

Data Comm Program Status

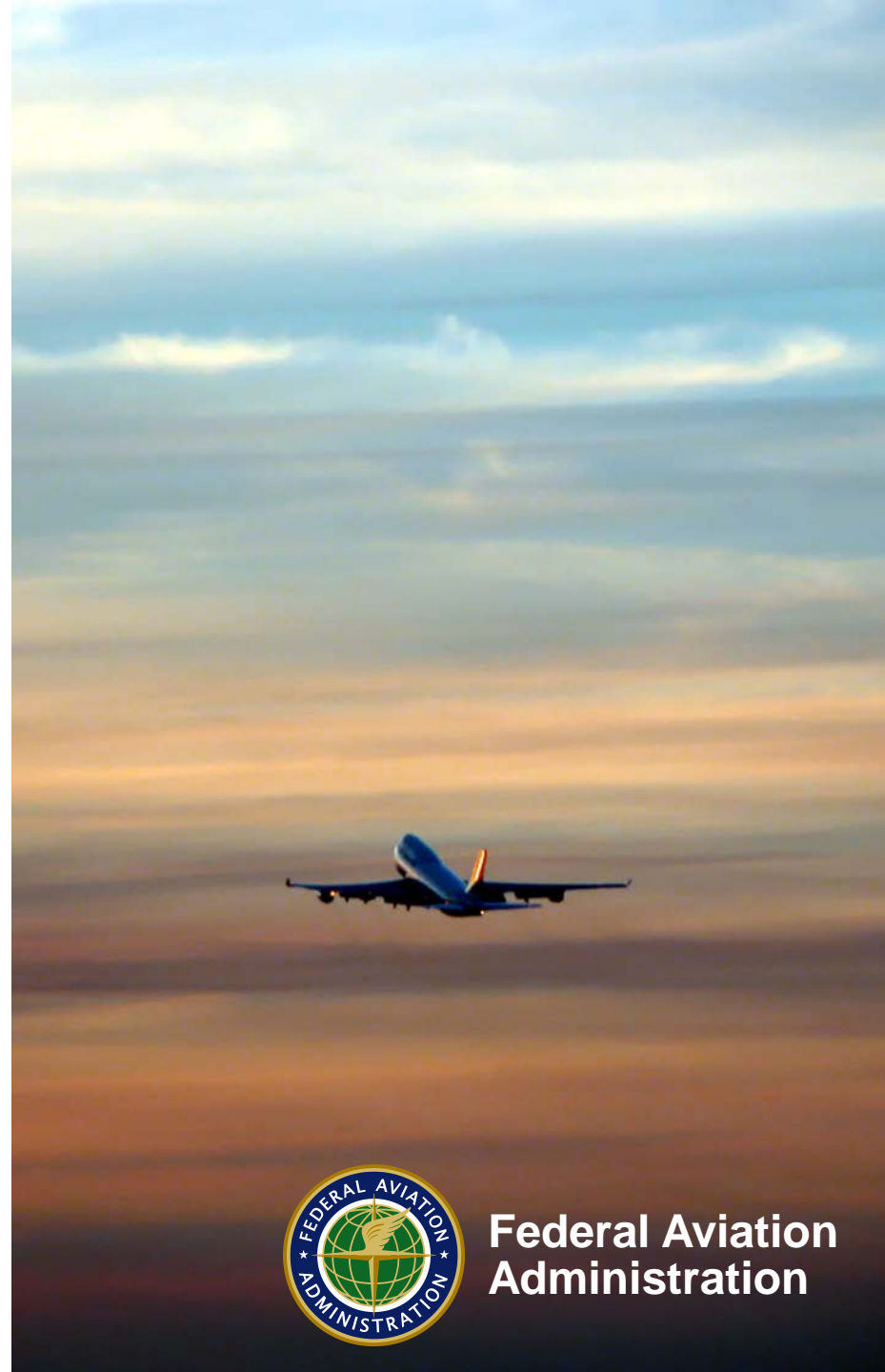
Aeronautical Charting Forum

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Data Comm Program Manager

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**Federal Aviation
Administration**



