Specifications Document

Aeronautical Information Exchange Model (AIXM)

Specifications and Cost Estimates

Version 1.1

August 2022

APPROVAL SHEET

Author:		**DATE:**	**DD/MM/YYYY**
	(Designation: Department) **(Name Surname)**		
Endorsed:		**DATE:**	**DD/MM/YYYY**
	(Designation: Department) **(Name Surname)**		
Approved:		**DATE:**	**DD/MM/YYYY**
	(Designation: Department) **(Name Surname)**		

REVISION INDEX SHEET

Version	Revision	Date	Reason for Change	Pages Affected
1	0	xx/xx/20xx	Initial Document	All

Table of Contents

1. Glossary of Terms

Aeronautical data. A representation of aeronautical facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing.

Aeronautical Information Management (AIM). The dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties.

Aeronautical Information Product. Aeronautical data and aeronautical information provided either as digital data sets or as a standardised presentation in paper or electronic media. Aeronautical Information Products include:

— Aeronautical Information Publication (AIP), including Amendments and Supplements;
— Aeronautical Information Circulars (AIC);
— Aeronautical charts;
— NOTAM;
— Digital data sets.

Note.—Aeronautical information products are intended primarily to satisfy international requirements for the exchange of aeronautical information.

Aeronautical Information Regulation and Control (AIRAC). A system aimed at advance notification, based on common effective dates, of circumstances that necessitate significant changes in operating practices.

Air Traffic Management (ATM). The dynamic, integrated management of air traffic and airspace (including air traffic services, airspace management and air traffic flow management) — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.

Data. A representation of fact, concept, or instruction represented in a formalised form suitable for communication, interpretation or processing either by human and/or by automated systems.

Note. — This is the lowest level of abstraction, compared to information and knowledge.

Database. A collection of data stored in structured digital format so that appropriate applications may retrieve and update it.

Note. — This primarily refers to digital data (accessed by computers) rather than files of physical records.

Data accuracy. A degree of conformance between the estimated or measured value and the true value.

Data completeness. The degree of confidence that all of the data needed to support the intended use is provided.

Data Dictionary. or metadata repository, is a "centralised repository of information describing the contents, format, and structure of a database and the relationship between its elements, used to control access to and manipulation of the database.

Data format. A structure of data elements, records and files arranged to meet standards, specifications or data quality requirements.

Data integrity (assurance level). A degree of assurance that an aeronautical data and its value has not been lost or altered since the origination or authorised amendment.

Data Management. The management of resources and processes for the development and execution of the architectures, policies, practices and procedures that properly manage the full data lifecycle throughout the collection, validation, integration, storage, protection, exchange and delivery of accredited, quality-assured and timely data.

Data product. Data set or data set series that conforms to a data product specification (ISO 19131*).

Data product specification. Detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party (ISO 19131*).

Data quality. A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution, integrity (or equivalent assurance level), traceability, timeliness, completeness and format.

Data resolution. A number of units or digits to which a measured or calculated value is expressed and used.

Data timeliness. The degree of confidence that the data is applicable to the period of its intended use.

Data traceability. The degree that a system or a data product can provide a record of the changes made to that product and thereby enable an audit trail to be followed from the end-user to the originator.

Data set. Identifiable collection of data (ISO 19101*).

Data set series. Collection of data sets sharing the same product specification (ISO 19115*).

Extensible Mark-up Language (XML). A step in the evolution of web data formats (beyond HTML).

Information. Data that:
(1) has been verified to be accurate and timely,
(2) is specific and organised for a purpose,
(3) is presented within a context that gives it meaning and relevance, and which
(4) leads to increase in understanding and decrease in uncertainty. The value of information lies solely in its ability to affect a behaviour, decision, or outcome.

Information Consumer. The person, application or system consuming an information service. Also called consumer.

Infrastructure. The logical and physical (i.e., hardware and software) elements that together provide (SWIM) functionality.

Internet. A system of computer networks that interconnect worldwide and use the Transmission Control Protocol/Internet Protocol (TCP/IP) for transmission and recovery of information.

Internet protocol (IP). A protocol used to route data packets from source to destination in an Internet (interconnected networks) environment.

Metadata. Data about data (ISO 19115*)
Note. — A structured description of the content, quality, condition or other characteristics of data.

Origination (aeronautical data or aeronautical information). The creation of the value associated with new data or information or the modification of the value of an existing data or information.

