

Federal Aviation Administration



Controller/Pilot Data Link Communications (CPDLC) Builds I & IA

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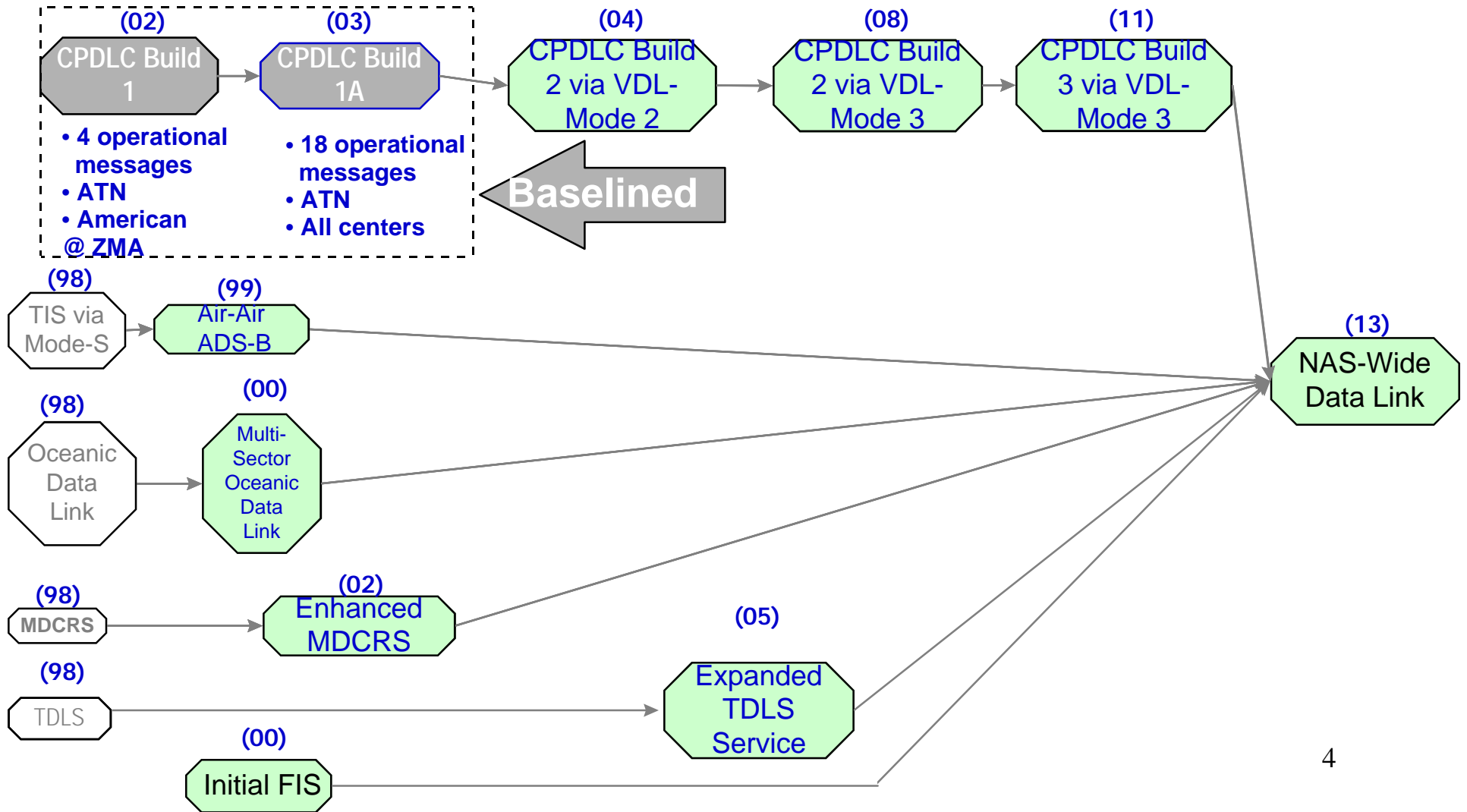
FAA/Industry En Route CPDLC Recommendations

