



Appendix B:

Specification – AMHS & IWXXM System

Airports Fiji Limited
Nadi Airport
Namaka Nadi, Fiji



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ABBREVIATIONS USED IN THIS SPECIFICATION

AIM	-	Aeronautical Information Management
AIS	-	Aeronautical Information Services
AFTN	-	Aeronautical Fixed Telecommunication Network
AMHS	-	ATS Message Handling System
BCST	-	Business Continuity/Training System
CRV	-	Common Aeronautical VPN (Asia/Pacific)
FAT	-	Factory Acceptance Testing
FTBP	-	File Transfer Body Parts
IWXXM	-	ICAO Weather Exchange Model
MCTU	-	Message Control Transfer Unit
MTA	-	Message Transfer Agent
NOTAM	-	Notice to Airmen
OPMET	-	Operational Meteorology
UA	-	User Agent
RAT	-	Reliability Acceptance Testing
ROBEX	-	Regional OPMET Exchange
RODB	-	Regional OPMET Databank
ROM	-	Rough Order Magnitude
SAT	-	Site Acceptance Testing
SWIM	-	System Wide Information Management
TAC	-	Traditional Alphanumeric Code

REFERENCE DOCUMENTS

- a) ICAO Annex 10
- b) ICAO Doc 9880 Technical Specifications for ATN using ISO/OSI Standards and Protocols Second edition, 2016
- c) ASIA/PAC Technical Specification of the Air Traffic Services Message Handling System (AMHS) Version 1.0 - September 2011
- d) ICAO Guidelines for the Implementation of OPMET Data Exchange Using IWXXM Fourth Edition – November 2020
- e) ICAO Annex 3 – Meteorological Service for International Air Navigation
- f) ICAO Annex 15 – Aeronautical Information Services
- g) ICAO Doc 10057 Manual on Air Traffic Safety Electronics Personnel Competency-based Training and Assessment First Edition, 2017

1.0 SCOPE OVERVIEW

Fiji Airports currently operates and maintains AMHS System k, which is used to provide Air Traffic Services for the exchange of ATS/AIS/OPMET messages across the global network for Air Traffic Management services within Nadi Flight Information Region (FIR). The AMHS System s centrally controlled and operated from Nadi Air Traffic Management Operations Centre in Nadi.

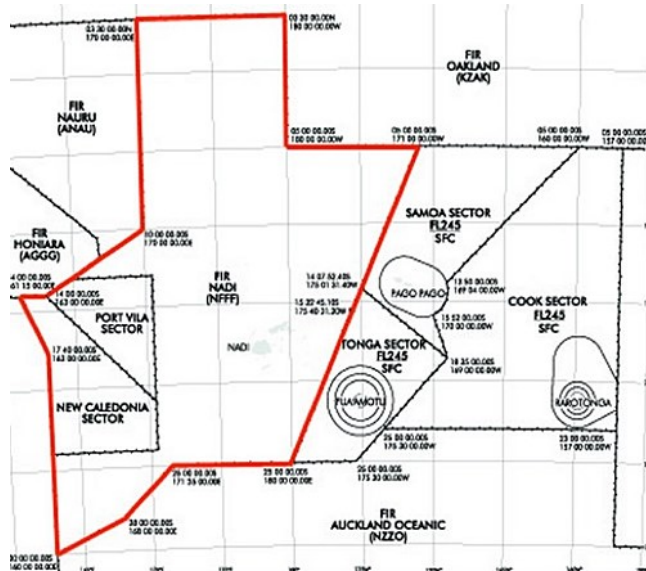


Figure 1.0 Fiji FIR (6x10⁶ km²)

Boundary

The current AMHS System has been in operation since 2010 and has exceeded its operating life cycle and the hardware are obsolete and is due for replacement. While it support Extended ATS services for the exchange of file attachment using File Transfer Body Parts (FTBP), it does not have the IWXXM capability. This project will include the replacement of the current AMHS system with a new AMHS & IWXXM system.

