International Civil Aviation Organization

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Agenda Item 2: Aeronautical Fixed Service (AFS) Communications

PLANNED AFS UPGRADES BETWEEN THE USA FAA AND BOTH AIRPORTS FIJI LIMITED AND AIRWAYS CORPORATION OF NEW ZEALAND

(Presented by the United States of America)

Summary

AFS communications upgrades are planned between the USA FAA and both Airports Fiji Limited and Airways Corporation of New Zealand through the implementation of compatible voice/data multiplexing platforms. This paper summarizes the USA/Fiji and USA/New Zealand bilateral AFS communications upgrade plans and their associated benefits.

1.0 Introduction

1.1 The United States of America (USA) Federal Aviation Administration (FAA) and Airports Fiji Limited (AFL) will soon be upgrading the Aeronautical Fixed Services (AFS) between their two states. Additionally, the USA FAA and Airways Corporation of New Zealand will be establishing new bilateral AFS communications. A key element in each of these upgrades was agreement on a common state-of-the-art multiplexing platform.

2.0 proposed usa/fiji afs implementation

2.1 The FAA and AFL already had existing AFS communications between Oakland Air Route Traffic Control Center (ARTCC) and the Nadi Area Control Center (ACC). The FAA and AFL exchanged voice and Aeronautical Fixed Telecommunications Network (AFTN) data via a 9.6 kilobytes per second (Kbps) trunk circuit. This trunk circuit was multiplexed and comprised of a 2.4 Kbps AFTN data channel and a 4.8 KbpsKbps compressed voice channel.

2.2 Unfortunately, the original manufacturer of this multiplexing equipment went out of business. Therefore, no reliable support for this multiplexing platform existed. The FAA and AFL did not have any spare multiplexers. Additionally, Fiji upgraded its voice switch system. The new voice switch was incompatible with the existing multiplexing hardware. As a result, the FAA and AFL determined that AFS communications between Oakland ARTCC and Nadi ACC needed to be reconfigured to ensure reliable and continued service.

2.3 The FAA and AFL agreed to replace the unsupportable multiplexers at Oakland ARTCC and Nadi ACC with the multiservice access platform discussed in this paper.

2.4 To accommodate additional services, the FAA AFL agreed to upgrade the trunk service between them to 64 Kbps. This reconfigured service is scheduled to be operational in July 2002.

2.5 The following list details the implemented, proposed, and future AFS services between the two states:

2.5.1 Proposed Services

A. 8 Kbps -- management overhead
This channel is required for the replacement equipment to determine the network topology. It allows the equipment to check the condition of other compatible equipment and the links to this equipment. It is also used for call setup and teardown.

B. 3 Kbps -- framing overhead
This channel is used for framing and maintaining the 64 Kbps line code.

C. 1.2 Kbps -- emergency management access channel
This channel allows the FAA to assist AFL technicians in troubleshooting the replacement equipment and/or any tail circuits. Fiji would have the option of leaving this channel up or activating it when desired.

D. 2.4 Kbps -- X.25 AFTN data channel (existing)

E. 8 Kbps -- air traffic, compressed voice channel (existing – modified)

2.5.2 Potential Near-term Services

A. 8 Kbps -- weather compressed voice channel (between Fiji and Honolulu, Hawaii)

B 9.6 Kbps -- weather data channel (between Fiji and Silver Spring, Maryland)

2.5.3 Potential Future Services

A. 9.6 Kbps -- ATN data channel

B. 8 Kbps -- air traffic compressed voice channel (contingency voice channel)

C. 6.2 Kbps -- remaining bandwidth

Figure 1 shows the USA/Fiji bi-lateral AFS communications configuration.

3.0 Proposed USA/New Zealand AFS Implementation

3.1 The FAA and the Airways Corporation of New Zealand Limited have a mutual Air Traffic requirement for AFS communications between Oakland ARTCC and Auckland ACC. Direct voice communications between these two facilities is needed to support an International Civil Aviation Organization (ICAO) approved airspace change that realigns the Nadi, Fiji/Auckland, New Zealand/Oakland, United States common Flight Information Region (FIR) boundary. This airspace change is scheduled to occur on August 8, 2002.

