirements are anticipated for any subsequent RFP.

5. Additional Information Requests

After review of all information packages, additional information, clarifications, and/or demonstrations of systems may be requested by DND via the Contracting Authority identified in Section 7.

6. Enquiries

All enquiries and other communications related to this Letter of Interest shall be directed exclusively to the PWGSC Contracting Authority. All enquiries must be submitted to the Contracting Authority no later than five (5) calendar days before the closing date of this Letter of Interest. enquiries received after that time may not be answered.

Care should be taken by Respondents to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked “proprietary” at each relevant item. Items identified as “proprietary” will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the questions or may request that the Respondent do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all Respondents. Enquiries not submitted in a form that can be distributed to all Respondents may not be answered by Canada.

Changes to this Letter of Interest may occur and will be advertised on the Government Electronic Tendering Systems (GETS). It is each Respondent’s responsibility to verify changes, if any, on Buy and Sell.

7. PWGSC Contracting Authority

Greg Guilderswon
Public Works and Government Services Canada (PWGSC)
Defence ands Major Projects Sector (DMPS)
11 Laurier Street, Place du Portage, Phase III, 8C2-106
Gatineau, QC, K1A 0S5
Tel: (819) 956-0564
Fax: (819) 956-0740
E-Mail: greg.guilderson@tpsgc-pwgsc.gc.ca

8. Notes to Interested Respondents

This is neither a call for tender nor a request for Proposal (RFP), and no agreement or contract for the procurement or the equipment stated above will be entered into solely as a result of this LOI. This announcement does not constitute a commitment by Canada. Canada does not intend to award a contract on the basis of the notice or otherwise pay for the information solicited. Any and all expenses incurred by Industry in pursuing this opportunity, including the provision of information and any potential visits, are at the Respondents' sole risk and expense.

Any discussions on this subject with project staff representing DND or PWGSC, or any other Government of Canada representative, or other personnel involved in project activities, shall not be construed as an offer to purchase or as a commitment by DND, PWGSC or Government of Canada as a whole.

Although the documents / information / data collected may be provided as commercial-in-confidence and will not be provided to a third party outside of Canada, Canada reserves the right to use the information to assist them in drafting performance specifications and for budgetary purposes. Requirements are subject to change, which may be as a result of information provided in response to this LOI. Respondents are advised that any information submitted to Canada in response to this LOI may, or may not, be used by Canada in the development of the potential subsequent RFP. The issuance of this LOI does not create an obligation for Canada to issue a subsequent RFP, and does not bind Canada legally or otherwise, to enter into any agreement or to accept or reject any suggestions.

There will be no short-listing of Respondents for the purposes of undertaking any future work as a result of this LOI. Similarly, participation in this LOI is not a condition or prerequisite for the participation to any RFP.

Respondents to this LOI should identify any submitted information that is to be considered as either company confidential, proprietary and if the response contains controlled goods.

9. LOI Closing Date and Submission of Respondent Information Packages

Respondents must submit their information package to the PWGSC Contracting Authority identified in Section 7 of this LOI document, on or before December 16th, 2013 at 14:00 EST (LOI Closing date).

two (2) hard copies and one (1) soft copy of the information packages are requested.

Respondent point of contact information must be included in the package.

DEPARTMENT OF NATIONAL DEFENCE

STATEMENT OF WORK

TO REPLACE THE

HIGH FREQUENCY AUDIO SYSTEMS

AT MILITARY AERONAUTICAL

COMMUNICATIONS SYSTEM LOCATIONS,

MARITIME COMMAND LOCATIONS, AND

SUPPORT FACILITY LOCATIONS

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APPENDICES

APPENDIX 1: TECHNICAL SPECIFICATION
APPENDIX 2: BLOCK DIAGRAMS

LIST OF ACRONYMS AND ABBREVIATIONS

The following acronyms and abbreviations are used in this statement of work:

ACAS	Any Console-Any Station.
AG	Air-Ground
AGA	Air-Ground–Air
AGC	Automatic Gain Control
BITE	Built In Test Equipment
BLER	Block Error Rate
C	Celsius
CDR	Critical Design Review
CAF	Canadian Armed Forces
CFB	Canadian Forces Base
CFSCE	Canadian Forces School of Communications and Electronics
COTS	Commercial Off The Shelf
CPM	Contractor Project Manager
CSA	Canadian Standards Association
CTL	Control
c/w	Complete With
DA	Direct Access
DC	Direct Current
dB	Decibel
dBm	Decibel/Milliwatt
DCE	Data Circuit Terminating Equipment
DJSCS	Directorate of Joint Strategic Communications Support
DND	Department of National Defence
DSL	Digital Subscriber Line
DTE	Data Terminal Equipment
E & M	Earth and Magneto
FAT	Factory Acceptance Test
FTP	File Transfer Protocol
GDNS	Global Defence Network Services
GFE	Government Furnished Equipment
GG	Ground Ground
GND	Ground
GP	General Purpose
GUI	Graphical User Interface
HF	High Frequency
HQ	Headquarters
Hz	Hertz
I/O	Input/Output
IP	Internet Protocol
IRR	Instant Recall Recorder
JOC	Joint Operations Centre
JSCSS	Joint Strategic Communications Support Services
JTF(N)	Joint Task Force North
KVM	Keyboard, Video, Mouse
LAN	Local Area Network

LCMM	Life Cycle Material Manager
LED	Light Emitting Diode
LRU	Lowest Replaceable Unit
MACS	Military Aeronautical Communications System
MARCOM	Maritime Command
MCS	Monitoring and Control System
MFIT	Mean Fault Isolation Time
MHz	Megahertz
MPLS	Multiprotocol Label Switching
MS	Microsoft
MTBF	Mean Time Between Failures
MTTR	Mean Time to Repair
MOS	Mean Opinion Score
NDHQ	National Defence Headquarters
NRS	Naval Radio Station
NT	Northwest Territories
ON	Ontario
PC	Personal Computer
PESQ	Perceptual Evaluation of Speech Quality
PTT	Press to Talk
R&O	Repair and Overhaul
RC	Receive Controller
RLPA	Rotatable Log Periodic Antenna
RMS	Root Mean Square
RX	Receive
RTP	Real Time Protocol
SAT	Site Acceptance Test
SATCOM	Satellite Communication
SFDR	Spurious Free Dynamic Range
SIN	Social Insurance Number
SOW	Statement of Work
SQ	Squelch
SSB	Single Sideband
SSN	Social Security Number
TA	Technical Authority
TC	Transmit Controller
TX	Transmit
UHF	Ultra High Frequency
UDP	User Datagram Protocol
UPS	Uninterruptable Power Supply
USB	Upper Side Band
V	Volts
VHF	Very High Frequency
VOIP	Voice Over Internet Protocol
VOX	Voice Operated Switch
W	Watt
WAN	Wide Area Network

1 INTRODUCTION

1.1 Purpose

The purpose of this SOW is to define the work to be performed by the contractor to deliver, install and replace the HF Audio Systems and their associated interface and control networks with a new system of audio equipment, operator processors, control processors, associated interfaces and control networks. The work includes provision of operator, technician and instructor training on the new HF Audio Systems. This SOW provides an overview of the HF Audio System functionality within the CAF Strategic HF Systems, describes the equipment and work required to replace the HF Audio Systems, describes the elements of the HF Audio System Replacement Program, and defines the administrative details of the program. The HF Audio System and associated network interfaces are components of the Military Aeronautical Communications System (MACS), the MARCOM AGA systems located at the Naval Radio Stations (NRSs), the Joint Task Force North (JTFN) HQ HF system, and in two HF system support facilities.

2 HF AUDIO SYSTEM

2.1 Existing Operational Capability

2.1.1 MACS

The MACS HF system provides HF strategic air-ground-air communications used for command and control of Canadian military aircraft and Search and Rescue operations. It is distributed in the regional areas of Edmonton, Trenton and Debert. The stations use a split-site HF station architecture, having receive and transmit sites at the following locations: Riverbend (RX) and Cardiff (TX) for Edmonton, Carrying Place (RX) and Point Petre (TX) for Trenton, and Masstown (RX) and Great Village (TX) for Debert. Under normal operations both the Edmonton and Debert systems are remotely controlled from operator consoles at the Trenton RX site. The MACS system uses HF Audio Systems to provide inter- and intra-site audio and control signal connectivity between radio operator console positions and CAF Strategic HF System radio equipment.

2.1.2 MARCOM AGA

The MARCOM AGA HF system also provides HF strategic air-ground-air communications used for command and control of Canadian military aircraft and Search and Rescue operations, however this system supports maritime flight operations. The MARCOM AGA HF system use a split-site HF station architecture, located in the regional areas of Esquimalt and Halifax, distributing operations, receive and transmit sites at the following locations: the Esquimalt operations centre uses Aldergrove (RX) and Matsqui (TX) and the Halifax Trinity operations centre uses Mill Cove (RX) and Newport Corners (TX). The MARCOM AGA system uses HF Audio Systems to provide inter- and intra-site audio and control signal connectivity between radio operator console positions and CAF Strategic HF System radio equipment.

2.1.3 JTFN HQ

The JTFN HQ HF system also provides HF strategic communications used for command and control of Canadian military units and Search and Rescue operations in the Arctic. This network is based at the control site in the JOC in the HQ building in Yellowknife and employs the Ptarmigan Lake (RX) and Kam Lake (TX). The JTFN HQ system uses HF Audio Systems to

provide inter- and intra-site audio and control signal connectivity between radio operator console positions and CAF Strategic HF System radio equipment.

2.1.4 HF System Support Facilities

The operational stations are supported by DND facilities at the CFSCE HF Training Facility in CFB Kingston, and the HF Development Laboratory at DND's Uplands site, in Ottawa. The CFSCE HF Training Facility contains identical equipment to the MACS and NRS radio stations to replicate their operations for technician and operator training provided by senior military instructors. The HF Development Laboratory contains identical equipment to the MACS and NRS radio stations to develop system modification prototypes in a non-operational setting prior to system integration, and also to provide control and messaging software fault-finding capability.

2.1.5 HF Audio System Sites

The HF Audio System Sites are:

a. The MACS system operations and receive site, Carrying Place, ON;
b. The MACS system transmit site, Point Petre, ON;
c. The MACS system receive site, Riverbend, AB;
d. The MACS system transmit site, Cardiff, AB;
e. The MACS system receive site, Masstown, NS;
f. The MACS system transmit site, Great Village, NS;
g. The MARCOM West AGA system operations site, Esquimalt, BC;
h. The MARCOM West AGA system receive site, Aldergrove, BC;
i. The MARCOM West AGA system transmit site, Matsqui, BC;
j. The MARCOM East AGA system operations site, Halifax, NS;
k. The MARCOM East AGA system receive site, Mill Cove, NS;
l. The MARCOM East AGA system transmit site, Newport Corners, NS;
m. The JTFN HQ system operations and receive site, Yellowknife, NT;
n. The JTFN HQ system transmit site, Kam Lake, NT;
o. The CFSCE HF Training Facility, CFB Kingston, Kingston, ON;
p. The HF Development Laboratory, DND Uplands Site, Ottawa, ON.

3 HF AUDIO SYSTEM REPLACEMENT PROGRAM

3.1 Scope of Work

The contractor shall perform the activities (manufacture, assemble, integrate, interconnect, deliver, install, test, and train) necessary to provide systems that fully comply with the technical specifications attached in Appendix 1. These activities shall meet the tasks of this audio system replacement SOW. The contractor shall procure or manufacture all necessary equipment, not specifically identified as GFE or in-service operational systems provided by Canada, to accomplish or meet all requirements specified in Appendix 1. All hardware and software provided by the contractor shall be the most recent version of COTS items available.

3.2 Replacement HF Audio System Design Concept

3.2.1 Design Concept Overview

The replacement of the audio system component of the CF HF Radio System shall provide the radio operators the capability to route audio, data message, and control signal traffic between different arrays of radio station operator positions, audio or data message input or output systems and HF station receive or transmit equipment. The design concept for the audio system is broken into the following sub-functionalities:

a. Audio switching functionality;
b. Monitoring and control functionality;
c. Radio control interface functionality;
d. Radio operator console equipment; and
e. Autonomous operations functionality.

3.2.2 Audio Switching Functionality

The audio system shall include audio switching functionality between the various audio inputs and outputs of the strategic HF system, it shall include a monitoring and control functionality at various user levels of audio system access, it shall include a radio control interface functionality that provides an interface between various radio types and various types of common carrier telecommunications circuits, it shall provide the radio operator console equipment and it shall provide any further ancillary interface connectivity equipment to connect radio operator consoles and technician terminals with operational CAF Strategic HF System radio equipment. Essentially, the proposed equipment shall be capable of being operated remotely in an “Any Console, Any Station” configuration with appropriate configuration, supervision, and operator levels of access. In addition, the delivered systems shall have the capability to transition to an IP/Multi Packet Label Switching (MPLS) UDP network in future. The audio switching system functional component of the audio system shall provide the operators with the ability to perform core tasks such as:

a. Operator capability to communicate over HF, VHF, UHF, SATCOM, telephone;
b. Operator capability to key in-service HF transmitters;
c. Operator capability to control radio gain and squelch;
d. Operator capability to operate main and stand-by radios;
e. Operator capability to perform intercoms between positions;
f. Operator capability to perform phone patches with external telephone subscribers;
g. System Administrator capability to modify the touch interface (look and feel);
h. System Administrator capability to view system diagnostics;
i. System Administrator capability to modify user profiles;
j. System Administrator capability to notify operators of configuration changes;
k. System Administrator capability to send instant messages to operators;
l. System Administrator capability to activate or deactivate user features; and
m. System Administrator capability to monitor up to 12 operators.