All tenderers are to allow for co-ordination between different trades and to ensure that all of the following has also been included for:

- a) Permits and approvals as required under applicable legislation and referenced in this document including submissions of a method of works plan.
- b) Contractor Submissions as required by this document to the satisfaction of Fiji Airports including any necessary rework and resubmissions required to receive approval.
- c) Removal of waste materials from the site and disposal in an agreed location within 1km of the site.
- d) Liaison and meetings as required with Fiji Airports, CAAF and associated Contractors.
- e) Personal Protective Equipment for your staff onsite.



- f) The Contractor to also allow for the arrangement of airside passes for Contractor personnel and vehicles accessing the site.
- g) Access to site to be maintained as clean and clear and adjacent roadways are not to be impacted without prior written approval in the form of traffic plan which will generally limit impacts to afterhours road closures.
- h) Protection to all roadways and adjacent pavements, including cleaning of the pavements daily should dirt or dust be trafficked onto the pavements.

A schedule of day work rates for plant and labour is also to be provided should any unforeseen works arise.

1.1 Current AMHS System

1.1.1 General

Indicative performance requirements include:

System Component	Availability	MTBF
AMHS System	> 0.9999	> 1000HRS
NOTAM Database & Pre-flight Briefing	> 0.9999	> 1000HRS
OPMET Database & ROBEX System	> 0.9999	> 1000HRS

1.2 Scope of works

1.2.1 General Obligations

Completion of the works and compliance with the requirements as detailed herein and as detailed in the documents listed under the contract documents.

1. Supply, Installation and Commissioning of the AMHS & IWXXM System.
2. Compliance to the technical specification
3. Provision of the Design and Submissions as required.
4. Complete Equipment Schedule (CES), technical data, and appropriate training to allow for the introduction into service of the vehicles. FA seeks a non-developmental solution which has a demonstrated and proven track record in deployment on other airport sites.

APPENDIX B - SPECIFICATION



5. Supply of spare parts for the period of 10 years.

The delivery methodology is as a Supply delivery and training solution incorporating the following hold points:

1. Tender submission
2. Tender approval
3. Technical compliance review
4. Contract Award
5. System Design Review – On Site
6. Factory acceptance testing: Allow for travel of four (4) AFL representatives to the factory for factory acceptance testing of the AMHS & IWXXM System prior to shipment in accordance.
7. Site delivery
8. Site acceptance testing (SAT)
9. Training 15 days - Onsite
10. Reliability Acceptance Testing (RAT)
11. Commissioning/Handover.

1.2.2 Design and Submissions

Further to the submissions as required by the RFT response of this document, the scope in general terms is to within four (4) weeks of contract award to action the following:

- 1) Pending the Respondent's advice and input, liaison with the project stakeholders/ design consultants to select and recommend any additional requirements and facilities as required/ available for approval
- 2) Prepare a fully itemized equipment schedule including quantities, costs and any ongoing software licensing fees and charges if applicable.
- 3) Work with stakeholders to ensure AMHS & IWXXM system listing and quantities are correct and meet user requirements
- 4) Prepare a detailed AMHS & IWXXM system installation program and then provide fortnightly monitoring during the periods where close control is required.
- 5) Detail any enabling or interface works required to enable the effective installation and operation of AMHS & IWXXM system scheduled or specified for the works.

1.2.3. Service Maintenance and Reliability

The Supplier shall provide written undertakings associated with the following that:



1. The Supplier will maintain support for the AMHS & IWXXM software and spare parts for the associated hardware under procurement for a period of 10 years post-delivery of AMHS & IWXXM system.
2. The Supplier will be able to provide remote support for the supply of spare parts during normal business hours in their place of business for 10 years post-delivery AMHS & IWXXM system and associated hardware.
3. The Supplier will provide a full 5-year warranty on all Parts for the AMHS & IWXXM system.
4. The Supplier will allow for mid-life health inspection check for AMHS & IWXXM and provide refresher training during the time of same visit. Mid-life is usually 5 years after this system has been commissioned.

