

ATN/VDL Mode 2 Capabilities

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Topics

- ▶ ATN/VDL Mode 2 Service History and Status
- ▶ Current VDL Mode 2 Capabilities
- ▶ Future ATN/VDL Mode 2 Support

ATN/VDL Mode 2 Service History and Status

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ARINC's Enabling Support

May 2007: ARINC has been successfully providing ATN/ CPDLC to EUROCONTROL Maastricht UAC for 38 months

Mar 2004: ARINC 1st with operational ATN/VDL M2 service for CPDLC as EUROCONTROL Maastricht UAC communications service provider

May 2003: ARINC awarded contract for EUROCONTROL Link 2000+ ATN/VDL M2 service at Maastricht UAC

2002: ARINC 1st with operational ATN/VDL service for CPDLC as FAA CPDLC Build 1 (Miami ARTCC) communications service provider

2001: ARINC 1st to operationally demonstrate ATN/VDL for CPDLC in PETAL II Programme

2000: ARINC 1st with operational VDL network

1997: ARINC launches VDL Program

ARINC's VDL Mode 2 Interoperability Experience

- ▶ In 1999 ARINC formed an industry team comprising all the major avionics developers to coordinate industry VDL Mode 2 development
- ▶ This team met numerous times over the subsequent years to coordinate VDL Mode 2 implementations
 - ARINC made its proprietary VDL Mode 2 design documentation available to promote interoperability
- ▶ As ARINC's VDLM2 development evolved to the point of producing hardware, this team requested that ARINC make its prototype VDL Mode 2 Ground Station available for testing with the avionics under development
- ▶ ARINC produced the Air Ground Test Station (AGTS), a portable VDL Mode 2 ground station with special test features
 - Several AGTS's were produced and provided to industry
- ▶ This interoperability effort lead to the successful launch of ARINC's VDL Mode 2 Service in 2000

PETAL IIe Support

▶ Goals

- Demonstrate viability/suitability of CPDLC over ATN/VDL Mode 2
- Work out many technical and ops issues for CPDLC over ATN/VDL Mode 2 in a trials environment
- Forcing function/keep forward momentum for CPDLC
- First step for full operations: US-based CPDLC program, and Link 2000+

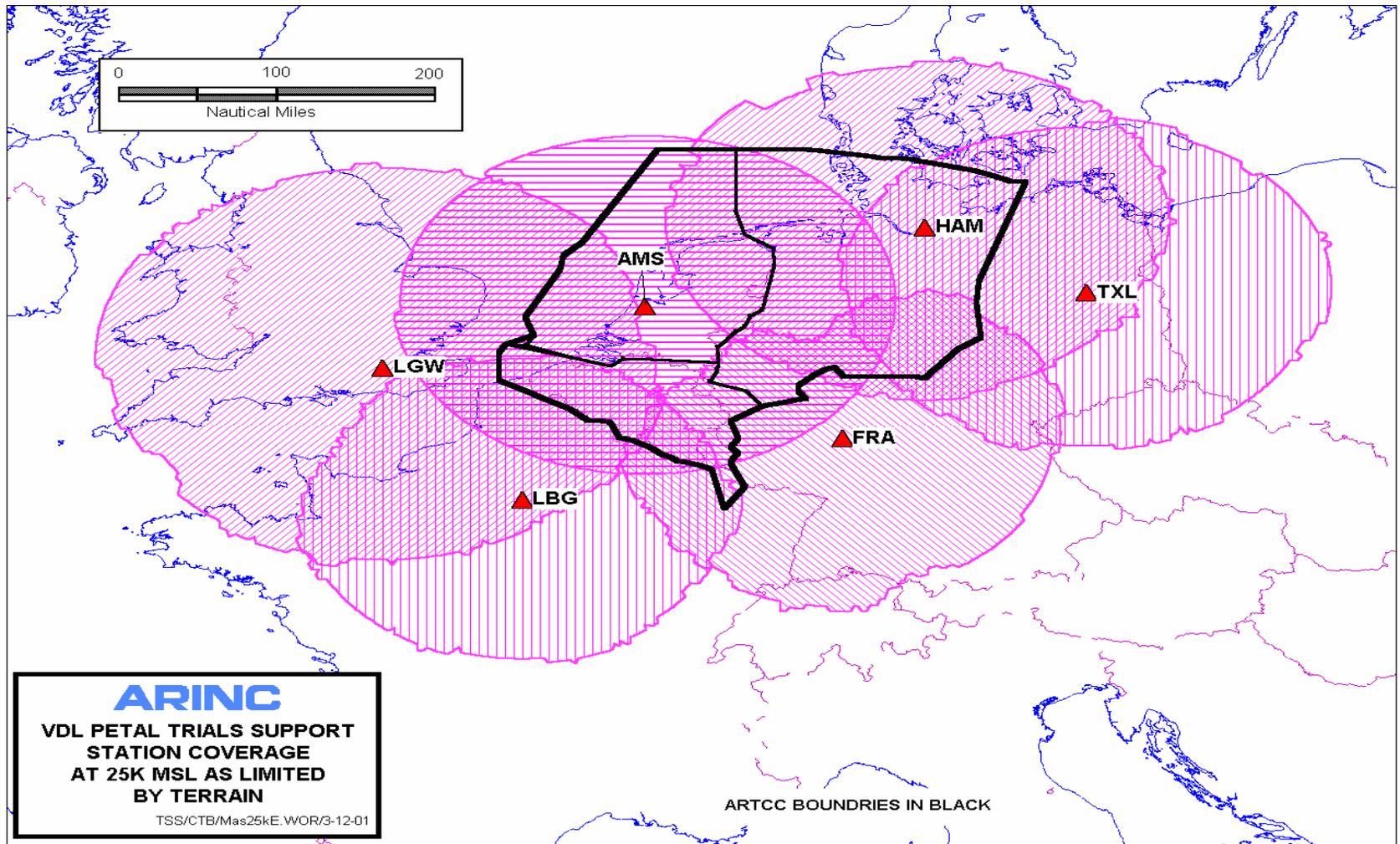
▶ ARINC began interoperability testing in April 2000 to ensure technical compliance of the avionics