3.2.3 Monitoring and Control Functionality

The monitoring and control functional component of the audio system shall:

a. Allow the technician user to monitor and reconfigure the audio switching;

b. Provide a remote session that shall be capable of both configuration or administrative sessions running on a remote networked monitoring and control PC;
c. Provide a login dialog box that shall allow a technician user to enter their username and password, and then select OK to login;
d. Allow a technician user to logout when in a configuration session of the monitoring and control PC;
e. Allow a technician user the option to lockout the monitoring and control PC in order to prevent unauthorized access should the user need to step away from the PC;
f. Allow a technician user to have a diagnostics session with an alarm management component;
g. Allow a technician user to have a system setting database configuration session;
h. Allow a technician user to have an operational configuration session; and
i. Allow a technician user to have an administrative session.

3.2.4 Radio Control Interface Functionality

The radio control interface functional component of the audio system shall:

a. provide a multi-purpose interface that shall connect radios to various types of common carrier telecommunications circuits;
b. be compatible with new digital technologies such as IP/MPLS, DSL, T1, or modem, etc. to transfer audio and data between the local and remote sites; and
c. be connected directly, via the ancillary interface connectivity equipment, to the audio switching system functional component, to the monitoring and control functional component and to external site to site communication circuits.

3.2.5 Radio Operator Console Equipment

The operators consoles located at all control sites shall have an identical hardware configuration, but shall be software configurable in accordance with the specific requirements of the individual sites and, as a minimum shall include the following features:

a. 1 x Data Modem;
b. 1 x Touch Screen;
c. 2 x Speakers;
d. 1 x Headset Jackbox;
e. 1 x Headset and Handset;
f. 1 x Footswitch;
g. 1 x Gooseneck Microphone;
h. 1 x Crypto Headset Jackbox, and
i. 1 x 600 ohm recording port.

3.2.6 Autonomous Operations

The HF Audio Systems shall have the capability, without major equipment modifications, to be operated remotely in an “Any Console, Any Station (ACAS) configuration”. However, if communications are lost between Trenton and the MACS remote sites then the remote sites shall be capable of Autonomous Operation with control from the RX Site at Riverbend and the TX site at Gt. Village. If communications are lost between the MARCOM AGA control and remote sites then the remote sites shall be capable of Alternate Operation between the East and West Coasts with cutover control at Matsqui and Newport Corners.

3.2.7 Replacement HF Audio System Design Concept And Block Diagrams

The technical specification for the HF Audio System is attached as Appendix 1. Generic block diagrams showing the connectivity required for the MACS, MARCOM, JTFN HQ and support facility locations is attached as Appendix 2.

3.2.8 System Design Constraints

In the development of the overall system the following operational conditions apply:

a. The existing HF receivers, receive RF antenna matrices, and antennas will continue to be used;
b. The existing HF transmitters, transmit RF antenna matrices, and antennas will continue to be used;
c. The existing HF radio ancillary equipment such as RF exciters, RF adaptive controllers, RF modems will continue to be used;
d. The existing back-end systems connected to the HF systems will continue to be used; and
e. The existing cryptographic systems connected to the HF systems will continue to be used.

3.2.9 System Design Exceptions

The HF Audio System replacement program does not require the contractor to directly provide control of the HF radio equipment listed in paragraph 3.2.7, beyond functional connectivity to that equipment.

3.2.10 Proprietary and Customised Software Requirements

The complexity of the systems/networks to be delivered by the contractor will necessitate the use of both COTS and customised equipment and software. The Government of Canada acknowledges that the contractor will retain all rights to their proprietary software. The Government of Canada, and DND in particular, require that the contractor provide full details, including any developed code, of all customised software developed for this procurement. The contractor shall be responsible to provide DND with the requisite quantity of software licences for all aspects of the new components of the overall system at all locations.

3.2.11 Equipment Spares Requirement

The contractor shall include a list of Recommended Spares, including quantities of each individual equipment, on a per site basis as well as recommended quantities to be held at the DND central depot in their proposal. The spare parts shall be at the lowest replaceable unit level, replaceable by a technician within one hour, and shall be identifiable, nomenclatured parts. The contractor shall include in their list of Recommended Spares sufficient quantities to replace any unique system module within one hour in the event of module failure. Quantities of spare parts at each site shall be sufficient to result in an overall system availability requirement (99.9999) defined in Paragraph 1.1 of Appendix 1 to this SOW. The contractor shall also supply a complement of depot spares equal to the site spares required for the largest site in terms of this program. The contractor shall make an optional standing offer for the cost of acquiring additional spares as required.

3.2.11 System In-Service Support

The contractor shall make an optional in-service support proposal to repair faulty spares returned to them as a result of first-line maintenance, fault-finding and replacement activities. Repair turn-

around time will be specified to maintain the overall system availability requirement (99.9999) defined in Paragraph 1.1 of Appendix 1 to this SOW.

3.2.12 Critical Design Review (CDR)

Within sixty (60) days of contract award, the contractor shall host a Critical Design Review Meeting to re-affirm that the Replacement HF Audio System design meets the requirements specified in this SOW. The timing and location of this meeting, shall be recommended by the contractor and agreed to by DND. The contractor shall be represented by the designated Contractor Project Manager, and contractor staff such as managers for the equipment design, system design and integration, production, logistics and/or contracting. The CDR shall be attended by the DND Technical Authority, and Requisitioning Authority, the PWGSC Contracting Authority, and support staff as required. The CDR shall include contractors presentations, including supporting documentation, for all aspects (hardware, software, system interfaces and ancillary elements, etc) of the proposed system design. In addition, the contractor shall confirm the anticipated development and delivery schedules including all testing phases. Agenda items shall include:

a. Introduction of participants;
b. SOW review;
c. RFP response review;
d. HF Audio System Replacement Program project planning, including work package review, project schedule, confirmation of milestone satisfaction criteria and payment schedule;
e. FAT test plan, test schedule and result sign-off;
f. GFE requirements to permit system design, integration and testing;
g. System Integration Responsibility Matrix for both the contractor and DND personnel for physical rack layouts, power requirements, RF and control connectivity requirements, facility infrastructure requirements; contractor/DND manpower requirements and POCs;
h. Transition Plan for old HF Audio System operations concurrent to replacement HF Audio System installation;
i. Tentative Installation schedule;
j. SAT conceptual test plan and result sign-off;
k. Technician and operator training concept (including content and duration) and tentative schedule;
l. System sparing concept and standing offer for additional spares;
m. System warranty;
n. System O&M support options and concepts (out-of-scope for this SOW);
o. Any other outstanding contractual issues; and
p. Contract close-out.

3.3 Factory Acceptance Testing (FAT)

3.3.1 Factory Acceptance Test Plan and Procedures

The contractor shall submit FAT Test Plans and Test procedures for approval by DND as part of their proposal. The Test Plan shall be capable of confirming conformance with the equipment specifications of each type of equipment to be supplied. The Test Plan shall also be capable of confirming conformance with the system specifications of an integrated HF Audio System that is as complex of the CFSCE configuration or higher.

3.3.2 Government Furnished Equipment (GFE)

DND will provide the contractor with Government Furnished Equipment (GFE), itemized as a minimum below, within one (1) month following award of contract, that will be required to allow the contractor to test and integrate complete systems in-factory. DND will provide one (1) complete set of GFE that will be used throughout the factory test and integration of each individual system. Following completion of all Factory Testing the contractor shall be responsible to return all GFE equipment to DND at a location to be determined by DND. The contractor's proposal shall identify the quantities of each piece of GFE equipment that they require to be provided for the Factory Testing.

a. Ethernet Switches;
b. Cisco Routers;
c. Cisco T1 WIC cards;
d. UPS for all equipment;
e. Multiplexer – this equipment will be the direct SIP interface to the external GDNS circuits and will provide both Ethernet and TDM interfaces using standard commercial specifications; and
f. Additional equipment, to that listed above, determined by the contractor to be required for the Factory Acceptance Test shall be identified in their proposal.

3.3.3 Factory Acceptance Tests, Results and Reports

The contractor shall perform a FAT at the contractor's facilities that is in accordance with the test plan. The contractor shall conduct these performance tests on a sample of each type of equipment to be supplied. The contractor shall also conduct functional performance tests on an integrated HF Audio System that is as complex of the CFSCE configuration or higher. Such testing shall establish whether or not the equipment is suitable for acceptance by the Government of Canada. As such, all testing shall be subject to Government of Canada witness and approval. The Government of Canada will not approve the system, sub-system, or equipment item for delivery until it has successfully passed all FATs. The contractor shall not ship systems, sub-systems, or equipment items until approved by the Government of Canada. Approval for shipment of production systems does not relieve the contractor of the responsibility of meeting the requirements of this SOW in full. If subsequent on-site tests reveal deviations from the Technical Specification, the changes required for conformance shall be the responsibility of the Contractor. The contractor shall, after successful completion of the FAT, submit a FAT report to the TA within thirty (30) days. This report shall comprise a copy of the acceptance test procedures with in-plant results recorded, TA sign-off, and copies of any test discrepancies or trouble reports.

3.4 Transition Plan

The Contractor, in conjunction with the DND TA, are responsible to develop a transition plan to permit installation of the replacement HF Audio System concurrent with ongoing operation of the old HF Audio System. The initial installation site shall be at the CFSCE HF Training Facility, CFB Kingston, Kingston, ON. The purpose of this installation shall be twofold. The primary purpose of this installation is to make the CFSCE HF Training Facility operational with the replacement HF Audio System, but of equal importance, the site operations and maintenance training component following from the installation shall train CFSCE instructors and key CAF operations and maintenance personnel on procedures to operate and maintain the system in a non-operational environment in preparation for the subsequent operational site installations and cut-overs.

3.5 Progress Review Meeting

Following successful completion of the initial FAT, the contractor shall host a Progress Review Meeting to re-affirm and update the planned HF Audio System Replacement Program Implementation. The timing and location of this meeting, shall be recommended by the contractor and agreed to by DND. The contractor shall be represented by the designated Contractor Project Manager, and contractor staff such as managers for the equipment design, system design and integration, installation technicians, logistics and/or contracting. The PMR shall be attended by the DND Technical Authority, and Requisitioning Authority, the PWGSC Contracting Authority, and support staff as required. The PMR shall include contractors presentations, including supporting documentation, for all aspects (hardware, software, system interfaces and ancillary elements, etc) of the proposed system integration. In addition, the contractor shall confirm the anticipated delivery and installation schedules including all testing and training phases. Agenda items shall include:

a. Introduction of participants;
b. SOW review;
c. RFP response review;
d. HF Audio System Replacement Program project planning, including outstanding work package review, updated project schedule, confirmation of milestone satisfaction criteria and payment schedule;
e. Confirmation of infrastructure requirements to permit system integration and testing;
f. Update to the System Integration Responsibility Matrix for both the contractor and DND personnel for physical rack layouts, power requirements, RF and control connectivity requirements, facility infrastructure requirements; contractor/DND manpower requirements, contractor and DND POCs, and site access and visit clearance requirements;
g. Update to the Transition Plan for old HF Audio System operations concurrent to replacement HF Audio System installation;
h. Installation schedule;
i. SAT test plan and result sign-off;
j. Technician and operator training concept (including content and duration) and schedule;
k. System spares delivery;
l. System warranty update;
m. System spare standing offer
n. System O&M support options and concepts (out-of-scope for this SOW);
o. Any other outstanding contractual issues; and
p. Contract close-out.

3.6 Shipping

Following completion of the FAT and Progress Review Meeting it is the responsibility of the contractor to organise and facilitate the shipment of systems and spares to each of the individual DND locations.

3.7 Installation

3.8.1 Installation Teams

The Contractor is responsible to designate and provide the members of their installation team. Team members shall be suitably qualified to perform the work specified in this SOW, and the installation team supervisor shall meet the minimum qualifications specified in paragraph 4.3.

3.8.2 Additional Hardware Requirements

The Contractor shall provide any additional hardware such as miscellaneous hardware, cables, fasteners, specialized punch-down tools, rack adapter plates, power strips, circuit breakers, fuses as required to required to complete the installation.

3.8.3 Site Infrastructure and Interfaces – DND Responsibilities

The site infrastructure and cabling interface fixtures will be provided by DND and will include:

a. Provision and installation of overhead cable raceways;
b. Provision of AC power outlets (110 volt 15 amp);
c. Antenna matrix feed cable connectivity; and
d. Control network connectivity.

3.8.4 Site Access Constraints

The contractor should note that the access to DND facilities or systems may be pre-empted by operations at any time and that due to operational requirements, the contractors times of access could be outside of the period 0800 hours to 1700 hours.

3.8.5 Site Acceptance Test Plan and Procedures

The contractor shall submit SAT Test Plans and Test procedures for approval by DND as part of their proposal. The Test Plan shall be capable of confirming conformance with the system specifications of the integrated HF Audio System at each site.

