International Civil Aviation Organization

ATN Seminar and Third ATN Transition Task Force Meeting

Singapore, 26-30 March 2001

Agenda Item: 6 Planning and Implementation Considerations

AIR/GROUND ATN IMPLEMENTATION

(Presented by Mike Murphy, ATN Systems, Inc. ATNSI)

Air/Ground ATN Implementation

ATN Seminar

Singapore, 26-27 March 2001

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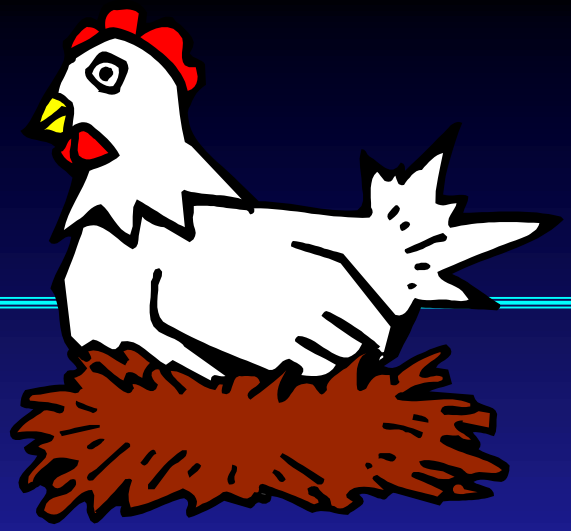
No one questions the need for the Aeronautical Telecommunication Network. The investment must be made. But who will go first?

Brian Evans, Avionics Magazine
February 2001

Presentation Overview

- Who will go first?
  - ATNSI Consortium Model/Cooperative Agreement with the Federal Aviation Administration (FAA)
- Air/Ground ATN Implementation Status
  - EUROCONTROL PETAL IIE Project
  - FAA CPDLC Programs
  - Airline/Avionics Programs
- Next Steps/Future Initiatives

Who will go first?
Chicken vs. the Egg



The Problems		Solutions
Technology First - or - Applications First	⇒	**Program Commitments** (Technology and Applications)
Users Equip First - or - Providers Equip First	⇒	**Cooperative Development** (Users and Providers)

ATNSI Consortium

- Air Canada
- Alaska Airlines
- American Airlines
- American Trans Air
- Continental Airlines
- Delta Air Lines
- El Al Israel Airlines
- Federal Express
- Hawaiian Airlines
- Northwest Airlines
- Trans World Airlines
- United Airlines
- United Parcel Service
- US Airways