- **Use phased approach for developing and implementing En Route ATN compliant data link services**
 - Build I (domestic CPDLC)
 - ATN compliant version of the 4 Build I/ACARS operational messages
 - Use VDL-2 as A/G subnetwork
 - Key site IOC in Miami: 6/02
 - Build IA (enhanced domestic CPDLC)
 - ATN compliant services (~18 operational messages)
 - Use VDL-2 as A/G subnetwork
 - Key site IOC: 6/03
 - National deployment (i.e., installation) completed by 6/05

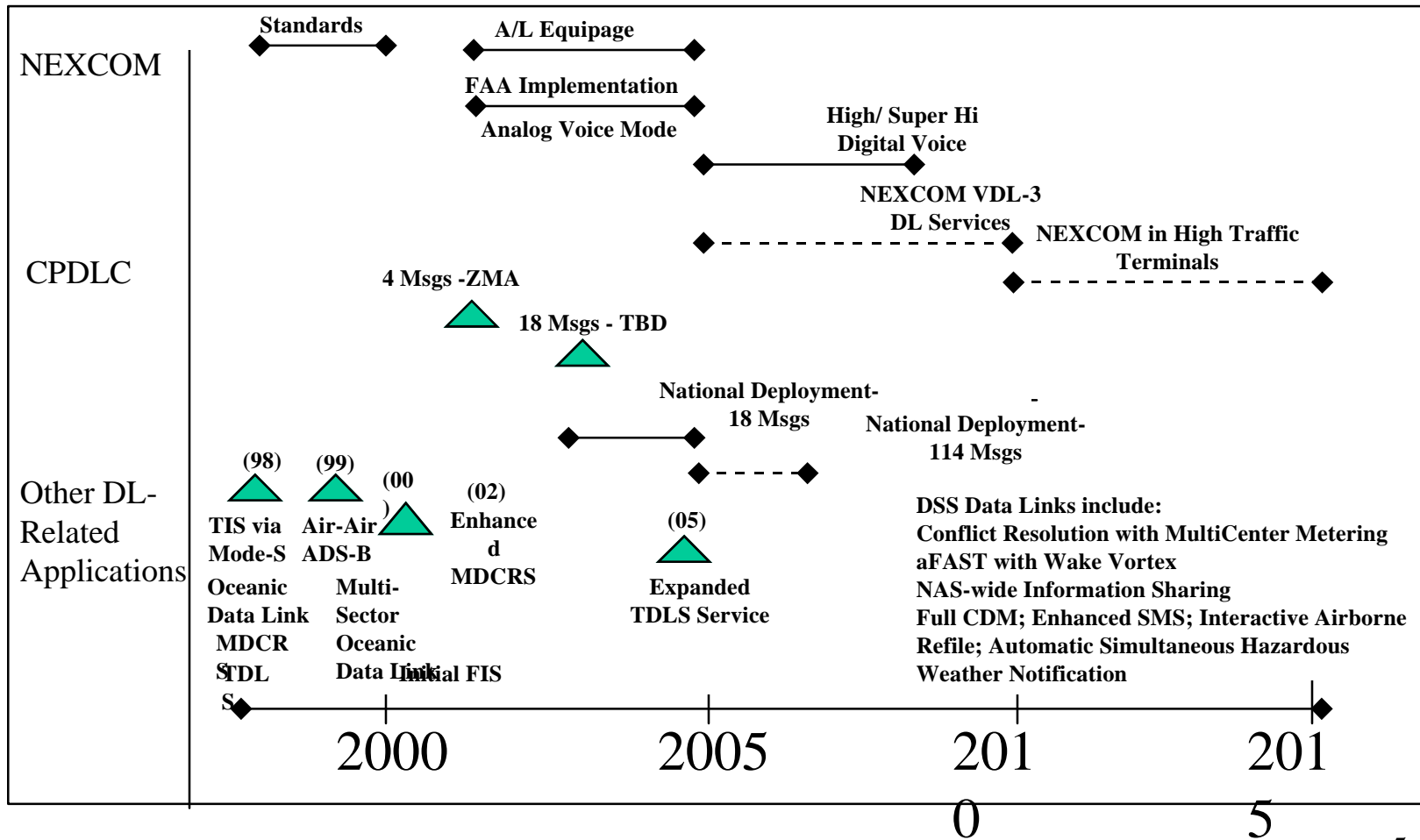
FAA/Industry En Route CPDLC Recommendations (Cont'd)

