ATN Presentation



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The ATN Overview



ATN



(Aeronautical Telecommunication Network)

- ATN is a global aviation standard telecommunications network, and is intended to provide seamless ground-to-ground and air-to-ground communication services
- ATN is a dynamic telecommunications network designed to support projected traffic increase due to Air/Ground Service









ATN Service



- Accommodate different grades of service
- ATN consist of:
 - ATN internet
 - ATN subnetworks
 - ATN applications, such as AMHS, AIDC, CPDLC ...



ATN Internet



• ATN Internet is made up of Intermediate Systems (IS or router), End Systems (ES or computer), and communication links. They form an ATN global internet





ATN Boundary Intermediate Systems (BIS Routers)



- BIS router ensure the routing of application to its destination
- For mobile systems, provides for dynamic routing
- ATN defines different types of routers
 - static or dynamic intra-domain routers
 - inter-domain routers (boundary intermediate systems -- BIS)





ATN Internet Backbone

 The interconnection of ATN BIS (Router) form an ATN backbone provide ATN internetworking service, such as current planned Asia/Pacific ATN regional BIS backbone network











ATN Internet Protocols

- ATN Internet Protocols
 - ISO/IEC 8473 Connectionless Network Protocol (CLNP), all ATN End Systems and Routers shall support the CLNP.
 - ISO/IEC 10747 Inter-Domain Routing Protocol (IDRP) required by all inter-domain routers
 - air-ground data links
 - between domains
 - ISO/IEC 9542 End system to Intermediate system routing exchange protocol (ES-IS)
 - ISO/IEC 10589 Intra-Domain-Routing & IS-IS
 Protocol (IS-IS)





ATN Internet Protocols

- ATN Internet Protocols
 - CLNP does not guarantee successful delivery of data; the end-to-end transport protocol is required to support reliable data streaming.
 - * ISO/IEC 8073 Class 4 Transport Protocol (TP4 with mandatory checksum support)
 - \times Connection mode protocol
 - \times Provides end-to-end flow control
 - × Retransmit lost packet
 - * or ISO/IEC 8602 Connectionless Transport Protocol (CLTP)





ATN Subnetworks

- A subnetwork is part of the communication network, but is not part of the ATN.
- It is defined as an independent communication network, which is used as the physical means of transferring information between ATN systems.



ATN Subnetworks



- Almost any data communications network can be an ATN Subnetwork:
 - X.25
 - Frame Relay
 - LAN
 - Aeronautical Mobile Satellite
 - VHF Digital Link
 - Leased Lines, etc ...



ATN Application



ATN Ground-to-ground applications include:

- AMHS (ATS Message Handling System)
- AIDC (Air Traffic Inter-facility Data Communications)



ATN G/G Applications AMHS



- AMHS will only process messages to it end user of its domain
- AMHS also perform as a gateway for AFTN/CIDIN as required





ATN G/G Applications AMHS



- running X.400 protocol,
- ATS Message Server,
- ATS Message User Agent, and
- AFTN/AMHS Gateway or CIDIN/AMHS.







ATN G/G Applications AIDC



The AIDC application automatically exchanges ATC information between ATSU in support of the ATC functions relating to:

- NOTIFICATION of flights approaching an FIR boundary,
- CO-ORDINATION of boundary crossing conditions, and
- TRANSFER of control at the FIR boundary



AIDC Flight notification, coordination, and transfer between regions



ATN Air-to-ground application



- Air-to-ground applications include:
 - CM (Context Management)
 - FIS (Flight Information Services)
 - ADS (Automatic Dependent Surveillance)
 - CPDLC (Controller Pilot Data Link Communications)







Context Management (CM) application allows an aircraft and the ground systems to exchange and update data link application information.

- CM exchanges the address information of ADS, CPDLC, and FIS between air and ground.
- Prior to data link activities, air CM initiates log-on to ground CM which responds to the logon request with appropriate address information to ground counterparts ADS, CPDLC, and FIS to air CM.
- After receiving appropriate address information, aircraft begins communicating with the ground ADS, CPDLC, and FIS.





FIS and D-FIS



- Flight Information Service (FIS) provides pilots (or avionics) with information that increases flight awareness and enhances flight safety.
- Data Link FIS (D-FIS) provides pilots (or avionics) with information from ground systems via Data Link.







 Automatic Dependent Surveillance (ADS) is designed to give automatic reports to a user, which provide positional, dimensional information, and aircraft identification to the Air Traffic Management function.



Topology of the ADS and ADS Report Forwarding Applications



CPDLC



Controller Pilot Data Link (CPDLC) provides two ways communication between pilot and controller, but using data link rather than voice

- Exchange of Controller/Pilot messages.
- Transfer of authority between current and next data authorities.
- Downstream* clearance delivery with downstream authorities.

*Downstream is ahead of the aircraft, toward the destination.



CPDLC



Potential Integration CPDLC Architecture







ATN Architecture