- After 100's of hours of interoperability testing the avionics were “deemed” qualified in March 2001
- Certification flight with American Airlines was successfully flown May 29, 2001

▶ Results

- All of the Petal IIe goals were met
- Several technical system issues were identified and resolved
 - ▶ Involved ground and airborne system
 - ▶ Lingering concern regarding VDL Mode 2 hand-off performance

PETAL-IIe VDLM2 Coverage

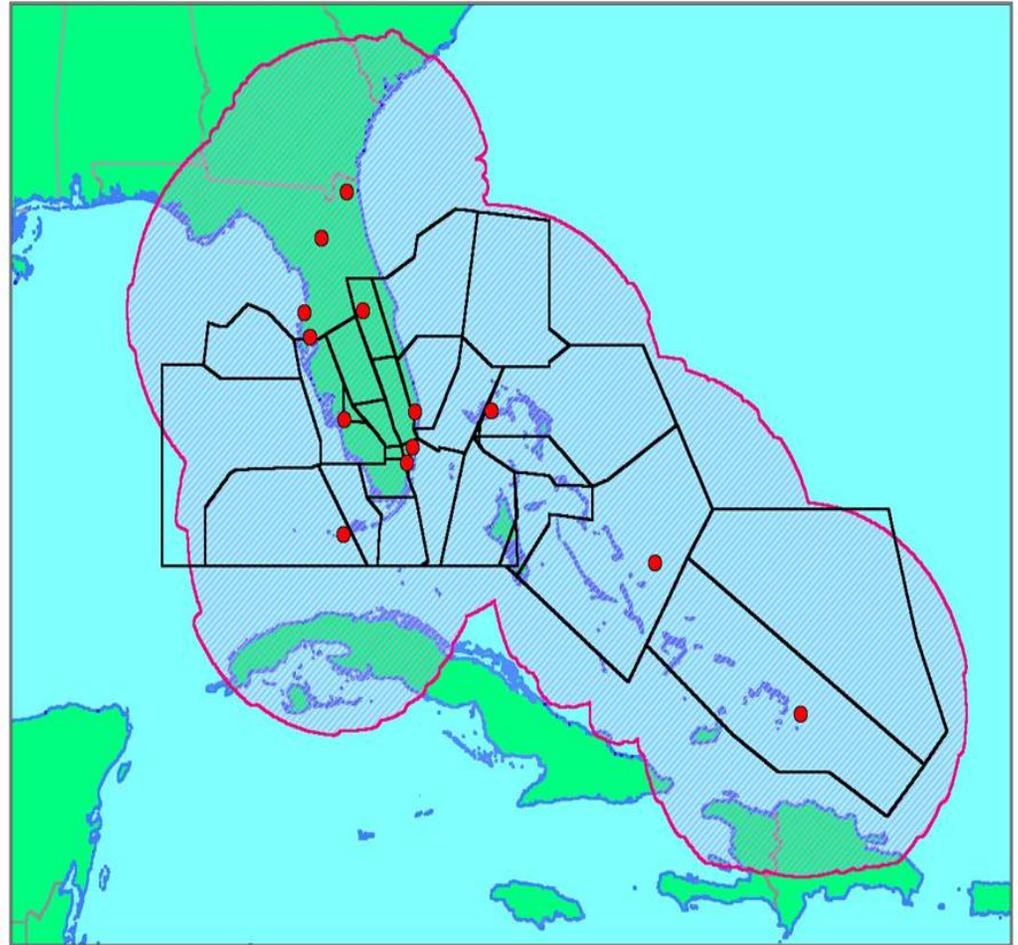


CPDLC Build 1 Support

- ▶ Following the successful Petal IIe trials the FAA initiated the CPDLC Build 1 program to provide ATN/CPDLC service in the Miami Enroute Airspace
- ▶ ARINC again provided extensive flight test and analysis support to the FAA's test aircraft prior to the service being declared operational in September 2002
