

*Global Information  
Management*

**AMHS in  
SWIM  
Environment**

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Federal Aviation  
Administration



**AIR TRANSPORTATION  
INFORMATION EXCHANGE  
CONFERENCE**

**Global Information Management**

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# Topics for Discussion

- What is AFTN? AMHS?
- AFTN → AMHS Migration
- Potential Use of AMHS in SWIM Environment

## What is AFTN?

- Aeronautical Fixed Telecommunications Network
- Message system used worldwide to exchange flight, weather and other data
- Has been in operation for over half a century
- Not surprisingly, has many limitations in today's Air Traffic environment

# AFTN Limitations

- Not all AFTN systems support full IA-5 character set
- Not all AFTN systems support line length greater than 69 characters
- AFTN systems generally have maximum message size limitation of 1800-3700 characters

# How to Overcome Limitations?

- The International Civil Aviation Organization (ICAO) is moving towards a new global communications network that offers significant improvement over the AFTN legacy network
- That network is Air Traffic Services (ATS) Message Handling System (AMHS)



# AMHS Overview

## What is AMHS?

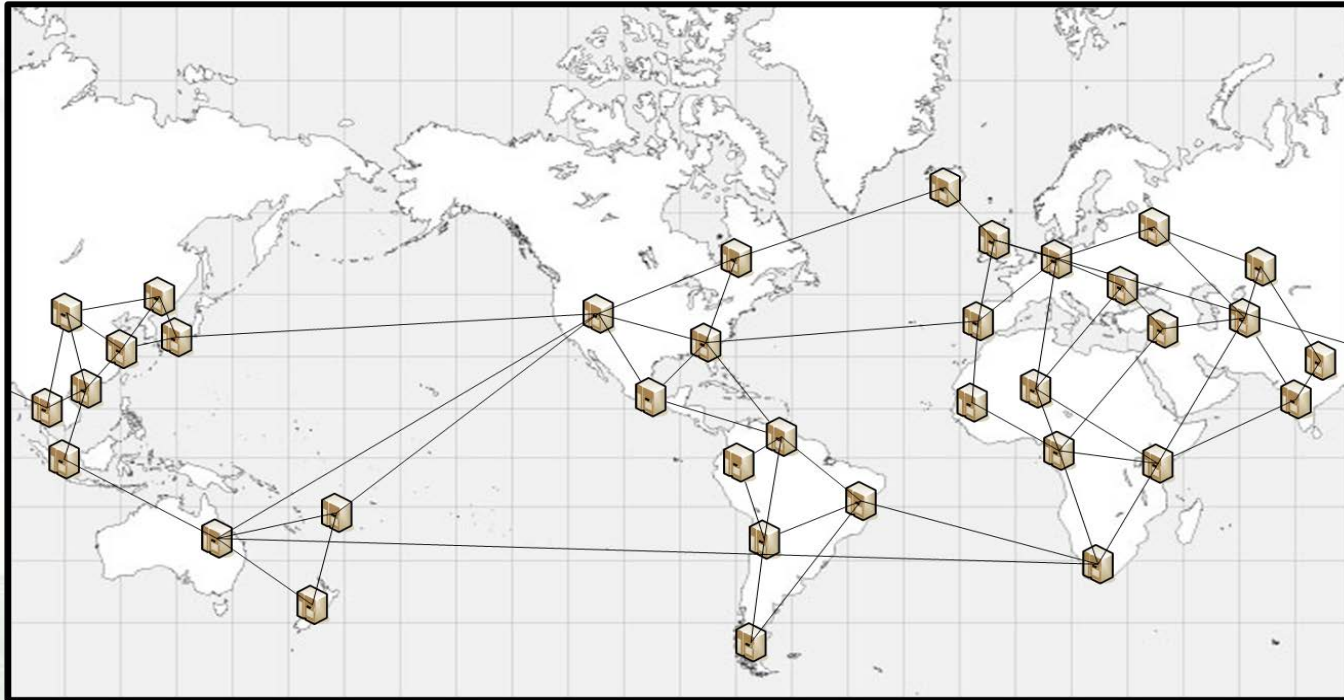
- Next generation of message switch technology
- Offers numerous benefits in terms of
  - Message content
  - Message routing
  - Message delivery
- Implemented exclusively for International data flows (no domestic user agents support)
- Supporting transmission of legacy Flight Data, Weather, and Aeronautical Information Data