Originator (aeronautical data or aeronautical information). An entity that is accountable for data or information origination and from which the AIS organisation receives aeronautical data and information.

Quality. Degree to which a set of inherent characteristics fulfils requirements (ISO 9000*).

Traceability. Ability to trace the history, application or location of that which is under consideration (ISO 9000*).

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (ISO 9000*).

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (ISO 9000*).

Service (application function). An implementation-independent reusable operational function that may be discovered as self-describing interfaces, and invoked using open standard protocols across networks. Services can be combined and orchestrated to produce composite services and operations processes, in accordance with predefined policies, security and service level agreements.

Service Provider. An organisation or entity providing a service. Refers (in this document) to ATM Service Providers (ASPs) or vendors that provide network or other value-added services; distinct from an information provider.

System-Wide Information Management (SWIM). SWIM consists of standards, infrastructure and governance enabling the management of ATM related information and its exchange between qualified parties via interoperable services

2. Abbreviations and Acronyms

Abbreviation	Description
AFTN	Aeronautical Fixed Telecommunication Network
AIC	Aeronautical Information Circular
AICM	Aeronautical Information Conceptual Model
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation and Control
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
AMHS	Aeronautical Message Handling System
API	Application Program Interface
ATM	Air Traffic Management
COTS	Commercial Off the Shelf Software
CSV	Common Separated Value
DMZ	Demilitarized Zone
ICAO	International Civil Aviation Organisation
GANP	Global Air Navigation Plan
GATMOC	Global Air Traffic Management Operational Concept
GML	Geography Mark-Up Language
IM	Information Management
IP	Internet Protocol
NMS	Network Management System
NOTAM	Notice to Airmen
PIB	Pre-flight Information Bulletin
SAT	Site Acceptance Testing
SNMP	Simple Network Management Protocol
SOA	Service Orientated Architecture
SWIM	System Wide Information Management
TCP/IP	Transmission Control Protocol/Internet Protocol
XML	Extensible Mark-up Language

3. Background

3.1 To satisfy new requirements arising from the Global Air Traffic Management Operational Concept, the Aeronautical Information services (AIS) must transition to the broader concept of Aeronautical Information Management (AIM), with a different method of information provision and management given the AIM data-centric nature as opposed to the product-centric nature of AIS.

3.2 This requirement is planned for under the Aviation system block upgrade (ASBU) Information Thread with the requirement for Digital Aeronautical Information Management.

3.3 AIM concept calls for the need to introduce digital processing and management of aeronautical data and information by:

  i). Use of aeronautical information exchange models and data exchange models designed to be globally interoperable.

  ii). Enable digital aeronautical data exchange between the parties involved in the data processing chain.

  iii). Providing real time services; and

  iv). Provide electronic AIS products (eAIP, eCharts, eTOD and Digital NOTAM)

3.4 The steps of the roadmap for the transition from AIS to AIM listed below are either directly or indirectly achieved through Systems that are AIM compliant.

P01	Data quality monitoring	P12	Aeronautical information briefing
P02	Data integrity monitoring	P13	Terrain
P03	AIRAC adherence monitoring	P14	Obstacles
P04	Monitoring of States' differences to Annex 4 and Annex 15	P15	Aerodrome Mapping

P05	WGS-84 implementation	P16	Training
P06	Integrated AI database	P17	Quality
P07	Unique identifiers	P18	Agreements with data originators
P08	Aeronautical information conceptual model	P19	Interoperability with meteorological products
P09	Aeronautical data exchange	P20	Electronic aeronautical charts
P10	Communication networks	P21	Digital NOTAM
P11	Electronic AIP		

3.5   The system specifications contained in this document, therefore have been drafted to facilitate the acquisition of aeronautical data and information management systems that meets the *P-06, P-08* and *P-09* requirements of the AIM Concept requirements.

4. Technical Specifications

These technical; specifications document serves to capture the approach that will be taken to address the project requirements and document the design of a feasible solution for **[State and/or Service provider Name]**.

4.1 FUNCTIONAL SCOPE

4.1.1   The system specification defined covers the following functional areas and describes:

    i).   Static and Dynamic Data Management (AICM/AIXM) Database

4.1.2   States are advised to consider all additional systems (systems not specific to AIXM) that will need to be connected to the AIXM database, such as:

    ii).Electronic AIP management

    iii).   Electronic Terrain and Obstacle Data (eTOD) management

    iv).   eCharts development

    v).   Web based system to enable aeronautical data exchange

    vi).   NOTAM

    vii).   Flight planning

    viii).   Contingency system specifications

    ix).   Instrument Flight Procedure Design (IFPD).

