

Transition To VDL/ATN

Prepared for
C/AFT
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Agenda

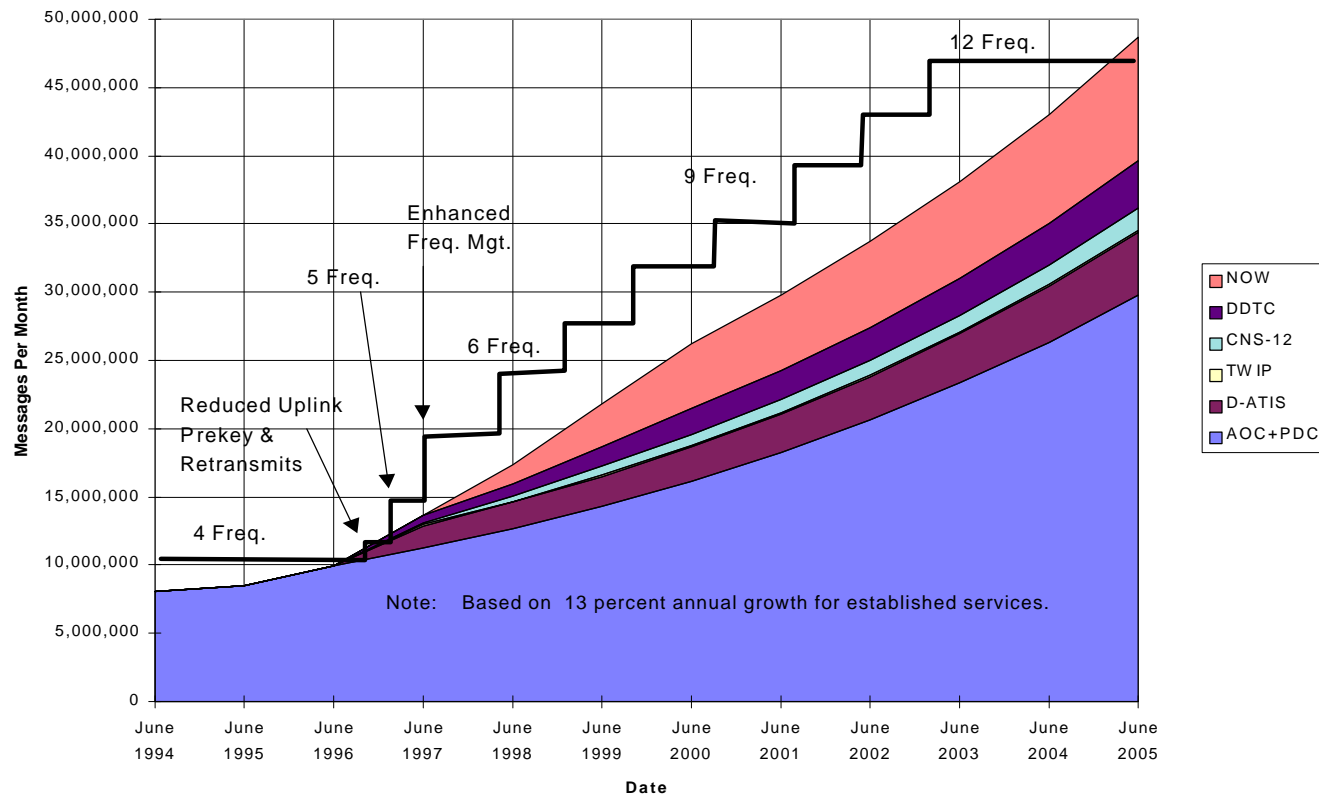
- **Industry objectives for transition**
- **ARINC Frequency Chart**
- **Technical Description of the ARINC Proposal**
- **Aircraft implications**
- **ARINC Roadmap**
- **Conclusion**

Transition Objectives

- **Provide additional data-link capacity by Year 2000**
- **Provide backward compatibility with existing applications and minimize impact on avionics**
- **Provide clear transition path to ATN**
- **Allow interim avionics and full ATN compatible avionics to operate over same ground infrastructure thereby reducing industry costs**
- **Allow local routing and delivery of user data**
- **Provide the capability to add new applications without changing basic communications stack**
- **Gain operational experience with new architecture**