3.8.6 Site Acceptance Testing

The contractor shall perform a SAT for the HF Audio System and associated interface and control networks following each on-site installation. The TA or his representative will witness and verify the SAT. The contractor shall establish, via the SAT, whether or not the equipment and the site installation are suitable for acceptance by the Government of Canada. The contractor shall furnish all test equipment required to conduct the SAT. The Government of Canada will provide participating resources for the SAT. The contractor shall provide assistance in the resolution of technical problems associated with system integration. TA written acceptance of SAT test results shall constitute acceptance of the installation. If the SAT cannot be performed because of facility deficiencies, and if the deficiencies cannot be resolved within 48 hours, the physical installation will be accepted if the work is done to industry workmanship standards. However, a contract option to perform the SAT at a later date, once facility deficiencies have been resolved, will be invoked. Once the Government of Canada accepts a SAT, the Contractor shall provide a SAT report to the TA. This report shall comprise a copy of the acceptance test procedures with on-site recorded results, TA sign-off and copies of any test discrepancies or trouble reports.

3.8.7 Installation Documentation

Within thirty (60) days of Government of Canada acceptance of each site SAT, the contractor shall provide the TA with reproducible electronic copies of the following installation documentation:

a. Overall system end to end configuration of each site;
b. Basic equipment operating manuals;
c. Basic equipment maintenance manuals;
d. Customised GUI description and display layouts for each site;
e. Customised software descriptions, flow charts and coding; and
f. As-built site drawings and cross connectivity tables for each site.

3.8 Equipment Spares

The contractor and the TA or his representative will witness and verify on-site quantities of spare parts at each site during the site installation. Supply depot personnel will accept the depot spares under the dues in process.

3.9 Existing Equipment Removal and Disposal

DND will be responsible for the removal and disposal of all in service equipment that becomes obsolete following the installation of the HF Audio System Replacement Program. In addition, DND will be responsible for the removal and disposal of all in service material, cabling and software associated with the equipment to be removed. The equipment that will be removed is detailed in Appendix 4 to this SOW. The availability of modern technology has determined that this replacement program does not necessarily require it to be a “direct one for one” equipment replacement – this concept is depicted in Appendix 2 and 3 of this SOW.

3.10 Training

3.11.1 Technician and Operator Training

The contractor shall be responsible for carrying out training of personnel (to be selected by the Government of Canada), for both technicians and operators, following installation at each DND location. Based upon the requirement that the control and software capabilities be provided for each of the above functions, there will be a different requirement for the two (2) independent training course structures and content. The technician training shall be undertaken at all sites following completion of the installation for a maximum of 10 (10) DND personnel. The Operator training shall be undertaken at CFB Halifax, CFB Trenton and CFB Esquimalt. This training shall be undertaken following completion of the installation for a maximum of ten (10) DND personnel. It is the responsibility of the contractor to provide details of the recommended content and duration for each individual course as part of their proposal, and shall be based upon the criteria detailed in Paragraph 4.11 of this SOW.

3.11.2 Training Course Requirements

The contractor shall carry out all the necessary work to deliver a training package to provide the basic theory, safety precautions, site level 1 and 2 maintenance and trouble-shooting procedures to train DND personnel. The contractor shall also carry out all the necessary work to deliver a training package to train military instructors to provide the basic theory, safety precautions, site level 1 and 2 maintenance and trouble-shooting procedures to DND personnel. The contractor

shall produce a Training Manual for each student that shall be retained by the student. A copy of all training documentation provided to the students shall be provided to the Technical Authority.

4 PROGRAM ADMINISTRATION

4.1 DND Technical Authority (TA)

The TA for the HF Audio System Replacement Program shall be DJSCS. All technical and operational concerns relating to this program shall be directed to:

Mr. Steve Dunnill
Lead HF Radio and Antenna LCMM
Department of National Defence
NDHQ/DJSCS
101 Col. By Dr.
Ottawa, ON
K1A 0K2

Telephone: (613) 991-9393
Facsimile: (613) 991-2681
E-Mail: stephen.dunnill@forces.gc.ca

4.2 Contractor Project Manager (CPM)

The contractor shall designate an overall point of contact for this contract, hereafter called the Contractor Project Manager (CPM). The contractor shall provide point of contact information and a brief biography outlining the CPM's position in the contractor's organization, and the CPM's professional qualifications and experience pertinent to this program as part of their proposal. The CPM shall demonstrate, in the biography, that he or she has completed a minimum of two multi-site, remote controlled HF Audio System development, provision, installation and training programs similar to the complexity of the MACS HF Audio System Replacement component of this SOW. The CPM shall be the primary interface between the contractor and the TA. The CPM shall be fully responsible for successful completion of HF Audio System Replacement Program. The CPM shall have full authority within the contractor organization to assign and schedule the resources required to design, manufacture, deliver, install and provide operator and technician training for the HF Audio System Replacement Program.

4.3 Contractor Installation Team Supervisor

The contractor shall designate the installation team supervisor for each installation site. The contractor shall provide a brief biography outlining the installation team supervisor's position in the contractor's organization, and the installation team supervisor's professional qualifications and experience pertinent to this program as part of their proposal. The installation team supervisor shall demonstrate, in the biography, that he or she has completed a minimum of two multi-site, remote controlled HF Audio System installations similar to the complexity of the MACS HF Audio System Replacement component of this SOW.

4.4 Contractor Instructor

The contractor shall designate the instructor for the technician and operator training. The contractor shall provide a brief biography outlining the instructor's position in the contractor's organization, and the instructor's professional qualifications and experience pertinent to this program as part of their proposal. The instructor shall demonstrate, in the biography, that he or she has completed a minimum of two multi-site, remote controlled HF Audio System train the trainer programs similar to the requirement for the CFSCE HF Audio System training component of this SOW.

4.5 Right of Access

The Government of Canada shall have the right to monitor the work in progress at all times. The contractor shall allow the Government of Canada access to the facilities where the work is being performed at all times. Opportunities for informal technical dialogue between the TA, his designated agents, and the assigned contractor personnel shall be provided on a continual and cooperative basis.

4.6 Visit Clearance

All contractor personnel visiting the MACS and MARCOM communications locations shall be subject to the approval of the Government of Canada. The contractor shall furnish the Government of Canada with the following information at least 30 calendar days in advance of the planned date of departure:

a. Full name of traveler;
b. SSN or SIN number, or equivalent;
c. Date and place of birth;
d. Citizenship;
e. Date of departure and duration of visit; and
f. Itinerary and purpose.

4.7 Summary of Deliverables

4.7.1 General

The CPM shall be responsible for the timely arrival and quality control of all contract deliverables.

4.7.2 System Deliverables

Unless otherwise stated, the contractor shall provide the hardware items for this HF Audio System replacement program. As a minimum the hardware shall be in accordance with the requirements detailed in the HF Audio System specification which is an integral part of this SOW. The proposed list of key deliverables for each site follows.

4.7.2.1 MACS System Operations and Receive Site, Carrying Place, ON

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;
b. IP Network interfaces to provide Any Console Any Station operation;
c. Access and control of all transmitters and receivers at Debert and Edmonton sites over T1, IP, 4W E&M and/or V.35 telco circuits;
d. Five (5) 4W E&M transmitter interfaces;
e. Redundant IP interfaces with appropriate interface control devices to control the A & B receiver control processors;
f. Redundant IP interfaces with appropriate interface control devices to control the A & B transmitter control processors;
g. Eighteen (18) 4W E&M monitor receiver interfaces;
h. Five (5) 4W E&M receiver interfaces;
i. Twelve (12) FXO and Twelve (12) FXS interfaces for Ground/Ground patching;
j. Local administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
k. Remote administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
l. Ancillary equipment as required; and
m. Six (6) Radio Operator Console Equipment positions, as listed in paragraph 3.2.5.

4.7.2.2 MACS System Transmit Site, Point Petre, ON

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces.

4.7.2.3 MACS System Standby Operations and Receive Site, Riverbend, AB

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;
b. IP Network interfaces to provide Any Console Any Station operation;
c. Access and control of all transmitters and receivers by the Carrying Place operations site over T1, IP, 4W E&M and/or V.35 telco circuits;
d. Fallback capability to local control of all Cardiff transmitters and Riverbend receivers in the event of failure of the network connection;
e. Five (5) 4W E&M transmitter interfaces;
f. Redundant IP interfaces with appropriate interface control devices to control the A & B receiver control processors;
g. Redundant IP interfaces with appropriate interface control devices to control the A & B transmitter control processors;
h. Eighteen (18) 4W E&M monitor receiver interfaces;
i. Five (5) 4W E&M receiver interfaces;
j. Twelve (12) FXO and Twelve (12) FXS interfaces for Ground/Ground patching;
k. Local administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;

l. Remote administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
m. Ancillary equipment as required; and
n. Four (4) Radio Operator Console Equipment positions, as listed in paragraph 3.2.5.

4.7.2.4 MACS System Transmit Site, Cardiff, AB

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;

4.7.2.5 MACS System Receive Site, Masstown, NS

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces.

4.7.2.6 MACS System Standby Operations and Transmit Site, Great Village, NS

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;
b. IP Network interfaces to provide Any Console Any Station operation;
c. Access and control of all transmitters and receivers by the Carrying Place operations site over T1, IP, 4W E&M and/or V.35 telco circuits;
d. Fallback capability to local control of all Great Village transmitters and Masstown receivers in the event of failure of the network connection;
e. Five (5) 4W E&M transmitter interfaces;
f. Redundant IP interfaces with appropriate interface control devices to control the A & B receiver control processors;
g. Redundant IP interfaces with appropriate interface control devices to control the A & B transmitter control processors;
h. Eighteen (18) 4W E&M monitor receiver interfaces;
i. Five (5) 4W E&M receiver interfaces;
j. Twelve (12) FXO and Twelve (12) FXS interfaces for Ground/Ground patching;
k. Local administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
l. Remote administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
m. Ancillary equipment as required; and
n. Four (4) Radio Operator Console Equipment positions, as listed in paragraph 3.2.5.

4.7.2.7 MARCOM West AGA System Operations Site, Esquimalt, BC

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;
b. IP Network interfaces to provide Any Console Any Station operation;
c. Access and control of all transmitters and receivers at Debert and Edmonton sites over T1, IP, 4W E&M and/or V.35 telco circuits;
d. Five (5) 4W E&M transmitter interfaces;
e. Redundant IP interfaces with appropriate interface control devices to control the A & B receiver control processors;
f. Redundant IP interfaces with appropriate interface control devices to control the A & B transmitter control processors;
g. Eighteen (18) 4W E&M monitor receiver interfaces;
h. Five (5) 4W E&M receiver interfaces;
i. Twelve (12) FXO and Twelve (12) FXS interfaces for Ground/Ground patching;
j. Local administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
k. Remote administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
l. Ancillary equipment as required; and
m. Four (4) Radio Operator Console Equipment positions, as listed in paragraph 3.2.5.

4.7.2.8 MARCOM West AGA System Receive Site, Aldergrove, BC

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site link interface to carry voice over a max of 10 4W E&M interface over T1, IP, 4W E&M and/or V.35 telco circuits.

4.7.2.9 MARCOM West AGA System Transmit Site, Matsqui, BC

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site link interface to carry voice & provide PTT control over a max of 10 4W E&M interface over T1, IP, 4W E&M and/or V.35 telco circuits.

4.7.2.10MARCOM East AGA System Operations Site, Halifax, NS

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;
b. IP Network interfaces to provide Any Console Any Station operation;

c. Access and control of all transmitters and receivers at Debert and Edmonton sites over T1, IP, 4W E&M and/or V.35 telco circuits;
d. Five (5) 4W E&M transmitter interfaces;
e. Redundant IP interfaces with appropriate interface control devices to control the A & B receiver control processors;
f. Redundant IP interfaces with appropriate interface control devices to control the A & B transmitter control processors;
g. Eighteen (18) 4W E&M monitor receiver interfaces;
h. Five (5) 4W E&M receiver interfaces;
i. Twelve (12) FXO and Twelve (12) FXS interfaces for Ground/Ground patching;
j. Local administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
k. Remote administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
l. Ancillary equipment as required; and
m. Four (4) Radio Operator Console Equipment positions, as listed in paragraph 3.2.5.

4.7.2.11MARCOM East AGA System Receive Site, Mill Cove, NS

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site link interface to carry voice over a max of 10 4W E&M interface over T1, IP, 4W E&M and/or V.35 telco circuits.

4.7.2.12MARCOM East AGA System Transmit Site, Newport Corners, NS

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site link interface to carry voice & provide PTT control over a max of 10 4W E&M interface over T1, IP, 4W E&M and/or V.35 telco circuits.

4.7.2.13JTFN HQ System Operations and Receive Site, Yellowknife, NT

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;
b. IP Network interfaces to provide Any Console Any Station operation;
c. Five (5) 4W E&M transmitter interfaces;
d. Redundant IP interfaces with appropriate interface control devices to control the A & B receiver control processors;
e. Redundant IP interfaces with appropriate interface control devices to control the A & B transmitter control processors;
f. Eighteen (18) 4W E&M monitor receiver interfaces;
g. Five (5) 4W E&M receiver interfaces;
h. Twelve (12) FXO and Twelve (12) FXS interfaces for Ground/Ground patching;
i. Local administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;

j. Remote administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
k. Ancillary equipment as required; and
l. Four (4) Radio Operator Console Equipment positions, as listed in paragraph 3.2.5.

4.7.2.14JTFN HQ System Transmit Site, Kam Lake, NT

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces.