# AMHS Benefits

- Practically unlimited message length
- Virtually no limit on number of addressees
- Potential for attachments
- Provision for non-delivery reports
- Routing will evolve from message level to network level
- AFTN routing is static, and requires manual intervention to re-route
- AMHS routing is dynamic, re-route is automatic

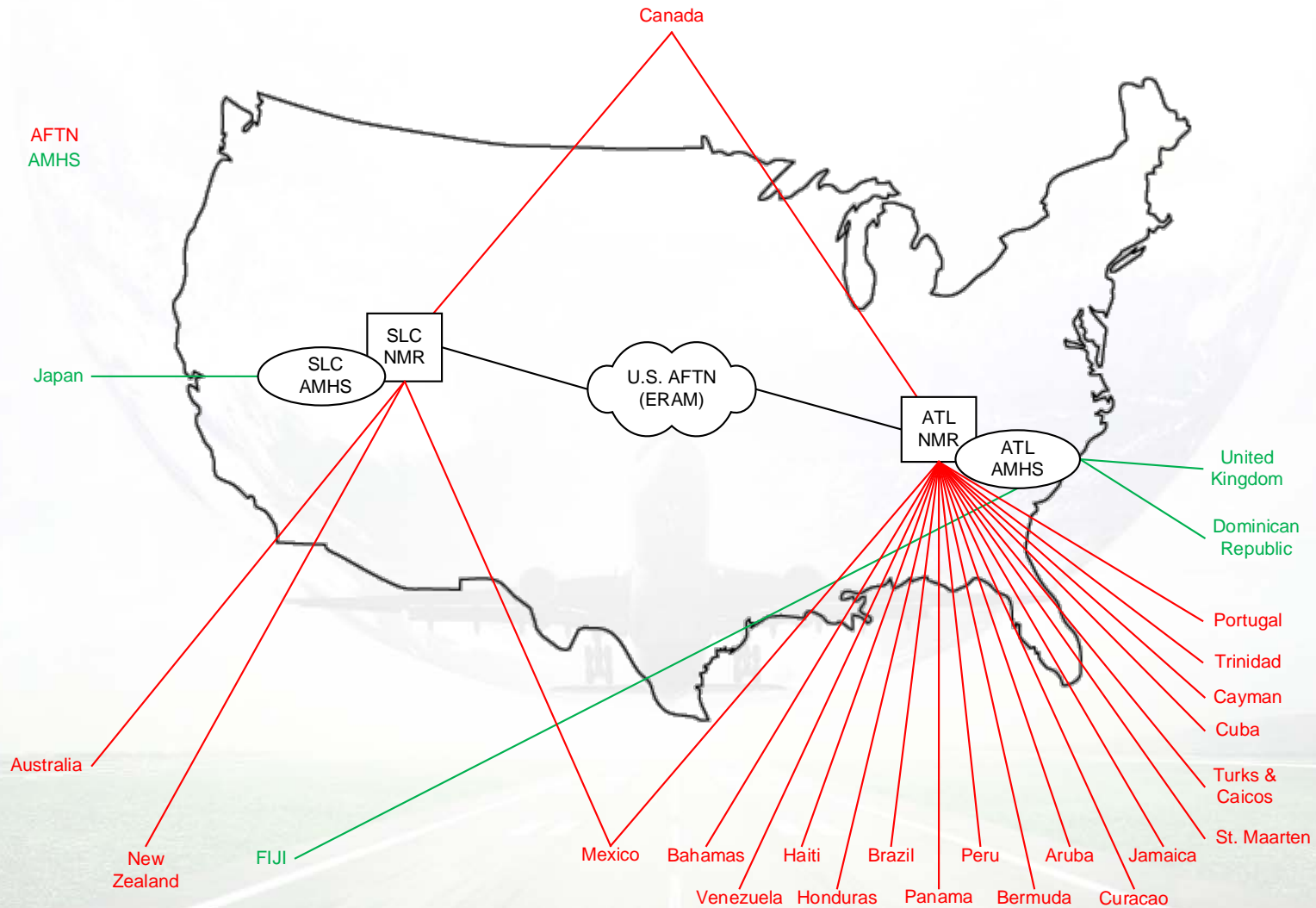
# Current Network

- Globally, 245 Com Centres in 189 countries