Program Overview

- ✈ Provides data communications services between pilots and air traffic controllers, supplementing existing voice communications capabilities
- ✈ Provides a data link between ground automation systems and flight deck avionics for air traffic control (ATC) clearances, instructions, traffic flow management, and flight crew requests
- ✈ Controllers will be able to deliver instructions with a push of a button and without the need to utilize voice frequencies
- ✈ Enables the transmission of complex instructions that can be quickly and correctly loaded into an aircraft's flight management system, upon acceptance by the pilot
- ✈ Enables NextGen Initiatives and Trajectory-Based Operations



Benefits of Data Comm

Reduce communication time between controllers & pilots



Improve re-routing around weather and congestion



Increase flexibility and accommodation of user requests



Enable NextGen Initiatives & Trajectory-Based Operations



Controller/Pilot Efficiency



- Communication Time

Throughput/Efficiency



- Delay
- Fuel Burn

Environmental



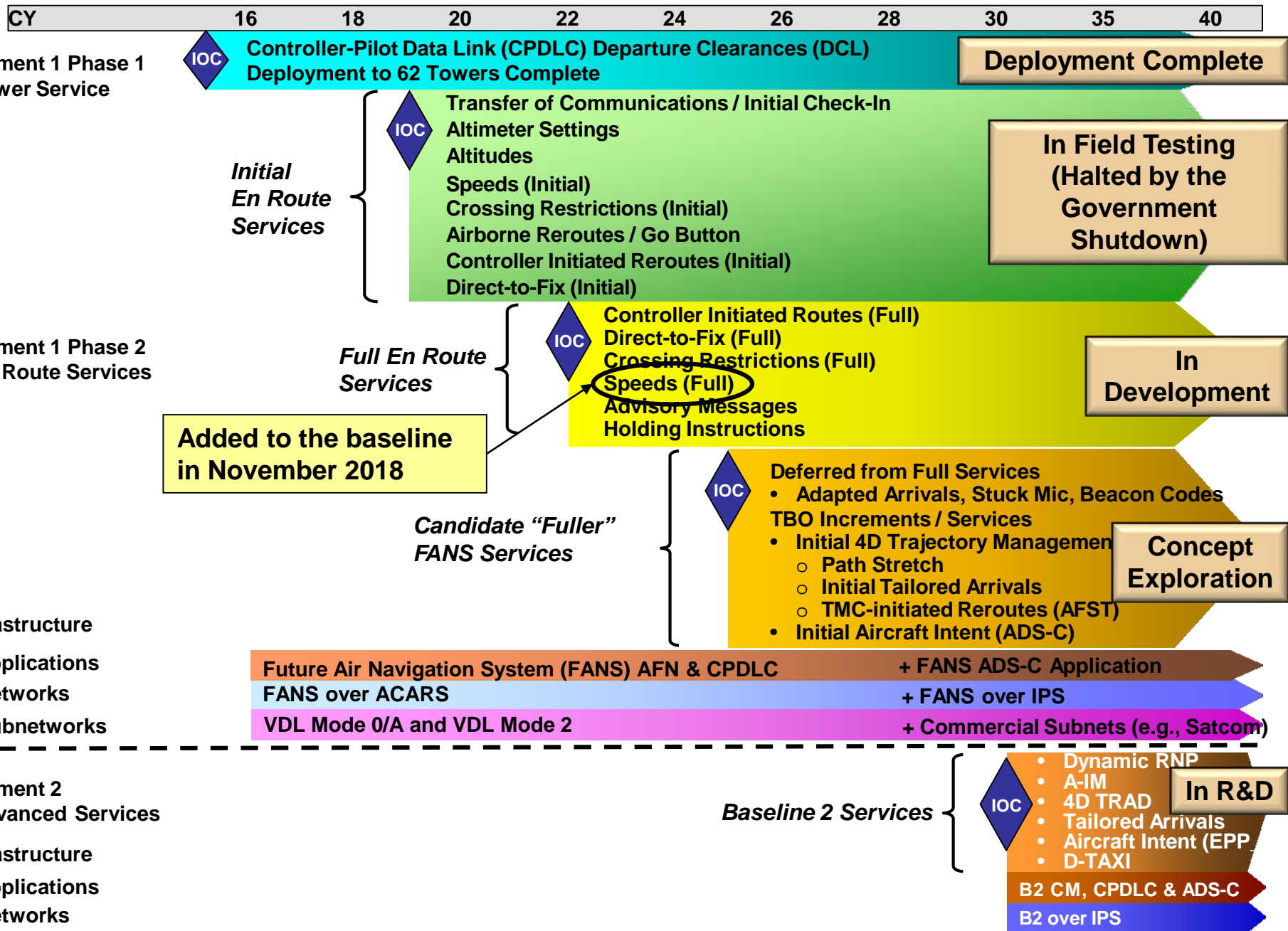
- Emissions (CO₂)