4.7.2.15CFSCE HF Training Facility, CFB Kingston, Kingston, ON

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Simulated site μW link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;
b. IP Network interfaces to provide Any Console Any Station operation;
c. Five (5) 4W E&M transmitter interfaces;
d. Redundant IP interfaces with appropriate interface control devices to control the A & B receiver control processors;
e. Receive site simulation interface to carry voice over a max of 10 4W E&M interface over T1, IP, 4W E&M and/or V.35 telco circuits;
f. Redundant IP interfaces with appropriate interface control devices to control the A & B transmitter control processors;
g. Transmit site simulation interface to carry voice over a max of 10 4W E&M interface over T1, IP, 4W E&M and/or V.35 telco circuits;
h. Eighteen (18) 4W E&M monitor receiver interfaces;
i. Five (5) 4W E&M receiver interfaces;
j. Twelve (12) FXO and Twelve (12) FXS interfaces for Ground/Ground patching;
k. Local administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
l. Remote administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
m. Ancillary equipment as required; and
n. Four (4) Radio Operator Console Equipment positions, as listed in paragraph 3.2.5.

4.7.2.16HF Development Laboratory, DND Uplands Site, Ottawa, ON

The site HF Audio System shall be provided with the necessary equipment to support the following functionality:

a. Site link interface to carry voice & provide PTT control over a maximum of ten (10) 4W E&M interfaces;
b. IP Network interfaces to provide Any Console Any Station operation;
c. Five (5) 4W E&M transmitter interfaces;
d. Redundant IP interfaces with appropriate interface control devices to control the A & B receiver control processors;

e. Receive site simulation interface to carry voice over a max of 10 4W E&M interface over T1, IP, 4W E&M and/or V.35 telco circuits;
f. Redundant IP interfaces with appropriate interface control devices to control the A & B transmitter control processors;
g. Transmit site simulation interface to carry voice over a max of 10 4W E&M interface over T1, IP, 4W E&M and/or V.35 telco circuits;
h. Eighteen (18) 4W E&M monitor receiver interfaces;
i. Five (5) 4W E&M receiver interfaces;
j. Twelve (12) FXO and Twelve (12) FXS interfaces for Ground/Ground patching;
k. Local administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
l. Remote administration and maintenance software applications and associated licences and terminal(s) for proposed equipment;
m. Ancillary equipment as required; and
n. Two (2) Radio Operator Console Equipment positions, as listed in paragraph 3.2.5.

4.7.3 Documentation

Unless otherwise indicated, the required reports may be in the contractor's format. Unless otherwise specified, the contractor shall provide electronic copies on MS Office based format and technical drawings in MS Visio format. This documentation shall, as a minimum, include the following:

a. As part of the proposal a point of contact information and a brief biography outlining the CPM's position in the contractor's organization, and the CPM's professional qualifications and experience pertinent to this program;
b. As part of the proposal a detailed description of the concept for integration of the HF Audio System equipment, c/w block diagrams identifying the major functional components proposed for each individual site, and the concept for integration into the strategic HF radio system;
c. As part of the proposal a detailed description of the HF Audio System equipment c/w schematics identifying the major components of each individual unit. The description shall include details of the proposed equipment BITE capability, details of the LRU replacement capability (e.g. hot switchable, power ON/OFF, etc.), and details of actual and/or calculated MTTR and MTBF values for the proposed equipment;
d. As part of the proposal a detailed description of the technician control server processors and the operator console processors, c/w minimum processor requirements and minimum operating system requirements to run the server software applications, operator software applications, and the technician software applications of the HF Audio System;
e. As part of the proposal a detailed specification of the infrastructure requirements to support system integration, testing and operation (e.g RF input specifications, system output connectivity specifications, control system connectivity specifications, input power specifications, physical size, weight and rack space requirements as applicable, and heating/cooling/airflow specifications;
f. As part of the proposal, a list of recommended spares, including the quantity of each individual equipment, on a per site basis, as well as recommended quantities to be held at the DND central depot;
g. As part of the proposal a detailed description of the operator controlled software and the technician controlled software;

h. As part of the proposal a detailed Project Plan identifying CDR meeting, software development, monitor receiver hardware production, FAT, Progress Review Meeting(s), system delivery, system installation, SAT, system spares delivery, technician and operator training and closeout;
i. As part of the proposal advise if an extended warranty period can be provided;
j. As part of the proposal, an optional standing offer itemizing the cost of acquiring additional spares as required;
k. FAT Test Plans and test procedures and final FAT report(s);
l. GFE requirements to permit system design, integration and testing;
m. Transition Plan for old HF Audio System operations concurrent to replacement HF Audio System installation;
n. Installation schedule;
o. Personal information required to request Visit Clearance for contractor personnel on DND sites;
p. Technician and operator training concept (including content and duration and schedule);
q. Minutes of the Critical Design Review Meeting;
r. Minutes of Progress Review Meetings;
s. SAT Test Plans and test procedures and final SAT report(s);
t. Operator training course content and student work packages;
u. Technician training course content and student work packages;
v. Overall system end to end configuration;
w. Basic equipment operating manuals;
x. Basic equipment maintenance manuals;
y. Customised GUI description and display layouts;
z. Customised software descriptions, flow charts and coding;
aa. As-built site drawings and cross connectivity tables.

Appendix 1 V1.6 to
Annex A SOW HF Audio Systems V2.0
Requisition W8474-136546
October 2013

DEPARTMENT OF NATIONAL DEFENCE

TECHNICAL SPECIFICATION

TO REPLACE THE

HIGH FREQUENCY AUDIO SYSTEMS

AT MILITARY AERONAUTICAL

COMMUNICATIONS SYSTEM LOCATIONS,

MARITIME COMMAND LOCATIONS, AND

SUPPORT FACILITY LOCATIONS

TECHNICAL SPECIFICATION FOR THE REPLACEMENT OF HIGH FREQUENCY AUDIO SYSTEMS AT MILITARY AERONAUTICAL COMMUNICATIONS SYSTEM (MACS) LOCATIONS, NAVAL RADIO STATION (NRS) MARITIME COMMAND LOCATIONS, AND SUPPORT FACILITY LOCATIONS

As a minimum, the hardware and software elements within the overall system shall be compliant with the following specifications:

Audio System Hardware Specifications

1 Introduction

1.1 The equipment component of the HF Audio System shall meet or exceed operational requirements for highly reliable (99.9999 availability) radio and telephone communications.

1.2 The HF Audio System shall provide the operators with the ability to perform core tasks such as:

a. Communicate over HF, VHF, UHF, SATCOM, telephone;

b. Provide a keying function for in-service HF Transmitters;

c. Control radio gain and squelch;

d. Supports main and stand-by radios;

e. Perform intercoms between positions; and;

f. Perform phone patches with external telephone subscribers.

1.3 The HF Audio System Administrators shall have additional capabilities including:

a. Modify the touch interface (look and feel);

b. View system diagnostics;

c. Modify user profiles;

d. Notify operators of configuration changes;

e. Instant Message to operators;

f. Activate or deactivate user features; and

g. Monitor up to 12 operators.

1.4 The communication function of the ASF shall be based on user roles.

2 HF Audio System - Reliability & Availability

2.1 The HF Audio System Mean Fault Isolation Time (MFIT) and Mean Time to Repair (MTTR) shall be less than 20 minutes.

2.2 The HF Audio System shall be 100 percent non-blocking

3 HF Audio System – Maintainability

3.1 The HF Audio System maintenance software shall offer functions that include status display, logging functions, system hardware configuration, software updates, diagnostics, system troubleshooting to LRU and verify restored LRUs.

3.2 The HF Audio System shall be provided with automatic fault detection and isolation by Built-In-Test-Equipment (BITE).

3.3 The HF Audio System shall be capable of having any central equipment module replaced without affecting the complete operation of the system.

3.4 The HF Audio System shall be provided with electronic circuit cards that have front panel access and are easy to replace.

3.5 The HF Audio System circuit boards shall be hot replaceable (i.e. replaceable without powering off the circuit board enclosure).

3.6 The HF Audio System circuit boards must be keyed to prevent incorrect insertion.

4 HF Audio System - Air/Ground (A/G) Features (Radio-Specific Functions)

4.1 The HF Audio System shall provide operators and technicians with the following A/G channel controls:

a. TX select;

b. RX select;

c. TX Main/Stby;

d. RX Main/Stby;

e. Headset/speaker; and

f. Volume control and mute.

4.2 The HF Audio System shall enable HF transmission by activation of the PTT footswitch or hand-switch on all selected and activated radio channels.

4.3 The HF Audio System shall not permit more than one operator to transmit on a given radio circuit at any given time.

4.4 The HF Audio System shall provide the operator with the capability to select and deselect the receiver and transmitter associated with a channel.

5 HF Audio System - Linked Air/Ground (A/G) & Ground/Ground (G/G) Features

5.1 The HF Audio System shall be provided with a Patch feature that allows an operator to link audio between resources. All parties using these resources shall be able to communicate without the intervention of the operator who created the patch.

5.2 The HF Audio System shall be provided with the capability to patch telephone circuit with Radio circuits. In patch mode, the radio shall be keyed automatically from the VOX detect feature inherent in the telephone circuits. The HF Audio System operator shall be capable of disabling the VOX keying feature and assisting the telephone communication by keying the radio from its PTT.

5.3 The HF Audio System shall be provided with A/G-G/G coupling for a maximum of three (3) A/G channels and one (1) G/G circuit per position.

5.4 The HF Audio System, from each position, shall be provided with the capability to assign a Direct Access (DA) selector to provide automatic transfer of A/G calls to the speaker during a G/G call.

5.5 The HF Audio System operator shall be provided with the ability to place or receive A/G calls at any time during any G/G call without interrupting the G/G call.

6 HF Audio System – Features

6.1 The HF Audio System shall be provided with a latching button at each console which will allow an operator and a supervisor to communicate via their headsets

6.2 The HF Audio System shall allow supervisors to monitor the audio of up to 12 operators. A single operator can be monitored by up to three (3) supervisors. The following states shall be possible: monitor, barge in, and barge over.

6.3 The HF Audio System shall be provided with an Instant Recall Recorder (IRR).

6.4 The HF Audio System shall be provided with a connection for a voice-logging recorder to record all A/G/A calls, and relief briefings, at each position.

6.5 The HF Audio System recording outputs shall be available in analogue mode 0dB/600 ohms, and in digital mode T1 1.544 Mbps specification.

6.6 The HF Audio System shall be provided with a port to connect to an external time synchronization device to provide time synchronization of all supplied equipment, and provide time displays at each position.

6.7 The HF Audio System shall be provided with position tests for each position that can be invoked on demand by the System Administrators. This feature shall be used to verify the proper operation of all controls, displays, indicators and audio circuits.

7 HF Audio System – Operational Specification for Equipment

7.1 Humidity : 0% to 95%, non-condensing.

7.2 Distortion:

a. Less than 1% Harmonic distortion; and

b. Less than 3% Total distortion (Distortion with noise measurement).

7.3 Hum & Noise: 60 dB below rated output at any port.

7.4 Crosstalk: Less than -60 dB at 0 dBm transmit level (typical-70dB).

7.5 Level Control: Digital Automatic Gain Control (AGC).

7.6 VOX Detect Threshold: Adjustable per radio frequency from -35 dBm to 0 dBm

7.7 Line Balance: 60 dB at 1,004 Hz.

7.8 Line Impedance: 600 Ohm, balanced.

7.9 Line Output: Adjustable from -60 to +5 dBm.

7.10 Line Output Impedance: 600 Ohm.

7.11 Memory Protection: Settings preserved in non-volatile memory.

7.12 Redundant Power Supplies: Accept simultaneous AC power from Feed A, the Main Power Source, and Feed B, the Critical Power Bus, with zero delay load sharing in the event of failure.

7.13 AC Input Voltage: 115 V AC.

8 Monitoring & Control System (MCS) – Specifications

8.1 A MCS shall be provided.

8.2 The MCS terminal shall be coded in a high level structured language.

8.3 The MCS application software, shall allow the user to monitor and reconfigure the HF Audio System.

8.4 The MCS shall not be necessary for on-going HF Audio System operations. Once the initial “On-Line” database containing both the physical and virtual circuit parameters and layouts is uploaded, it shall be able to be disconnected.

8.5 The MCS shall be attached directly to the HF Audio System central equipment.

8.6 The MCS shall be capable of remotely running configuration and administrative software on a remote networked MCS PC.

8.7 A MCS login dialog box shall allow a user to enter their username and password, and then select OK to login.

8.8 The MCS shall allow, when in the configuration session of the MCS menu, the user to be able to select Logout. The user shall be asked to confirm their request to logout by selecting "Yes" when a login dialog box appears.

8.9 MCS user shall have an option to lock the MCS application in order to prevent unauthorized access should the user need to step away from the PC.

8.10 The MCS application shall have, as a minimum, the following user sessions:

a. An administrative session.

b. An operational configuration session;

c. A MCS database configuration session;

d. A diagnostics session with an alarm management component;

e. A software upgrade session:

f. A System Status Monitoring session;

g. An operator position configuration session;

h. An Advanced Reconfiguration session;

i. A core configuration session.

8.11 The MCS application shall have direct access to all data required for configuration and monitoring of all radio control interface networks.

8.12 The MCS shall be able to communicate to a minimum of 100 radio control interfaces nationwide.

8.13 The MCS shall be accessible via an ethernet port of the control radio control interface.

8.14 The MCS application shall operate on a contemporary Windows operating system.

8.15 The radio control interface shall be capable of communicating with 4 different MCS simultaneously.

8.16 The MCS position shall be provided with the capability to view the operational status of each radio control interface.

8.17 The MCS position shall be provided with the ability to remotely view the operational status of any other HF Audio System radio control interface connected through a telco circuit.