- AFTN-to-AMHS Migration is ongoing

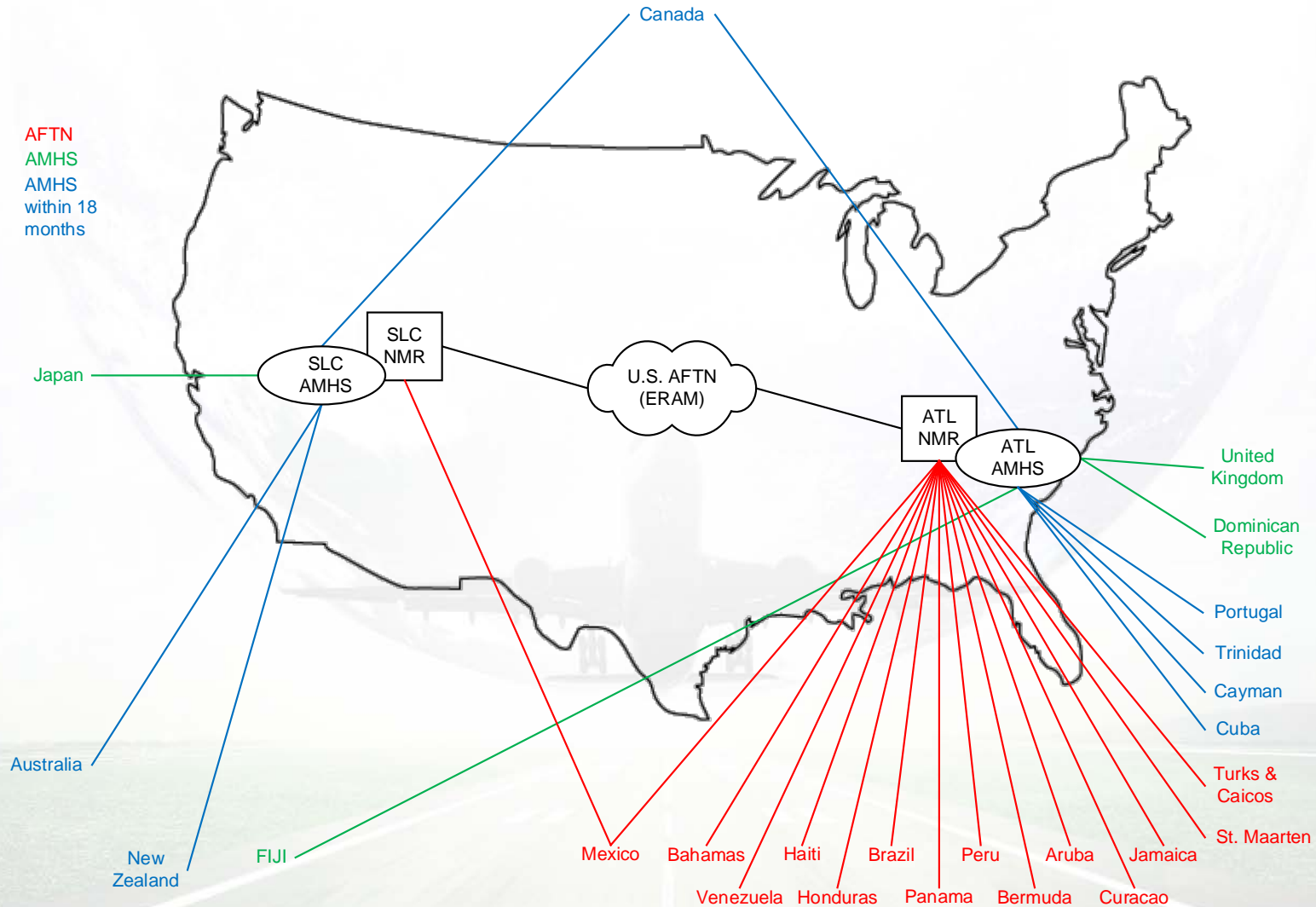




# Current FAA Connections



# Future FAA Connections

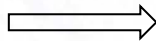


# Current Message Flow

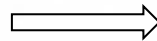
ICAO 2012 formatted FPL



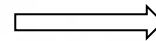
ICAO FPL



US AMHS



NMR



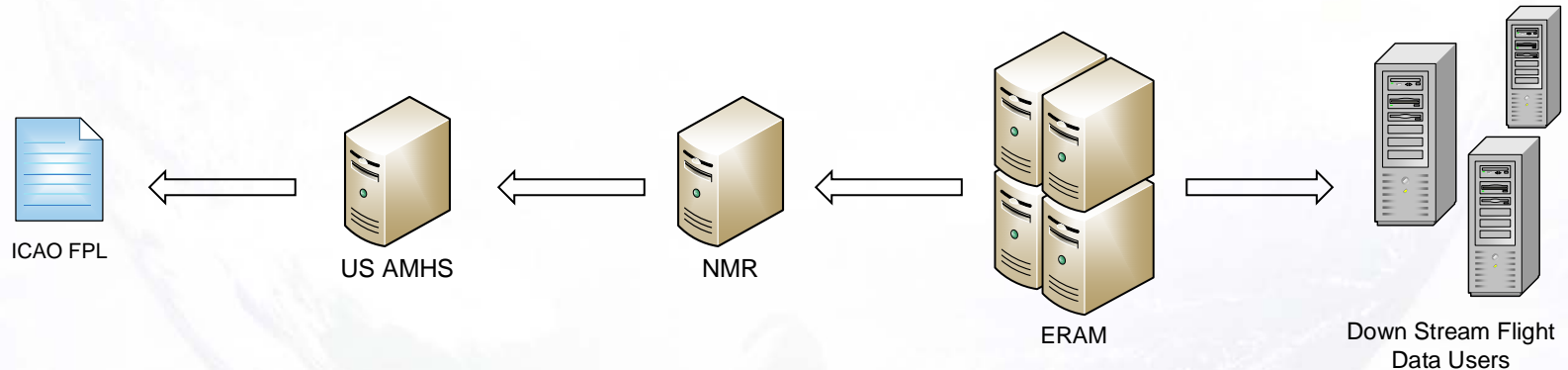
ERAM

FPL submitted to US AMHS via ATN or IP network

AMHS/AFTN gateway performs address and message conversion then forwards to NMR

NMR performs routing and format conversion then forwards to ERAM

# Current Message Flow



AMHS/AFTN gateway performs address and message conversion then forwards Ack to AMHS for delivery to submitter via ATN or IP network

NMR performs routing and format conversion then forwards Ack to AMHS/AFTN gateway

ERAM performs internal processing, sends Ack back to NMR, and distributes to other flight data users