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ARINC Frequency Utilization



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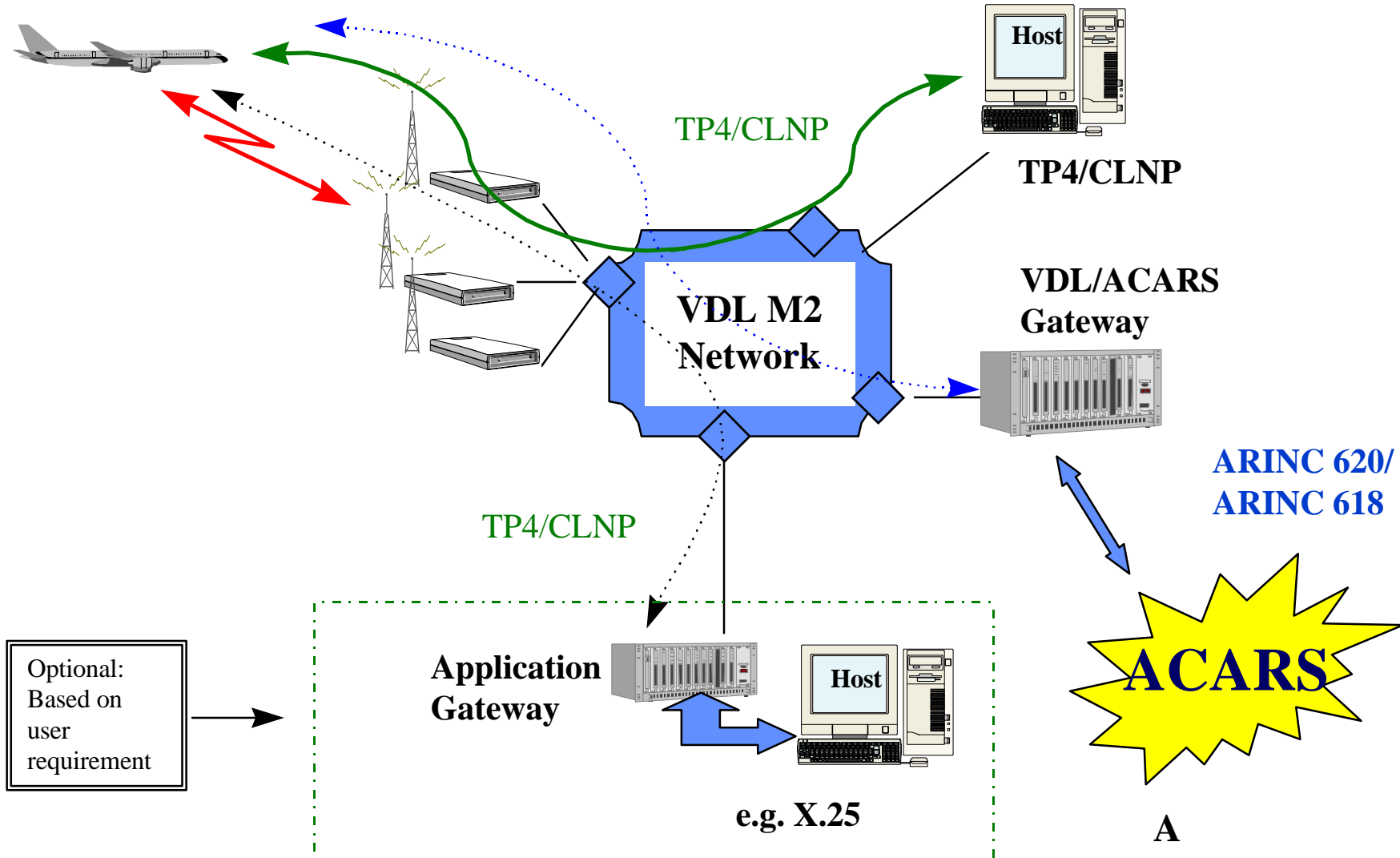
ARINC Proposal Highlights

- **Complies with ICAO VDL and ATN SARPs**
- **Uses Connection Less Network Protocol (CLNP) address for end-to-end data delivery**
- **Supports direct delivery of user data to hosts using CLNP**
- **Supports optional X.25 Gateway for host connectivity**
- **Announces VDL service availability using ACARS squitter message**
- **Will allow simultaneous operation of interim VDL and full ATN based avionics**