8.18 The MCS position shall report and display local and remote BITE alarms reported by the HF Audio System.

8.19 The MCS shall timestamp all alarm reporting.

8.20 The MCS shall store all reported alarms on its hard drive.

8.21 Any failure of the MCS shall not affect the operation of any radio control interface.

8.22 The user I/F of the MCS shall be configurable for French or English operation.

8.23 The MCS shall be capable of independently configuring, monitoring, maintaining and troubleshooting any radio control interface and any associated remote radio control interface(s) nation-wide.

8.24 The MCS shall be provided with the capability to replicate complete radio control interface configuration from one Radio Control interface to another for quick creation and definition of a new Radio Control interface.

8.25 The MCS shall be provided with the capability of editing the radio control interface configuration locally at the MCS and pushing/saving the new configuration to the radio control interface when ready.

8.26 The MCS shall be provided with the capability to download a new software version into a radio control interface individually.

8.27 The MCS shall be provided with the capability to store the complete configuration of each radio control interface locally for backup purposes.

8.28 The MCS shall be provided with the capability to transfer and retrieve complete radio control interface configurations from one MCS to another.

8.29 The MCS shall be provided with the capability to retrieve and display the software version of any radio control interface.

8.30 The MCS shall be provided with the capability to broadcast configuration/firmware to multiple radio control interfaces using timer and batch files.

8.31 The MCS shall be provided with the capability to search among all alarm types, radio control interface IDs, or timeframes stored in the MCS log database.

8.32 The MCS shall be provided with the capability to view the discrete I/O state of a local or remote radio control interface.

8.33 The MCS shall be provided with the capability to control the output state of a discrete I/O at a remote radio control interface.

8.34 The MCS shall report and display alarms associated with input I/O transitions at remote radio control interfaces.

8.35 The MCS shall display the link state between local and remote end and shall generate alarms upon receiving fault detection from the link, or from either radio control interface.

8.36 The MCS shall receive from each radio control interface, or group of radio control interfaces cascaded together, the following status:

a. Radio control interface and associated telecom links are normal;

b. Radio control interface hardware failure but no loss of service;

c. Radio control interface hardware failure but some services are lost;

d. Hardware failure and all telco services are lost;

e. Maintenance mode;

f. One of the telecom links connected to the Radio Control interface has failed; and

g. Loss of a power source (either AC or DC).

8.37 The MCS shall have 3 states for each link status shall have 3 states:

a. Operational;

b. Degraded; and

c. Failed.

8.38 The radio control interface shall be provided with the capability to be put in maintenance mode, causing reporting of alarms and automatic actions to be suspended

8.39 The radio control interface shall be in degraded mode if it is unable to carry all the functions for which it was configured, including redundancy.

8.40 The MCS software shall support the following minimum password-protected roles and user access levels:

a. The role of system status monitoring. (read only access). This role can be assumed by anyone and shall be the default role;

b. The role of telecom circuits management;

c. The role of radio control interface management;

d. A maintenance role, which allows online parameter changes only;

e. The role of configuration control and administration of software release and system upgrade; and

f. The role of system administration to define user roles, access rights, privileges, group passwords, and other system administration duties.

9 MCS – Security

9.1 The MCS shall provide security privilege control functions to allow the system maintainer to set different operator privileges. These control functions shall be password protected, with minimum length of password 8 digits, and the passwords shall support uni-code.

9.2 The MCS application shall provide a minimum of five(5) main sessions that may be active at any time. These sessions shall allow the user access to different but related aspects of the MCS monitoring, managing and reconfiguring the HF Audio System. The sessions shall consist of:

a. Configuration session;

b. Supervisory session;

c. Maintenance session;

d. Administrative session; and

e. Operator position session.

9.3 The MCS configuration session shall be used to define and set the properties of the HF Audio System hardware, monitor and interact with the on-line diagnostics and to configure the screen layouts, mapping them to users.

9.4 The MCS supervisory session shall be used as an operator position server for the supervisor to create/modify and dynamically assign operator position configurations to the positions.

9.5 The MCS administrative session shall be used to control the network server, ensure the exchange of information between positions, monitor network events and store database information.

9.6 The MCS operator position session shall only include operator position components and is the touch-screen operational component of the software. Operator position sessions used by the operators shall be separate from the MCS.

10 MCS – Users

10.1 The MCS shall allow different categories of users depending upon login permissions. As a minimum, the MCS shall support the following user categories:

a. Monitor the state of the hardware components;

b. Upgrade equipment hardware and software components;

c. Adjust system and trunk parameters; and

d. Make operational changes in HF Audio System position configurations and databases.

10.2 The MCS security subsystem shall be based on user logon identification. Security data shall be stored in a security database and must be in an encrypted form

10.3 The MCS shall have a minimum five (5) predefined user roles identified as:

a. Super-user - shall have use of all sessions listed in Paragraph 8.10;

b. Administrator – shall have use of the following sessions listed in Paragraph 8.10 (a, b, c, d, f and g)

c. Supervisor - shall have use of the following sessions listed in Paragraph 8.10 (a, b, d, f and g)

d. Technician - shall have use of the following sessions listed in Paragraph 8.10 (c, d and f)

e. Operator - shall have use of the following session listed in Paragraph 8.10 (g)

10.4 The MCS shall require a username and password to be assigned in order to add a user.

11 MCS - Roles (Categories)

11.1 The MCS shall have two (2) levels of System Administrators:

a. A Level 1 System Administrator shall be able to create users on the MCS system, assign user permissions and passwords, create/modify operator position sectors, create and modify global database elements, create backup archives of the databases and log files and view operational activity on the MCS terminals; and

b. A Level 2 System Administrator shall be able to create/modify operator position sectors, create and modify global database elements, and create backup archives of the databases and log files.

11.2 MCS Maintenance Technicians shall maintain the hardware in the central equipment and the validity of the MCS Database:

a. Level 1 - Supervisor/Administrator;

b. Level 2 - System Maintainer (Full Access); and

c. Level 3 – System Technician (Limited Access).

11.3 The MCS shall provide the capability to define a role in such a way that an alarm is activated if this role is not assigned to any operator position.

11.4 The MCS shall provide the capability to assign any operator role or combined operator roles to any physical operator position.

11.5 Monitoring & Control System (MCS) – Diagnostics

11.6 The HF Audio System shall provide a minimum of three (3) methods of diagnosing system malfunctions.

a. the MCS diagnostics interface;

b. the diagnostic LEDs located on module faceplates; and

c. Position tests available at each position.

11.7 The diagnostic software in the HF Audio System shall be embedded in each microprocessor and become active immediately upon the completion of power-on self tests after power is applied to the module. All modules shall become ‘active and online’ immediately after power up and no user intervention shall be required to initiate online diagnostic.

11.8 The MCS diagnostics, when selected, shall utilize a flow diagram that appears within the workspace. When the user selects a node from the tree, extra context information shall appear on the rest of the MCS workspace.

11.9 The MCS shall utilize a message window to show the last 50 messages received at the MCS from the HF Audio System.

11.10 The MCS shall incorporate a status icon that displays the summary state of the major system component and can be selected for detailed information.

11.11 All of the modules and power supplies in the HF Audio System shall have error/status indicator LEDs on their front panel.

11.12 Depending upon the nature of the HF Audio System message, messages shall be displayed in a minimum of three (3) different colors:

a. Black - Information messages, such as software version and some warnings;

b. Green - Normal state of a component; and

c. Red - All component and system malfunctions.

12 MCS - Register

12.1 The MCS event register shall log system-wide events. These events shall include, who has logged in/out (each login or attempt to login as well as each logout and the date/time is registered by the register), which databases were opened and closed, which MCS position was connected/disconnected and whether an incorrect password was used.

13 MCS - Mission Menu

13.1 The MCS Mission Menu shall allow the Supervisor/Administrator to change the assigned resources in real time as needs change or provide a list of allowable roles that the user may use.

14 MCS - Mission Map

14.1 The MCS Mission Map menu shall allow the Administrator to assign one or many operator position roles to specific workstations. The next time a user logs into the position they shall be presented with a list of allowed operator position roles. The user shall be able to select multiple roles if desired.

14.2 The MCS Mission Map shall permit selection of a new configuration or mission at a position must be possible without having to logout, and without affecting communication in progress.

14.3 The MCS Mission Map shall permit mission changes to be manually confirmed at any affected operator position without time limitation. The new layout must only be activated

when the operator presses the confirmation button, until then the old layout must remain active.

15 MCS - System Menu

15.1 The MCS System Menu shall include all MCS tools that allow a user to create, modify, import or export the system MCS database.

16 MCS – Statistics/Diagnostics

16.1 The MCS terminal shall perform events recording as follows:

a. Telephone calls;

b. Radio frequencies selections;

c. PTT actions; and

d. Configuration changes, tables modifications.

16.2 The MCS recorded data shall provide the capability to be viewed, and to be printed.

16.3 The MCS recorded data shall be stored in the system to perform statistics calculations. Capacity storage shall be for one month of operations as a minimum.

16.4 The MCS shall provide a capability to allow the administrator to consult a daily log for each individual workstation and shall include the time-stamped communication actions and events.

16.5 The MCS shall provide a diagnostics log in which all system alarms are captured.

17 MCS - System Log

17.1 The MCS System Log function shall allow an administrator to access all database modifications performed over the previous 30-day period.

17.2 The MCS shall save each database in a file with the filename having the following format: date-time + operation-type name + user.

17.3 The MCS System Log dialog box shall allow the MCS administrator to refer to the maintenance history of the system.

17.4 The MCS System Log shall not permit any attempt to delete the Maintenance file before 30 days.

17.5 The MCS System Log shall include a notes section that allows the MCS administrator to add comments to the log file.

18 MCS - Status Display

18.1 A MCS status screen shall display HF Audio System graphics and provide various indicators that relay the state of the system

18.2 The MCS Status Display shall, as a minimum, show indicators in green, yellow, or red, depending on whether the device indicated is working properly, synchronizing or failed.

18.3 The MCS Status Display shall provide a detailed diagnostics screen when the MCS administrator clicks on a yellow or red indicator

19 MCS - File Transfer Protocol (FTP) Upload

19.1 The MCS software shall be uploaded to the system processors via FTP utilising the system LAN. This upload function shall be occur automatically upon boot-up of the system or when triggered manually by the user.

20 MCS – Archive

20.1 The MCS Archive feature shall allow the user to backup and restore system databases.

21 MCS – Help

21.1 The MCS Help menu shall open the MCS user manual in a window, providing help information regarding the MCS system in PDF format.

21.2 The MCS Help menu shall also provide information about the MCS database, disc space usage and disk space available on the MCS disc.

21.3 The MCS Help menu shall display the software version number.

22 MCS - Monitor Users

22.1 The MCS Monitor Users feature shall allow for the monitoring of the activity on all MCS workstations.

22.2 The MCS Monitor Users feature display shall show which operators are logged in, when they logged in/out, what Operator Position configuration file they are using and what position they are using

23 MCS - Sound Alerts

23.1 The MCS shall support a database that contains all possible diagnostic audible alarms.

23.2 The MCS, by default for any system malfunction, shall generate a report and depending upon the settings of the sound database, the MCS shall generate either a .wav file or short system beeps

23.3 The MCS shall provide a feature that when a user acknowledges an alarm, the corresponding audible alarm shall be turned off. Also, audible alarms shall cease if the problem self-corrects.

24 Operator Position Control – Specifications

24.1 The operator positions shall each be equipped with A/G and G/G controls.

24.2 The operator positions shall each include the position equipment and touch screen with an Operator Position electronic to perform all A/G/A functions.

24.3 The operator Graphical User Interface operator position shall operate on the SUN® JVM Engine or any equivalent modern engine to provide maximum stability and platform independence.

24.4 The Operator Position screen shall consist of the following components:

a. Static Row;

b. Functional Column;

c. Navigation Row; and

d. Display Workspace for Screen displays (several types).

24.5 An Operator Position display consisting of multiple pages shall have a row of page Tabs. These page tabs shall allow the operator to rapidly switch between pages in the current display.

25 Operator Position Control – Display

25.1 The operator display shall provide a “Clean” button that allows an operator to temporarily turn off the touch-screen so they can clean the monitor without activating any buttons.

25.2 The operator display shall have the following five (5) pages:

a. System page;

b. Screen page;

c. Password page;

d. Communications page; and

e. Network page.

25.3 The system page shall display system status information including the time of day, the state of the systems links, and current login information.

25.4 The operator display system shall allow the operator to adjust button brightness, screen contrast, and to clean the screen.

25.5 The operator password page shall be used to change the operator's password.

25.6 The operator communications page shall be used to set the COM port.

25.7 The operator network page shall be used to specify the server address and port, and to name the workstation.

26 Operator Position Control - Features

26.1 The operator position control shall include a configuration button that blinks when a supervisor has changed the configuration file. Clicking on the configuration button when it is blinking shall prompt the operator to accept or reject the change.

26.2 The operator position control shall include a Change Close button that brings up a dialog box where the user will be able to select a new Operator Position configuration.

26.3 The operator position control shall include a Custom Broadcast button that allows the operator to create custom groups of frequencies and be able to transmit (broadcast) on all the frequencies in the group.

26.4 The operator position control shall include a Status indicator that indicates the name of the current display.

26.5 The operator position control shall include a LAN status indicator that indicates (by color) the computer's state of the connection(s) to the LAN. Green shall mean the connection is OK with the HF Audio System server. Yellow shall mean the computers are in the process of connecting. Red shall mean there is no connection.

26.6 The operator position control shall include a position status indicator that indicates (by color) the state of the connections to the HF Audio System Central equipment. Green shall mean the connection is OK. Yellow shall mean the computers are in the process of connecting. Red shall mean there is no connection.