- International Airlines Encouraged to become Members -

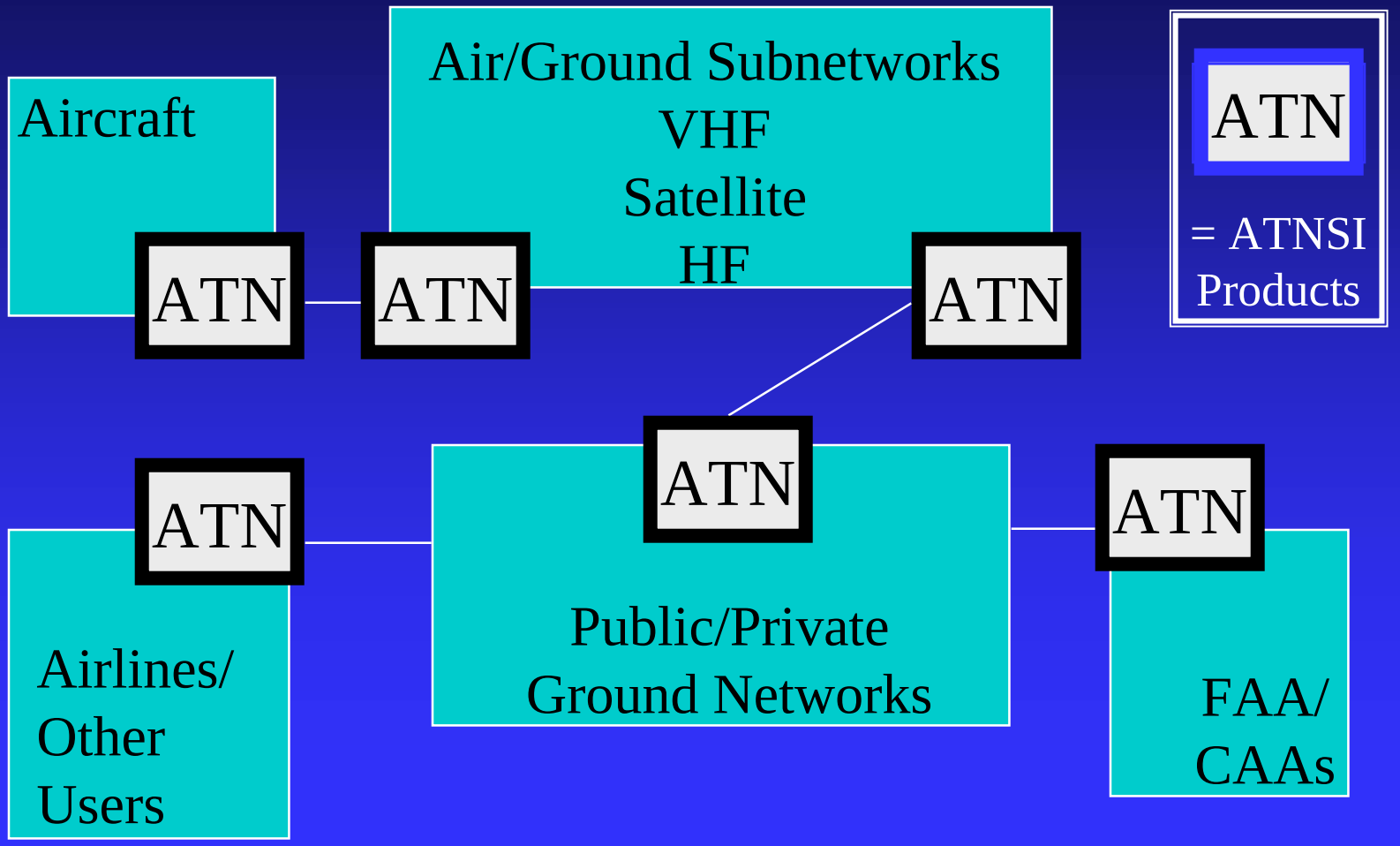
ATNSI/FAA Cooperative Agreement

- Objective
  - Provide Capacity and Efficiency Benefits to World-Wide Flight Operations

Develop the critical components of the Aeronautical Telecommunication Network (ATN) and encourage wide-spread deployment in the air and ground segments of the aviation community.