- Build II (domestic/international CPDLC)
 - ATN compliant services (~114 operational messages)
 - Use VDL-2 as A/G subnetwork
 - Key site IOC: 12/04
 - National deployment (i.e., installation) completed by 6/06
- Build III
 - Expanded ATN message set
 - Integration with Decision Support Systems
 - Use NEXCOM as A/G subnetwork
 - National deployment

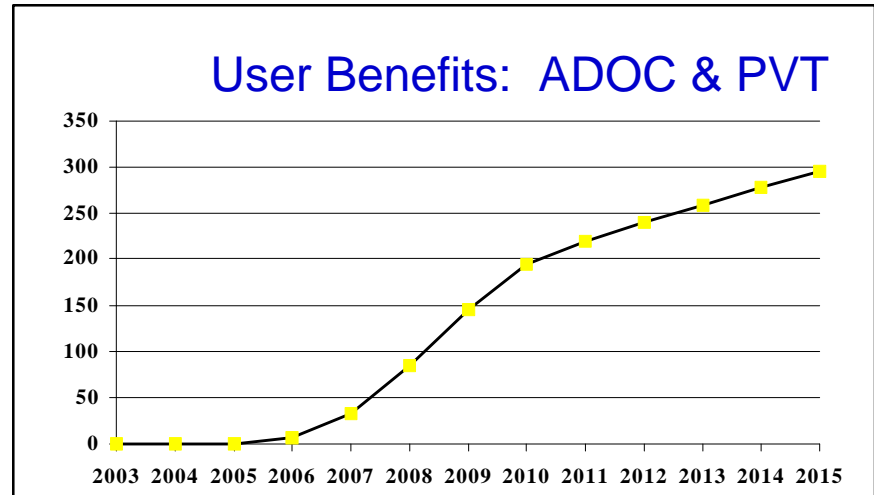
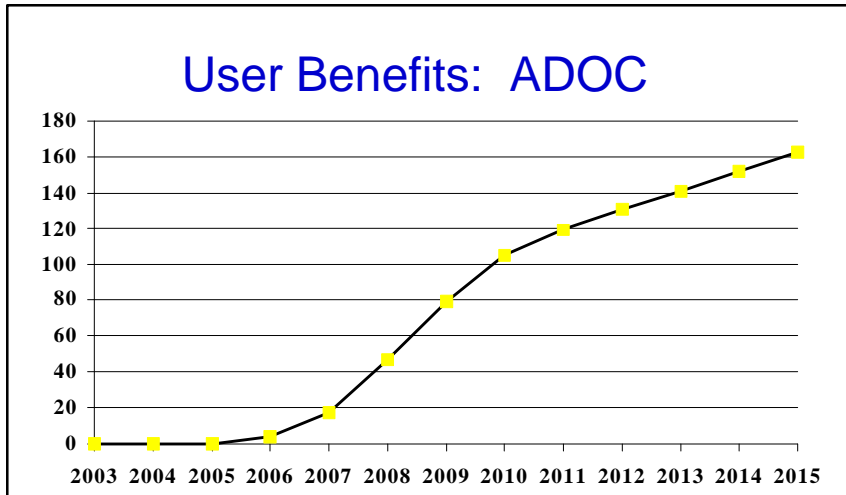
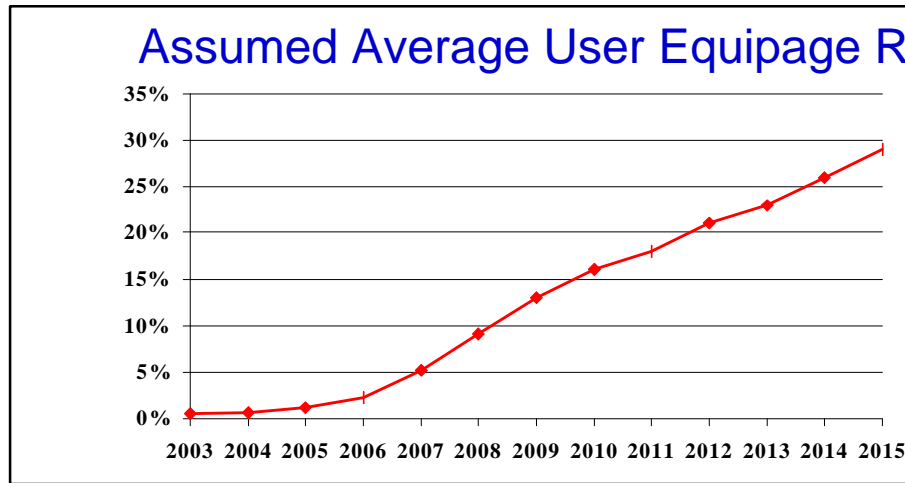
Data Link Capabilities Evolution