4.2 SYSTEM FUNTIONAL ARCHITECTURE

4.2.1   General

4.2.1.1   The system architecture shall utilize client-server architecture to host the main processing functionality and the AICM/AIXM database in a central place within (Insert State/Organisation Name)

(Note: States should increase these requirements based on services provided by the State which could include NOTAM and flight plan servers)

4.2.1.2   Clients shall be Web based.

4.2.1.3   The system shall be designed with modularity and expandability to allow for phased out modular implementations, future addition of workstations, connection to regional databases (e.g. AFI-Centralized database and Digital NOTAM upgrades.)

4.2.1.4   The system design should take into consideration the use of Commercial off the Shelf (COTS) software and hardware.

4.2.1.5   The application shall ensure portability to new hardware platforms, should the initial hardware be unavailable.

4.2.1.6   The application shall be platform independent to provide functionality for disaster recovery and business continuity.

4.2.1.7   The system shall be integrated with the following existing systems:

i)   ATC Systems

ii) AMHS/AFTN Network

iii) Aviation Meteorological data systems as applicable

(Note: A State should include all systems which the AIXM database should be capable of integrating with. This may include any standalone systems as defined in 4.1.2 above)

4.2.1.8   The system shall include remote control and monitoring tools for entire system including sub-systems.

4.2.1.9   The remote management system shall be based on standard internet web browsers.

4.2.1.10   The system shall be web based to enable online aeronautical data exchange.

(Note: States should list any additional services offered by the State which will be included into the AIXM database procurement such as flight planning, briefing and NOTAM as defined in 4.1.2 above).

4.2.2   Sharing and Exchange of Aeronautical data

4.2.2.1   The system shall implement a web-based application to enable sharing and exchange of aeronautical data with data providers and the next intended users.

4.2.2.2   The application described in 4.2.3.1 above shall use aeronautical information exchange models and data exchange models designed to be globally interoperable.

4.2.2.3   The application shall support standard data entry forms as appropriate.

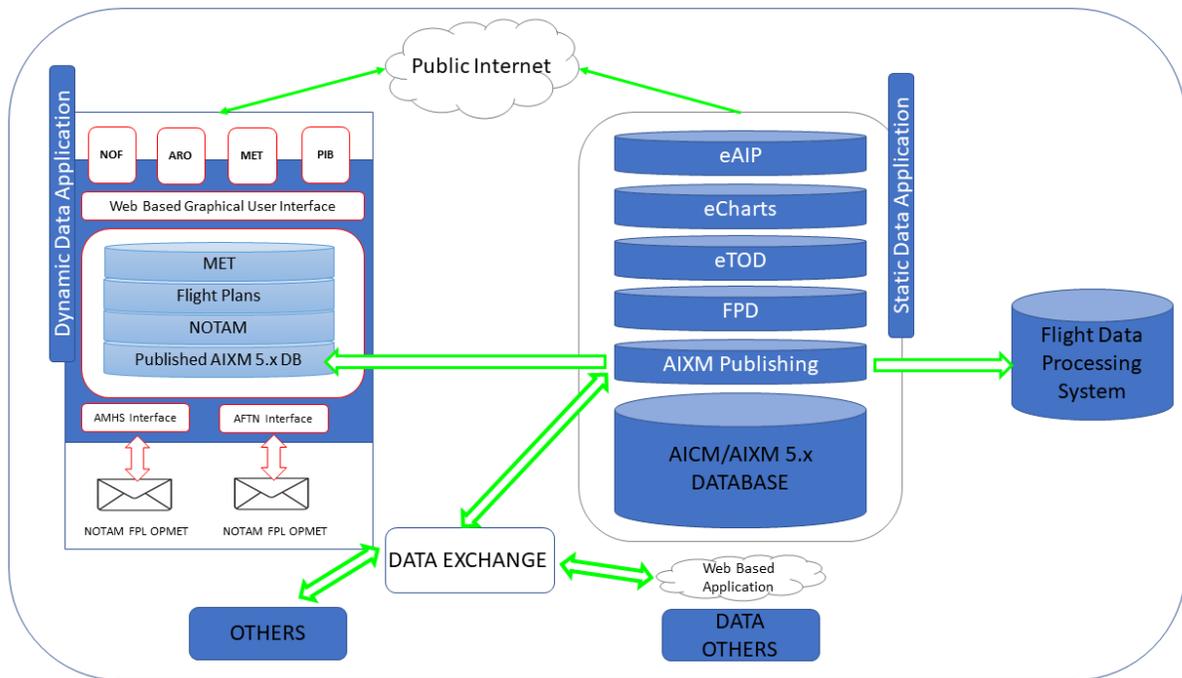4.2.2.4   Figure below illustrates the proposed functional architecture.