- ▶ ARINC also provided flight test, analysis, and certification support for American Airlines, the United States Air Force, and Atlantic Southeast Airline ATN/CPDLC certification efforts
- ▶ During the course of FAA and certification flight tests an airborne problem was discovered that significantly impacted hand-off performance
 - The problem was corrected and hand-off performance increased significantly
- ▶ This alleviated the last remaining major concern from Petal IIe

ARINC's ATN/VDLM2 Coverage for FAA CPDLC Build 1

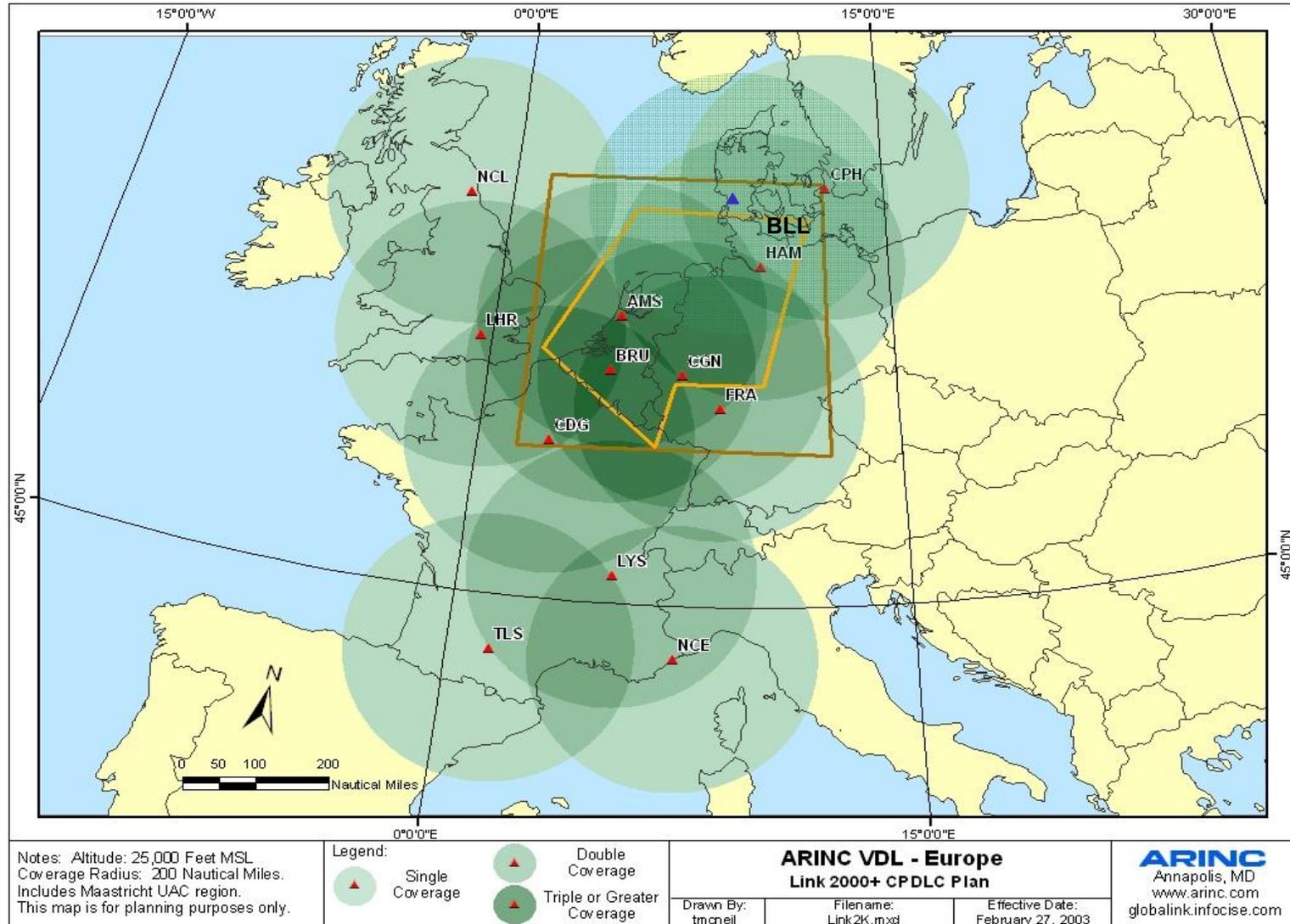
- ▶ ARINC was the communications service provider for the FAA CPDLC Build 1
- ▶ 14 Station VDLM2/ATN Network with redundant ATN air/ground and ground/ground routers
- ▶ Operational 2002 to 2004
- ▶ 100% RF availability domestic (99.86% in Caribbean)



