

AMHS Workshop – SP/27

ASIA/PAC AMHS Implementation Workshop

Aeronautical Fixed Service (AFS) Network Strategy

27-28 January 2010

Bangkok, Thailand



Federal Aviation
Administration



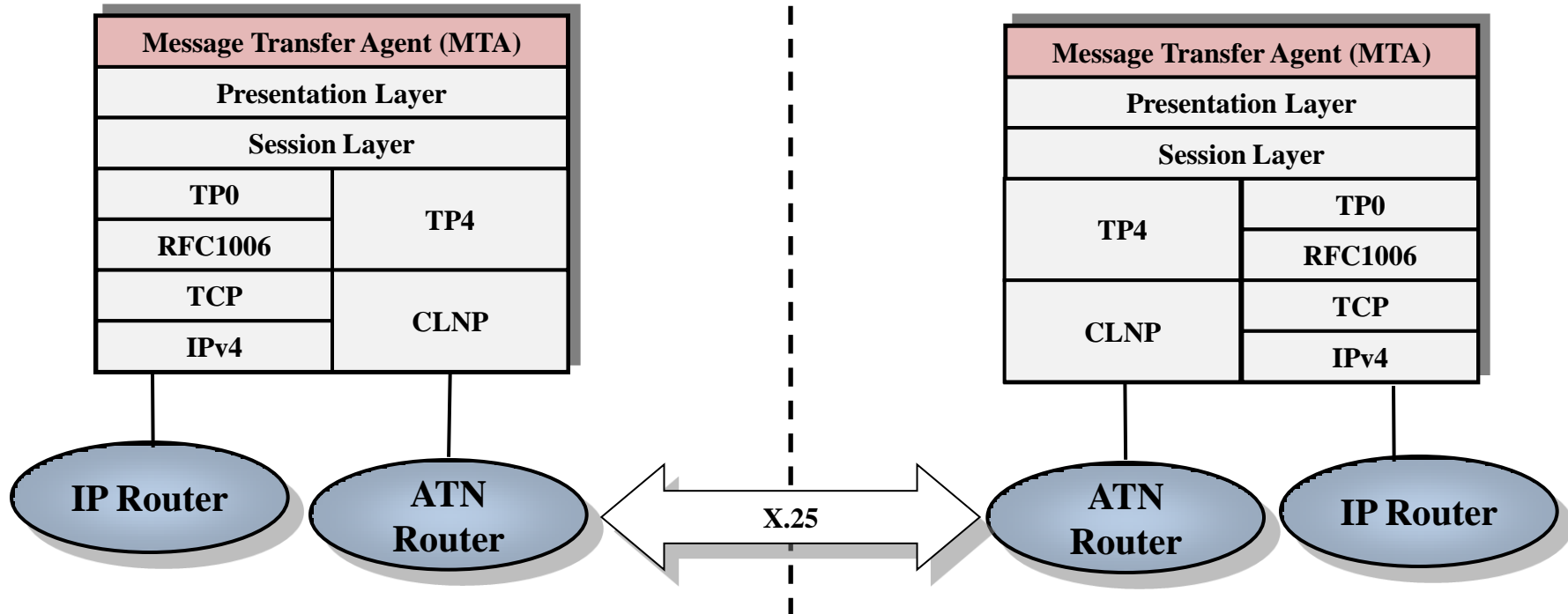
AMHS Configuration

ICAO Aeronautical Telecommunication Network (ATN) Documents specify AMHS network configuration as below. However, ICAO regions have adopted different approaches based on existing network environment:

