Air/Ground ATN Implementation Status

ATN Seminar, Chiang Mai

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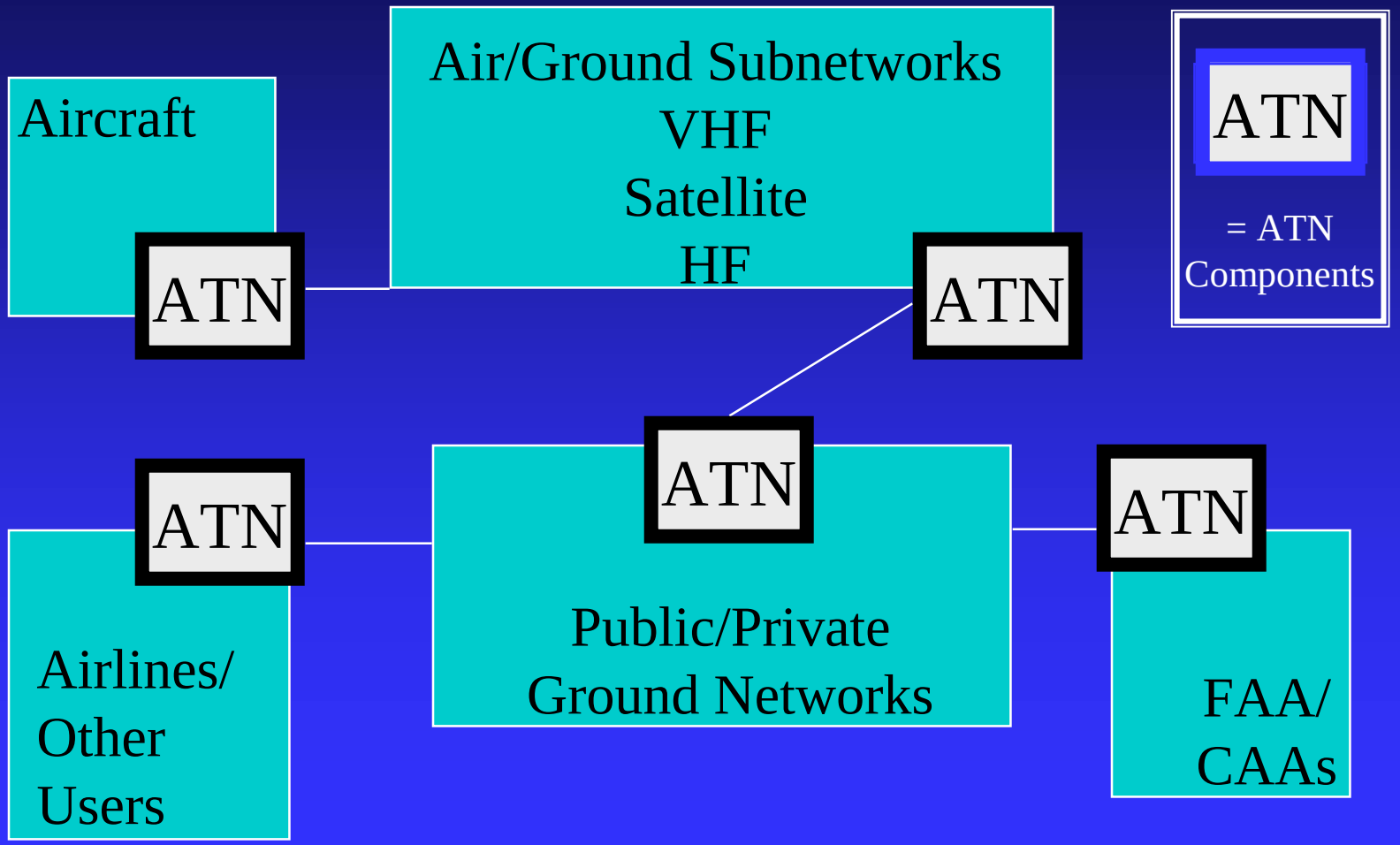
Presentation Overview

- An Approach to Defining CPDLC/ATN Benefits
- Air/Ground CPDLC/ATN Implementation Status
  - EUROCONTROL PETAL IIE Project
  - FAA CPDLC Programs
  - Airline/Avionics Programs
- Next Steps/Future Initiatives
  - RTCA CPDLC Benefits Activity
  - FANS 1/A Accommodation
  - Security Initiatives
- Conclusions

ATN Infrastructure Upgrade

	ACARS Infrastructure	***ATN Infrastructure***
Applications	Operational, and Administrative Services and initial Air Traffic Services	Expanded Air Traffic, Operational, Administrative, and Passenger Services
Network	ACARS	ATN
Sub-Networks	Character Oriented	Bit Oriented

Air/Ground ATN Infrastructure



ATN - Why Invest

- Only Alternative for Strategic, Common, World-Wide Data Communication Infrastructure Upgrade for the Aeronautical Industry
- Enables Common Systems to accommodate Air Traffic Services, Operational and Administrative Services, and Passenger Services (possibly)
- Facilitates Reduction in Development/Operational Costs
  - Creates Larger Market facilitating reduced “per unit” Pricing
  - Facilitates System Development Vendor Competition by basing Requirements on Open Standards
  - Facilitates “Real Time” Data Communication Service Provider Competition for Ground/Ground and Air/Ground Operational Services
- Supports Contract Requirements based on Required Communication Performance (RCP)
- Future Proof - Enables integration of emerging “bit-oriented” Data Communication Subnetworks

ATN - Impact of No Investment

- Industry (CAAs and Airspace Users, Including Airlines)
  - Loss of Opportunity to Baseline System Automation Upgrades against Data Communication Infrastructure
    - Delay in Realization of Improved Air Traffic Services
  - Exposure to Non-Compliant Requirements
    - Increase in Development Costs and Operational Service Costs
    - Negative Impact on Utility of Common Systems for World-Wide Operations
  - Delay in Realization of Benefits based on User Equipage
- Airlines
  - Missed “Window of Opportunity” for Updated Avionics on New Aircraft Orders