ATNSI Products

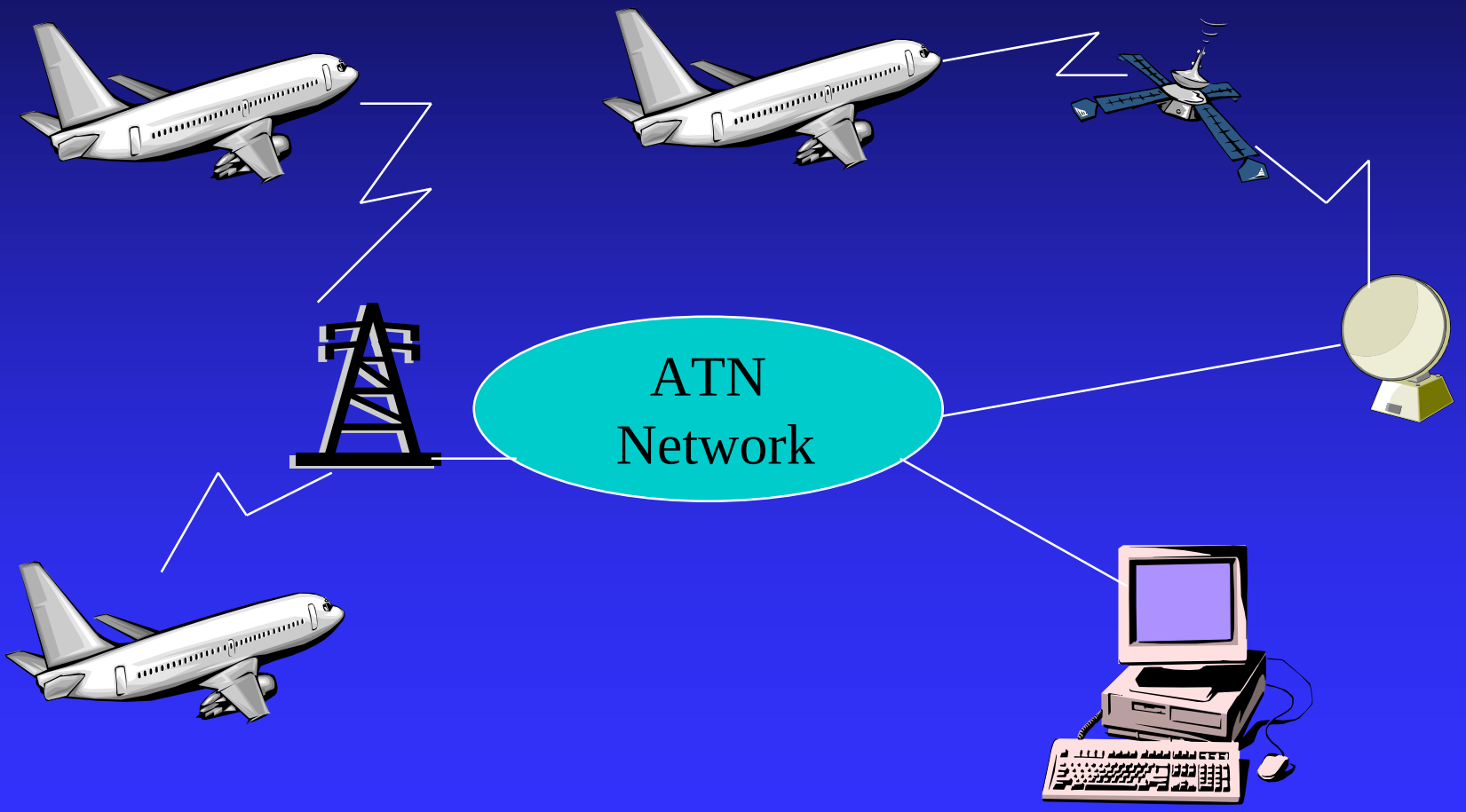
ATN Infrastructure Components



Benefits of the Consortium Model

- Pooled Resources among Government and Industry Participants
- Reduced Development Risk through Establishment of Common Baseline
- Single Development Effort creating Products for Installation in several types of Avionics and Ground Systems
- Enhanced Government Acquisition Process through Industry Collaboration