# SWIM – AMHS Interaction

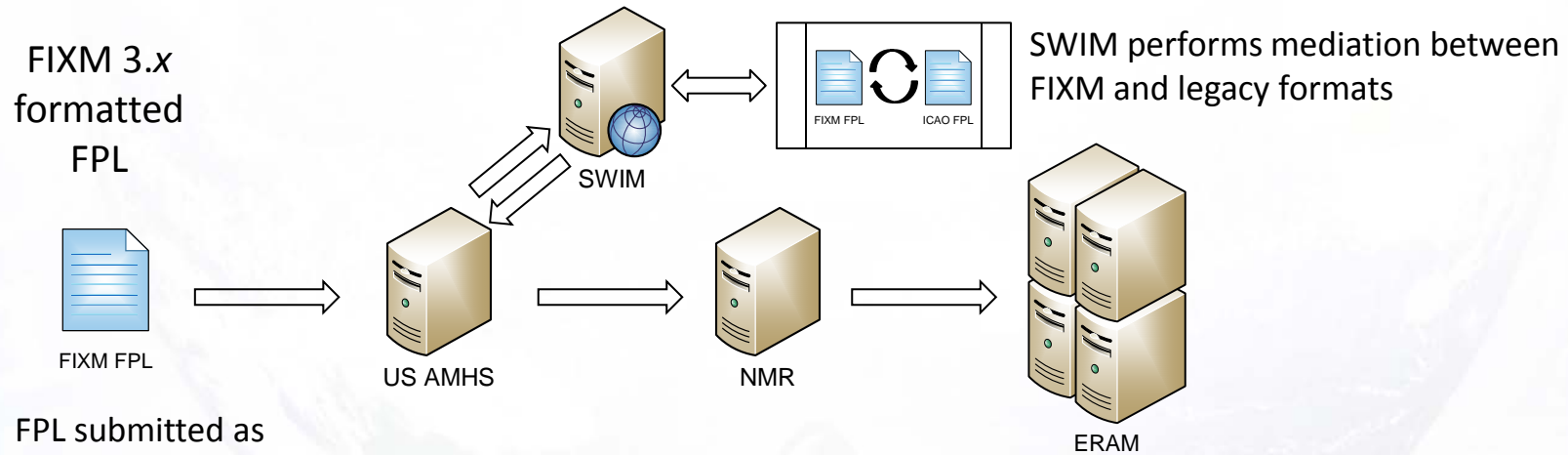
- Rapidly expanding AMHS provides environment for exchange of XML formatted data
- Proof of concept testing has already been conducted
- Possible to implement AMHS to SWIM gateway
  - Publish XML to SWIM
  - Utilize mediation capabilities of NEMS or other data conversion service
  - Consume value added product from SWIM



# SWIM – AMHS Interaction

- Minimizes investment to enable international XML data flows
  - Limits development to a single system
  - Minimizes requirements for down stream systems (NMR, ERAM, etc...)
- Supports migration path that allows systems to implement XML support based on their own schedule/needs

