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**Agenda Item 3: Air Navigation Services –
3.1 CNS/ATM**

**FEDERAL AVIATION ADMINISTRATION (FAA) AERONAUTICAL
TELECOMMUNICATION NETWORK (ATN) ARCHITECTURE APPROACH**

(Presented by the United States of America)

SUMMARY

This information paper presents a technical overview of the FAA Aeronautical Telecommunications Network (ATN) Architecture Plan, and provides a brief synopsis of the FAA ATN Architectural Plan (AAP) document.

1. Introduction

1.1 This information paper presents a document overview of the FAA Aeronautical Telecommunications Network (ATN) Architecture Plan (AAP), and provides a brief synopsis of the architectural details and implementation aspects contained within multiple sections of the AAP document.

1.2 The ATN is an integral part of the Communications, Navigation, and Surveillance/Air Traffic Management (CNS/ATM) systems concept. The ATN, in its original inception, adopted common interface services and protocols based on the International Organization for Standardization (ISO) Open Systems Interconnect (OSI) reference model. At the time of ATN inception and standards development, OSI protocols were more formally specified and were the predominant networking technology of the time.

1.3 However, in light of recent technology advancements and the proven performance of the Transmission Control Protocol/Internet Protocol (TCP/IP) suite in the technological field, the Internet Protocol Suite (ISP) is now able to offer potential economic benefits and rapid implementation of new services in the aviation environment. Present ICAO Doc 9705 Ed. 3, 2002, requirements are specified as ISO/OSI; however, plans are currently underway to include TCP/IP in this documentation for possible future implementation. The FAA ATN Architectural Plan describes a proposed strategy for the incorporation of IPS technologies (applications and protocols) into the FAA ATN, a plan that previously encompassed OSI technologies exclusively.

2. Discussion

2.1 The objective of the FAA AAP is to present the OSI and IPS protocol architectures and discuss details of an FAA Hybrid Architecture implementation. A Hybrid Architecture implementation is presented that will provide for a fully implemented network allowing the FAA to participate in the ATN Internet. The AAP presents a hybrid implementation that will harmonize differences in FAA program implementations, as well as differences of international architecture implementations. This document also presents FAA Data Link subsystem architectures and the technical rationale for Hybrid Architecture configuration and implementation detail preferences.

2.2 The main goal of the FAA AAP is to set forth a hybrid communications architecture that will function as a common networking infrastructure solution. Through the use of network routers and gateways, the architecture will make full use of existing networks by effectively drawing upon past network investments. The transmission of these data will provide for reliable, robust, and high-integrity services.