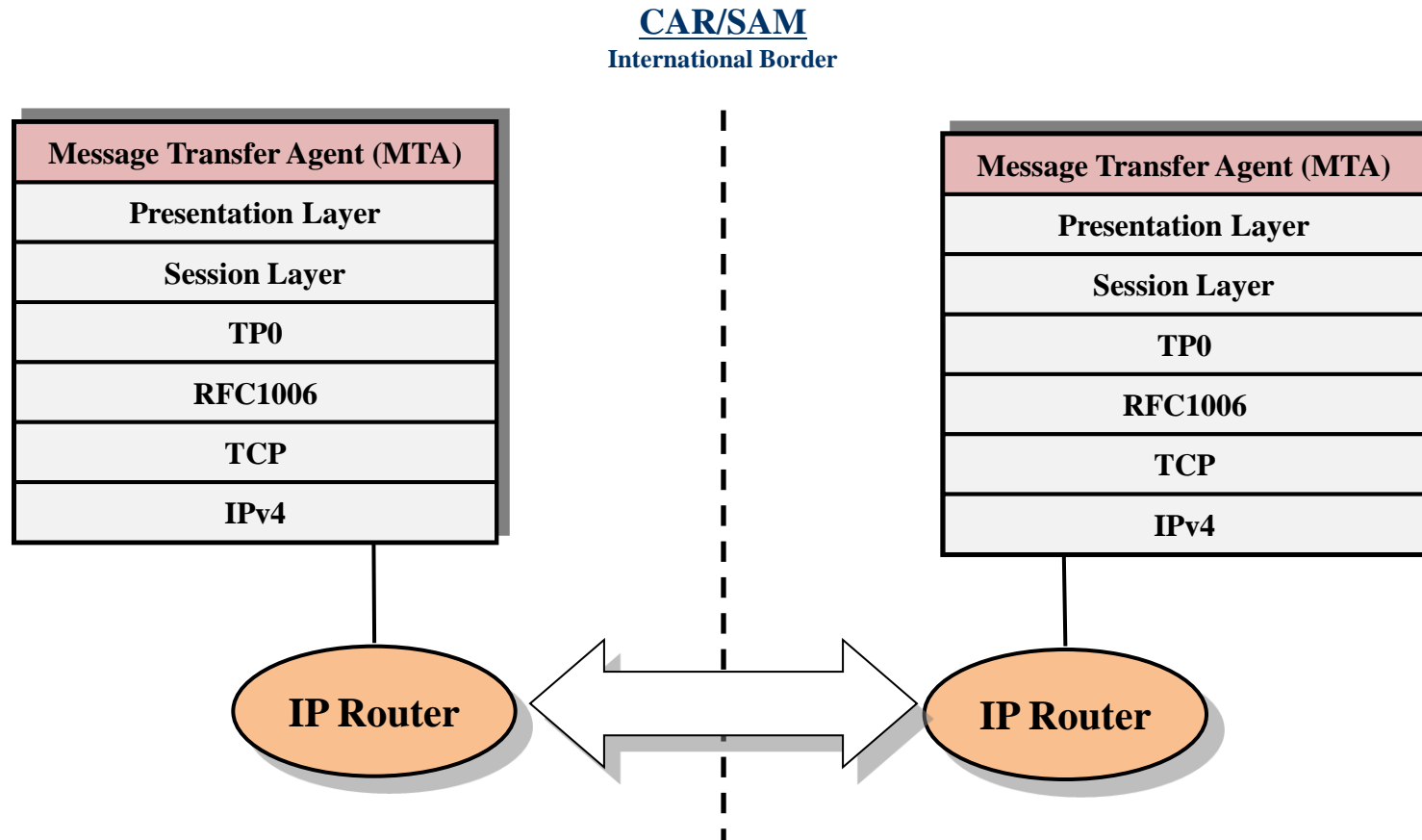
1. AMHS with ATN router over an X.25 subnetwork.
2. AMHS with ATN router over an IP subnetwork (v4/6).
3. AMHS using RFC1006 over TCP/IP network.
4. AMHS using RFC1006 over TCP/IP with Network Address Translation-Protocol Translation (NAT-PT) for IPv6 network.
5. AMHS using RFC2126 over TCP/IP network using IPv6.