Safety



- Read/hear back errors
- Loss of Comm events

Data Comm Services Roadmap



Tower Services Implementation

Key Sites			
Site Name	Site ID	ARTCC ID	IOC
Boise (Non-CPDLC)	BOI	ZLC	06/10/15
KS 1: Salt Lake City	SLC	ZLC	08/07/15
KS 2: Houston Intcl	IAH	ZHU	09/03/15
KS 3: Houston Hobby	HOU	ZHU	09/10/15
NAP – NAP Intgr Compl	N/A	ZLC/ZT	09/30/15

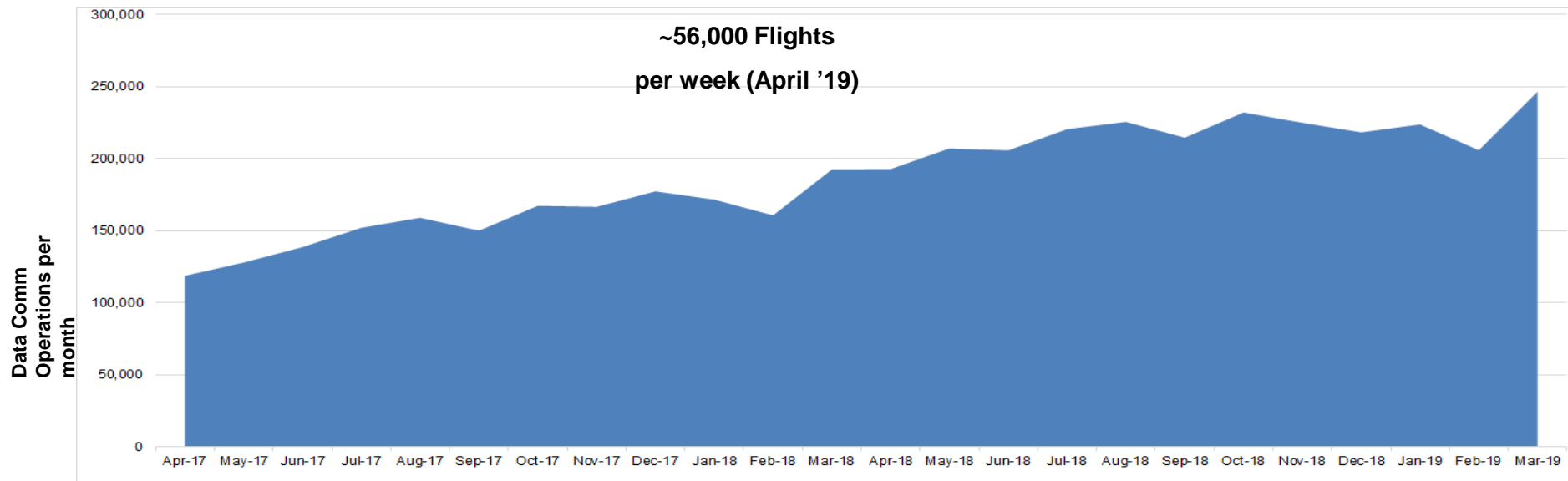
Group A			
Site Name	Site ID	ARTCC ID	IOC
New Orleans	MSY	ZHU	01/21/16
Austin	AUS	ZHU	02/04/16
San Antonio	SAT	ZHU	02/19/16
Los Angeles	LAX	ZLA	03/10/16
Las Vegas	LAS	ZLA	03/25/16
San Diego	SAN	ZLA	04/07/16
John Wayne	SNA	ZLA	04/25/16
Burbank	BUR	ZLA	05/06/16
Ontario	ONT	ZLA	05/18/16
San Francisco	SFO	ZOA	06/08/16
Oakland	OAK	ZOA	06/23/16
San Jose	SJC	ZOA	07/06/16
Sacramento	SMF	ZOA	07/20/16
Phoenix	PHX	ZAB	08/10/16
El Paso (Non-CPDLC)	ELP	ZAB	08/29/16
Portland	PDX	ZSE	09/14/16
Seattle	SEA	ZSE	09/15/16
Albuquerque	ABQ	ZAB	09/21/16
Dallas Love	DAL	ZFW	10/10/16
Dallas FTW	DFW	ZFW	10/18/16
Will Rogers (Non-CPDLC)	OKC	ZFW	10/24/16
Honolulu (Non-CPDLC)	HNL		12/06/16
Anchorage (Non-CPDLC)	ANC		12/12/16
Reno	RNO	ZOA	02/20/18
Van Nuys (New TDLS)	VNY	ZLA	08/21/18