ATN - Investment Perspective

- The Data Communication Infrastructure is a Long-Term Investment
- Industry MUST agree on a Common Data Communication Infrastructure Upgrade Path
- The ATN is on the Upgrade Path
- Decisions as to “When” to Equip with ATN will be based on Internal Economic Analyses

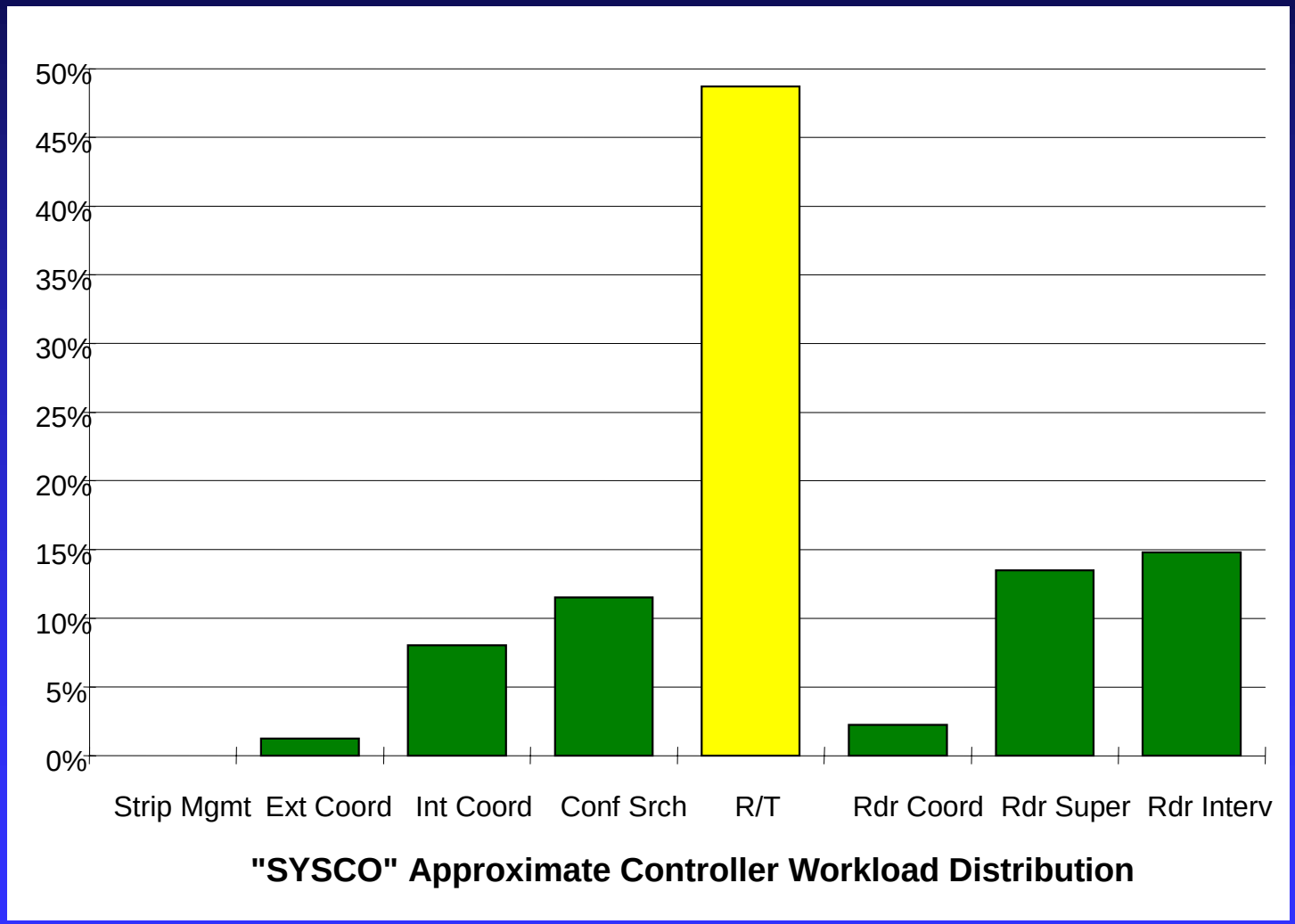
Air/Ground ATN Application Services

- 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)