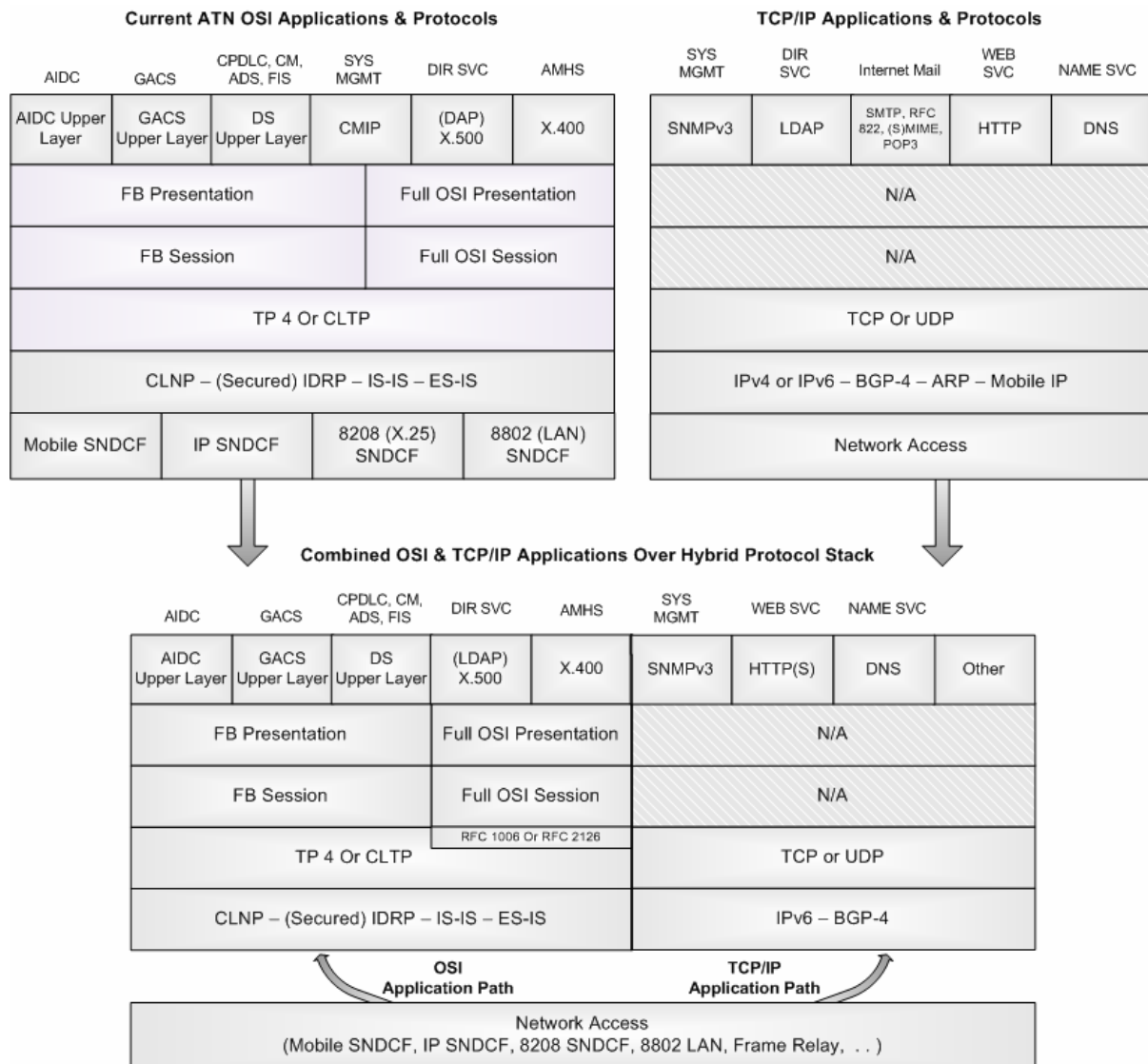
3. Conclusion

3.1 The FAA AAP describes a strategy for the incorporation and merging of the IPS (applications and protocols) and OSI technologies. Figure 3-1 depicts the merging of OSI and IPS applications and protocols into a Hybrid Protocol Stack. Highlights of the proposed strategy include:

- Maintaining the OSI Air/Ground applications (CPDLC, CM, FIS, and ADS) using the ICAO Doc 9705 Ed. 3, 2002, -specific “Fast Byte” Upper Layer Communications Service and the ATN OSI Internet Communications Service (TP4 for the Transport Layer, and CLNP and IDRP for the Network Layer).
- Permitting certain ICAO Doc 9705 Ed. 3, 2002, OSI-based applications (AMHS and Directory) to maintain the OSI Full Presentation and Full Session Upper Layer Structure but to optionally use the IPS Transport Layer and Network Layer for these applications.
- Replacing the ICAO Doc 9705 Ed. 3, 2002, System Management Service based on CMIP with TCP/IP System Management based on SNMP.
- Using IPv6 as the IPS forwarding protocol and BGP-4 as the Inter-Domain Routing Protocol for the Hybrid architecture solution.
- Maintaining the ICAO Doc 9705 Ed. 3, 2002, IDRP approach to Mobility (rather than TCP/IP Mobile IP), but providing a Gateway function in Air/Ground Routers allowing an all IP Ground-Ground Network to be used for TCP/IP applications.

3.2 The FAA AAP describes a hybrid (OSI and IPS) implementation for an ATN network. The Hybrid Architecture section of the AAP describes examples of FAA program details including a hybrid FAA ATS Message Handling System (AMHS) and Air Traffic Services Interfacility Communications (AIDC) implementation approach. Separate subsections are provided to describe protocol architecture, Routing Policy, Redundancy, and System Management details. The Hybrid section also describes the hybrid ATN architecture and provides a description of a long-term, multi-protocol architecture environment. This section is based on various assumptions related to the evolution of IP sub networks.

Figure 3-1 Merging of OSI and TCP/IP Protocol Stacks



4. **Conclusion**

4.1 Upon completion of the FAA AAP document and subsequent approval for public release, the FAA will make the ATN architecture plan available for review by members of the International Civil Aviation Organization (ICAO), as well as other interested parties. The FAA will finalize and make available the AAP document no later than December 2005. The FAA is eager to work within ICAO to address the inclusion of the IPS in aeronautical networking architectures, participate in the discussion and incorporation of IPS-related materials in standards documentation (ICAO Doc. 9705, Edition 3), and participate in discussions related to further development of the ATN.

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