Air/Ground ATN Implementation Status



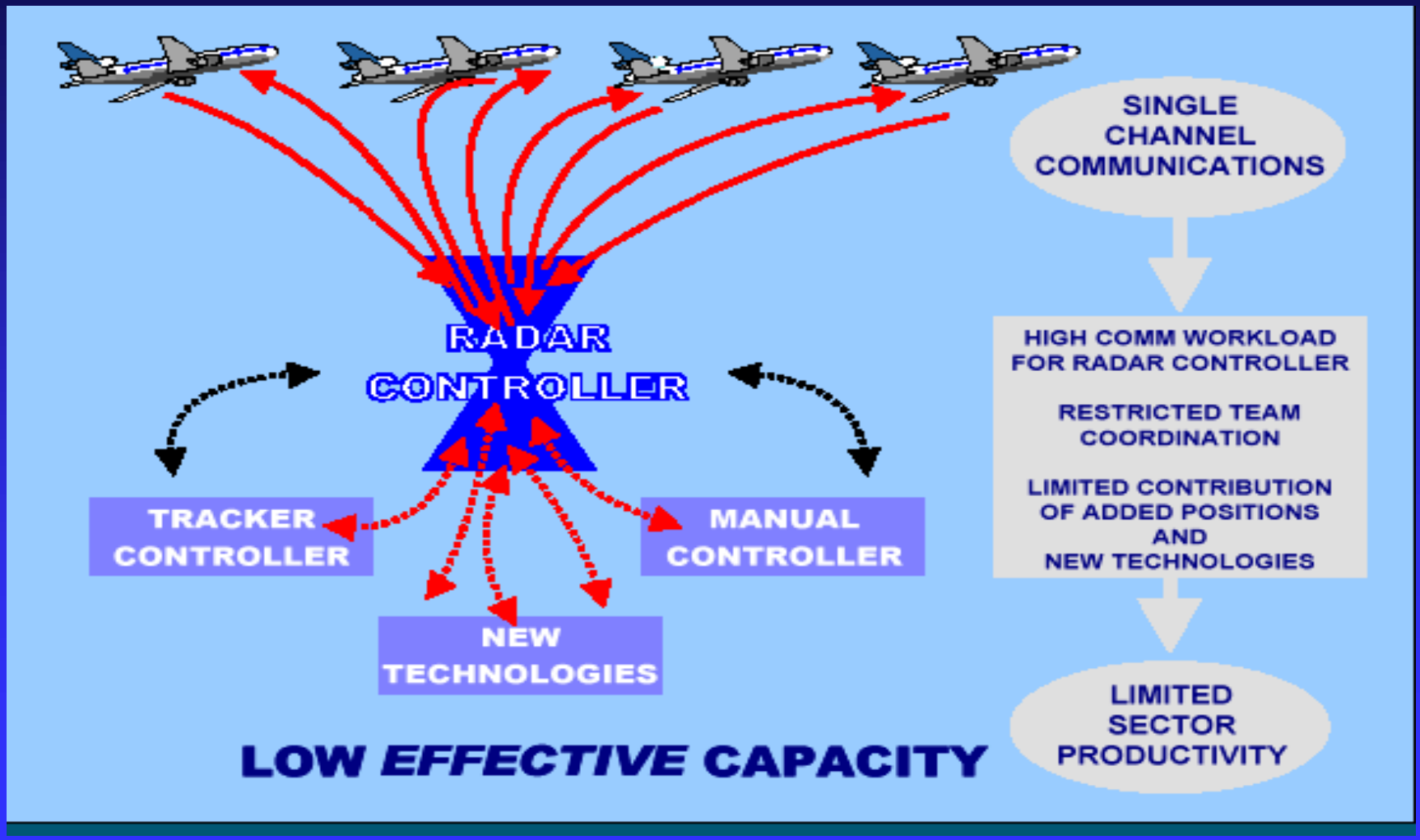
ATN Air/Ground Application Services

- Air Traffic Control (ATC) Services
  - Controller Pilot Data Link Communications (CPDLC)
  - Automatic Dependant Surveillance (ADS)
  - Flight Information Services (FIS)
  - Context Management (CMA)
- Other Potential Services
  - Aeronautical Operational Control (AOC)
  - Aeronautical Administrative Communication (AAC)
  - Aeronautical Passenger Communications (APC)