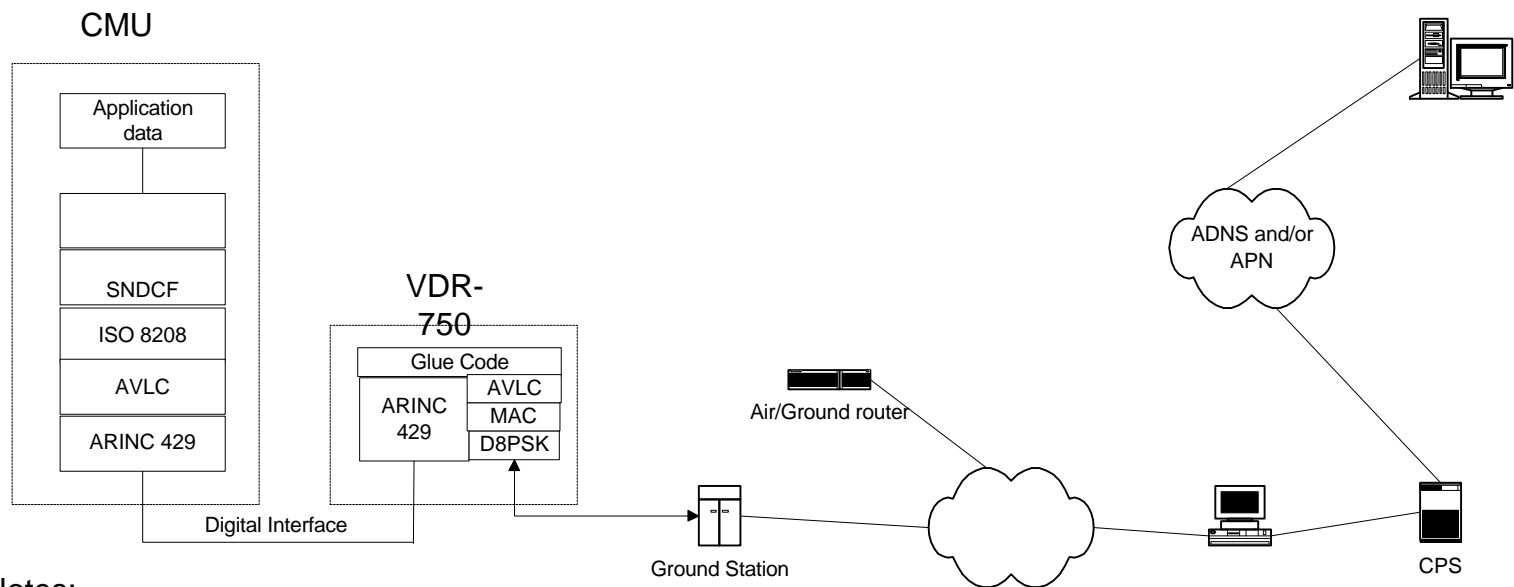
Backward Compatibility

- **Supports existing ACARS applications and ground host interfaces**
- **Eliminates ACARS Multi-block processing to improve system efficiency**
- **Uses ARINC 618/620 message formats and ACKs to ensure data exchange with character-based ground hosts**
- **Uses “Media Advisory” message to switch host routing from ACARS to VDL and vice versa**

VDL Mode 2 Network Architecture



VDL End-To-End Data Flow



Notes:

- VDL subnet connection terminated at GS
- Standard or Mobile SNDCF manages VDL connection and user data flow between DTE pairs
- GS forwards downlink to AGR via Reliable Data Delivery Service
- AGR sends data PDU to HDL GW based on CLNP address

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CLNP PDU Format

Network Layer PID = 0x81			
Length Indicator = 0x33			
Version/PID Extension = 0x01			
PDU Lifetime = 0xFF			
SP = 0 No Seg.	MS = 0 Full Blk	E/R = 0 No Err Rpt	Type = 0x1C Data PDU
Segment Length = 0x33 + Data Length			
Checksum = 0x00 (Ignore)			
Dest. Address Length Indicator = 0x14			
Destination Address (see Section 7)			
Source Address Length Indicator = 0x14			
Source Address (see Section 7)			
Application Data: ACARS Characters in ARINC 620 A/G format - SOH to ETX			

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VDL Address Structure

Aircraft NSAP:

AFI 0x47	IDI 0x0027	VER 0x41	ADM 0x55414c = UAL	RDF 0x00	ARS = 24-bit a/c addr.	LOC 0x0000	SYS "000000" decimal	SEL = 0xa1 denoting ACARS over CLNP
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Ground NSAP:

AFI 0x47	IDI 0x0027	VER 0x01	ADM 0x584141 = XAA	RDF 0x00	ARS = 24-bit grnd. addr.	LOC 0x0000	SYS "000000" decimal	SEL = 0xa1 denoting ACARS over CLNP
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CLNP PICS