2.0 AMHS & IWXXM SYSTEM SPECIFICATION

2.1 General Requirement

2.1.2 Introduction

This document summarised the generic system specification for the for AMHS & IWXXM system for Fiji Airports (FA) Scope of Work

This project is aimed to replace the current AMHS System as well as the implementation of the IWXXM services as mandated by ICAO

The AMHS System shall support the exchange of ATS/AIS/OPMET AFTN text message using ATS Basic Service and FIXM/AIXM/IWXXM services using XML format that is supported by the ATS Extended services using File Transfer Body Parts (FTBP)

The AMHS system shall be connected to the following ANSP AMHS MTA over the CRV network:

- a) Brisbane - AMHS, Airservices Australia
- b) Salt Lake City - - FAA, USA
- c) Tontouta - - Noumea, New Caledonia

2.1.3 Compliance with Specification

A written statement of compliance that the AMHS & IWXXM system meets the specification and requirement as documented in the relevant ICAO document.

2.1.4 Project Completion

All the Works shall be completed, tested, Site Accepted and commissioned before or preferably earlier than the expiration of nine (9) elapsed months from the date of commencement of the Contract.

2.1.5 Planning Document

The following planning documents:

- a) Project Management Plan (PMP)
- b) Systems Engineering Management Plan (SEMP)
- c) AMHS & IWXXM Compliance document
- d) Test and Evaluation Master Plan (TEMP) which includes Factory Acceptance Testing requirements (FAT), Site Acceptance Testing requirements (SAT), Reliability Testing (RAT), This should address test failures, re-testing and cost responsibility.
- e) Quality Assurance Plan (QAP)
- f) Software Development Plan (SDP) if any software is non- commercially based.
- g) Installation Management Plan (INMP)
- h) Method of Works Plan (MOWP)
- i) Transition Plan from the current to the new SYSTEM outlining the process to show minimum outage time possible.
- j) Interface Control Document (ICD)
- k) Interface Management Plan (IMP)
- l) Risk Management Plan (RMP)
- m) Configuration Management Plan (CMP)
- n) Logistics Support Plan (LSP)
- o) Work Breakdown Structure (WBS)
- p) Project Timetable and Network Schedule, PERT and GANTT
- q) Environmental Management Plan
- r) List of suppliers the contractor will use for equipment, components, hardware and software.

2.2 Project Services Requirement

The project service requirements have been discussed as detailed in the Technical proposal submitted by CONTRACTOR that includes the following major milestone in the project implementation:

- a) System Design Review
- b) System Design & Engineering Testing
- c) Factory Acceptance Testing - Optional proposal for four (4) FA operational & technical personnel to participate in the pre-FAT training & FAT to be submitted.
- d) Freight & Shipment – Incoterms 2010
- e) Installation & Integration
- f) Migration plan (Current System to New System)
- g) Safety Case Analysis
- h) Site Acceptance Testing
- i) Reliability Testing



- j) System Documentation
- k) System Administration & Maintenance Training
- l) Recommended Test Equipment
- m) Recommended Spare parts List
- n) Warranty & Post Warranty support.

2.2.1 On-site Training – Operation and Technical

The on-site training will be conducted at the site at Nadi Airport.

OPERATOR TRAINING

Operator Training to operate the system shall be conducted by the Contractor for minimum of ten (10) Operators for minimum of 10 working days. The Contractor shall also propose the recommended duration for the on-site training that will enable the participant to be competent to operate the system.

TECHNICAL TRAINING

Technical Training (System Administration & Maintainer) shall be conducted by the Contractor for minimum of ten (10) Technicians for minimum of 15 working days. The Contractor shall also propose the recommended duration for the on-site training that will enable the participant to be competent to provide technical maintenance support on the system.