LINK 2000+ Support

- ▶ ARINC began deploying their LINK 2000+ network in May 2003 and completed installation in September 2003
- ▶ ARINC supported EUROCONTROL's extensive flight test program
- ▶ ARINC also supported and participated in SAS, American Airlines, and ATI ATN/CPDLC certifications for LINK 2000+
 - Up to this point all ATN aircraft installations were retrofits via STC's
- ▶ In 2003 Boeing approached ARINC to provide ATN certification support
 - Ground stations in the Seattle area were upgraded to ATN with connectivity to EUROCONTROL
- ▶ In 2005 Airbus approached ARINC to provide an ATN connection to support their ATN development and certification
 - ARINC provided Airbus connectivity to ARINC's operational ATN network for LINK 2000+
 - This connectivity allows ATN and AOC end systems at Airbus's test facilities to communicate with Airbus flight test aircraft and test avionics
- ▶ ARINC continues to provide ATN/VL Mode 2 service to MAAS UAC with >99.99% availability

ARINC ATN/VDLM2 Coverage for Link 2000+



Current VDL Mode 2 Capabilities

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VDL Mode 2 Capabilities

- ▶ Two VDL Mode 2 Services Offered Today
 - AOA: ACARS Over AVLC (Aviation VHF Link Control)
 - ▶ Operational since November 2000
 - ▶ “Hi-speed” ACARS supporting AOC communications
 - ATN: Aeronautical Telecommunication Network
 - ▶ Supports Controller Pilot Data Link Communications (CPDLC)
 - ▶ Deployed in 2001 to support the Petal Ile Trials
 - ▶ Deployed in September 2002 to support FAA CPDLC Build 1
 - ▶ Currently operational in Maastricht UAC for LINK 2000+

- ▶ ARINC Providing ATN/VDL Mode 2 Products/Service Globally
 - North America
 - ▶ AOA
 - Europe
 - ▶ AOA
 - ▶ ATN/VDL Mode 2
 - Asia
 - ▶ AOA -AVICOM (Japan)