Protocol Function	End System	
	Sending	Receiving
PDU Composition	M	N/A
PDU Decomposition	N/A	M
Header Format Analysis	N/A	O
PDU Lifetime Control	O	O
Route PDU	--	--
Forward PDU	--	--
Segmentation	--	--
Reassembly	N/A	--
Discard PDU	N/A	M
Error Reporting	--	--
Header Error Detection	--	--
Security	--	--
Complete Source Routing	--	--
Complete Route Recording	--	--
Echo Request	--	N/A
Echo Response	N/A	--
Partial Source Routing	--	--
Partial Route Recording	--	--
Priority	--	--
QoS Maintenance	--	--
Congestion Notification	N/A	--
Padding	--	--
Key: <ul style="list-style-type: none"> • M: Mandatory, must be supported by the interim solution • --: Not implemented by the interim solution • O: Implementation option • N/A: Not applicable 		

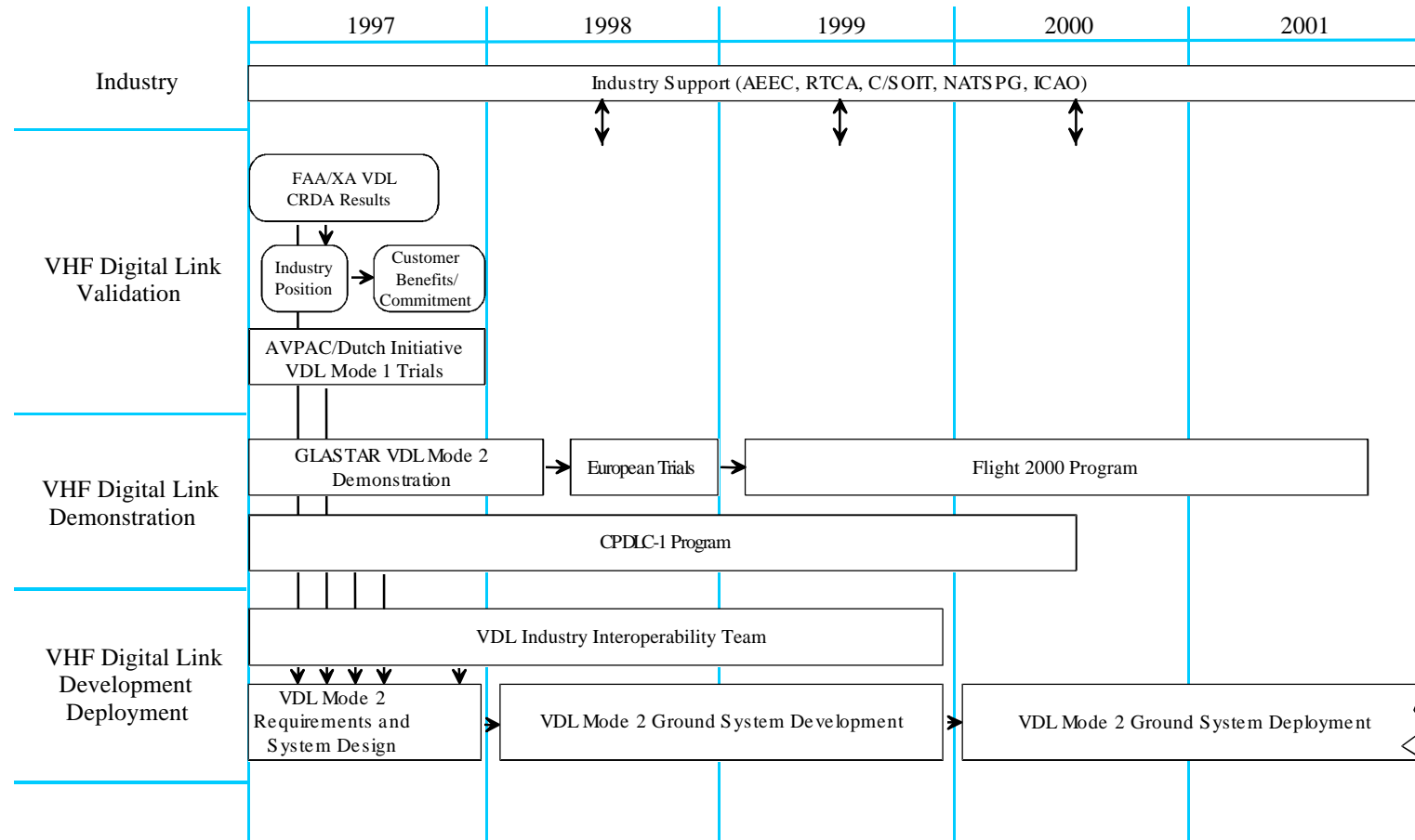
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Aircraft Implications