26.7 The operator position control shall include coupling, also known as patch, that allows an operator to link audio between resources. All parties using these resources shall be able to communicate without the intervention of the operator who created the patch.

26.8 The operator position control shall include a radio button that when displayed with a yellow outline shall indicate that the radio is in maintenance mode.

26.9 The operator position control shall include the word "Busy" that appears on the TX button for that frequency if another operator is trying to transmit on that frequency.

26.10 The operator position control shall include a feature that displays the word “Lock” and shall notify the operator, in the headset, indicating the frequency is not available if an operator attempts to transmit while the frequency is busy.

26.11 The operator position control shall include a feature that when a radio is selected the TX button shall change shape. When the PTT is pressed and the PTT Confirm signal is received the button shall change color.

26.12 The operator position control shall include a volume control button located in the static row at the top of the Operator Position screen that allows the operator to set the volume of individual frequencies assigned to that position. This function utilises three buttons, UP, DOWN and Volume level indicator to set the required volume.

26.13 The operator position control shall include a “load configuration" button that appears when the operator starts the operator position display. The “Load Configuration” shall be used to load a desired operator position configuration file.

27 Operator Position Control – Barge-in and Barge-over

27.1 The operator position control shall include a monitoring feature that allows a supervisor at one position to monitor the audio (A/G, G/G or patch) of up to 12 other positions simultaneously.

27.2 The HF Audio System shall provide the capability to monitor access of a single operator by up to 3 supervisors.

27.3 The operator position control shall include a Barge In button that allows the supervisor to override and talk to a monitored operator. All radio communication in progress and the far end party(ies) on the active call in progress shall not be able to hear the supervisor talking to the operator.

27.4 The operator position control shall include a Barge Over button that allows the supervisor to communicate with the monitored operator and the third party(ies) on the active call.

27.5 The operator position control shall include a feature that when in barge over mode, a supervisor PTT shall override a monitored operator PTT and communicate with the TX selected radio(s) at the monitored position.

28 Operator Position Control - Color Coding

28.1 The operator position control shall allow color-coding the buttons, with the intention of grouping destinations logically together.

28.2 The operator position control shall allow the definition of at least 8 different groups.

28.3 The operator position control shall include a Transmit button on the Active display that selects all the active frequencies to transmit at the position.

29 Operator Position Control – Volume

29.1 The operator position control shall include a volume control pop-up window that provides volume control of the headsets and speakers independently.

29.2 The operator position control shall provide each volume control group with three buttons, UP, DOWN and Volume level indicator.

29.3 The operator position control volume controls shall not allow for a complete muting of the headset/handset and speaker.

29.4 The operator position control shall include a visual indication on the frequency icon that alerts the operator that there is audio on the RX channels.

30 Operator Position Control - Operator Position Control Mini-Bar

30.1 The operator position control shall provide a communications function that has the ability to display a reduced set of voice switch functions as defined in adaptation.

30.2 The operator position control shall provide a communications function that has the ability to switch from the reduced set display to the full set display of communications resources available to the operator

31 Radio Control Interface - Introduction

31.1 The radio control interface shall provide a multi-purpose interface that can connect radios to various types of telecom circuits.

31.2 The radio control interface shall also be provided the capability of changing HF Audio System links to new or different digital communications technologies such as IP/MPLS, DSL, T1 or MODEM etc. to transfer audio and data between the local and remote sites.

32 Radio Control Interface - General Requirements

32.1 Mechanical:

a. The radio control interface equipment shall be mountable in a 19 inch rack shelf; and

b. The radio control interface equipment shall not exceed 8 RU.

32.2 Electrical:

a. The radio control interface equipment shall be able to operate on 120 VAC;

b. The radio control interface supplied equipment shall tolerate AC voltage frequency of 60 Hz ± 20% with the following tolerances:

i. Voltage tolerance : ± 10%;

ii. Voltage transient: ± 8% of nominal, not to exceed 100ms;

iii. Phase regulation: ± 1 electrical degree;

32.3 The radio control interface shall self recover (reboot) after a complete power failure within 2 minutes and restore it's last configuration without operator intervention.

32.4 The radio control interface shall include protection against AC power surges.

33 Radio Control Interface - Environmental Characteristics

33.1 The radio control interface shall meet the electrical design requirements over the entire frequency range of operation and over the following range of service conditions:

a. Operating:
   i. Temperature: -20°C to 55°
   ii. Ambient Relative Humidity: 5% to 90% non condensing
b. Non-operating:
   i. Temperature: -30°C to 55°C
   ii. Altitude: Up to 40 000 ft for transportation

34 Radio Control Interface - Electromagnetic Compatibility Requirements

34.1 The radio control interface electromagnetic emission characteristics of the delivered equipment shall comply with tests and limits of ETSI EN 301 489-1 and ETSI EN 301 489-22. The frequency range of interest for this requirement is 100 kHz to 1000 MHz.

35 Radio Control Interface - Electromagnetic Susceptibility

35.1 The radio control interface electromagnetic susceptibility characteristics of the delivered equipment shall comply with tests and limits of ETSI EN 301 489-1 and ETSI EN 301 489-22.

36 Radio Control Interface - ESD Requirements

36.1 In case of a discharge, the radio control interface shall only reset, providing the equipment comes back to the same configuration and idle state without human intervention.

37 Radio Control Interface - RMA Requirements

37.1 The radio control interface shall be provided with full redundancy, with no single point of failures, either self-contained or when 2 units are installed. All components shall be configured for maximum configuration and all connections included.

37.2 All radio control interface modules shall be hot swappable.

37.3 The radio control interface availability shall exceed .99999.

37.4 The radio control interface equipment shall have self diagnostics and Built-In Test Equipment (BITE) that monitors the health of the unit, power and other devices, including any companion units.

38 Radio Control Interface - Functional Requirements

38.1 The radio control interface equipment must be COTS and a fielded product.

38.2 The radio control interface equipment shall have a scalable design so that the hardware can be adjusted to the site requirements (1 to 8 radios, types of telecom interface in use, number of I/O, serial ports etc.).

38.3 The radio control interface shall connect to a minimum of 8 radios connected digitally and a minimum of 8 analog radios:

a. Analog audio, control signals;

b. Digital audio, control signals; and

c. VoIP, and control signal data packets.

38.4 The radio control interface system shall be designed to cascade additional radio control interfaces together at a single location to enable additional equipment interfaces using only radio control interface internal communication ports.

38.5 Communication within a redundant radio control interface shall be done with internal communication not using any of the Telco and the equipment ports.

38.6 Cascading redundant or non-redundant radio control interfaces shall be done with internal communication not using any of the telco and the equipment ports.

38.7 The radio control interface shall be software driven and upgradeable by field firmware/software.

38.8 The radio control interface shall have any one of the following: USB, RS232 or IEEE 802.3 port for local management.

38.9 The radio control interface shall be remotely configurable through it's existing telco interface with no additional interface required for configuration.

38.10 All radio control interface configurable settings shall be stored in such a way that they are not lost after a total power loss.

38.11 Multiple radio control interfaces shall have the capability to network with each other via either or both LAN and/or any type of telecommunication links.

38.12 The radio control interface system shall be capable of daisy-chaining a minimum of 3 distinct remote locations using any TELCO interfaces, for the purpose of carrying compressed or uncompressed audio and data from one site to another.

38.13 A radio control interface shall selectively and simultaneously connect to other radio control interfaces using the following inter-site circuit configurations:

a. Up to 8 other radio control interfaces using one of its T1s fractioned through a Central Office,
b. Up to 4 other radio control interfaces using its 4 X 4W analog trunk lines,

c. Up to 8 other radio control interfaces using one of its 802.3 Ethernet Links,

d. Up to 2 other radio control interfaces using its 2 V.35 links,

e. Up to 2 other radio control interfaces using its 2 T1 links

38.14 The radio control interface shall be capable of multiplexing and routing between any relevant communication ports.

38.15 The radio control interface shall be provided with the capability to route any audio channel from any digital port to any analog port and vice versa through a fully meshed network.

38.16 The radio control interface shall be provided with the capability to connect a voice equipment port to any other voice equipment port through a fully meshed network.

38.17 The radio control interface shall be provided with the capability to connect a data equipment port to any other compatible data equipment port through a fully meshed network.

38.18 If available, the radio control interface shall be capable to send maintenance data from any and all radios to any control center through a fully meshed network.

38.19 In addition to the above capabilities, the radio control interface shall be provided with the capability of the following type of sharing configurations:

a. Dual Control;

b. Monitoring; and

c. HF/VHF/UHF combining/splitting.

38.20 The radio control interface shall be provided with the capability, for three networked radio control interfaces at geographically distinct locations, to monitor any one of the RX radio audio channels of a given radio control interface.

39 Radio Control Interface and HF Audio System End-to-End Performance

39.1 End-to-End performance shall be measured with 2 radio control interfaces connected back to back from the HF Audio System trunk demarcation point to the radio demarcation point

39.2 The radio control interface shall perform, at minimum, as follows:

a. 32 dB minimum signal to noise ratio (noise with tone) at any level setting, measured with 1004 reference tone, using 15 kHz flat response (no weighting) over range of +3dbm to -25 dBm for a G.711 PCM; and

b. dBrnc maximum for idle channel noise.

39.3 The radio control interface shall be capable of storing pre-assigned delays associated with each audio port based on the compression used and network delay.

39.4 The radio control interface shall be capable of independently delaying the input and output audio and PTT/SQ based on each network type from the default 0ms to 1000ms with a resolution of 10ms.

39.5 The audio distortion added by the radio control interface shall be less than 2% for G.711

39.6 Voice compressed circuits shall meet the following minimum Mean Opinion Score (MOS) performance using the Perceptual Evaluation of Speech Quality (PESQ), as per ITU-T P862, over all telecom link types when used with a minimum Block Error Rate (BLER) of 1 per 100.

Vocoder	Minimum MOS
PCM G711	3.7
32K ADPCM G726	3.6
16K LD-CELP G.728	3.6
8 KBPS C-CELP G.729/G.729a	3.6
6.3 KBPS G.723.1	3.6
5.3 KBPS G.723.1	3.5

39.7 Within the radio control interface the isolation between any transmit and/or receive path shall be 70 dB or better.

39.8 The radio control interface audio frequency response shall be between 3.0 dB within the range of 300-3400 Hz with a reference to a 1004 Hz tone applied at the highest output level excluding CSTI or CET SCADA emulation.

39.9 The radio control interface audio signal shall be reduced by 50 dB below 100Hz and above 5KHz.

40 Radio Control Interface - Interface Requirements

40.1 The radio control interface shall interface to a minimum of 8 equipment analog interfaces supporting the following signals:

a. 1 X -30dBm to +5.3 dBm adjustable level 600 ohms MAIN TX analog audio pair (300Hz to 3400 Hz);

b. 1 X -30dBm to +5.3 dBm adjustable level 600 ohms MAIN RX analog audio pair (300Hz to 3400 Hz); and

c. 1 X PTT signal + reference pair.

40.2 The radio control interface shall have a minimum of 16 reserved I/O points individually configurable as input or output.

40.3 The radio control interface, if used as input, shall have the I/O points opto-isolated.

40.4 The radio control interface, if used as output, shall have the I/O points open collector or dry contact

40.5 The radio control interface shall be capable of mapping each discrete port to a discrete point on the remote end.

40.6 The radio control interface shall have the capability to configure any unused audio pairs as generic analog port.

40.7 The radio control interface shall have the capability to configure any unused dedicated discrete pairs as generic I/O respecting inputs and outputs.

41 Discrete Signalling

41.1 Each discrete input signal shall be settable to accept signalling types on an individual basis as follows:

a. +24V Signalling:

i. Presence of DC voltage between +15V and +30VDC at 10mA maximum with respect to the associated reference wire shall be interpreted as an active input state,

ii. Open circuit input with respect to the associated reference wire to be interpreted as an inactive input state; and

b. +GND Signalling:

i. Presence of shorted input (low impedance) with respect to the associated reference wire shall be interpreted as an active input state,

ii. Open circuit input with respect to the associated reference wire to be interpreted as an inactive input state.

41.2 Each discrete output signal shall be settable to accept both signalling types on an individual basis as follows:

a. +24V Signalling:

i. An active output state in the form of a dry contact closure that shall switch 24VDC rated for 250 mA,

ii. An inactive output state shall be indicated by an open circuit with respect to the associated reference wire; and

b. GND Signalling:

i. An active output state shall be indicated by the presence of a short circuit (low impedance) with respect to the associated reference wire,

ii. An inactive output state shall be indicated by an open circuit with respect to the associated reference wire.

42 Radio Control Interface - Tone Signalling

42.1 The radio control interface shall be capable of generating, detecting and filtering narrowband tones for PTT and Squelch (in band signalling) when using Radio Control interface analogue ports.

42.2 The radio control interface PTT and squelch shall use different tones.

42.3 The radio control interface equipment, when tone signalling generation is enabled, shall generate a user selectable tone signal at 2304Hz, 2504Hz, and/or or 2604Hz, at+/-2 Hz maximum, mixed with the voice output signal.

42.4 The radio control interface generated tone level shall be user selectable to -10 dB +/-8dB minimum with respect to the audio line level setting adjustable in 1dB steps.

42.5 The radio control interface equipment, when the tone signalling detection characteristics is enabled, shall detect the presence of a user selectable tone signal at 2304Hz, 2504Hz, and/or or 2604Hz, at +/-30Hz minimum, mixed with the voice signal, at any level within the range of -5 dBm to -40 dBm.