VDL Mode 2 Statistics

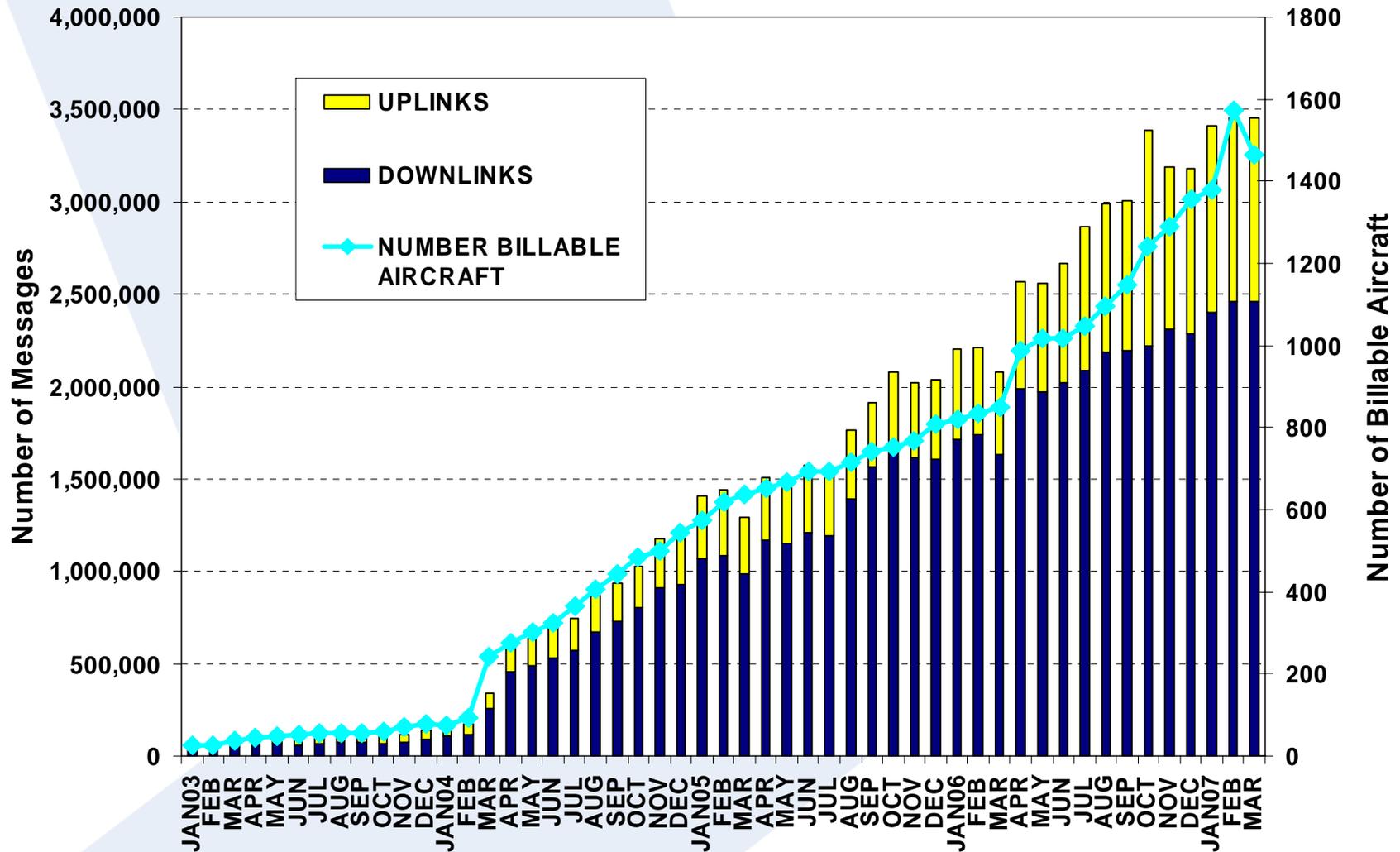
- ▶ ARINC has 250+ operational VDLM2 stations in North America, Europe, and Japan
- ▶ ARINC is currently expanding its AOA service into other regions such as Mexico, Singapore, China, Thailand, and Australia
- ▶ Over 1600 aircraft from more than 25 airlines regularly use ARINC's AOA Service
- ▶ Average monthly traffic ~3.5 million messages
- ▶ Round trip transit delay
 - Average ~1.40s
 - 95 percentile <3s
- ▶ Average Uplink Success Rate: 99.00%
- ▶ VDL Mode 2 connection success rate >99.5%
- ▶ VDL Mode 2 hand-off success rate >99.5%

ARINC's AOA Customers

ARINC AOA customers

Aeroflot	Japan Airlines
AIRBUS	Lufthansa
Air Canada Jazz	Mesa Airlines
Air Europa	Pinnacle Airlines
Air France	Quantas
American Airlines	SAS
ATI	Skywest
BOEING	Spirit Airlines
China Airlines	Southwest
Continental	Sun Country
FedEx	Thai Airways
Finnair	Universal Airways
FlyNik	USAF
GoJeti	