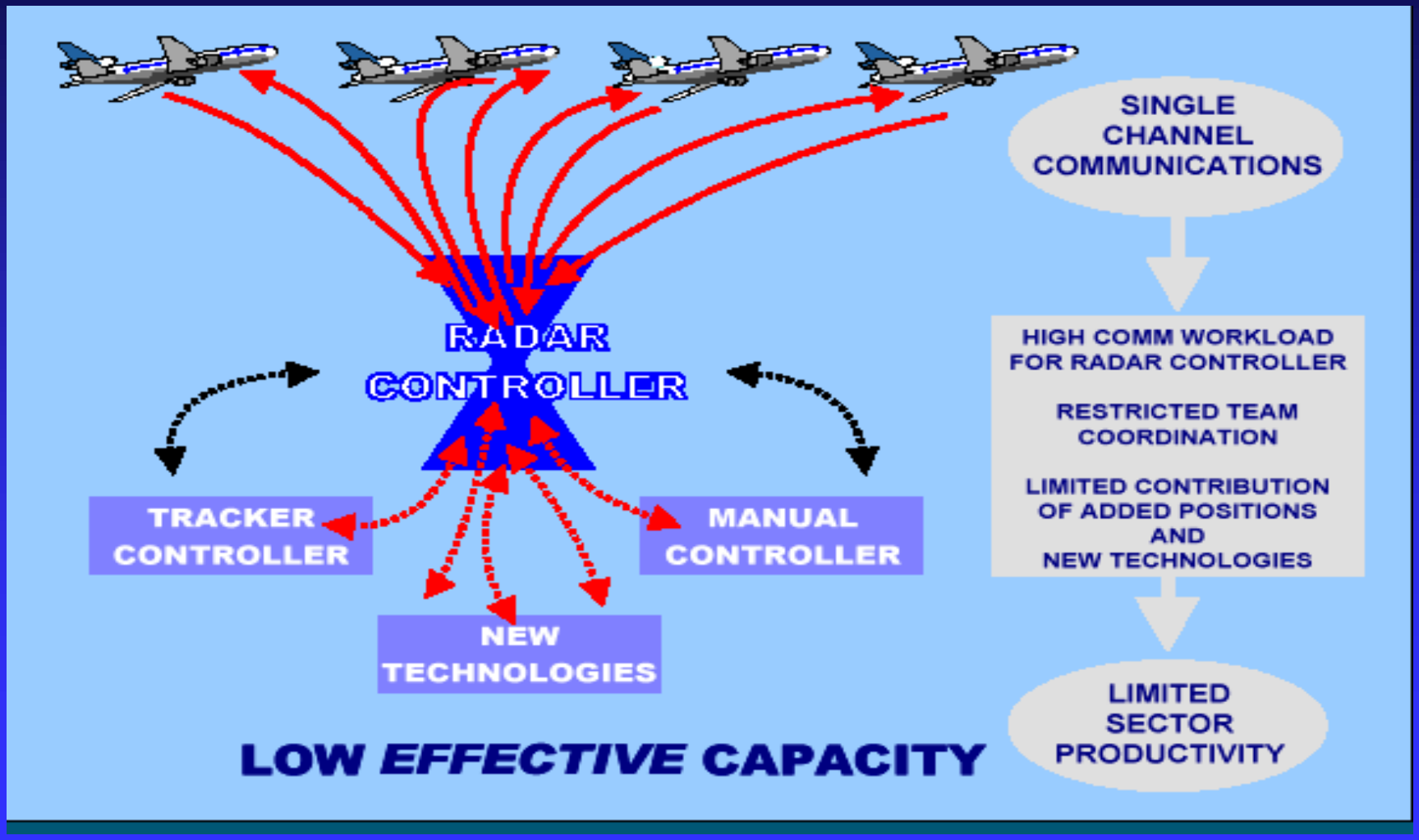
ATC Service Benefits

	Operational Improvements	Service Improvements	Safety Benefits
Direct Cost Avoidance	• Increased Capacity • Operational Efficiencies (e.g. Delay Reduction, Reduced Restrictions)		
Indirect Cost Avoidance		• Improved Service Availability • Operational Predictability • Bank Integrity	• Reduced Comm Errors • Additional Comm Mechanisms • Improved Information Flow
Opportunity Cost Avoidance	Loss of access to Service Benefits because of delay in Service Implementation		

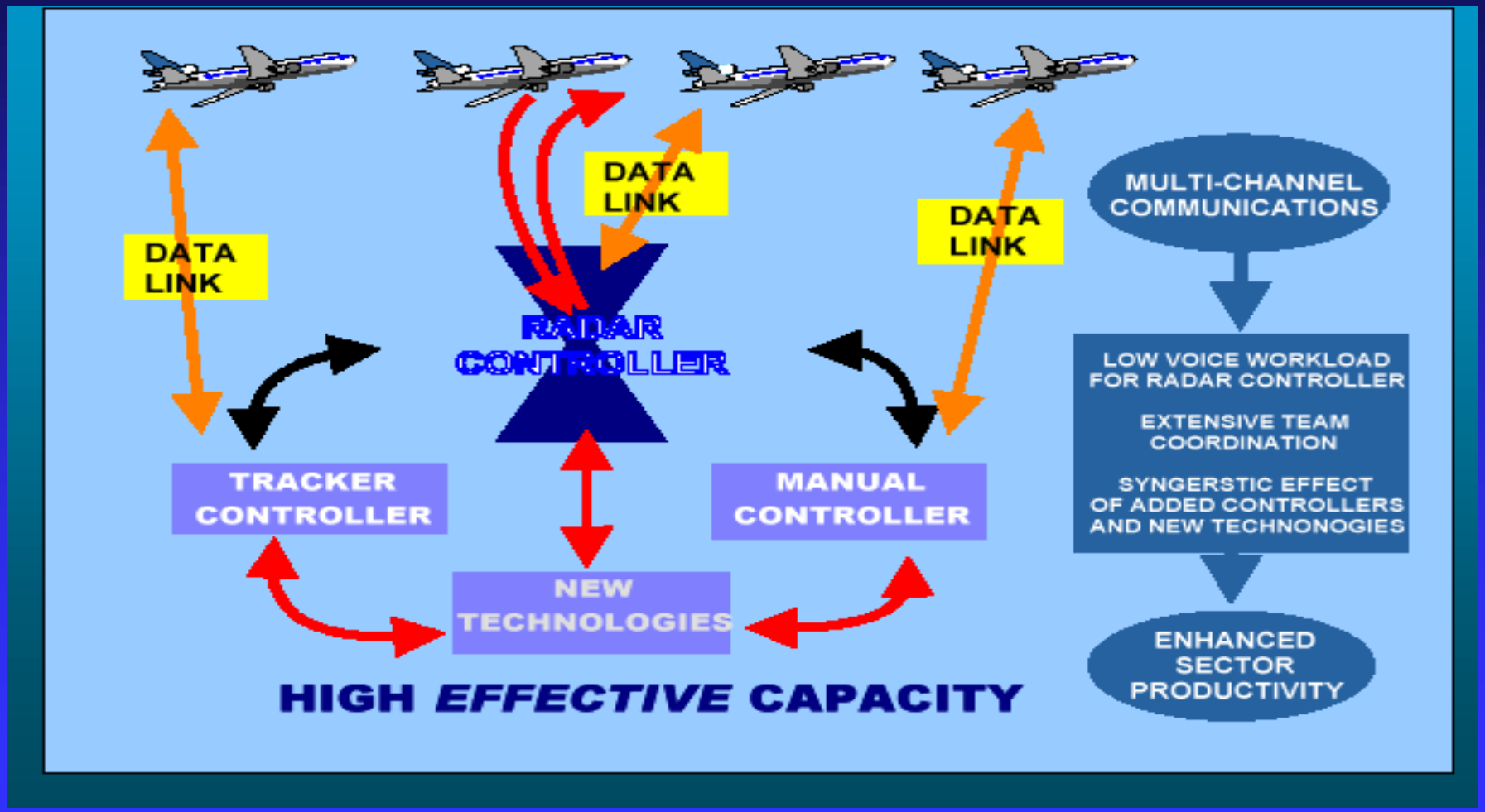
First Step: Controller Communications Workload