Figure 1 – Proposed System Architecture

(Note: **(Insert State/Organisation Name)** *may choose to implement operational redundancy at various levels and contingency by mirroring the central servers at [insert the location of the server] at a second location and establishing contingency in a third location.)*

4.2.3   System Network Architecture/Configuration

4.2.3.1   The AIM system shall be integrated to both IP and AFTN/AMHS Network.

4.2.3.2   The system supplier shall describe a network Architecture including bandwidth requirements covering the entire system functional requirements illustrated in Figure 1 above.

4.2.3.3   Remote sites will be interconnected through both IP and AFTN/AMHS Network.

4.2.4   Network fall back Configuration

4.2.4.1   The clients for remote Stations shall be configured to take into consideration failure of IP to the central servers.

4.2.4.2   In the events that IP network fails, access to the central servers hosting the AICM/AIXM database shall be via AFTN/AMHS.

4.2.5   Network Management System (NMS)

4.2.5.1   A NMS shall monitor the system status of the overall system including applications, computers and network components in real-time, gather performance data and provide an overall view of the system status on a graphical display.

4.2.5.2   The NMS Graphical User Interface (GUI) shall generate all the necessary system management reports.

4.2.5.3   The user shall be able to generate reports/statistics convertible to standard file versions (eg. Excel, Word, .txt, CSV, etc).

4.2.5.4   The retention time for event and alarm data shall be configurable.

4.2.5.5   The NMS shall provide control facilities for database tables and all data elements contained within the system.

4.2.6   Graphical User Interface (GUI)

4.2.6.1   The graphical user interface shall provide a clear and user-friendly presentation of all system components.

4.2.6.2   The graphical user interface shall visualize the system status in graphical views

in order to give the user an easily understandable overview of the status.

4.2.6.3   Concurrent access of the NMS GUI from multiple terminals shall be possible.

4.2.6.4   The GUI shall be web-based. The GUI shall be accessible by using a standard web browser.

4.2.6.5   The GUI shall offer a search function for events, alerts, and monitored objects.

4.2.7   Interface with third party NMS

4.2.7.1   The NMS shall offer the possibility to integrate with a top-level NMS. At least Simple Network Management Protocol (SNMP) shall be offered as the interface to the top-level NMS.

4.2.7.2   The NMS shall send SNMP alarm traps to a top-level NMS.

4.2.7.3   The NMS shall offer a Management Information Base (MIB), which contains information about the various object states of the monitored systems and the own NMS system status.

4.2.8   Remote Support Services

4.2.8.1   The system shall include a remote maintenance support facility enabling the supplier to remotely log in to the system and perform system checks when necessary.

4.2.8.2   The remote management system shall be based on standard web browsers.

4.2.8.3   The remote facility shall be secured.

4.2.8.4   The software shall allow all users to work remotely without local software installation

4.2.9   System Access

4.2.9.1   The Human Machine Interface (HMI).

   i)   The clients/user Human Machine Interface (HMI) shall be Web based, for use with standard Web Browsers on standard desktop workstations and mobile devices

4.2.9.2   User Roles

i)   Access to the system shall be controlled through a username and password combination by system administrators. Every user shall be allowed to change his/her password.

ii)   It shall be possible to assign one or more roles to each user. These roles shall control the contents and presentation of the HMI by showing only those parts of the application that the user is configured to have access to.

iii)   It shall be possible to have different roles for Operators, Supervisors, On-Job-Trainees and System Administrators

4.2.9.3   Internet

i)   The system shall be configurable to allow access of services over the Public internet.

ii)   These services shall include any additional sub systems as listed in 4.1.2 above selected to be implemented by the State as a service.

iii)   The system shall be secured against attacks over the internet by using latest security measures. This includes modern firewall technology and the possibility to have a system split into a main system and a dedicated, internet-accessible system located in a Demilitarized Zone (DMZ).