As part of the regulation on licensing requirement for Technician on the upgrade AMHS/IWXX system. FA will require the Contractor to conduct system training, on the job training and assessment for competency and rating of the Technician for a period not less than six (6) months based on the *ICAO Doc 10057 Manual on Air Traffic Safety Electronics Personnel Competency-based Training and Assessment First Edition, 2017*. The Tender shall also propose the best method to enable FA to have competent rated Technicians to support the AMHS & IWXXM System.

A Training report to be submitted by the Contractor for the course participants on the system training and evaluation method used. This will be required to be submitted to the Regulator CAAF.AMHS & IWXXM System Technical Requirement

2.3 AMHS & IWXXM System Specification

The table below provides the functional requirement of the AMHS & IWXXM System that will be configured as a Redundant Main AMHS & IWXXM System and Single BCST AMHS & IWXXM system. The BCST System will act as a standby system.

#	AMHS & IWXXM System	Function
1	Redundant Main AMHS System Single BCST AMHS System	a) AMHS Message Transfer Agents (MTA) & Message Store (MS) b) AFTN/AMHS Gateway – Message Control Transfer Unit (MCTU) c) AFTN/AMHS Terminal – User Agents (UA)
2	Redundant Main AIS System Single BCST AIS System	a) NOTAM Database b) Pre-flight Briefing
3	Redundant Main IWXXM System Single BCST IWXXM System	OPMET Database (TAC & XML)- RODB ROBEX System (TAC & XML) – ROC
4	Proxy Server (Main & BCST)	Internet End User
5	Redundant Network	Main & BCST System
6	Redundant Firewall	Firewall & DMZ LAN

BCST – Business Continuity System/Training

2.3.1 System Function

The AMHS & IWXXM System will support the following operational functions requirements:

- a) AFTN/AMHS Gateway – MTCU
- b) Basic AMHS Services for AFTN messaging
- c) Extended AMHS Services for FTBP for IWXXM up to 4.0MB file size as per the IWXXM guideline.



- d) AFTN Terminal & AMHS User Agent and Laser Printer for AFTN & AMHS message compose for sending and receiving & printing
- e) AIS for NOTAM Database & Pre-flight Briefing
- f) IWXXM System with TAC to XML message gateway with IWXXM OPMET database & ROBEX generation.
- g) The User functions of the different functional application shall be operated using web service portal
- h) The application of web portal function for any remote user to connect and operate the system. This is designed specifically for Pacific Island States within the Nadi FIR.

2.3.2 System Platform & Component

The System will have the following platform and sub system:

- a) System Platform configured in a fully redundant system using VM technology
 - i. Main System
 - ii. BCST System
- b) Sub- System Component with functions that is consolidated in one Operator workstation.
 - i. AMHS/AFTN Function
 - ii. AIS/NOTAM Database & Pre-flight
 - iii. ROBEX & OPMET database (RODB) in TAC & XML format

2.3.3 System Configuration

The system will have a redundant Main System using Virtual Machine Technology where all function is provided in the Main & Contingency System.

The Contingency System will also be used at training and backup system should the Main System fail.

The summary of the System requirement is provided in the Table 1.0.

2.3.4 Network Configuration

The network configuration will employ redundant configuration for both the Main & Contingency System.

It will also employ a dual Firewall system configuration for failover purposes. There will be a redundant Optic Fiber network that will connect the Main & Contingency System.

