

# AFTN Terminal

## Architecture Overview

**Flight ATM Systems Ltd.**



Document Number  
**AFTNTERM-ARCH**

Rev  
A0.01

Page  
1/10

Filename: GEN\_AFTN\_Terminal Architecture.doc

Paper size: A4

Template: Flight ATM.dot

All information contained in this document remains the sole and exclusive property of Flight ATM Systems Ltd. No part of it may be copied, or disclosed by the recipient to third persons, without the prior written consent of Flight ATM Systems Ltd.; nor shall it be used for any purpose other than in connection with an agreement or proposed agreement with Flight ATM Systems Ltd. Registered in the United Kingdom, registration number 562 5816;

---

## Table of Contents

---

|                             |                              |    |
|-----------------------------|------------------------------|----|
| 1                           | Document Overview .....      | 3  |
| 1.1                         | Identification .....         | 3  |
| 1.2                         | Purpose .....                | 3  |
| 1.3                         | Scope .....                  | 3  |
| 1.4                         | Features - Application ..... | 4  |
| 1.5                         | System Overview .....        | 4  |
| 2                           | Client Application .....     | 6  |
| 2.1                         | General .....                | 6  |
| 3                           | System .....                 | 7  |
| 3.1                         | Functionality .....          | 7  |
| 4                           | AFTN Terminal Server .....   | 8  |
| 5                           | Implementation .....         | 9  |
| Appendix A – Acronyms ..... |                              | 10 |

---

## List of Figures

---

|            |  |   |
|------------|--|---|
| Figure 1 - | AFTN Terminal Application Overview ..... | 5 |
| Figure 2 - | Client Connection Options .....          | 7 |

# 1 Document Overview

## 1.1 Identification

|                  |  |
|------------------|--|
| Product:         | AFTN Terminal                          |
| Document Name:   | Architecture Overview                  |
| Document Number: | AFTNTERM-ARCH                          |
| Revision:        | A0.01                                  |
| Revision Date:   | Sunday, 18 October 2009                |
| Document Owner:  | Peter Venton – Flight ATM Systems Ltd. |
| File Name:       | GEN_AFTN_Terminal Architecture.doc     |

## 1.2 Purpose

This document describes a high level architectural overview of the Flight ATM Systems Ltd. AFTN Terminal application.

## 1.3 Scope

This document provides a brief high-level description and does not attempt to address in detail all architectural aspects of the application.

This document is not a requirement document and does not attempt specify topics in an atomic form.

## 1.4 Product Overview

The AFTN Terminal application provides a convenient means to both receive and enter ATS flight plans for submission onto the AFTN network. The primary functionality implemented by the application is:

- Facilitate flight plan input by AIS officers or tower controllers;
- Facilitate flight plan input by other users from remote locations other than an AIS office;
- Ensure flight plans comply syntactically and semantically to ICAO 4444 standards;
- Report syntax and semantic<sup>1</sup> errors in real time to the end user submitting a message;
- Support legal obligations for storing filed flight plans by recording all filed plans to a DB;
- Provide facilities to retrieve flight plans from the flight plan DB;
- Provide security by using an account based system for access authentication;
- Use existing WAN and LAN infrastructure for message transport (e.g. Internet or LAN etc.);
- Use COTS software and hardware wherever possible;

The AFTN Terminal application aims to reduce user workload by automating the flight plan filing process.

The AFTN Terminal application supports the input of flight plans using Internet technology; this ensures the application can be accessed from remote locations. No dedicated high cost communications links are required.

---

<sup>1</sup> Semantic checking is limited to checks requiring no AIP database such as that provided by the EAD system. This is envisaged for future functionality.

As standard commercial Internet technology and related software are used, the AFTN Terminal application ensures training and deployment costs are kept to a minimum.

Flight plan and ATS message input validation is carried out in real time and ensures flight plans are syntactically and semantically<sup>2</sup> correct. Flight plan validation conforms to both EUROCONTROL ADEXP and ICAO 4444 Standards.