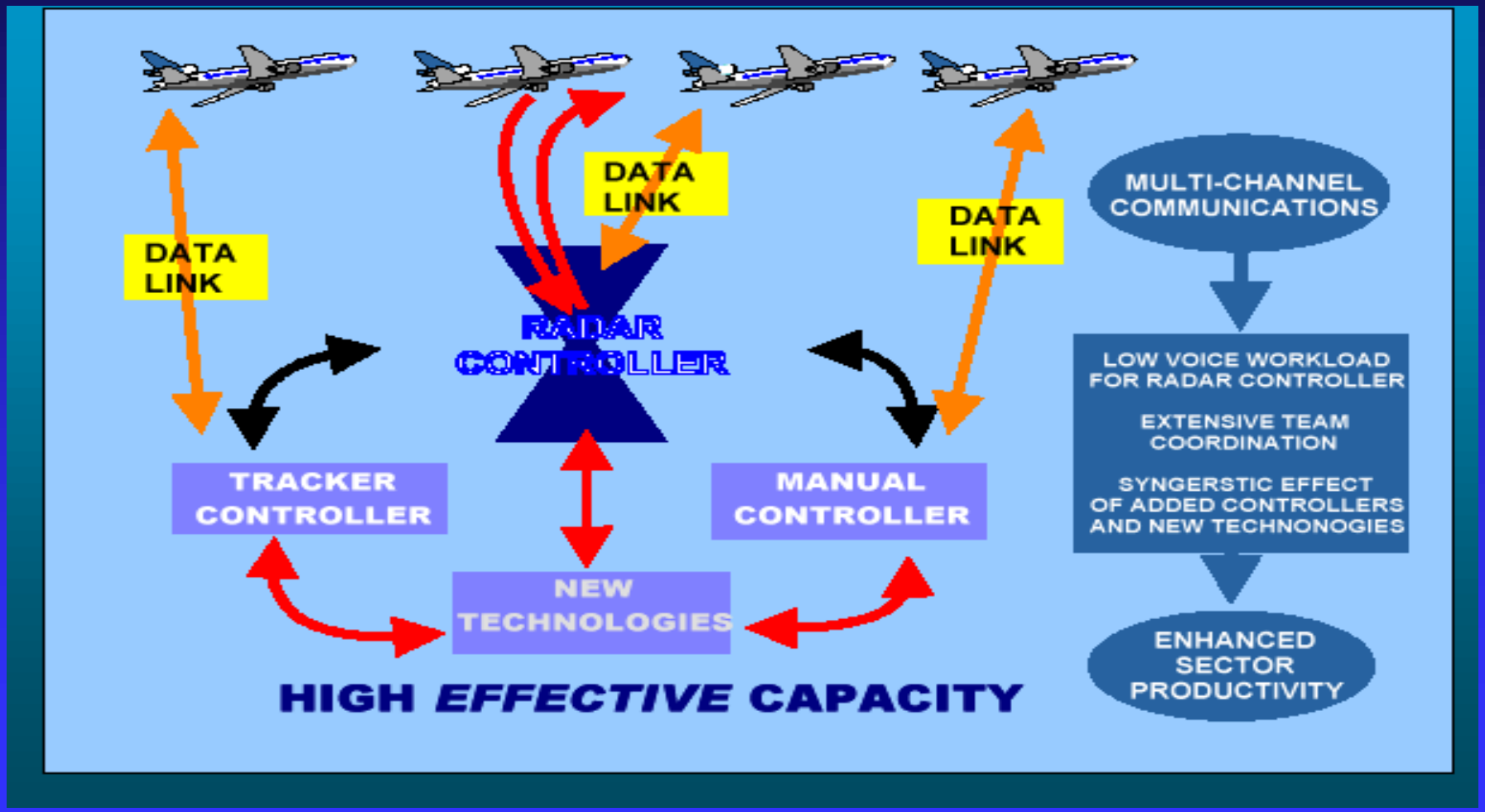
ATC Service Benefits

- Reduced Holding and Delays
  - Enables Timely and Effective Clearances
- Reduced Communication Errors
  - Enables Utilization of pre-prepared Messages and facilitates Error Checking
- Increased Margin of Safety
  - Enables a more orderly Operation during Traffic Rushes