- **Requires change of ACARS MU and Radio to ARINC 758 CMU and ARINC 750 VDR**
- **Requires digital interface between CMU and VDR**
- **No impact on other airborne equipment**
- **End-systems (e.g., FMS) can be upgraded to ATN when full benefit can be derived**
- **Can be easily integrated with ATNSI software when available**

ARINC Road-Map

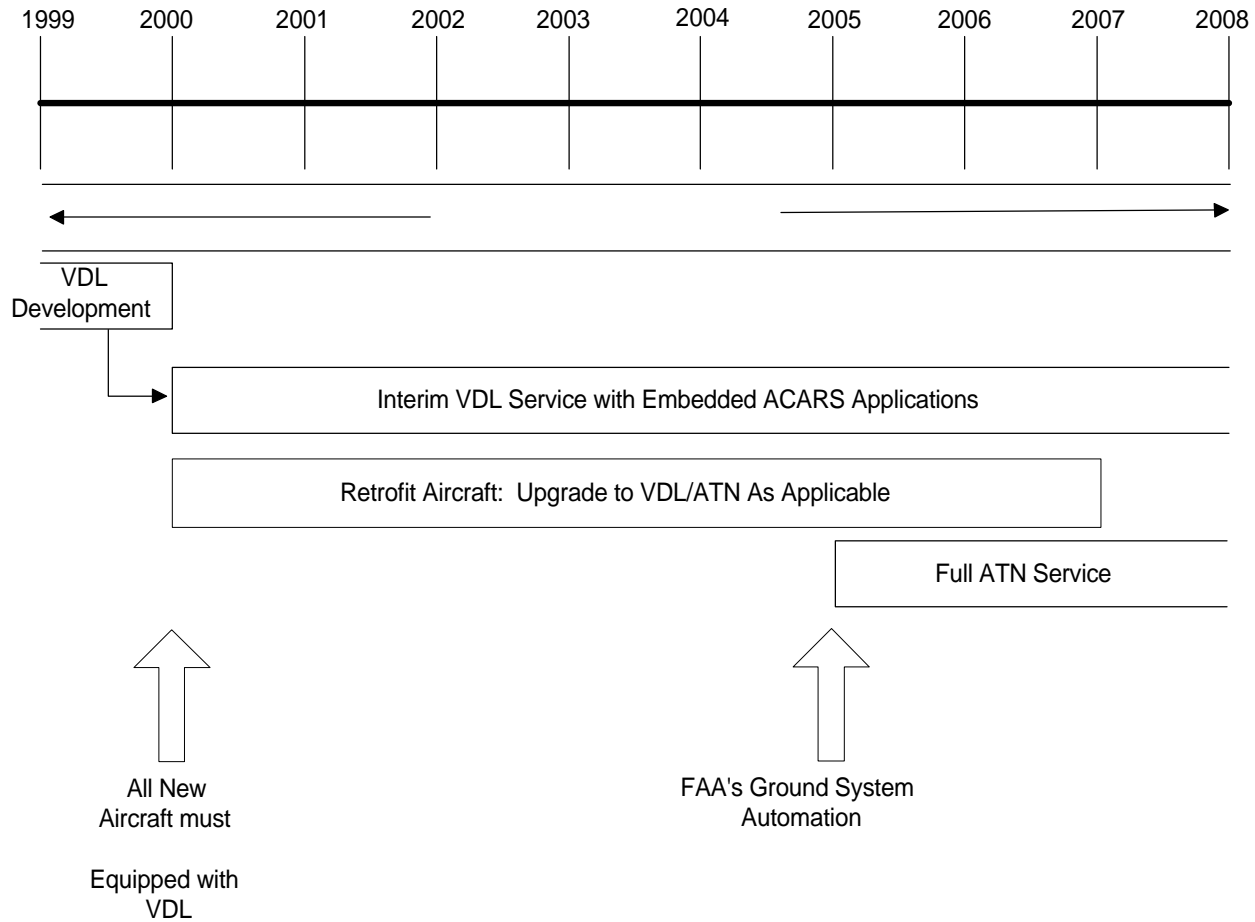
Future Data Link ARINC High-Level Program Roadmap



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ACARS To ATN

Transition of Air/Ground Service



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Conclusions

- **Evolutionary approach to support smooth migration of users from ACARS to ATN via the Interim VDL Solution**
- **ARINC's ground network is based on ATN architecture and will support interim and full ATN solutions**
- **Provides backward compatibility with the existing ACARS character based hosts through gateways**
- **ARINC would like to work with Boeing and C/AFT members to reduce implementation costs while maximize benefits**

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