## 1.4 Features - Application

- 'Look and Feel' similar to email application;
- Supports ATS message creation in ICAO format;
- Supports ATS message reception in both ICAO and ADEXP formats;
- Text and structured Form editors to create and/or correct messages;
- Syntax and Semantic checking of received and created messages;
- Received messages can be 'replied' to, whereupon an initialized form editor is displayed requiring only a small number of fields to be entered for the return message;
- Can be used to file ATS messages from any machine connected to a network, this includes LAN and WAN (e.g. Internet);
- Complex searches possible that support searching on any logical combination of ICAO ATS message fields;

## 1.6 Features - Technical

- Written in Java™;
- Platform independent;
- Software deployment can be made using either standard methods such as zip files or using Java™ Web Start technology;
- Where user accounts are requested, uses RSA encryption for user account and server access;

## 1.5 System Overview

The AFTN Terminal application is implemented as a client server architecture.

---

<sup>2</sup> Semantic checking is limited to checks requiring no AIP database such as that provided by the EAD system. This is envisaged for future functionality.

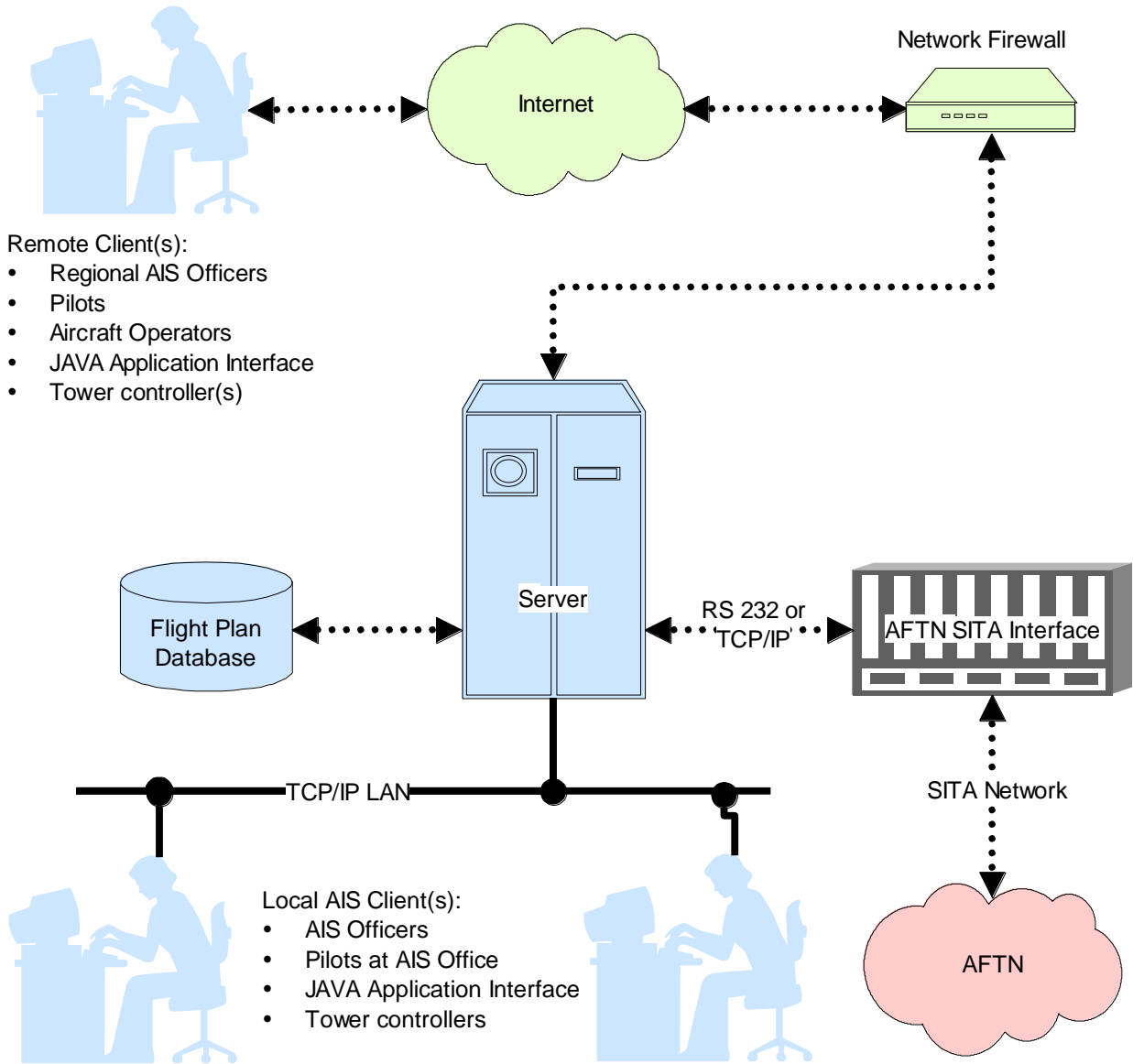


Figure 1 - AFTN Terminal Application Overview

## 2 Client Application

### 2.1 General

The client application provides access to the Message Server. Upon starting a client the AFTN Terminal client connects to the Message Server.

The client application reflects that of a standard email application and treats ATS Messages in a similar manner to an email. Using an email paradigm for the application ensures users can quickly adapt to the application with minimum training requirements.

User input is supported by drop down lists where options for input fields are finite. Default content for the drop down list and miscellaneous configuration data pertaining to a particular client, is obtained from the Server when a client connects to the server.

There is optionally a client privilege mechanism available that limits what a given client is able to do. When the privilege schema is enabled, clients can receive and/or transmit messages from the AFTN network based upon privileges assigned to a given client account.