42.6 The radio control interface selected tone shall be attenuated from the incoming audio by a minimum of 60 dB below the audio level.

42.7 The radio control interface detected tone shall be validated to avoid false signalling.

42.8 The radio control interface notch filter minimum characteristics shall be as follows:

a. The notch circuit bandwidth response shall not be wider than +/- 150 Hz from the selected tone center frequency when measured at 3 dB below the audio level reference signal of 1004 Hz;

b. The notch circuit bandwidth response shall not be narrower than +/- 20 Hz from the selected tone signal center frequency when measured at 60 dB below the audio level reference signal of 1004 Hz; and

c. It shall be possible to disable the notch filter in the field when in-band Squelch signalling is not used.

43 Radio Control Interface - Equipment Digital Interfaces

43.1 The radio control interface shall provide physical interfaces to a minimum of 8 digital radio trunks using either T1 or Ethernet connection.

43.2 The radio control interface Digital connection equipment shall support the same functions as defined in the Equipment Analog Interfaces section of this specification..

43.3 The radio control interface shall be provided with the following additional equipment digital interfaces:

a. 4 X EIA-232 (RS-232); and
b. 1 X V.35.

43.4 The radio control interface shall support the following selectable digital equipment interface at any given time:

a. 1 X IEEE 803.2 LAN interfaces (independent from network interfaces); and
b. 8 X T1 connections.

44 Radio Control Interface - Serial Ports

44.1 The radio control interface serial ports shall be used to connect to either equipment or telecom devices indiscriminately.

44.2 The radio control interface EIA-232 port shall be compliant with ITU-T Rec. V.24/V.28, EIA RS-232.

44.3 The radio control interface EIA-232 ports shall be supporting full featured 9 pin ports, at standard speeds from 300 bps to 57.6 kbps.

44.4 The radio control interface shall provide virtual connections from any digital telecom port to any equipment serial port.

44.5 The radio control interface hardware handshaking shall be supported when 2 equipments are communicating via RS232 ports through a network of radio control interface.

44.6 The radio control interface shall be capable of sharing available static network bandwidth between the ports at static baud rate.

44.7 The radio control interface shall be capable of serial communication between devices using different baud rates.

44.8 The radio control interface shall be capable of priority level assignment for each serial port for bandwidth access.

45 Radio Control Interface - V.35 Port

45.1 The radio control interface shall be capable of mapping a V.35 port to any of the digital telecommunication ports.

45.2 The radio control interface V.35 port shall be configurable as either DTE or DCE mode, including external DCE clocking.

45.3 The radio control interface V.35 port shall be capable of standard speeds from 300bps, 1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 32kbps, 38400bps, 56 kbps, 64 kbps and multiple of 64 Kbps up to 1.544 Mbps.

46 Radio Control Interface - LAN Ports

46.1 The radio control interface shall support standard TCP/IP stack.

46.2 The radio control interface LAN ports shall be capable of a data rate of 10 and/or 100 Mbps(10/100baseT UTP), half duplex or full duplex, auto-negotiable, as per ISO/IEC 8802-3 ANSI/IEEE 802.3.

46.3 The radio control interface shall be provided with a user defined data connection from any of the remote ports to the local end 802.3 port.

46.4 The radio control interface Ethernet connections shall be capable of the same functions as those described in the analog section for interface to Radio Control interface/HF Audio System.

46.5 Any radio control interface I/O points shall be capable of being mirrored to a corresponding physical I/O points and/or mapped to the maintenance application.

46.6 Any radio control interface I/O configured as input shall be able to drive one or more corresponding outputs whether on a physical output, and/or, mapped to the maintenance application.

47 Radio Control Interface - Telecom Interfaces

47.1 The radio control interface shall be capable of operating on a dedicated link that can be made of any metallic landline or non-metallic communication links such as satellite link, microwave link and fiber optic cable.

47.2 The radio control interface shall have the ability to simultaneously and selectively use a minimum of 3 Network Connections, on a pre-determined priority basis, at any given time.

47.3 When a telecom link connected to the radio control interface fails, the radio control interface shall be able to spread the load on remaining communication links and/or initiate a dial-up to establish data transmission via MODEM based on pre-defined scenarios which include configurable failure and recovery method for manual and automatic modes as part of the scenario.

48 Radio Control Interface - VoIP

48.1 The radio control interface shall support IPv4.

48.2 The radio control interface shall support IP data rates consistent with time slot assignment data on T1 channels to allow exchange of data at compatible rate between digital interfaces.

48.3 The radio control interface shall be capable of supporting SIP protocol.

48.4 The radio control interface shall incorporate Real Time Protocol (RTP).

48.5 The radio control interface shall statically compensate for voice packet jitter of up to 300 milliseconds in increment of 10 ms.

49 Radio Control Interface - T1 Trunk

49.1 The radio control interface shall support fractional and/or full T1 connection to canadian telecom providers.

49.2 The radio control interface shall be compatible with telecom T1 connections supporting SF (D3/D4), ESF, and signalling bits(CAS) that can be allocated as single time slots for all channels or A,B (C,D) bits at selectable time slots rate of 56kbps and multiple 64 kbps.

50 Radio Control Interface - V.35 Port

50.1 The radio control interface specification of the TELCO V.35 port is the same as for equipment V.35 ports described herein.

51 Radio Control Interface - Analog TELCO Ports

51.1 All four TELCO ports shall be configurable as a 4W leased line or a 2W PSTN port.

52 Radio Control Interface - Analog 4W Leased Line

52.1 The radio control interface shall be scalable form 1 to 4 CS-03 compliant 4-wire, balanced 600 ohm analog ports for connection to TELCO.

52.2 The radio control interface composite transmit audio level shall be adjustable from -30 to +3 dBm.

4.3.6.3 The radio control interface composite receive audio level shall be adjustable from -40 to -3 dBm.

52.3 The radio control interface analog ports shall be configurable for analog voice or to be used as a modem.

53 Radio Control Interface - Modem

53.1 The radio control interface, when used as modem, shall support V.34bis protocol and voice compression techniques using 16KBPS and lower rates as described below:

a. 64 KBPS as per G.711 to G.714, selectable as A-law and/or u-Law;

b. 32 KBPS ADPCM as per G.726 & G.727;

c. 16KBPS LD-CELP as per G.728;

d. 8 KBPS C-CELP as per G.729/G.729a;

e. 6.3 KBPS as per G.723.1; and

f. 5.3 KBPS as per G.723.1.

53.2 The radio control interface shall multiplex several compressed voice channels to multiple radio connection and control over a single link depending on the negotiated connection speed.

53.3 The radio control interface shall multiplex several voice and/or data sources, e.g. I/Os, serial data, maintenance data etc., over a single link depending on the negotiated connection speed.

54 Radio Control Interface - PSTN 2W Dial-up Ports

54.1 The radio control interface shall be scalable form 1 to 4 CS-03 compliant 2-wire analog ports for connection to TELCO.

54.2 The radio control interface composite transmit audio level shall be adjustable from -30 to +3 dBm.

54.3 The radio control interface composite receive audio level shall be adjustable from -40 to -3 dBm

54.4 The radio control interface analog ports shall be configurable for analog voice or to be used as a modem.

54.5 The radio control interface 2W Return loss shall be better than 20 db.

55 Radio Control Interface - Voice Compression

55.1 The radio control interface shall have the capability to use the voice compression techniques below on any of the network connections:

a. 64 KBPS as per G.711 to G.714, selectable as A-law and/or u-Law;

b. 32 KBPS ADPCM as per G.726 & G.727;

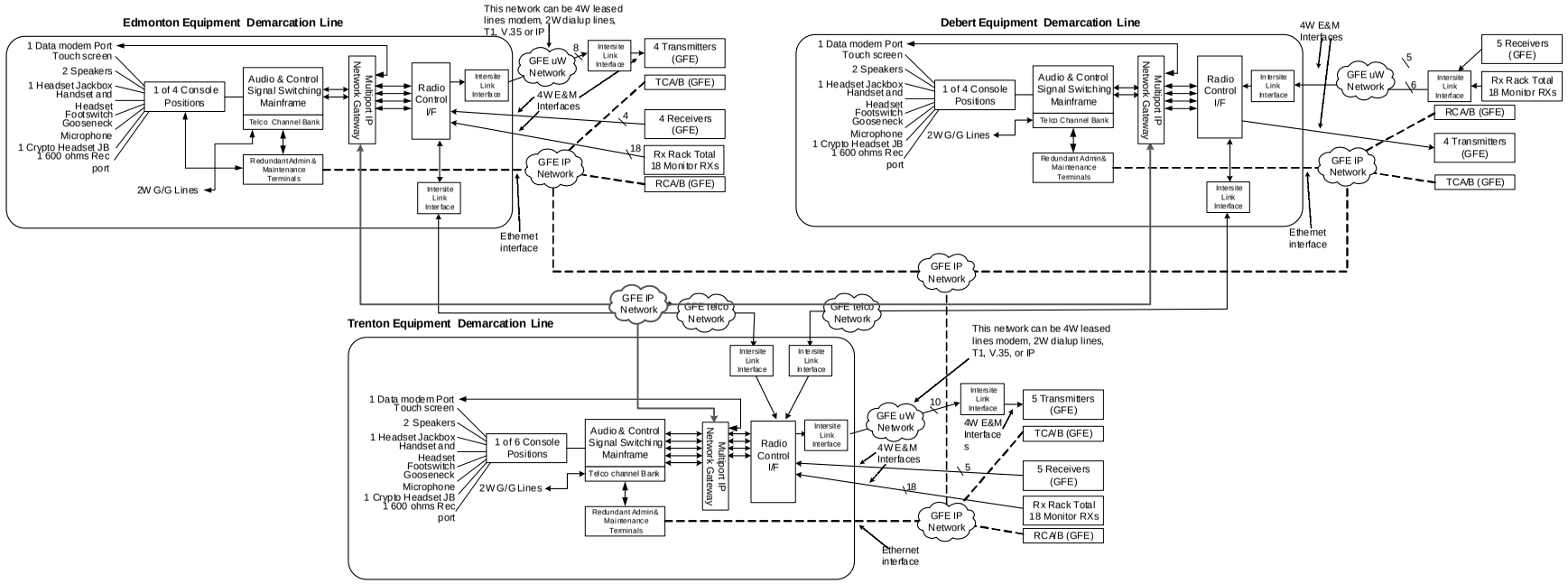
c. 16KBPS LD-CELP as per G.728;

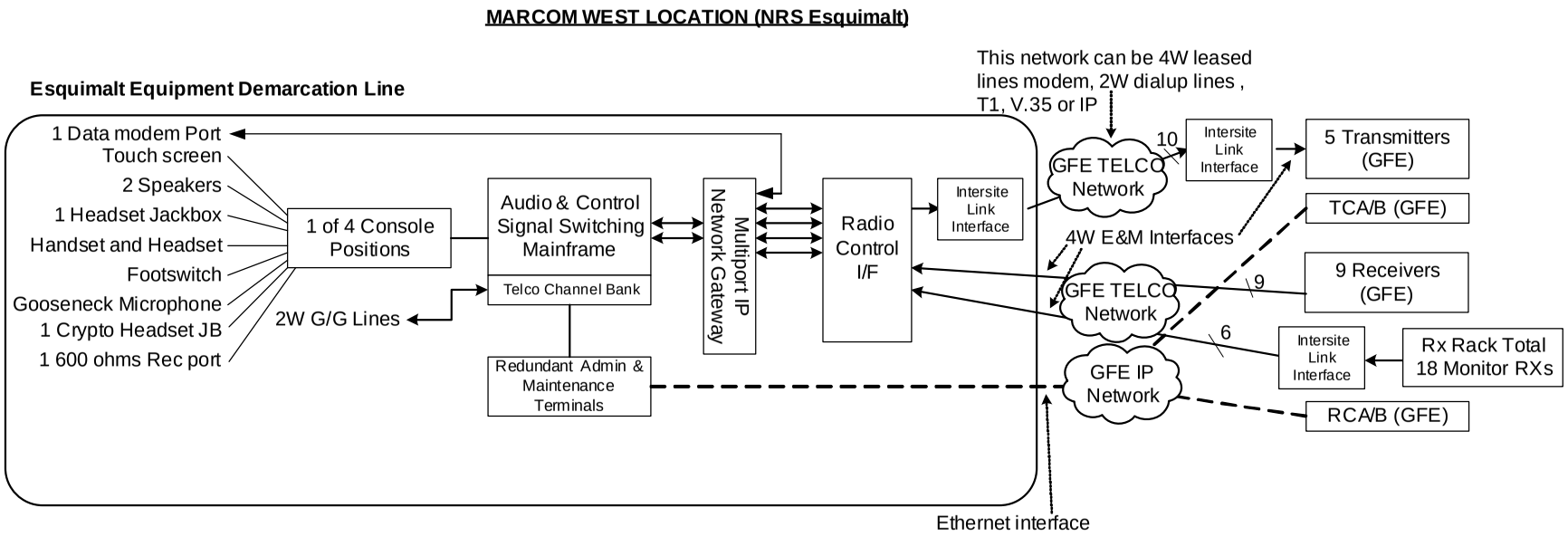
d. 8 KBPS C-CELP as per G.729/G.729a;