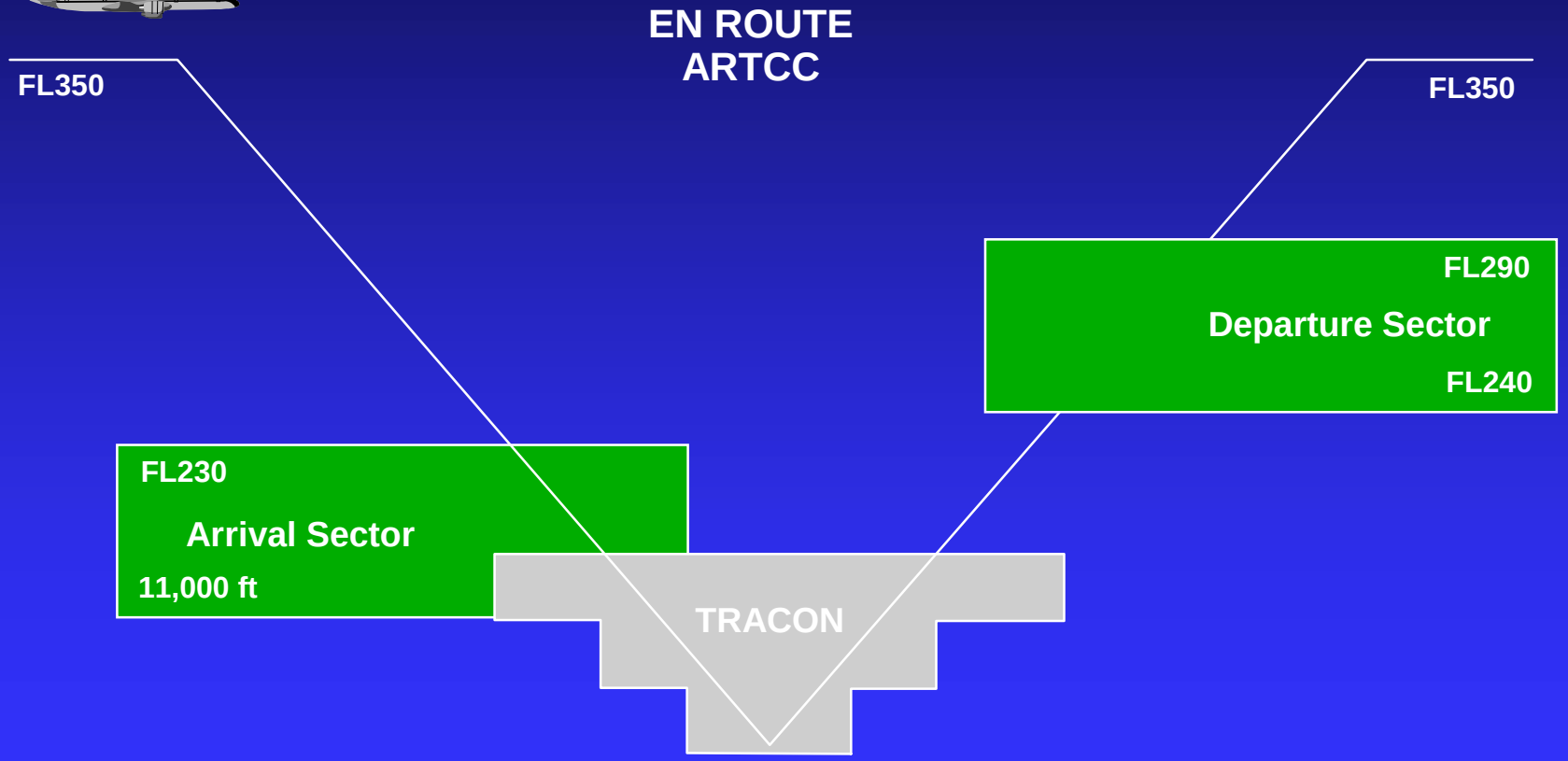
Problem: Voice Congestion



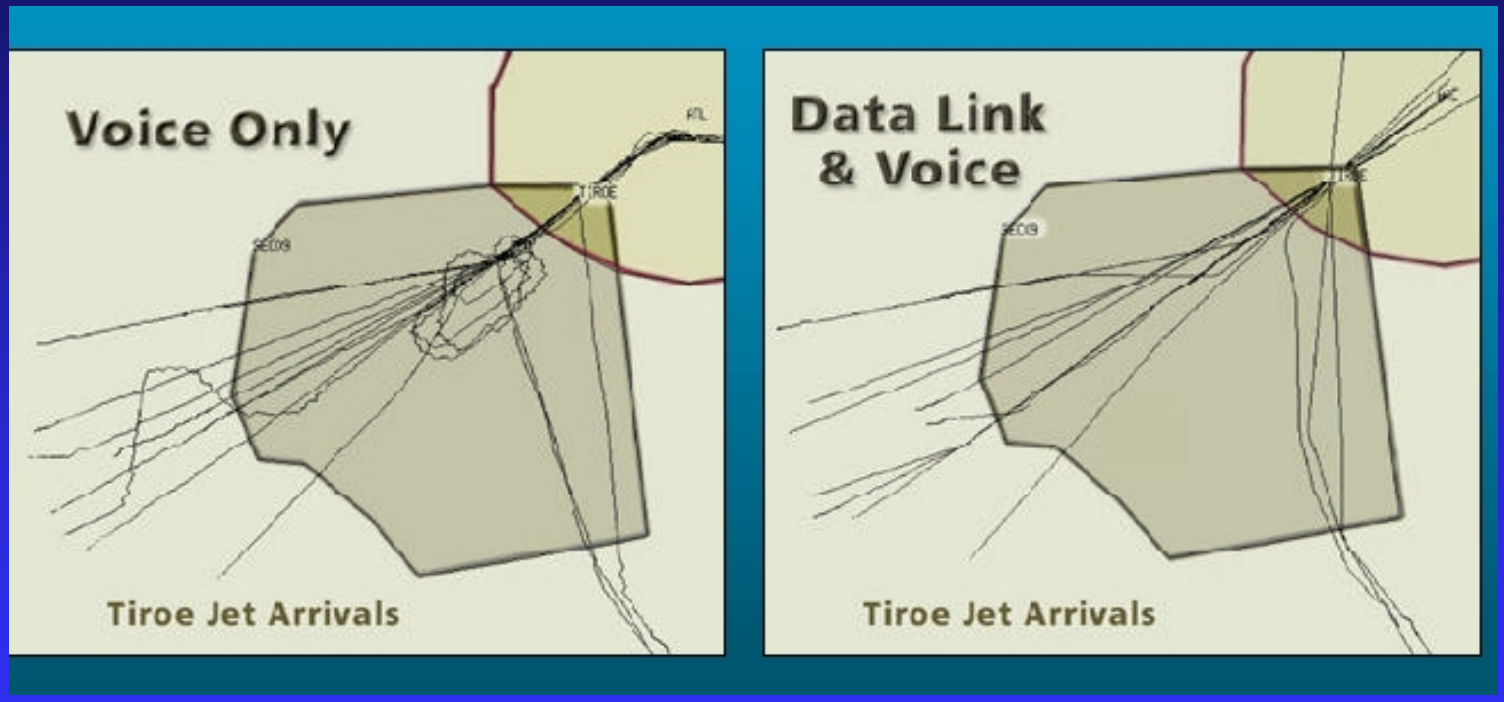
Solution: Data Communications



Example: FAA Study



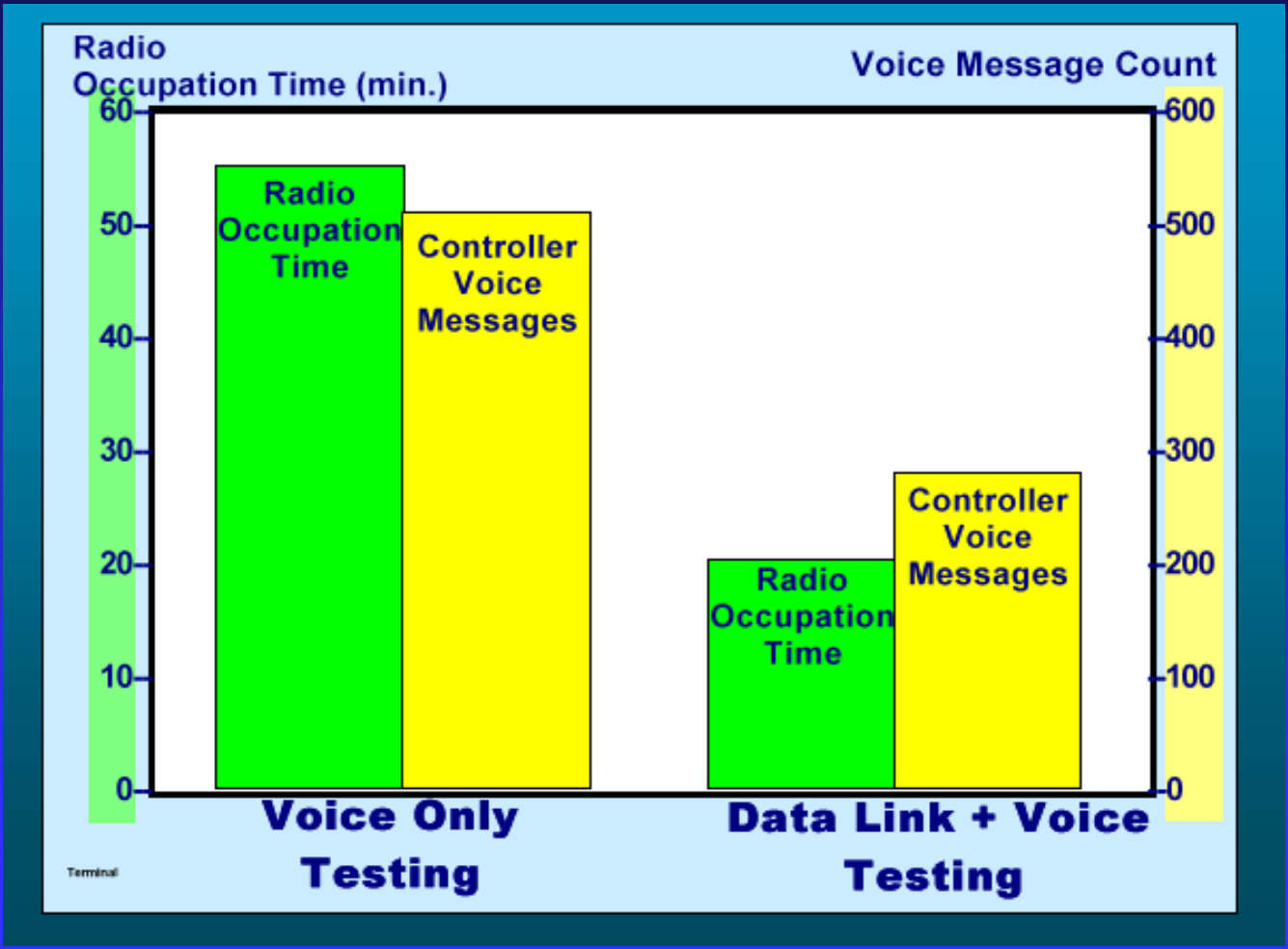
FAA Study: Reduction in Holding



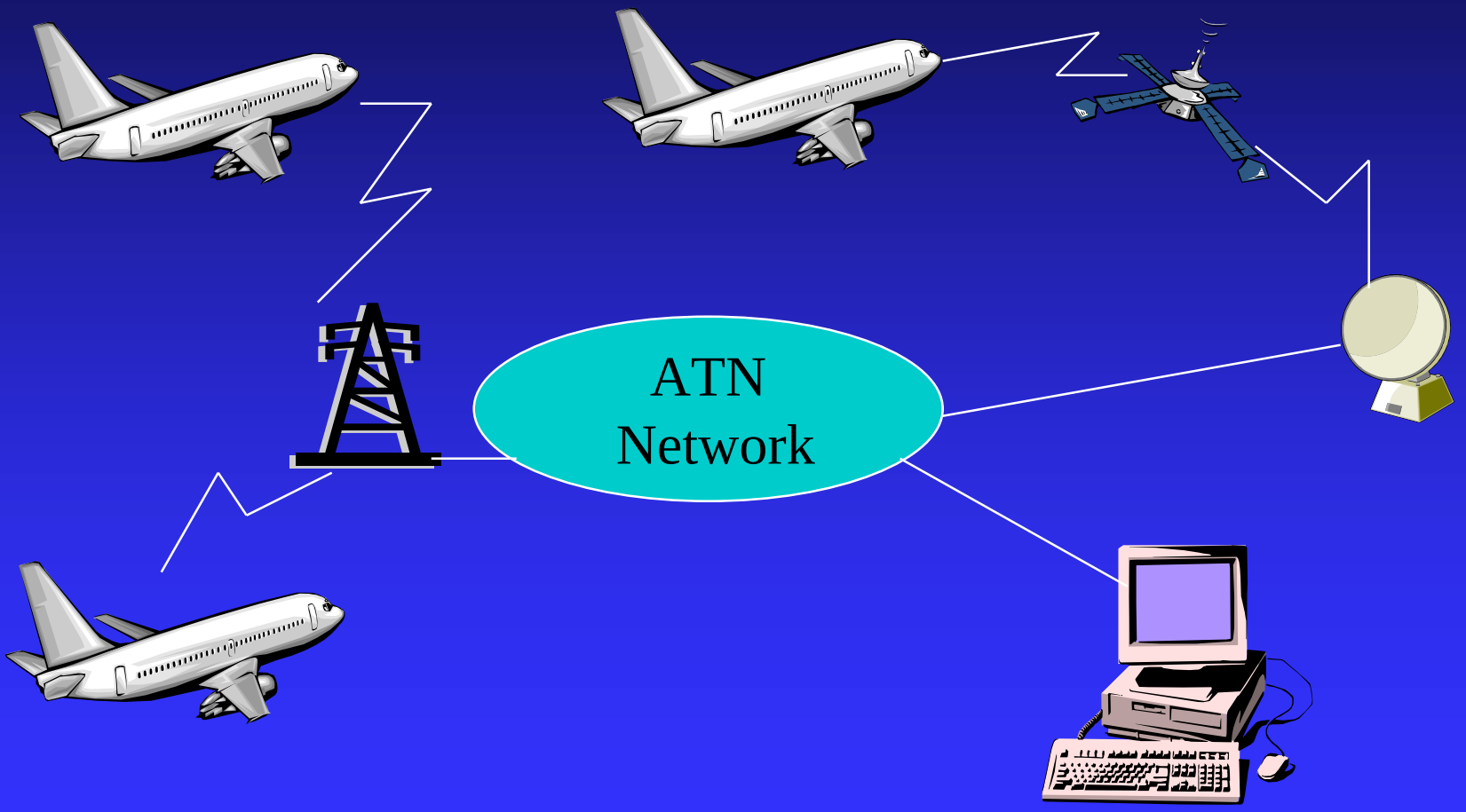
Problem

Solution

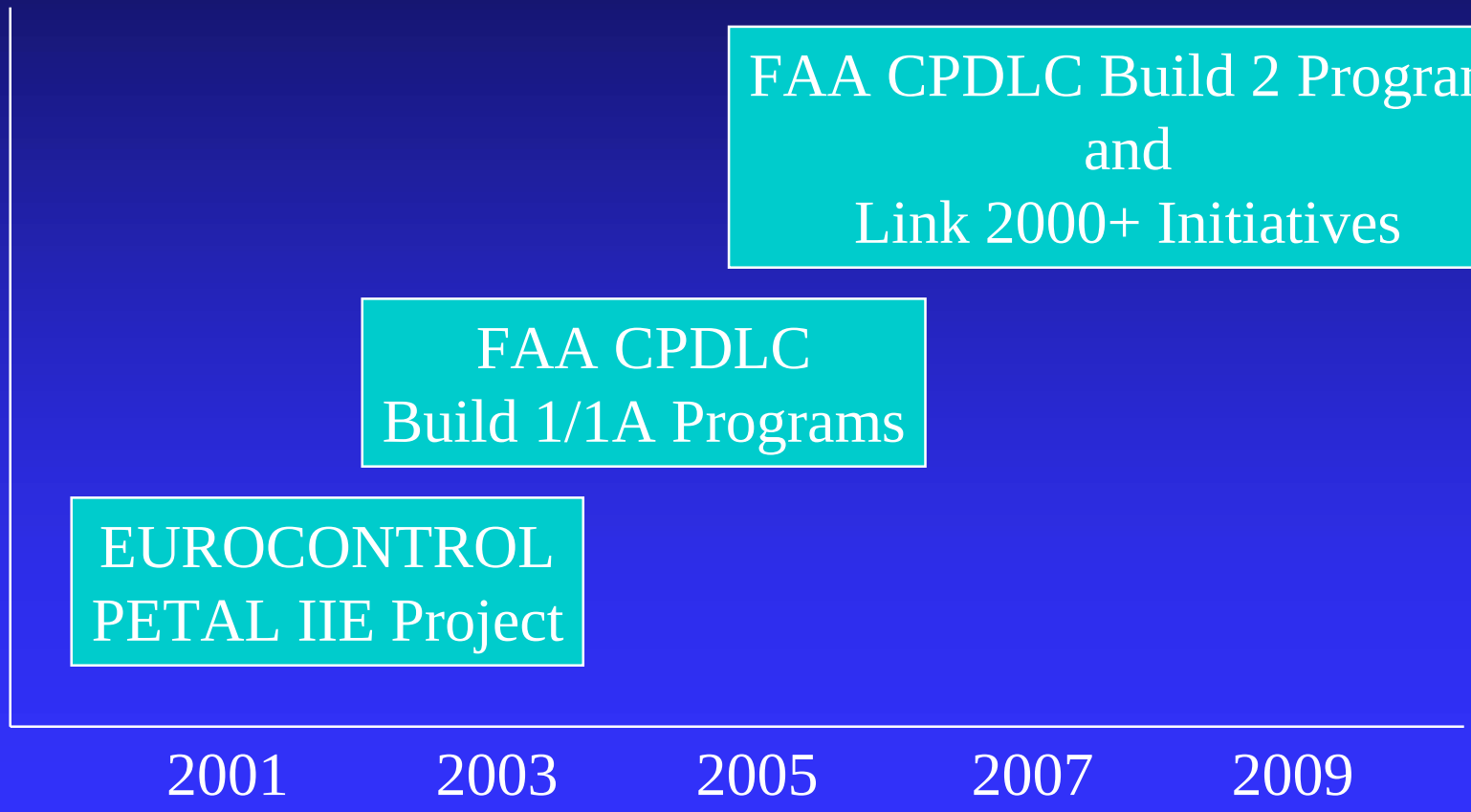