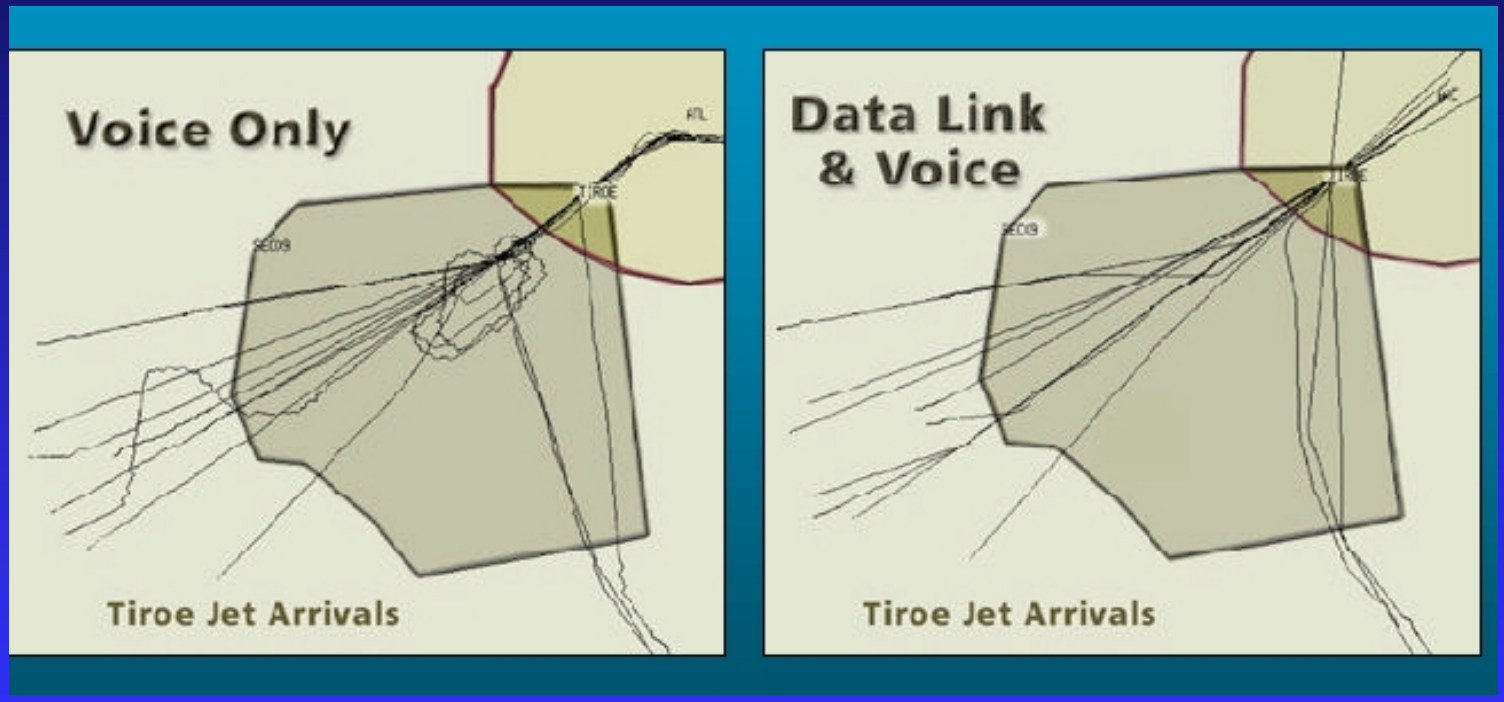
Problem: Congested Voice Radio Sector



Solution: Data Comm. + Voice Radio

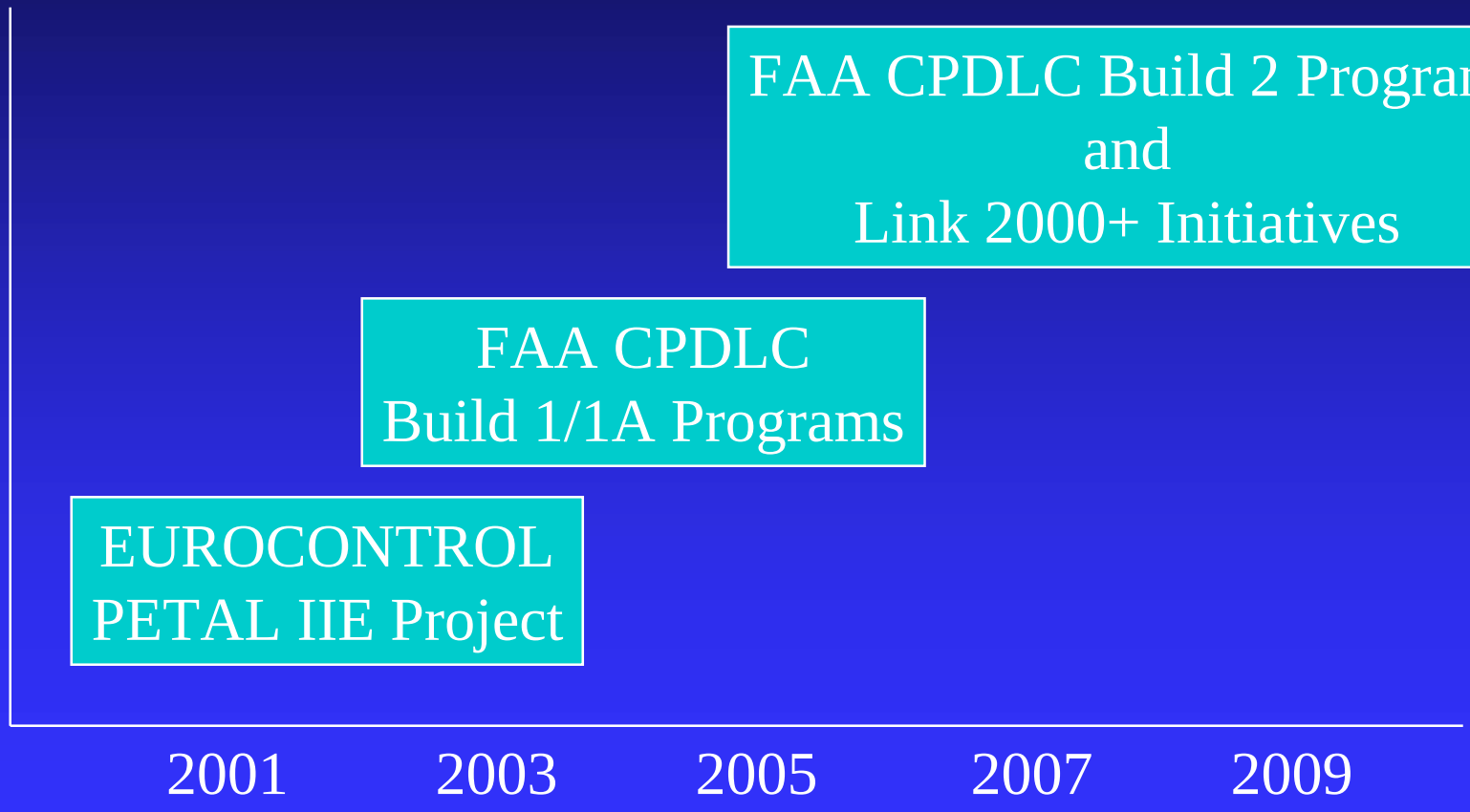


Example: FAA Study



Problem Solution

Air/Ground ATN Implementation Programs



PETAL IIE Project Overview

- PETAL = Preliminary Eurocontrol Test of Air/Ground Data Link
  - PETAL IIE = Extension of PETAL Project to include ATN Operations
- Single Site: Maastricht Upper Area Control Centre
- Operational Services
  - Transfer of Voice Communication, Initial Contact, Altimeter Setting
  - Clearances and Requests: Flight Level, Route and Heading, Speed
  - “Passive” Requests (e.g. Preferred Level, Top of Descent)
- Uses VDL Mode 2 as Air/Ground Subnetwork
- American Airlines is the Launch Airline

www.eurocontrol.be/projects/eatchip/petal2/

PETAL IIE Overview

Status:
- End-to-End Testing in Progress
- Flights Start in June 2001

FAA CPDLC Build 1 Overview

- Single Site: Miami Air Route Traffic Control Center
- Provides 4 Operational Services
  - Transfer of Voice Communication
  - Initial Contact
  - Altimeter Setting
  - Informational Free Text (menu capability built by supervisor inputs)
- Uses VDL Mode 2 as Air/Ground Subnetwork
- American Airlines is the Launch Airline

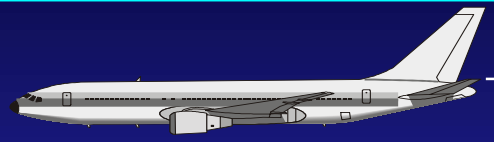
www.adl.tc.faa.gov

FAA CPDLC Build 1A Overview

- National Deployment: All Air Route Traffic Control Centers
- Provides Additional Operational Services
  - Larger Message Set accommodating assignment of Speeds, Headings, and Altitudes
  - Includes Route Clearance Function
  - Capability to accommodate Pilot-Initiated Altitude Requests
- Uses VDL Mode 2 as Air/Ground Subnetwork
- American Airlines is the Launch Airline
- Widespread Industry Participation is Anticipated

www.adl.tc.faa.gov

FAA CPDLC Build 1/1A Architecture



Display

CMU/ATSU
(ATN compliant)