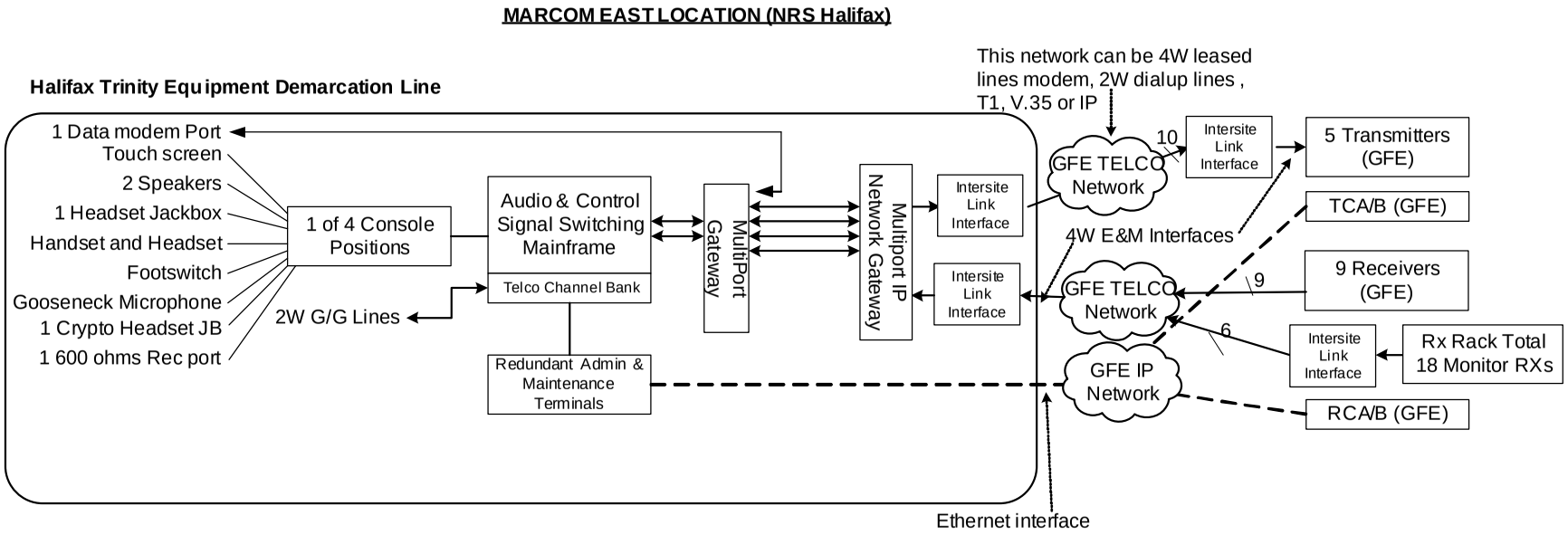
e. 6.3 KBPS as per G.723.1; and

f. 5.3 KBPS as per G.723.1.

MACS LOCATIONS (CFB Trenton, CFB Edmonton, CFB Debert)




MARCOM WEST LOCATION (NRS Esquimalt)
Esquimalt Equipment Demarcation Line
This network can be 4W leased lines modem, 2W dialup lines , T1, V.35 or IP
1 Data modem Port
Touch screen
2 Speakers
1 Headset Jackbox
Handset and Headset
Footswitch
Gooseneck Microphone
1 Crypto Headset JB
1 600 ohms Rec port
1 of 4 Console Positions
2W G/G Lines
Audio & Control Signal Switching Mainframe
Telco Channel Bank
Redundant Admin & Maintenance Terminals
Multiport IP Network Gateway
Radio Control I/F
Intersite Link Interface
GFE TELCO Network
10
Intersite Link Interface
5 Transmitters (GFE)
TCA/B (GFE)
4W E&M Interfaces
GFE TELCO Network
9
9 Receivers (GFE)
6
Intersite Link Interface
Rx Rack Total 18 Monitor RXs
GFE IP Network
RCA/B (GFE)
Ethernet interface


MARCOM EAST LOCATION (NRS Halifax)
Halifax Trinity Equipment Demarcation Line
This network can be 4W leased lines modem, 2W dialup lines , T1, V.35 or IP
1 Data modem Port
Touch screen
2 Speakers
1 Headset Jackbox
Handset and Headset
Footswitch
Gooseneck Microphone
1 Crypto Headset JB
1 600 ohms Rec port
1 of 4 Console Positions
2W G/G Lines
Audio & Control Signal Switching Mainframe
Telco Channel Bank
Redundant Admin & Maintenance Terminals
MultiPort Gateway
Multiport IP Network Gateway
Intersite Link Interface
Intersite Link Interface
GFE TELCO Network
10
Intersite Link Interface
5 Transmitters (GFE)
TCA/B (GFE)
4W E&M Interfaces
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6
Intersite Link Interface
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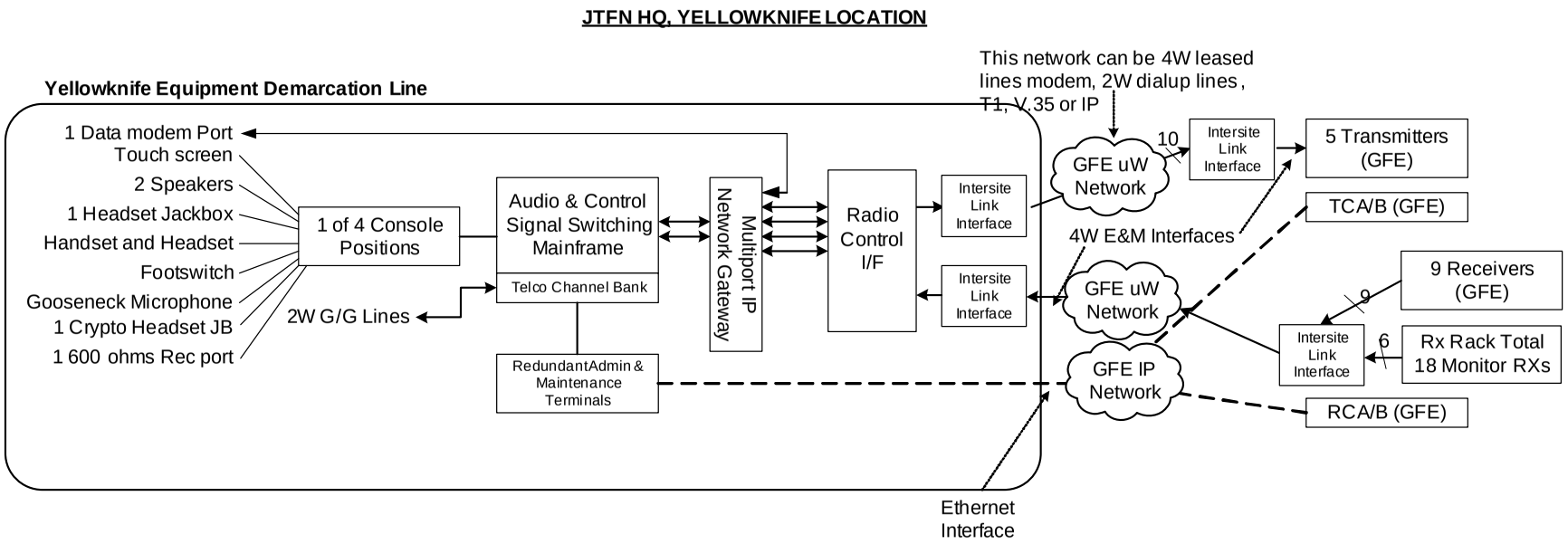
Ethernet interface


JTFN HQ, YELLOWKNIFE LOCATION
Yellowknife Equipment Demarcation Line
This network can be 4W leased lines modem, 2W dialup lines, T1, V.35 or IP
1 Data modem Port
Touch screen
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1 Headset Jackbox
Handset and Headset
Footswitch
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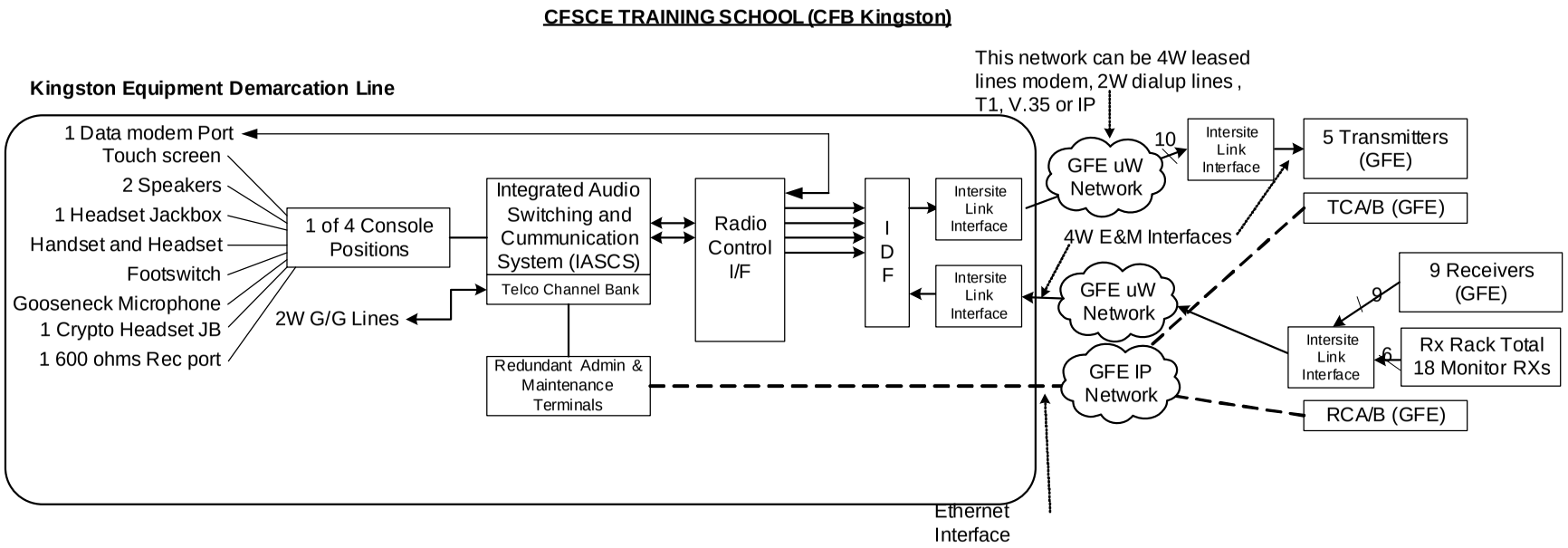
CFSCE TRAINING SCHOOL (CFB Kingston)
Kingston Equipment Demarcation Line
This network can be 4W leased lines modem, 2W dialup lines , T1, V.35 or IP
1 Data modem Port
Touch screen
2 Speakers
1 Headset Jackbox
Handset and Headset
Footswitch
Gooseneck Microphone
1 Crypto Headset JB
1 600 ohms Rec port
1 of 4 Console Positions
2W G/G Lines
Integrated Audio Switching and Cummunication System (IASCS)
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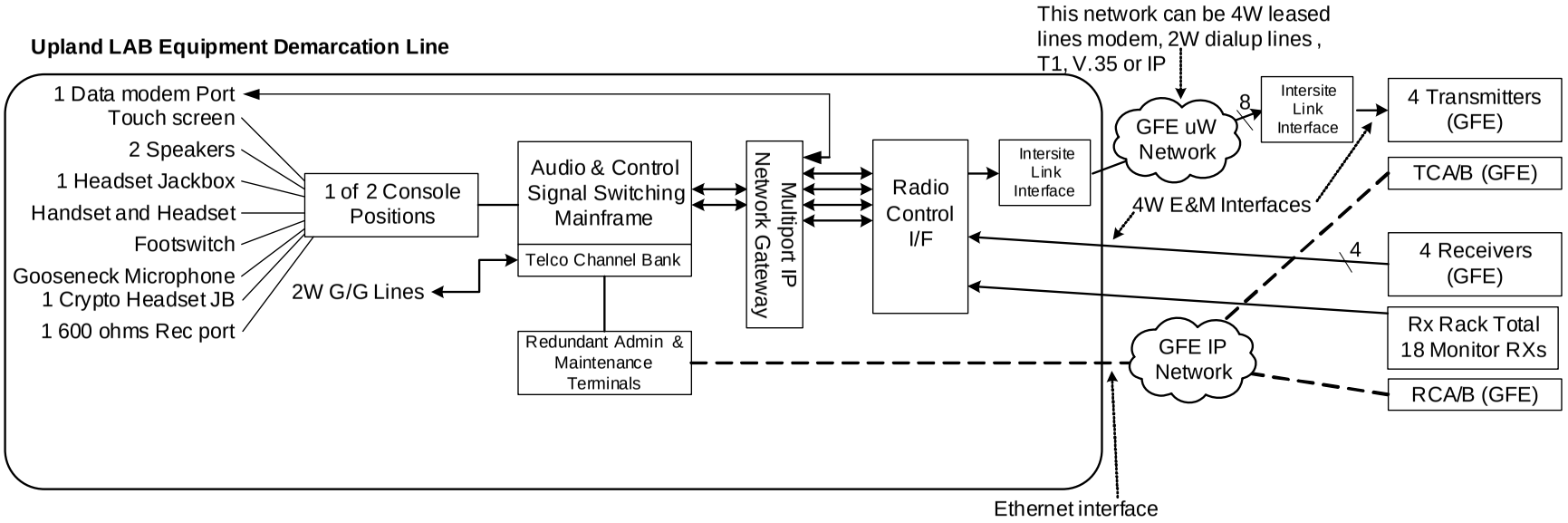
UPLANDS HF DEVELOPMENT LABORATORY (CFB Ottawa)