2.3.4 Time Source

A common redundant NTP server for both Main & BCST System

2.3.5 Summary of System Configuration

The summary of the System hardware and software requirement for AMHS & IWXXM system is provided in Table 1.0

Table 1.0 Proposed AMHS & IWXXM System Configuration

#	Description	Quantity	Remarks
	Hardware Listing		
1	VM Server - Main System (AMHS & IWXXM)	2	Redundant VM server
2	VM Server – BCST (AMHS & IWXXM)	1	Single VM server
3	Proxy Server	2	Main & BCST System Rack
4	Network Attached Storage (NAS)	2	Main & BCST NAS
5	Operator Terminal	27	User Terminal
6	Laser Printer	20	User printer
7	Layer 3 Network Switch	2	Redundant with dual power supply
8	DMZ LAN	2	Redundant with dual power supply
9	Firewall	2	Redundant with dual power supply
10	NTP Server	2	Redundant NTP server
	Software Listing		
1	AMHS (AFTN message for ATS/AIS/OPMET TAC & XML format)	1	Support both ATS Basic & Extended services AFTN/AMHS Gateway Message Store User Agents NOTAM Pre-flight Briefing
2	IWXXM service	1	ROBEX & RODB (TAC & IWXXM)



3	Proxy Server	1	Proxy Server
4	VM	1	VM box server
5	Operating System	1	Linux Based

The summary of the system function requirement for the AMHS-IWXXM is provided in Table 2.0

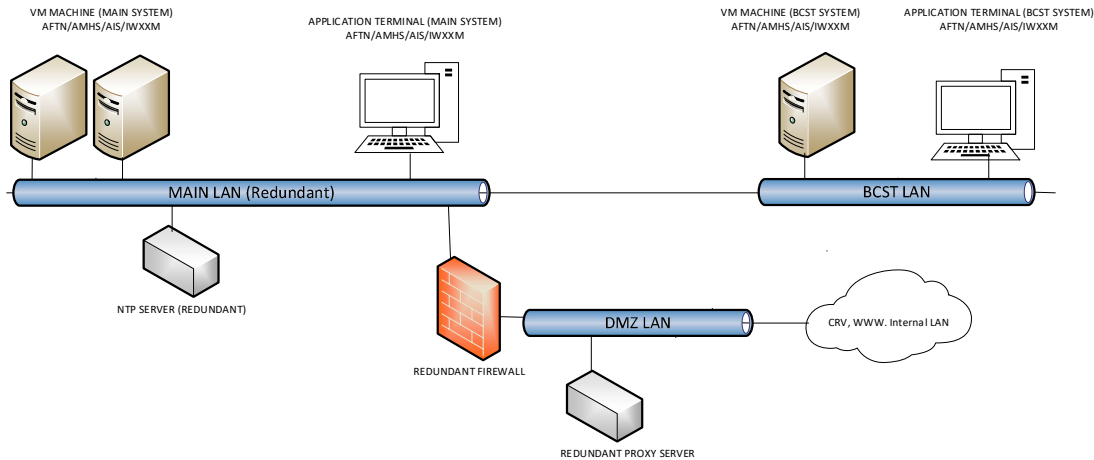
Table 2.0 AMHS & IWXXM System Configuration

#	Function	Description	Proposed Configuration
1	AFTN	Comply with normal AFTN specification as specified in Annex 10	Configured in a Redundant VM for Main & Contingency System. VM server shall employ dual power supply for UPS A & B
2	AMHS	Comply with AMHS requirement for Basic & Extended ATS services with the applicable protocol for MTA to MTA, MTA to MS & MTA to UA. The Extended ATS service shall comply with IWXXM guideline with up to 4.0MB file size including FTBP. The AMHS shall be capable to detect and generate IPN to the originator of the virus message on the status of the message using <u>VIRUS CHECKER</u> functions.	Configured in a Redundant VM for Main & Contingency System. VM server shall employ dual power supply for UPS A & B. AMHS MTA will connect to Brisbane, Salt Lake & Noumea MTA using IP suite over the CRV network
3	AFTN/AMHS Gateway	Convert AFTN to AMHS and vice versa	Configured in a Redundant VM for Main & Contingency System. VM server shall employ dual power supply for UPS A & B.
4	AIS & NOTAM Database	Comply with AIS requirement under	Configured in a Redundant VM for Main & Contingency System. VM server shall