VDR Multi-Mode
Transceivers

FAA En Route CPDLC Ground System

Display

HOST

National Airspace
System Local Network

Router

NADIN II

Data Link CPDLC
Processor
(ATN compliant)

Context
Management
Application
(ATN compliant)

G/G ATN
Router

VDL Mode 2
Ground
Stations

A/G ATN
Router

VDL Mode 2

G/G ATN
Router

Airline ATN Program Status

- American Airlines
  - 767-300: 4 Aircraft to be equipped
  - 737-800: 24 Aircraft to be equipped
  - Potential: 104-295 Aircraft could be equipped pending decision on participation in FAA CPDLC Build 1A program
- Continental Airlines
  - 757 (international): All equipped or to be equipped (hardware only)
  - 737-700/800: All equipped or to be equipped (hardware only)
  - 737-800/900: All equipped or to be equipped (hardware only)
  - 767-200/400: All equipped or to be equipped (hardware only)
  - Total Aircraft to be equipped (hardware only): approximately 160
  - Avionics software upgrade (CPDLC/ATN-Capable) pending decision on participation in FAA CPDLC Build 1A program

Airline ATN Program Status (cont)

- United Airlines (with US Airways, Northwest)
  - Currently, business case assessment underway for Airbus Aircraft equipment upgrade (for over 400 aircraft)
    - (Informal) Request for Cost Proposal to Airbus for CPDLC/ATN-Capable equipment upgrade
    - Airbus (informally) indicated schedule for CPDLC/ATN-Capable equipment upgrade to be = Project Start + 3.5 Years
    - “Formal” decision expected soon (United Airlines)
- Northwest Airlines
  - Considering equipment upgrade for 757-200 and 747-400

Airline ATN Equipage Status

Type	Retro-Fit	Forward-Fit
737-700	Continental: Hardware	
737-800	American: Hardware Continental: Hardware	**American: Hardware/Software** Continental: Hardware Delta: Hardware
737-900		Continental: Hardware

Airline ATN Equipage Status (cont)

Type	Retro-Fit	Forward-Fit
757-200	Continental: Hardware UPS: Hardware	Continental: Hardware UPS: Hardware
767-200	Continental: Hardware	Continental: Hardware
767-300	American: Hardware UPS: Hardware	**American: Hardware/Software** UPS: Hardware
767-400		Continental: Hardware

Avionics ATN Program Status

- Rockwell Collins
  - CPDLC/ATN-Capable CMU: In Test, CMU will be equipped on aircraft in PETAL IIE and CPDLC Build 1
- Honeywell
  - CPDLC/ATN-Capable CMU: Under Development
- Thales Avionics (Sextant):
  - Software for CPDLC/ATN-Capable Airbus ATSU: Under Development

ATSU = Air Traffic Services Unit
CMU = Communication Management Unit

Next Steps/Future Initiatives

- Formal, Strategic, Public/Private Partnerships
  - Common Objectives
    - Airspace Capacity/Efficiency/Safety Improvements
  - Risk Sharing
    - The Need to develop Air and Ground Systems based on a Common Architecture
    - The Opportunity to reduce program technical risk and development cost of Common Technologies
  - Improved Government Acquisition Processes
    - Mechanism to Collaborate on Cost/Benefit Analyses and to enable Commitment to meet Cost/Benefit Milestones

Future Initiatives for Global Air Traffic Service Improvements

- Projects of this scope are tending to evolve into constructive Collaborations among:
  - ATC Providers
  - Communication/Network Providers
  - Airspace Users
    - Air Transport
    - Business/General Aviation
    - Military
  - System Integrators/Developers
  - Certification/Regulatory Authorities

Future Initiatives for Global Air Traffic Service Improvements

- Areas for Partnership
  - Airspace Architecture Definition
  - System Development and Procurement
  - Communication Network Service Provision
  - Provision of Air Traffic Services
  - Regional Airspace Management

Collaboration is the Key

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