# Potential Message Flow



FIXM 3.x formatted FPL



FPL submitted as XML attachment to US AMHS via ATN or IP network

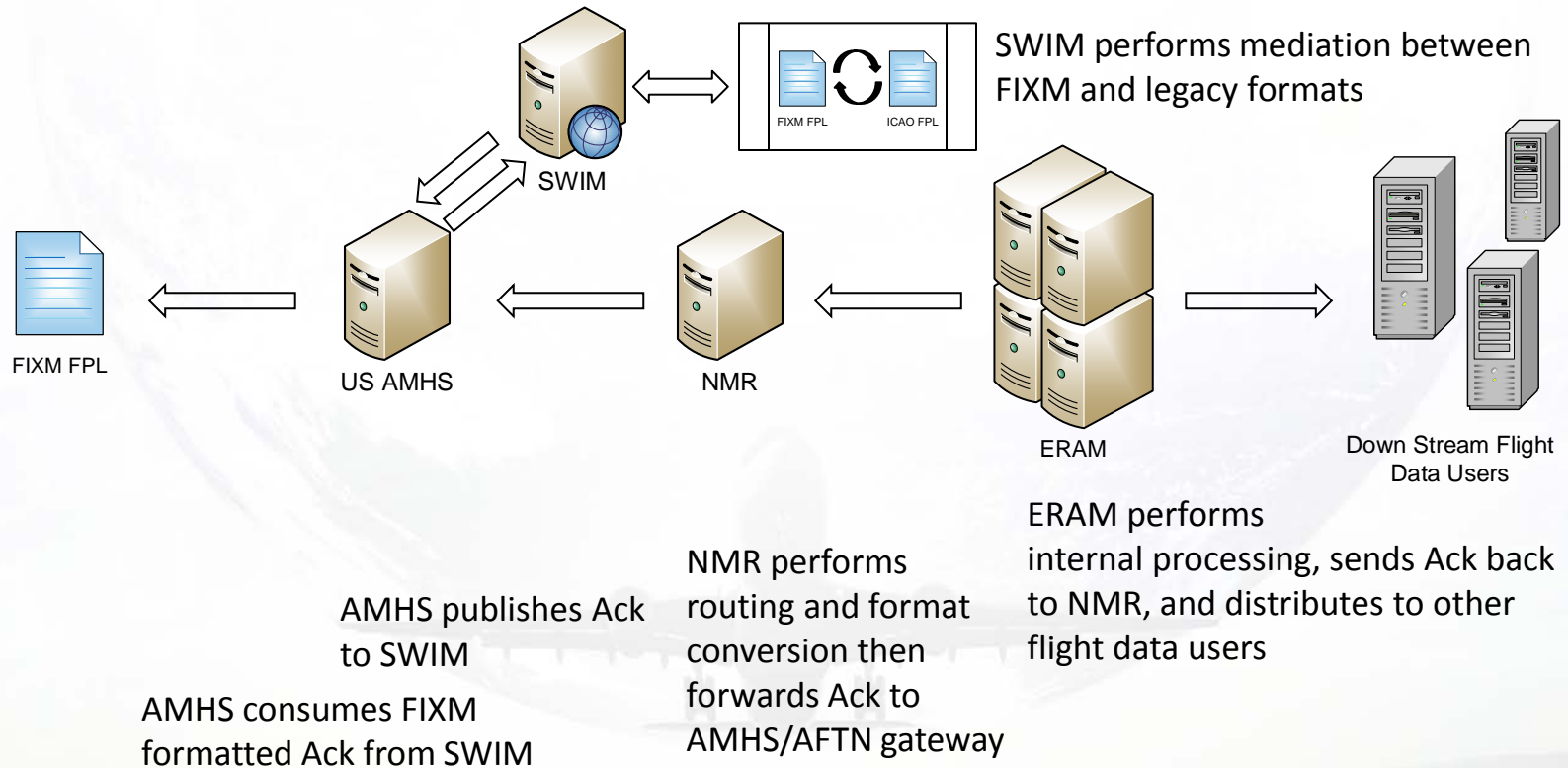
AMHS publishes FIXM FPL to SWIM

AMHS consumes legacy formatted ICAO FPL from SWIM

AHMS/AFTN gateway forwards legacy formatted FPL to NMR

NMR performs routing and format conversion then forwards to ERAM

# Potential Message Flow



AMHS forwards FIXM formatted Ack to submitter via ATN or IP network

# SWIM – AMHS Interaction

- SWIM would establish corresponding XML Business Services
- AMHS would publish XML to SWIM
- Foreign ANSP would be able to publish XML directly into Business Services as international SWIM materializes
- As FAA systems implement FIXM/WXXM/AIXM, they would be able to consume XML directly from SWIM

# AMHS XML Testing

- Testing has been performed between FAA and international partners using XML in an AFTN/AMHS environment
- Began in a basic fashion and has increased in scope with widening international participation as well as expanding capabilities
- All tests to date have used XML formatted text in the message body



# AMHS XML Testing

- 2010: Test between USA and Hong Kong China
  - Transmission of XML data to/from FAA and Hong Kong AMHS and AFTN systems
  - Data was canned data, extracted from WXXM Primer
- 2012: Test between USA, UK and Singapore
  - Transmission of XML data to/from FAA and Singapore, via the UK's AMHS system
  - Same data as above test

# AMHS XML Testing

- 2015: Test between USA, UK and Singapore
  - Same test configuration as above 2012 test, but introduced Singapore MET system
  - Data was generated by their MET system and sent into their AMHS for transmission to FAA
- Future testing will validate File Transfer Body Part (FTBP) capabilities which is x.400's method of sending attachments

# Conclusions Thus Far

- AMHS provides a suitable platform for transmission of XML data
- AFTN has limitations, and requires understanding of specific systems involved to support XML:
  - Should support the full IA-5 character set
  - Must be capable of line length > 69 chars
  - AFTN messages have 1800 character limit
  - This raises the issue of needing to know where a message will be traveling prior to issuance