#	Function	Description	Proposed Configuration
		Annex 13	employ dual power supply for UPS A & B
5	IWXXM for OPMET Database & ROBEX (IWXXM version 3.0)	Comply with Annex 3 and the ICAO IWXXM Transition plan. Capable to translate TAC to XML and vice versa	Configured in a Redundant VM for Main & Contingency System. VM server shall employ dual power supply for UPS A & B
6	User Terminal & Printers	User terminal to use for System Administration, AFTN, AMHS, AIS/Pre-flight briefing & IWXXM for OPMET & ROBEX using web based access.	This will require 27 User Terminal with 20 Laser printer
7	Proxy Server	Proxy server to allow accessing the system application over the internet.	Redundant Proxy Server that is common to both Main & Contingency System
9	Redundant Network Switch	Include Main & Contingency Layer 3 Network with a common redundant DMZ and Firewall for external connection.	Redundant Main & Contingency Layer 3 Network Switch with common redundant DMZ and Firewall for external connection. Network Switch shall employ dual power supply for UPS A & B
10	Recommended System Spares	Include recommended Spares list of Hardware	Include recommended Spares list of Hardware

2.3.6 High Level AMHS & IWXXM High Level Configuration Diagram



2.4 AMHS & IWXXM SYSTEM IMPLEMENTATION

The AMHS & IWXXM System can be implemented using the two Options provided below.

2.4.1 OPTION 1 - Staged Approach

The Staged Approach will include the following:

Stage 1

Integration of the new IWXXM System with the existing Comsoft AMHS System. The Comsoft AMHS system will exchange the IWXXM messages using the Extended ATS services. The new IWXXM system shall integrate to existing AMHS system through an AMHS connection interface based on the AMHS ICD.

Stage 2

Replacing the existing Comsoft AMHS system with a full AMHS & IWXXM system based on the IWXXM system implemented in Stage 1.

2.4.1 OPTION 2 – Full AMHS & IWXXM System Replacement

This will include the full replacement of the existing Comsoft AMHS System with a new AMHS & IWXXM system

The Contractor is required to submit Technical & Pricing proposal on the two OPTIONS stated above.

3.0 AIM AND SWIM IMPLEMENTATION ROADMAP

3.1 General

As part of the tender submission the Contractor is invited to submit a roadmap to integrate proposed AMHS & IWXM system solution in implementing Aeronautical Information Management System (AIM) and the System Wide Information Management (SWIM) system in accordance with the ICAO material guideline as reference below. The roadmap should clearly outline recommended solutions to migrate from AMHS to SWIM during the mix mode environment as explained in the Manual on SWIM Concept ICAO Doc 10039 Volume I

The proposed roadmap should employ the use of Virtual Machine (VM) server technology with user friendly application and provide easy transition of HMI application from the proposed AMHS & IWXXM system. In implementing the AIMS & SWIM, the proposed AMHS & IWXXM will be the baseline platform that can be easily expanded or scalable to accommodate the AIM & SWIM services.

The proposed roadmap should also factor the applicable cyber security application for ATM system to protect from any threat of cyber warfare that can interfere or shutdown the system and ATM services.

The Contractor is required to provide expected timeline of implementing these services based on ICAO implementation plan like for SWIM, ICAO has mandated the implementation by 2030. In addition, the Contractor shall also provide estimate ROM price to assist Fiji Airports budgeting, implementation and staging the migration from the proposed AMHS & IWXXM to AIM & SWIM services.

3.2 ICAO Reference Manual

The following ICAO reference manual provides specific requirements and guideline for the implementation of the AIM & SWIM services:

- a) [Roadmap for the Transition from AIS to AIM](#)
- b) [Manual on System Wide Information Management \(SWIM\) Concept ICAO Doc 10039](#)
- c) [Update on APAC SWIM Implementation Materials](#)