ARINC's AOA TRAFFIC



Future ATN/VDL Mode 2 Support

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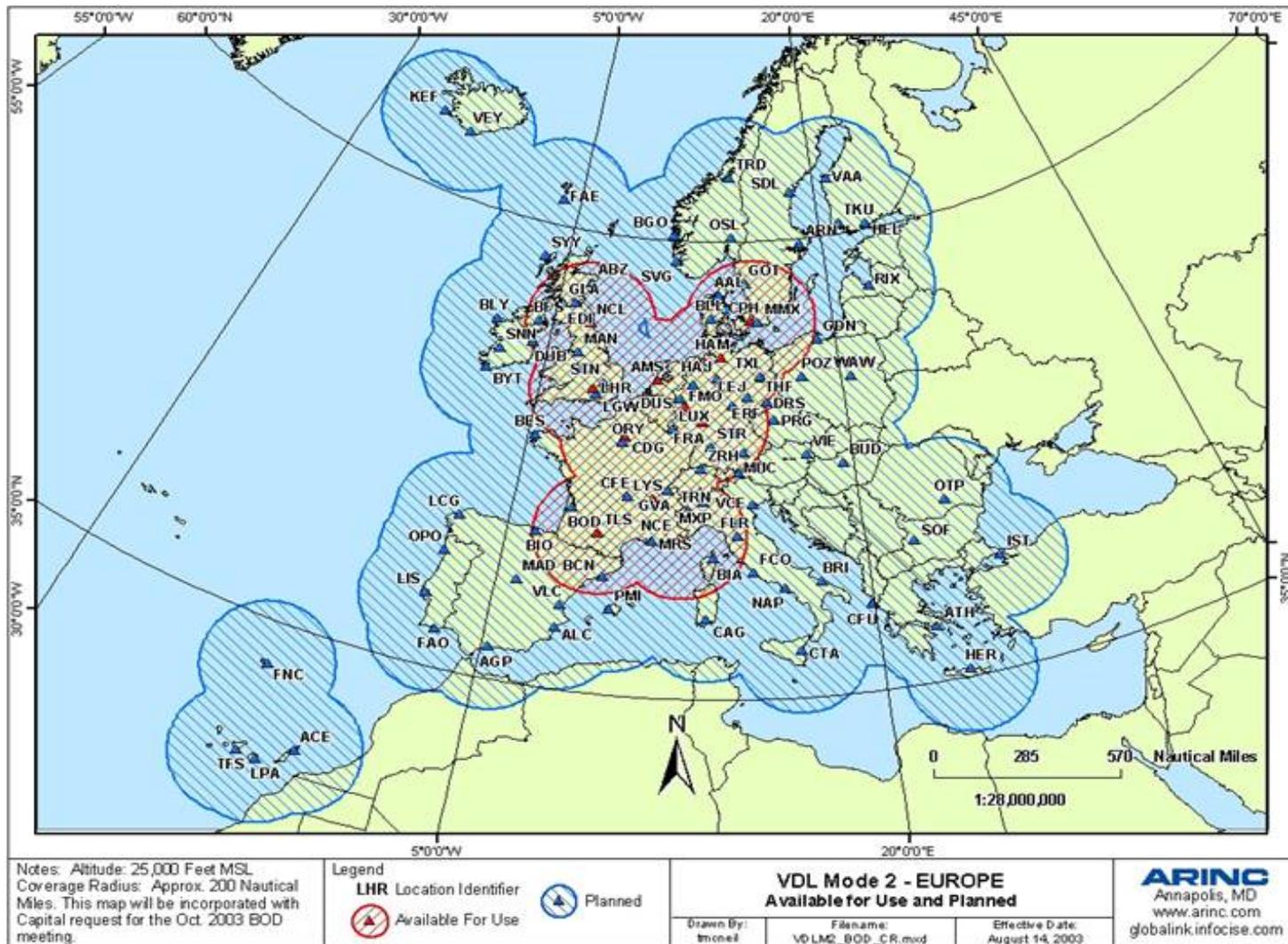
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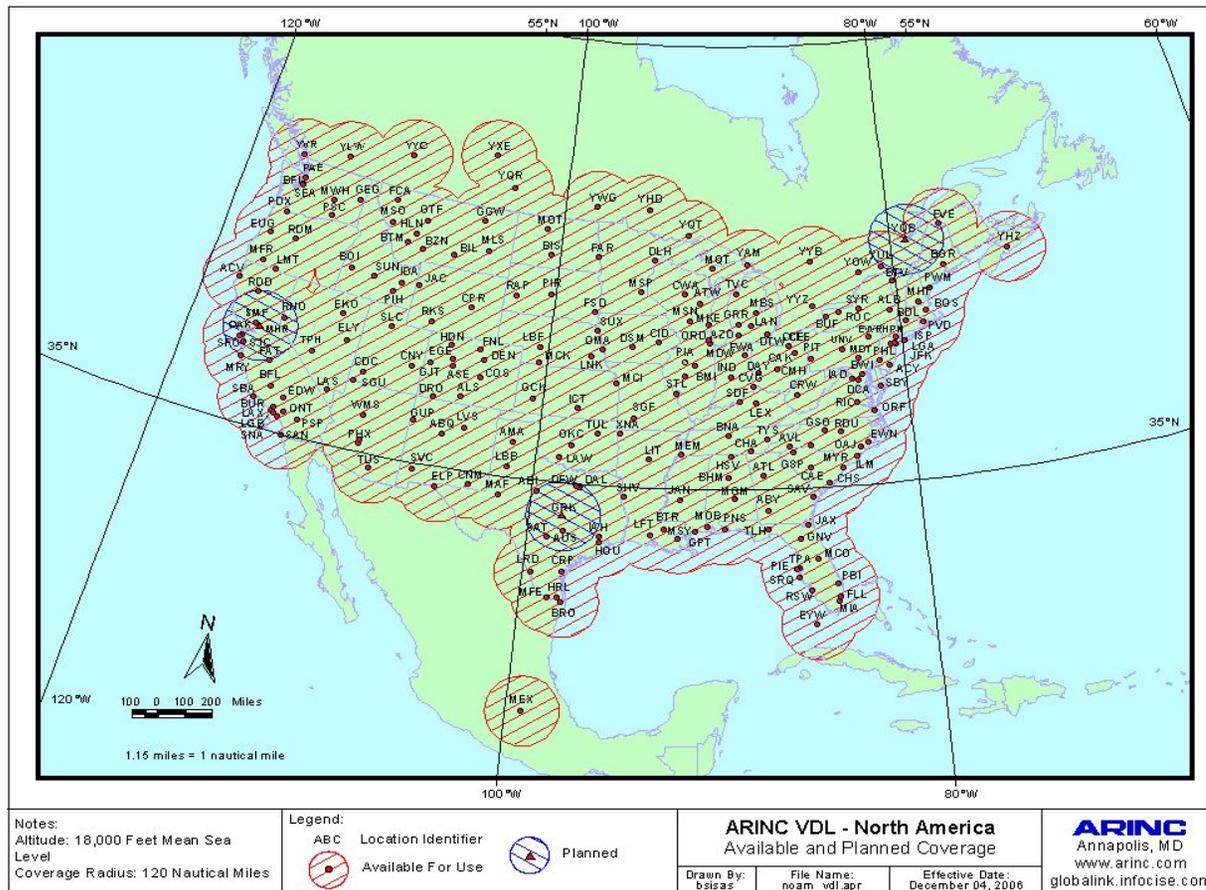
Expansion of ATN/VDL Mode 2 Network in Europe

- ▶ Expand European VDLM2 coverage in line with implementation of Link2000+ service in other European countries



VDL Mode 2 (ATN Capable) Coverage in North America

- ▶ All of ARINC's 240+ North American VDL Mode 2 ground stations are ATN capable via a simple S/W configuration change remotely from Annapolis
- ▶ ARINC will enable ATN/VDL Mode 2 in North America as required



Summary

- ▶ VDL Mode 2 technology has been accepted by the aviation community and supported by ARINC for more than seven years
 - Avionics are COTS products
 - Over 1600 equipped aircraft and growing
 - Technology choice for new aircraft deliveries and for new datalink airlines
- ▶ ATN/VDL Mode 2 technology has been accepted by the aviation community and supported by ARINC for more than six years
 - Current avionics are “COTS” products
 - Over 300 aircraft committed for LINK 2000+
- ▶ ATN/VDL Mode 2 technology is mature and proving its ability to enable ATS datalink communications providing enhanced efficiency and safety
- ▶ ARINC has been and is committed to making ATN/VDL Mode 2 a success

Questions?

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