Each client account can be configured to transmit flight plans directly onto the AFTN or force messages to be placed into client queue for confirmation by a supervisor before transmission onto the AFTN. This facilitates confirmation by AIS officers of flight plans filed by remote clients.

Upon entering a flight plan it is validated and appropriate errors are reported should the flight plan be syntactically or semantically incorrect. Errors are reported in real time to the end user, error free flight plans are secured on the Server DB.

A search facility is available to search the Server DB using any flight plan fields, (individually or combinations thereof). The search facility supports a form of wildcard input and supports construction of compound logical searches. Clients can search using any of the ICAO fields.

### 3 System

The client is implemented as a standalone Java™ application. Deployment of the application is simplified using the Java Web Start technology (if required) or by more conventional means such as TAR file distribution. The Java Web Start JNLP protocol allows a user to run a Java application directly from the Internet. JNLP uses the Java Virtual Machine directly and no browser is required.

The application can be installed on any local or remote machine. Communication with the server uses the Internet or a local TCP/IP network. All communication takes place over HTTP port 80 – no special firewall settings are required which means no decrease in network integrity.

The clients are lightweight processes; core processing is executed on the Server.

The client machines require the installation of a Java VM.

#### 3.1 Functionality

The AFTN Terminal client application has the general appearance of an email application where the ‘emails’ are ATS Messages. When ‘replying’ to a received message (e.g. generating an ARR message for a filed flight plan) a form editor is displayed with all fields initialised from the flight plan selected for the reply. The fields available in the form conform to the ICAO fields specified for ATS messages. Unique default values can be configured for each given client; this includes options displayed in drop down lists.

The AFTN Terminal Server stores received messages which are displayed by the client in an ‘Inbox’ folder.

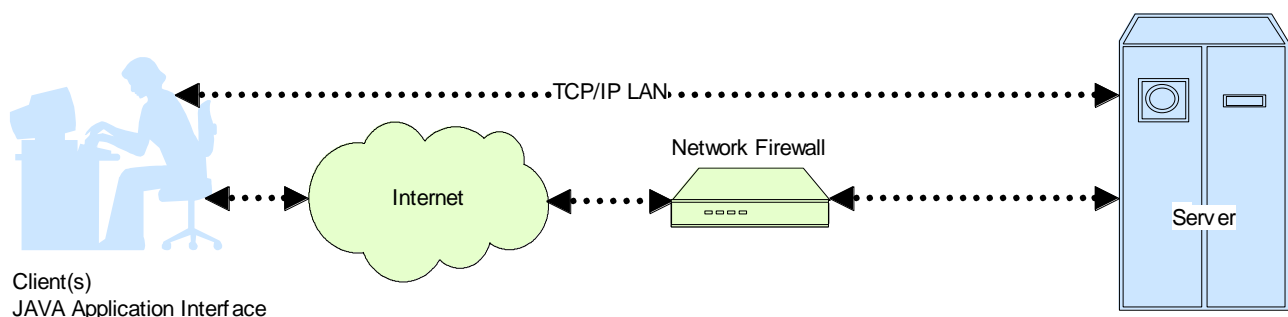
Clients can select and display messages from the ‘Inbox’ for subsequent modification or onward transmission. In addition the messages can be moved into other folders for client account message management.