4.2.10 Workflow

4.2.10.1   The system shall allow for a workflow management system in order to automate aeronautical data management processes.

4.2.10.2   The workflow management system shall allow the creation of new workflows. Existing workflows shall be editable.

4.2.11 Web GIS

4.2.11.1   A Web GIS based on standard GIS data exchange protocols interface shall be provided to retrieve and visualize all static AIXM 5 data that contain geographic information including dynamic data.

4.2.11.2   The Web-GIS shall be compatible with standard Web Browsers on standard desktop workstations and mobile devices.

4.2.11.3   The Web-GIS provided shall enable third-party GIS tools and components to connect to the database system.

4.3 AICM/AIXM 5.X DATABASE SPECIFICATIONS

4.3.1   General

4.3.1.1   The central database shall be based on the latest release of AICM/AIXM 5.x standard available in the market.

4.3.1.2   The database shall provide read and write functions for all information that comply with AIXM version 5.x.

4.3.1.3   In order to ensure maximum compatibility with international peer organizations, the database shall be able to export the data into AIXM 4.5 (Backward compatibility with AIXM 4.5)

4.3.1.4   The system shall ensure forward compatibility with AIXM 4.5 without data loss.

4.3.1.5   The database shall be designed to support evolutionary developments of future versions of AIXM.

4.3.1.6   The system shall support temporal versioning of the Aeronautical Database by allowing multiple Temporal Versions in the database at any one time according to AIXM time slice model.

4.3.1.7   The system shall Support Temporal Versioning of all Aeronautical Data and workspaces to a specific Validity Period in Coordinated Universal Time (UTC) to a resolution of one second.

4.3.1.8   The system shall enable digital NOTAM.

4.3.2   Interoperability

4.3.2.1   The system shall be SWIM compliant as per defined industry standards

covering all SWIM components (information, information services, technical infrastructure and governance)

4.3.2.2   The system shall be based on the Service Orientated Architecture (SOA).

4.3.2.3   The system shall allow for seamless connectivity with other regional AIXM databases without requiring the development of additional interfaces.

4.3.3   Data Model

4.3.3.1   Data Contents

The database shall be able to store all aeronautical information as features and objects as defined in the AIXM 5.x specification, covering, as a minimum, the following sub-domains:

i.   Airports, including runways, taxiways, aprons, facilities, ground services, etc.;

ii.   Airspace structures and their usages;

iii. Navaids and points used for air navigation;

iv.   Routes;

v.   Terminal procedures, i.e. arrivals, departures and approach procedures;

vi.   Obstacles;

vii. Organisations, units providing services and radio frequencies.

4.3.3.2   Supported Data Types

i.   The database shall be capable of managing all data types as defined by AIXM 5.x. This also includes geographic data as part of the features and objects.

ii.   The ISO 19100 series of standards shall be used as the framework for the modelling and encoding of geographic information, and shall include temporality and metadata elements.

4.3.3.3   Logging and Audit Trail

i)   The database shall ensure traceability requirements for all operations including the provision of appropriate metadata from data origination to distribution to the next intended user.

ii)   All entries in the log shall be protected against unauthorized modification or deletion.

4.3.4   Data Integrity

4.3.4.1   The system shall ensure automatic validation checks for all data entries and modifications.

4.3.4.2   The Cycle Redundancy Check (CRC) shall be utilised to check against loss or alteration of data.

4.3.4.3   Data consistency check shall be performed by the system during all data processes covering any sub-systems that are interconnected to the AIXM system, in order to ensure data interoperability.

4.3.5   Access Control

4.3.5.1   The database shall provide access control mechanism using user rights management.

4.3.5.2   The system shall enable authorized data providers to access AIXM 5.x database and update the data appropriately.

4.3.5.3   The system shall allow for simultaneous access by multiple clients/users.

4.3.6   Interface

4.3.6.1   The A system-to-system interface shall be provided for all functions of the system.

4.3.6.2   The client /user interface shall be designed based on web service to enable user interaction with the system

4.3.6.3   The API shall provide AIXM based functions to insert and retrieve all features and objects as defined in the AIXM 5.x specification.