FAA Study: Radio Occupation Time



Air/Ground ATN Implementation Status



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:
- MISSION COMPLETE
- PETAL II Link Bridge Project (P2L)
  to start in January 2002

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

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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

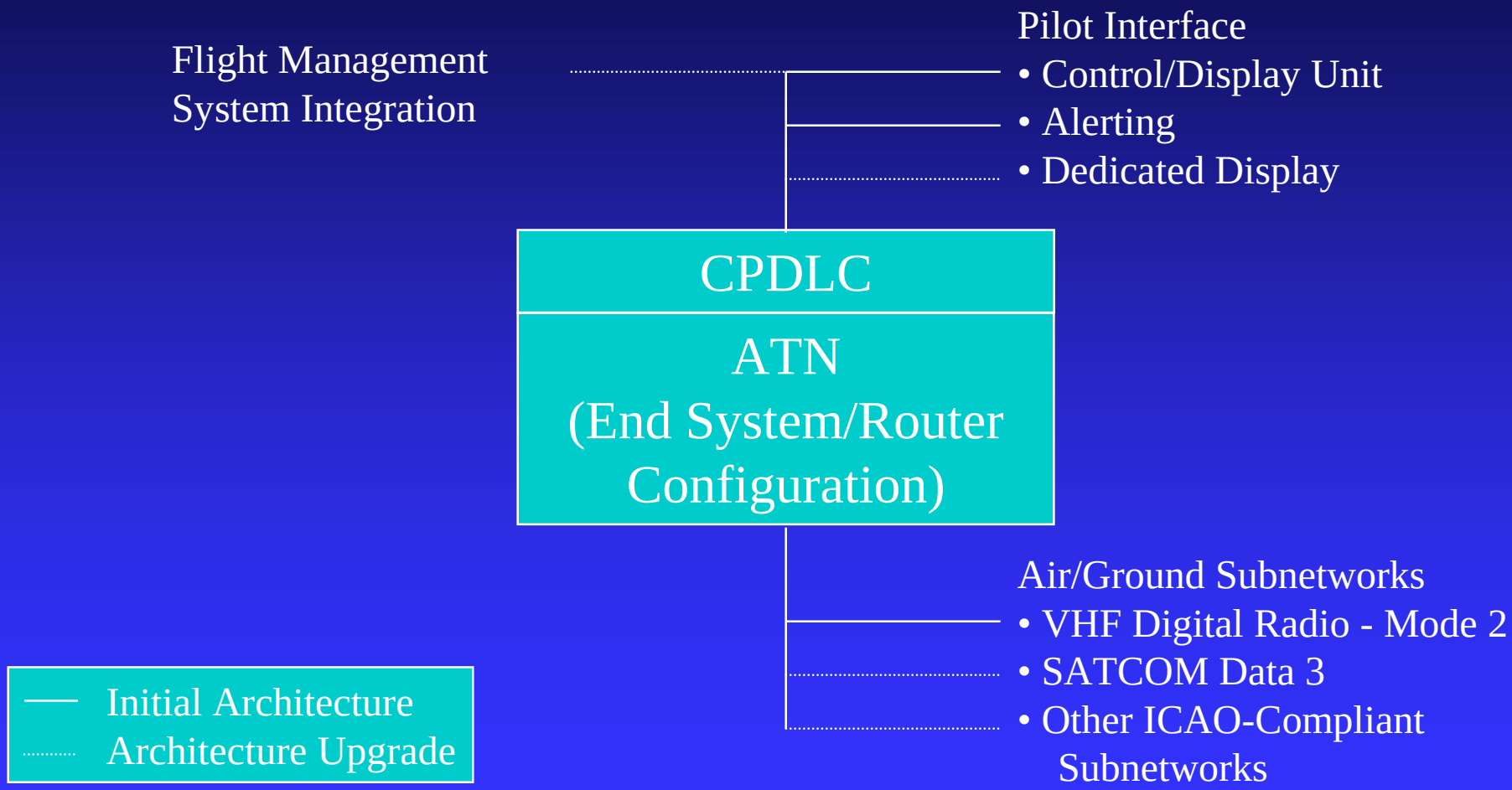
VDL Mode 2
Ground
Stations

A/G ATN
Router

VDL Mode 2

G/G ATN
Router

CPDLC/ATN Avionics: Functional Overview



ATNSI Airlines: Target Fleet Types

	American	Continental	Delta	Northwest	United	US Airways
Airbus Fleet Types	All	N/A	N/A	Some	All	All
Boeing Fleet Types	All	Most	Most	Some	Most	None
Regional Jet Fleet Types (affiliations)	All	Under Consideration	Under Consideration	None	Under Consideration	None

N/A = Not Applicable

Preliminary Airline Data. Subject to Revision.
Pre-Sep 11th Data.
Does not represent any actual or planned commitment by any airline to CPDLC equipage.