The default folders implemented in the ATS Message server are:

- Inbox – Contains received messages
- Draft – Contains messages being constructed and not yet sent
- Deleted Items – Contains deleted messages
- Sent Items – Contains transmitted messages
- Templates – Contains Doc user message templates to support messages that can be copied for repetitive filing

The number of read and unread messages as well as the total number of messages in a particular folder is displayed in the client status bar.

Client connection options to the server are depicted below.



**Figure 2 - Client Connection Options**

## 4 AFTN Terminal Server

The AFTN Terminal Server provides the following functionality:

- Client I/F – Server for clients. All input and output, including error messages and confirmation receipts are processed in real time.
- Message Processing – Validates messages entered for correct syntax and semantics and marshals flight plans between clients and the AFTN. Processes received messages and routes messages to clients.
- Buffers messages if clients are not logged in;
- Manages client account content;
- Routes error messages and filing confirmation receipts to clients.
- Database Access – Controls access to and from the Database. The database is used to ensure legal storage requirements are fulfilled as well as providing secure logging of queued messages.

The AFTN Terminal Server is fully configurable for client account management and client interface communications.



## 5 Implementation

The AFTN Terminal application uses state of the art technology in its implementation:

- Server processes are written in Java and are platform independent;
- Client applications require no special applications to be installed on client machines other than a Java VM;
- Validation software for syntax and semantics<sup>3</sup> is fully compliant with both ICAO and EUROCONTROL ADEXP specifications for ATS messages. Currently the application does not perform any semantic<sup>3</sup> checks requiring AIP data such as provided by the EAD system.

The server requires the Java VM to be installed. An Internet connection is required to run the Java clients or for 'local' clients an Intranet using TCP/IP.

The DB is implemented using A COTS XML DB.

---

<sup>3</sup> Semantic checking is limited to checks requiring no AIP database such as that provided by the EAD system. This is envisaged for future functionality.

## Appendix A – Acronyms

| Acronym     | Description  |
|-------------|--|
| <b>A</b>    |  |
| ADEXP       | ATS Data Exchange Presentation                         |
| AFTN        | Aeronautical Fixed Telecommunications Network          |
| AIP         | Aeronautical Information Publication                   |
| AIS         | Aeronautical Information Service                       |
| ARCH        | ?  |
| ARR         | ICAO ATS Arrival Message                               |
| ATM         | Air Traffic Management                                 |
| ATS         | Air Traffic Service                                    |
| <b>C</b>    |  |
| COTS        | Common Off The Shelf                                   |
| <b>D</b>    |  |
| DB          | Database   |
| <b>E</b>    |  |
| EAD         | European AIP Database                                  |
| EUROCONTROL | European Organisation for the Safety of Air Navigation |
| <b>G</b>    |  |
| <b>H</b>    |  |
| HTTP        | Hypertext Transfer Protocol                            |
| <b>I</b>    |  |
| ICAO        | International Civil Aviation Organisation              |
| IP          | Internet Protocol                                      |
| <b>J</b>    |  |
| JNLP        | Java Network Launching Protocol                        |
| <b>L</b>    |  |
| LAN         | Local Area Network                                     |
| <b>R</b>    |  |
| RSA         | Rivest, Shamir, & Adleman                              |
| <b>T</b>    |  |
| TAR         | Tape Archive   |
| TCP         | Transmission Control Protocol                          |
| <b>V</b>    |  |
| VM          | Virtual Machine  |
| <b>W</b>    |  |
| WAN         | Wide Area Network                                      |
| <b>X</b>    |  |
| XML         | Extensible Mark up Language                            |