4.3.7 Data querying, Insert, Update and Retrieval

4.3.7.1 The system shall provide automated tools for the User to perform the following operations on the AICM/AIXM Database:

 i) Allow the User to import/and export bulk aeronautical data.

 ii) Allow a User to filter/query data items within the database based on multiple fields.

4.3.7.2 Time Slices shall be inserted into the database in the form of AIXM 5.x messages as defined in the XML schema definition (AIXM 5.x schema specification).

4.3.7.3 The retrieval of all Time Slice types shall be possible in the form of AIXM 5.x messages as de-fined in the XML schema definition (AIXM 5.x schema specification).

4.3.7.4 The system shall allow for downloading and uploading of aeronautical data in AIXM 5.x in terms of:

 i) Snapshot – all that data in the database based on AIRAC or on demand dates.

 ii) Update – only data elements uploaded after the initial snapshot.

 iii) User defined – only data elements specified by the user.

4.3.7.5 The system shall allow for the automated comparison of AIXM files in order to create a "delta" of differences between the AIXM files.

4.3.7.6 The system shall allow for the bulk upload of data elements in CSV/Excel format.

4.3.7.7 The system shall allow for the download of information in ARINC424 format.

(Note: States should list any additional services offered by the State which will be included into the AIXM database procurement such as flight planning, briefing and NOTAM. This may include any standalone systems as defined in 4.1.2 above).

4.4 SYSTEM SUPPORT REQUIREMENTS

4.4.1　Quality and Safety Plan

4.4.1.1　The supplier shall be responsible for the quality assurance, configuration management, and acceptance testing and shall undertake a risk assessment and provide a quality and a safety plan.

4.4.2　Training Plan

4.4.2.1　The supplier of the system shall provide a training plan and course syllabus for approval by (Insert State/Organisation Name) covering technical training for engineers and operational training for AIS/AIM supervisors and operators.

4.4.2.2　The training shall consist of factory and on-site training.

4.4.2.3　The training shall cover all aspects of the supplied system management (application, operations, administration, networking and maintenance).

4.4.3　Maintenance Plan

4.4.3.1　A maintenance plan on how to conduct maintenance services during the defects liability period and during the life cycle of the system.

4.4.3.2　The plan shall include:-

i)　Repair/replacement of defective hardware components for the 3-year warranty period;

ii)　Software maintenance and upgrade during the 3 year warranty period;

iii)　Repair/replacement of defective hardware components during the 10 year system life cycle;

iv)　Software maintenance and upgrade during the 10 year system life cycle;

v)　Remote maintenance and web support services;

vi)　Management of the obsolescence of components.

4.4.4 Documentation

4.4.4.1 The following documents shall be supplied to facilitate both operations, diagnosis and maintenance:

    i)   Operations manual for all applications

    ii)   Maintenance manual,

    iii)   Administrator's manual,

    iv)   Inventory list of equipment.

    v)   System installation diagrams.

    vi)   Configuration management plan

    vii)   Project plan

    viii)   System Acceptance Tests

    ix)   Training plan

4.4.5 Factory Acceptance Test (FAT)

4.4.5.1 A FAT plan consisting of a set of functional and performance tests aiming at validating the compliance of the system with the specifications provided shall be conducted at the premises of the supplier. This is to address conformance with specification and where necessary change of configuration at the factory before the shipment of the systems.

4.4.6 Site Acceptance Test (SAT)

4.4.6.1 A site acceptance test will be carried out on both the application and hardware's supplied. The tests shall include all functional aspects taking into account the site environment (e.g. connection to networks and systems that could not be verified at factory, accommodation of real traffic).

4.4.6.2 The SAT test cases shall allow for configurable test as identified and required by (Insert State/Organisation Name).

4.4.7 Spares

4.4.7.1 The supplier shall supply the following system spares:-

    i)   1 complete server

ii)   2 of each active network devices in the proposed system design

4.4.8   Software Deliverables

4.4.8.1   All relevant COTS software including required licences should be supplied together with the application software as appropriate.

4.4.9   Back and Recovery Tools

4.4.9.1   All tools necessary for system, application and database backup and recovery to be supplied with the system.

4.4.10   Back and Recovery Tools

4.4.10.1   An agreement will be reached with the supplier to provide, install and configure any software patches and upgrades.

5. COST ESTIMATES

5.1 METHOD USED TO ESTIMATE PRICES

5.1.1   The estimated prices are based on a market survey conducted between XXXX 2023 and XXXX 2023 presented by the suppliers.