Avionics ATN Program Status

- Rockwell Collins
  - CPDLC/ATN-Capable CMU: Certified/Flew in PETAL IIE, Upgrade for CPDLC Build 1 Under Development
- 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

ATNSI Projects

- Router Reference Implementation (RRI)
  - Avionics: ATN End System and/or Router
  - Ground Systems: ATN End System and/or Router
- Conformance Test Suite (CTS)
  - Verification Tool for Installed RRI (Avionics or Ground Systems) or other “equivalent” ATN Systems
  - Integrated into Common American European Reference ATN Facility (CAERAF) Project
    - CAERAF Project is co-sponsored by EUROCONTROL and the FAA Certification Office
    - Use of CAERAF is not limited to America/Europe, usage is intended for world-wide ATN verification

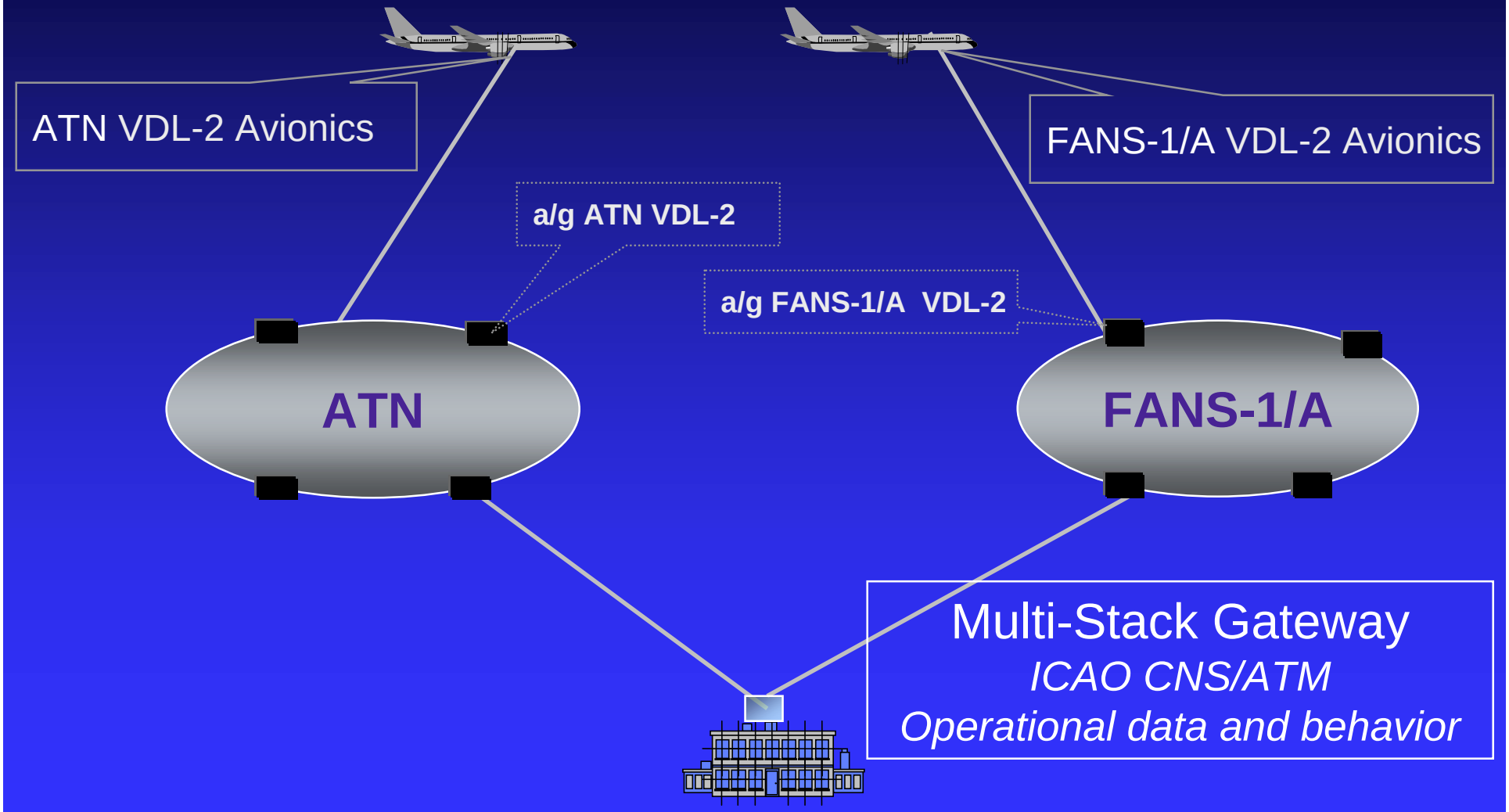
Next Steps

RTCA Free Flight Select Committee CPDLC Benefits Subgroup

- Charter
  - Update CPDLC Build 1A Business Case
  - Recommend Incentives for Early Equipage
  - Identify Impediments and Recommend Solutions
- Milestones
  - Apr 2002: Final Report to RTCA Free Flight Steering Committee

Future Initiatives

FANS 1/A Accommodation



Future Initiatives

Security Initiatives

- Potential Initiatives
  - Analysis of Security Features present in existing CPDLC/ATN/VDL2 Architecture
  - Implementation of Security Features in upgraded CPDLC/ATN/VDL2 Architecture
  - Implementation of Security Features in new Applications and Services
- Issues
  - Standardization
  - Globalization

Conclusions

- CPDLC/ATN Benefits
  - Benefits can accrue Locally (dependent upon equipage)
  - Regional Jet equipage is a significant Benefits component
  - Delay in CPDLC implementation is an Opportunity Cost
- Post-Sep 11 Impacts
  - Near-Term Lower Traffic Densities
  - Older Aircraft are already being removed from the Fleet
  - Regional/Business operations are growing
- CPDLC/ATN Implementation Plans must stay in Place

Traffic and Voice Communication Congestion will Return - CPDLC IS NEEDED!!

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