Asia/Pacific and USA AMHS Configuration

ASIA/PAC International Border

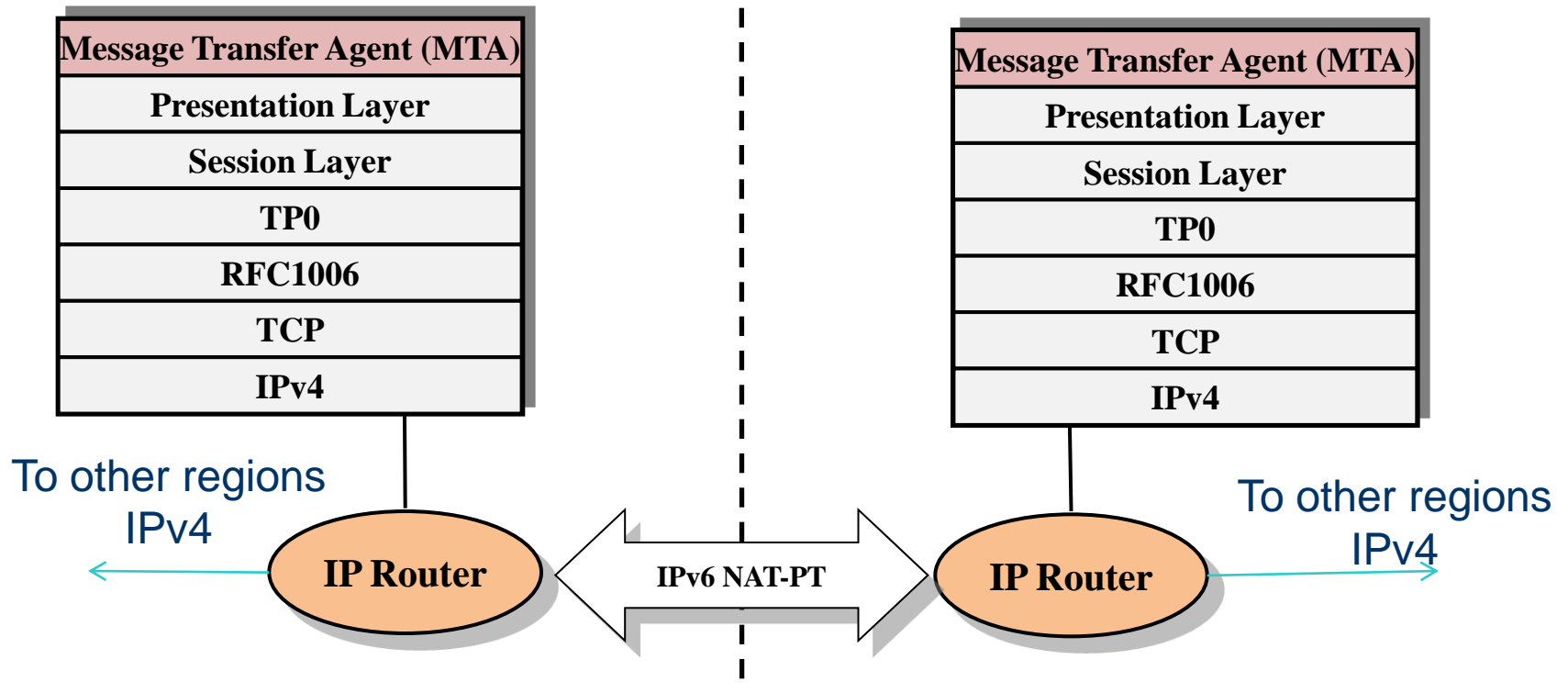


CAR/SAM AMHS Configuration



European AMHS Configuration

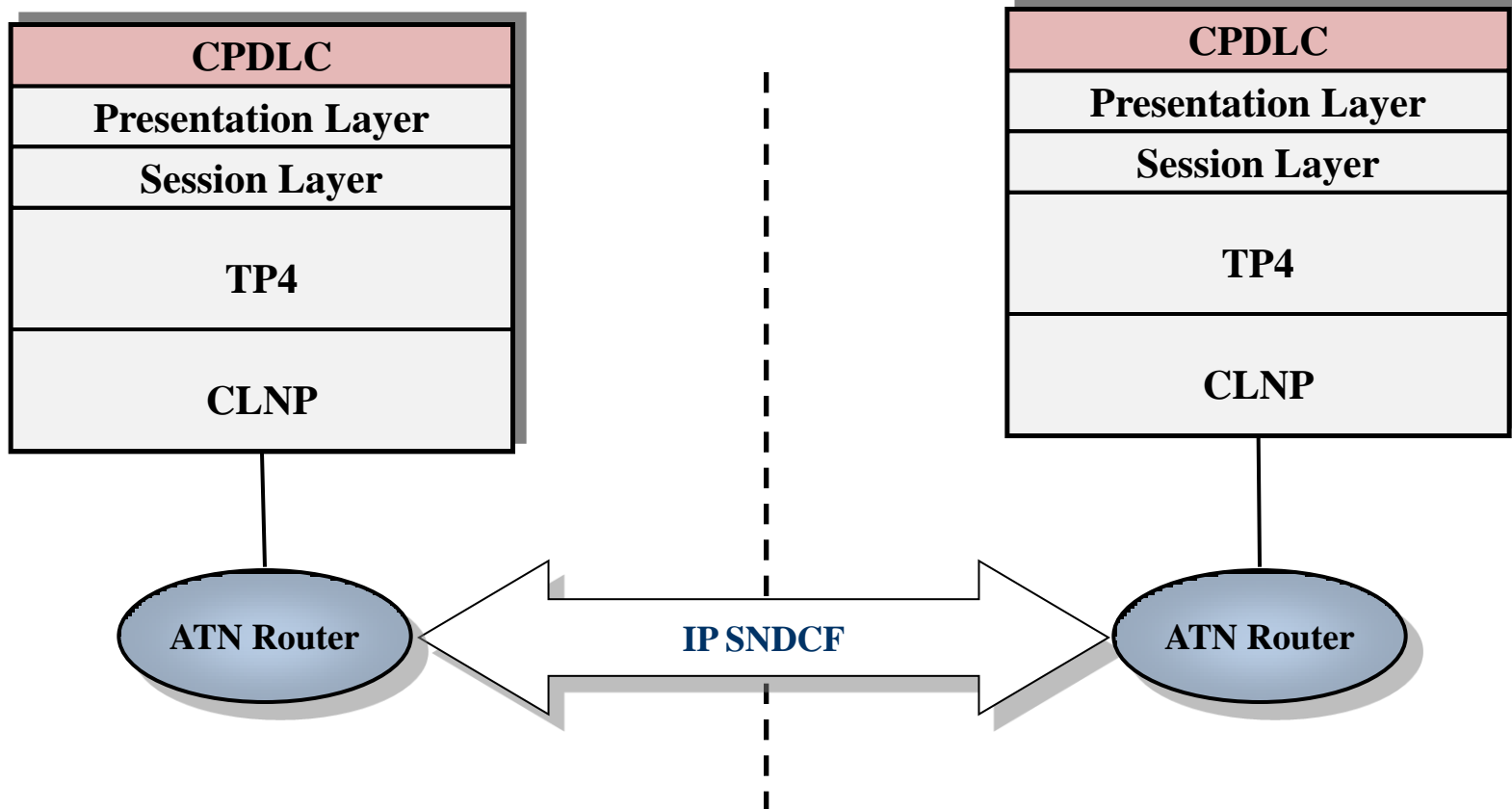
EUROPE International Border



NAT-PT Network Address Translation - Protocol Translation

Very High Frequency Data Link (VDL) Mode 2 Configuration

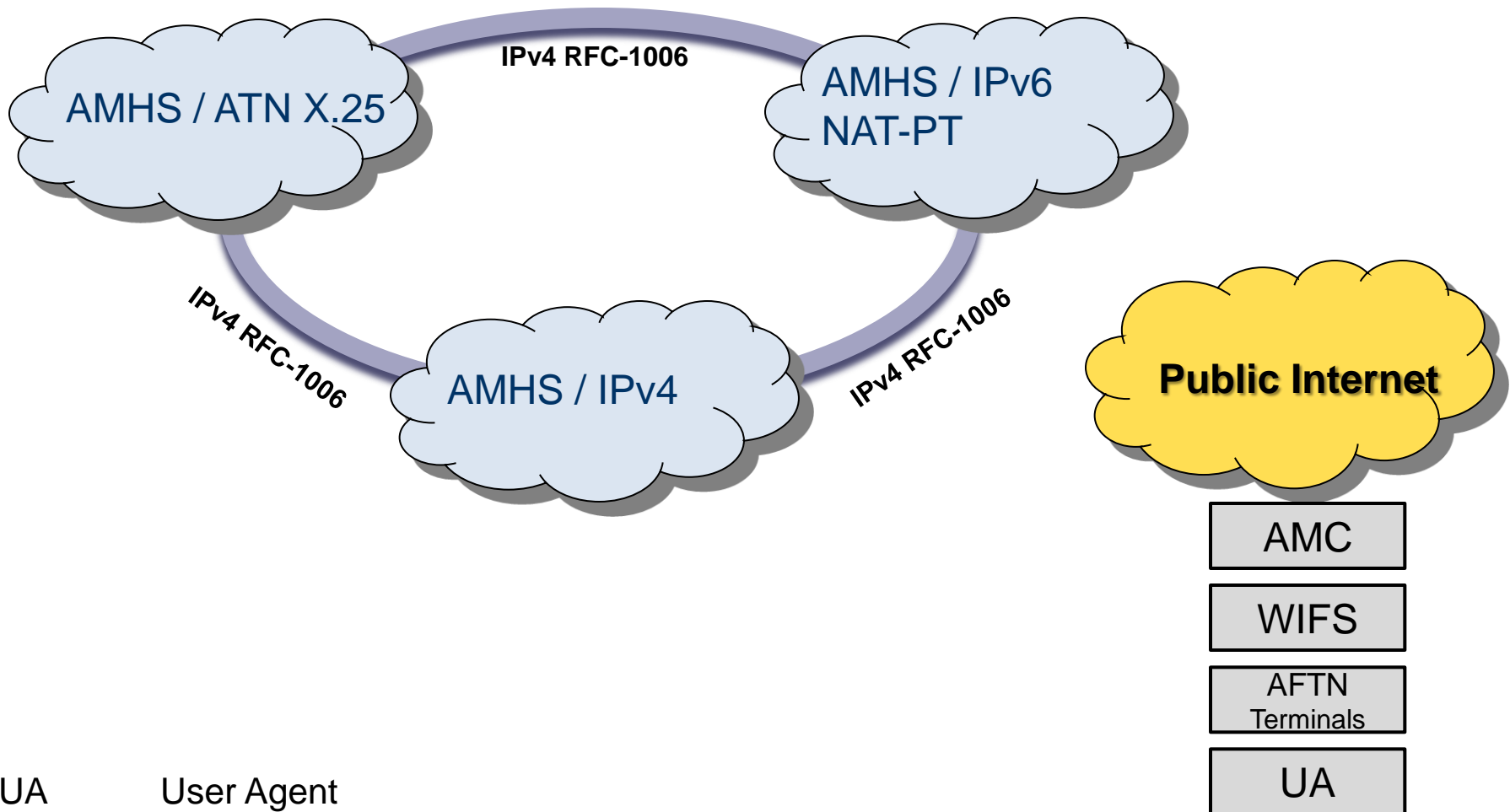
VDL Mode 2



SNDCF
CPDLC

Sub Network Dependent Convergent Function
Controller Pilot Data Link Communications

Current AMHS/Public Internet Environment



UA User Agent
WIFS World Area Forecast System (WAFS) Internet File Server

AFS Implementation Issues

The following are many of the issues confronting the Aeronautical Fixed Service (AFS) modernization program.

1. Various ICAO publications offer many options to upgrade the AFS: VoIP, public internet, dedicated private network, Open System Interface (OSI) applications, IP based applications, addressing schemes (CAAS, AFTN, XF), network security, and different network protocols (X.25, TCP/IP, IPv6, IPv4, IP Sub Network Dependent Convergence Function (SND CF), Network Address Translation.

CAAS Common AMHS Addressing Scheme
XF Translated Form



AMHS Implementation Issues (Cont'd)

2. ICAO regions have implemented different approaches requiring adjustments for traffic transmission across the regions.