3.2 Since there are no existing bilateral AFS communications between the USA and New Zealand, the FAA and the Airways Corporation of New Zealand Limited needed to agree on an AFS communications platform. The FAA and the Airways Corporation of New Zealand Limited agreed on implementing the replacement equipment for voice and data communications between the two states. Both states agreed to order a 64 Kbps 4-wire fractional T1 ½ circuit between Oakland ARTCC and Auckland ACC. With this additional bandwidth, the FAA and Airways Corporation of New Zealand Limited could implement additional AFS services. In addition to the required direct voice service, a direct AFTN/Air Traffic Services Interfacility Data Communications (AIDC) connection between the USA and New Zealand could be established with the initial equipment implementation. AFTN data between the two states is currently routed through Fiji. Additional voice and data service can be implemented immediately or in the future. This new service is scheduled to be operational between October and December 2002.

3.3 The following list details the proposed and future AFS services between the two states:

3.3.1 Proposed Services

A. 8 Kbps -- management overhead
This channel is required for the replacement equipment to determine the network topology. It allows the equipment to check the condition of other compatible equipment and the links to this equipment. It is also used for call setup and teardown.

B. 3 Kbps -- framing overhead
This channel is used for framing and maintaining the 64 Kbps line code.

C. 1.2 Kbps -- FAA emergency management access channel
This channel allows the FAA to assist New Zealand technicians in troubleshooting the replacement equipment and/or any tail circuits. New Zealand would have the option of leaving this channel up or activating it when desired.

D. 8 Kbps -- air traffic, compressed voice channel

E. 9.6 Kbps -- X.25 AFTN/AIDC data channel

3.3.2 Potential Future Services

A. 9.6 Kbps -- Aeronautical Telecommunications Network (ATN) data channel

B. 8 Kbps -- air traffic, compressed voice channel (contingency voice channel)

C. 16.6 Kbps -- remaining bandwidth/possible addition of MET services

4.0 Benefits of the Replacement Voice/Data Platform

4.1 The replacement platform was selected to implement AFS communications as a result of providing several significant benefits, including:

- Multi-service platform
- Voice compression
- Multi-protocol routing
- Re-routing capabilities
- Easily expandable platform
- Remotely manageable and configurable
- High network reliability
- Network security

4.1.1 *Multi-service platform*

The replacement platform allows for the integration of voice and data services on a single platform. This platform supports voice, video, data, fax, modem, LAN, and image traffic.

4.1.2 *Voice Compression*

Voice services can be compressed to use 16, 9.6, 8, or 4.8 Kbps of bandwidth. The replacement platform provides constant bandwidth and toll quality for voice services. The replacement platform also supports a number of voice compression industry standards, including Conjugate Structure Algebraic Code Excited Linear Prediction, CS-ACELP (G.729).

4.1.3 *Multi-protocol routing*

The replacement platform supports multiple protocols routing simultaneously. These protocols include: Asynchronous Transfer Mode (ATM), frame-relay, Internet Protocol (IP), Integrated Services Digital Network (ISDN), and voice.

4.1.4 *Re-routing capabilities*

Another potential benefit of the replacement equipment is the possibility of alternate routing of both AFS voice and data. With the proposed implementation of the replacement equipment in the USA, Fiji and New Zealand the possibility exists of establishing service rerouting capabilities among the three countries.

4.1.5 *Easily expandable platform*
The replacement platform is expandable with multi-feature card slots. As a result, expansion to meet new requirements may not involve buying a new platform or using more space.

4.1.6 *Remotely manageable and configurable*
This feature helps reduce service costs. Management is standards-based using Simple Network Management Protocol (SNMP) and HP OpenView.

4.1.7 *High network reliability*
The replacement equipment has the ability to determine network topology. With this information, data can be rerouted to optimize the end-to-end circuit path. The network has the ability to reroute traffic automatically in a few seconds in the event of a failure.

4.1.8 *Network security*
For the data services, the replacement platform addresses network security. The replacement equipment has a firewall feature that is used in existing service between the USA and other States that use the same equipment in Caracas, Venezuela and Tortola, British Virgin Islands.

5.0 Replacement Platform

5.1 The replacement voice/data multiplexing platform discussed in this paper is the Network Equipment Technologies (NET) Promina multiservice access platform.

6.0 Conclusion

6.1 In the Asia/Pacific Region, a common multiplexing platform is being implemented to support the exchange of USA/Fiji and USA/New Zealand bilateral AFS communications. The meeting is invited to review the technical solution implemented by the FAA, AFL, and Airways Corporation of New Zealand, Limited to satisfy AFS communications requirements.

Figure 1: USA/Fiji Bi-lateral AFS Communications Configuration