A/G Communications Roadmap



User Equipage Rates & Benefits

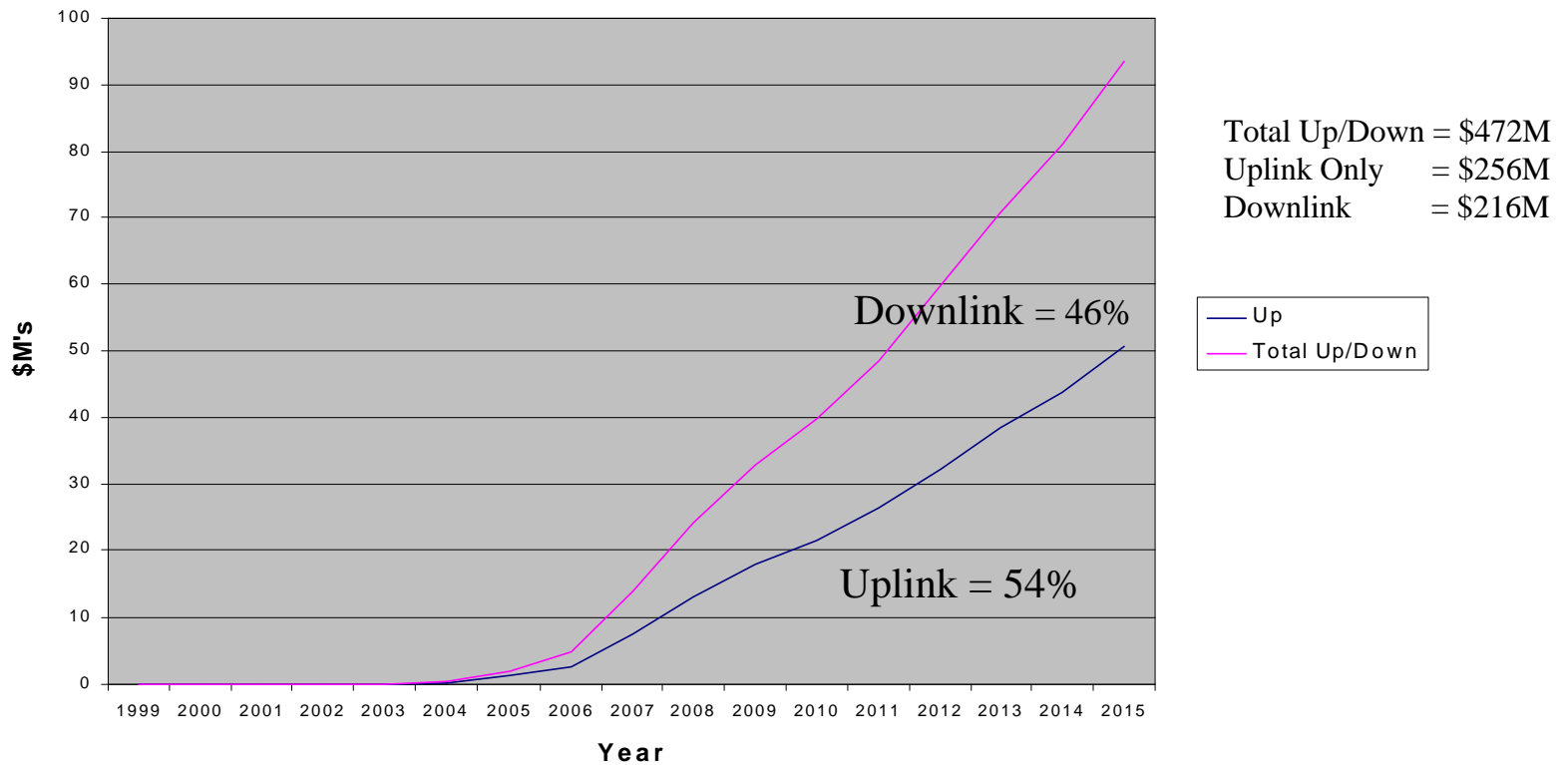


ADOC = A/C Direct Operating Costs Current year \$ per year

PVT = Passenger Value of Time ⁶

Projected VDL-2 Message Costs

Projected VDL-2 Message Costs (Budget Year, 80/20 Estimate)

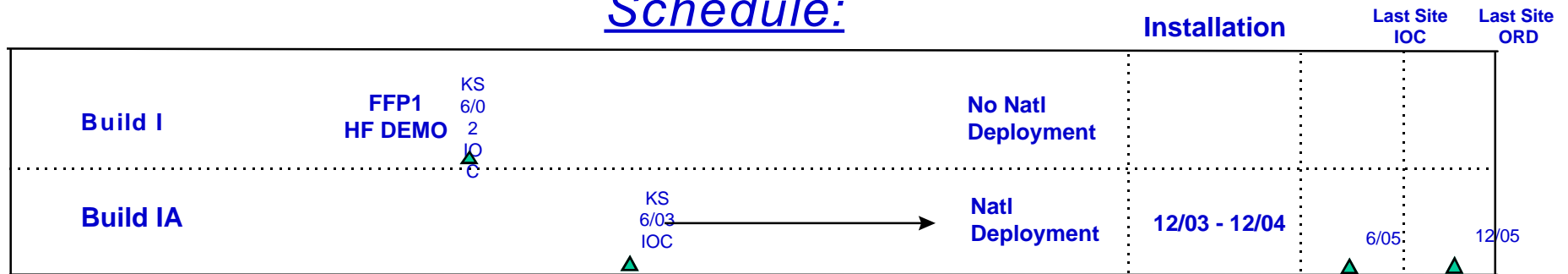


CPDLC Risk Factor Summary Chart

	<u>Risk</u>	<u>Issues</u>
❖ Cost Estimate		
F&E	Low	80/20 Estimate Used
O&M	Medium - High	VDL-2 message cost share not determined. Operational usage unknown.
❖ Schedule	Medium-High	ATNSI software development could slip further.
❖ Technical	Medium	Impact on NADIN II (PSN)/Gateway unknown.
❖ Human Factors	Low - Medium	Integration of existing work, continued evaluations of message sets/scenarios
❖ Benefits Estimate	High	Highly sensitive to equipage rates. Users waiting for AA benefits. Potential problems with retrofit.

CPDLC Summary

Schedule:



Lifecycle Costs (thru FY2015):

- Total F&E (w/o VDL-2): \$159.9M
- Total O&M (w/o VDL-2): \$13.7M
- Total VDL-2 costs: \$472M

Benefits (thru FY2015):

- NPV (\$M) range: Without PVT: (56) - 47 \$; M/L: 26 \$
With PVT: 166-326 \$; M/L: 288 \$
- B/C range: Without PVT: 0.8 - 1.2; M/L: 1.1
With PVT: 1.5 - 2.1; M/L: 2.0



BACKGROUND SLIDES



CPDLC I Messages

- Transfer of Communication (TOC), Initial Contact (IC), Altimeter Setting (AS), and an informational free text menu capability, which will be built by supervisory input and assigned to specified positions.