5.1.2   The pricing for each application was collected and compiled from various industry suppliers and thereafter averaged and presented as the cost estimate per application.

5.1.3   Further, an estimate for services is presented as separate cost items based on the same methodology.

5.1.4   Hardware cost estimates are based on online offers for minimum hardware and equipment specification.

5.1.5   The cost estimates provided excludes prices for logistical and incidental services such as insurance, transport etc

5.1.6   Services included in the estimated costs relates to:

    i)   Installation costs

    ii) Migration of services and products to new system

    iii) Development and processing of initial products including complete AIXM using the new system (and initial product development using the supplied system).

    iv) Tests (Factory and site acceptance tests)

5.1.7   The estimated costs are presented in parts-first for the AIXM database to address the initial ICAO RBIS objective of establishing an AIXM database for (Insert State/Organisation Name). These are presented in section 4. The costs are further split for each application and service to facilitate decision making in reference to priority areas.

5.1.8   Costs related to applications for any additional services as listed in 4.1.2 above are presented for information purposes and for future planning purposes as many companies present these together considering the high-level inter-dependency these applications are due to the data sharing.

5.1.9   These specifications are listed in the interfaces specifications document for ease of

reference and for (Insert State/Organisation Name) to identify any additional services and applications to be incorporated into the procurement of the AIXM database.

5.2 COST ESTIMATES FOR AIXM SYSTEM

5.2.1   The below estimated prices provide a summary that should be considered by (Insert State/Organisation Name) in terms of procurement.

5.2.2   Breakdown of Costs

	ITEM	ESTIMATED PRICE IN USD	SUB TOTAL
1	AICM/AIXM Database		
	Software		
	Hardware		
	Training		
	Support Services		
2	Additional systems and applications		
	Software		
	Hardware		
	Training		
	Support Services		

NB.Cost of hardware shall include hardware's related to redundancy site and contingency.

(Note: States should list any additional services offered by the State within table 2 above which will be included into the AIXM database procurement such as flight planning, briefing and NOTAM. This may include any standalone systems as defined in Erreur ! Source du renvoi introuvable.).

6. . REFERENCES/STANDARDS

ICAO Annex 3 - Meteorological Service for International Air Navigation

ICAO Annex 4 – Aeronautical Charts ICAO Annex 5 – Units of Measurements

ICAO Annex 10 - Aeronautical Communications Volume II (Communication Procedures including those with PANS status)

Aeronautical Telecommunications - Volume III (Part I — Digital Data Communication)

ICAO Annex 11 - Air Traffic Services

ICAO Annex 14 - Aerodromes

ICAO Annex 15 - Aeronautical Information Services

ICAO Doc 4444 – Procedure for air navigation services — Air Traffic Management

ICAO Doc 7910 - Location Indicators, latest Edition

ICAO Doc 8126 - Aeronautical Information Services Manual

ICAO Doc 8259 - Manual of the Planning and Engineering of the Aeronautical Fixed Tele-communication Network

ICAO Doc 8400- ICAO Abbreviations and Codes

ICAO Doc 9750- Global Air Navigation Plan

ICAO Doc 9855-Guidelines on use of public internet to aeronautical publications

ICAO Doc 9674-WGS 1984

ICAO Doc 9854- Global Air Traffic Management Operational Concept

ICAO Doc 9881-eTOD manual

ICAO DOC 9705 – Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN)

- • Sub-Volume I: Introduction and System Level Requirements

- • Sub-Volume III: Ground/Ground Applications

- • Sub-Volume V: Internet Communications Service

- Sub-Volume VII: Directory Service

- Sub-Volume VIII: Security Services

- Sub-Volume IX: Registration Service

- PDRs (Proposed Defect Reports) applicable to all sub-volumes

ICAO Doc 9739 - Comprehensive Aeronautical Telecommunication Network (ATN) Manual,

ICAO Doc 9880 - Manual on detailed technical specifications for the Aeronautical Telecommunication Network using ISO/OSI Standards

ICAO Doc 9896 - Manual for the ATN using IPS Standards and Protocols

ICAO Doc 10039 - Manual on System Wide Information Management (SWIM) Concept

ICAO Doc 10066 – Procedure for air navigation services — Aeronautical information management

ICAO Roadmap for the transition from AIS to AIM