3. New and emerging technologies has been considered such as web based services (XML, HTML) that can be used to provide service that is currently being distributed by AFTN and soon by AMHS. These applications would result in many gateways (e.g.NAT-PT for conversion IPv6/IPv4, AFTN/AMHS Gateway) being established. These gateways would have potential operational impacts such as longer time to determine the cause of network failure, tracking unknown message and service restoration.

XML Extensible Markup Language
HTML Hyper Text Markup Language



AMHS Implementation Issues (Cont'd)

4. Managing AFTN addresses along with AMHS schemes (Common AMHS Addressing Scheme (CAAS) and Translated Form (XF)) would require global address coordination process that would result in establishing a global network management tool such as an Air Traffic Service Messages Management Center (AMC).
5. AFS Security has not been globally implemented. The security requirement for IP network is different than ATN X.25 based network.
6. The AMHS Extended service as specified in ICAO Doc. 9705 need to be reviewed to address the transmission of attached files, Directory Service X.500 over different network protocols and security.

AMHS Implementation Issues (Cont'd)

7. There is a proposal being circulated to utilize web based service as a distribution network for non-critical service such as meteorological data. The following issues should be considered to support this approach:



AMHS Implementation Issues (Cont'd)

- a) Any web based application/service should be independent of AFS. This approach will not require adding more gateways into AFS and would allow maximum flexibility of the public internet service with minimal operating cost to States.
- b) The web based application would need only one or two gateways to ensure existing applications to be compatible to newly installed applications. This will significantly reduce the time needed to coordinate between States.
- c) The security for these web based application/services should be simple to implement because the server would be centralized and authentication of the connection can be achieved with minimum coordination.

Conclusion

AFS is complicated because it interfaces with many applications and networks which limited its flexibility. In addition, the AFS is independently operated and maintained by each State that requires extensive coordination and cooperation of each State before a new service can be implemented. Therefore, the concept of requiring every State to implement new equipment to support new service or improved technology should be reconsidered. On the other hand, the public internet and IP based technology has steadily improved and has become more reliable.



Conclusion (Cont'd)

The use of new IP based applications such as AMC and Weather Aviation Forecast System Internet File Server (WIFS) over the public internet with appropriate security planning to support these non-critical services. The data collected from this internet service can be used for analysis in making recommendation for improving the AFS.

Lastly, The integration between AFS and Public Internet Based ATC service can be achieved through a common Gateway.

AMHS/Public Internet in Common Platform