Contact/Monitor/Surveillance Requests (uplink)	<ul style="list-style-type: none"> ➤ CONTACT (<i>unit name</i>) (<i>frequency</i>) ➤ MONITOR (<i>unit name</i>) (<i>frequency</i>)
Report/Confirmation Requests (uplink)	<ul style="list-style-type: none"> ➤ CONFIRM ASSIGNED LEVEL
Air Traffic Advisories (uplink)	<ul style="list-style-type: none"> ➤ (<i>facility designation</i>) ALTIMETER (<i>altimeter</i>) ➤ CHECK STUCK MICROPHONE (<i>frequency</i>)
System Management Messages (uplink)	<ul style="list-style-type: none"> ➤ ERROR (<i>error information</i>) ➤ NEXT DATA AUTHORITY (<i>facility</i>) ➤ SERVICE UNAVAILABLE ➤ (<i>facility designation</i>) ➤ LOGICAL ACKNOWLEDGEMENT ➤ USE OF LOGICAL ACKNOWLEDGEMENT PROHIBITED
Additional Messages (uplink)	<ul style="list-style-type: none"> ➤ (<i>free text</i>)
Responses (downlink)	<ul style="list-style-type: none"> ➤ WILCO ➤ UNABLE ➤ STANDBY ➤ ROGER ➤ AFFIRM ➤ NEGATIVE
Reports (downlink)	<ul style="list-style-type: none"> ➤ ASSIGNED LEVEL (<i>level</i>)
System Management Messages (downlink)	<ul style="list-style-type: none"> ➤ ERROR (<i>error information</i>) ➤ NOT CURRENT DATA AUTHORITY ➤ CURRENT DATA AUTHORITY ➤ NOT AUTHORIZED NEXT DATA AUTHORITY ➤ LOGICAL ACKNOWLEDGEMENT

CPDLC IA Messages

- Increase the message set to accommodate assignment of speeds, headings, and altitudes as well as a route clearance function. A capability to handle pilot-initiated altitude requests will also be implemented.
- Added messages are:

Responses/acknowledgements (uplink)	<ul style="list-style-type: none"> ➤ UNABLE ➤ STANDBY ➤ ROGER
Vertical Clearances(uplink)	<ul style="list-style-type: none"> ➤ MAINTAIN (<i>level</i>) ➤ CLIMB TO (<i>level</i>) ➤ DESCEND TO (<i>level</i>)
Route Modifications (uplink)	<ul style="list-style-type: none"> ➤ PROCEED DIRECT TO (<i>position</i>) ➤ CLEARED (<i>route clearance</i>) ➤ FLY HEADING (<i>degrees</i>)
Speed Changes (uplink)	<ul style="list-style-type: none"> ➤ MAINTAIN (<i>speed</i>) ➤ MAINTAIN (<i>speed</i>) OR GREATER ➤ MAINTAIN (<i>speed</i>) OR LESS
Contact/Monitor/Surveillance Requests (uplink)	<i>Unchanged</i>
Report/Confirmation Requests (uplink)	➤ Adds STATE PREFERRED LEVEL
Air Traffic Advisories (uplink)	<i>Unchanged</i>
System Management Messages (uplink)	<i>Unchanged</i>
Additional Messages (uplink)	➤ Adds "THEN" to link messages
Responses (downlink)	<i>Unchanged</i>
Vertical Requests (downlink)	➤ REQUEST (<i>level</i>)
Reports (downlink)	➤ Adds PREFERRED LEVEL (<i>level</i>)
System Management Messages (downlink)	<i>Unchanged</i>

NASSIM

- Threshold

- 25% 50% 75% 90% 100%

- Effect

- 50% 70% 90% 97% 100%

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- Thus, 50% equipage, yielded benefits as if 70% were equipped.