Group B			
Site Name	Site ID	ARTCC ID	IOC
Louisville	SDF	ZID	02/10/16
Cincinnati (Non-CPDLC)	CVG	ZID	02/29/16
Indianapolis	IND	ZID	03/07/16
Memphis	MEM	ZME	03/25/16
Nashville	BNA	ZME	04/13/16
Adams Field (Non-CPDLC)	LIT	ZME	04/17/16
Denver	DEN	ZDV	05/03/16
Atlanta	ATL	ZTL	05/19/16
Charlotte	CLT	ZTL	06/02/16
Greensboro (Non-CPDLC)	GSO	ZTL	06/07/16
Orlando	MCO	ZJX	06/30/16
Miami	MIA	ZMA	07/29/16
Ft Lauderdale	FLL	ZMA	08/12/16
Tampa	TPA	ZMA	08/29/16
St Louis	STL	ZKC	09/29/16
Kansas City	MCI	ZKC	10/11/16
Tulsa (Non-CPDLC)	TUL	ZKC	10/17/16
Minn-St Paul	MSP	ZMP	11/03/16
Eppley Field (Non-CPDLC)	OMA	ZMP	11/09/16
Jacksonville (Non-CPDLC)	JAX	ZJX	11/10/16
Palm Beach (Non-CPDLC)	PBI	ZMA	11/18/16
San Juan	SJU	ZMA	12/09/16
Columbus	CMH	ZID	04/10/18
Fort Myers (New TDLS)	RSW	ZMA	04/25/18
Charleston (New TDLS)	CHS	ZJX	05/09/18

Group C			
Site Name	Site ID	ARTCC ID	IOC
Newark	EWR	ZNY	02/12/16
J F Kennedy	JFK	ZNY	02/25/16
La Guardia	LGA	ZNY	03/14/16
Teterboro	TEB	ZNY	03/24/16
Westchester	HPN	ZNY	04/12/16
Philadelphia	PHL	ZNY	04/22/16
Boston	BOS	ZBW	05/13/16
Providence (Non-CPDLC)	PVD	ZBW	05/13/16
Bradley	BDL	ZBW	06/10/16
Albany (Non-CPDLC)	ALB	ZBW	06/15/16
Detroit	DTW	ZOB	06/30/16
Cleveland	CLE	ZOB	07/13/16
Pittsburgh	PIT	ZOB	07/29/16
Balt/Wash	BWI	ZDC	08/16/16
Dulles	IAD	ZDC	08/30/16
Reagan	DCA	ZDC	09/14/16
Chicago Midway	MDW	ZAU	10/19/16
Chicago O'Hare	ORD	ZAU	10/28/16
Raleigh/Durham	RDU	ZDC	11/02/16
Milwaukee	MKE	ZAU	12/08/16
Andrews	ADW	ZDC	11/08/17
Buffalo	BUF	ZOB	05/21/18

TDLS Sites Color Key	
Site Operational	
Site Operational (PDC Only)	

Tower Service Ops Summary



13 US Mainline Air Carriers



58 Aircraft Types



53 International Air Carriers



Business Jet Operators



Data Comm Tower Benefits

In March 2019, CPDL DCL...



Saved 59,100+ minutes of radio time



Saved 40,700+ minutes of airspace user time



Cleared 234,500+ flights



Prevented 3,100+ readback errors

Since 2016, CPDLC DCL...



Saved 1.40M minutes of radio time



Saved 901,400+ minutes of airspace user time



Served 696M passengers



Cleared 5,046,700+ flights

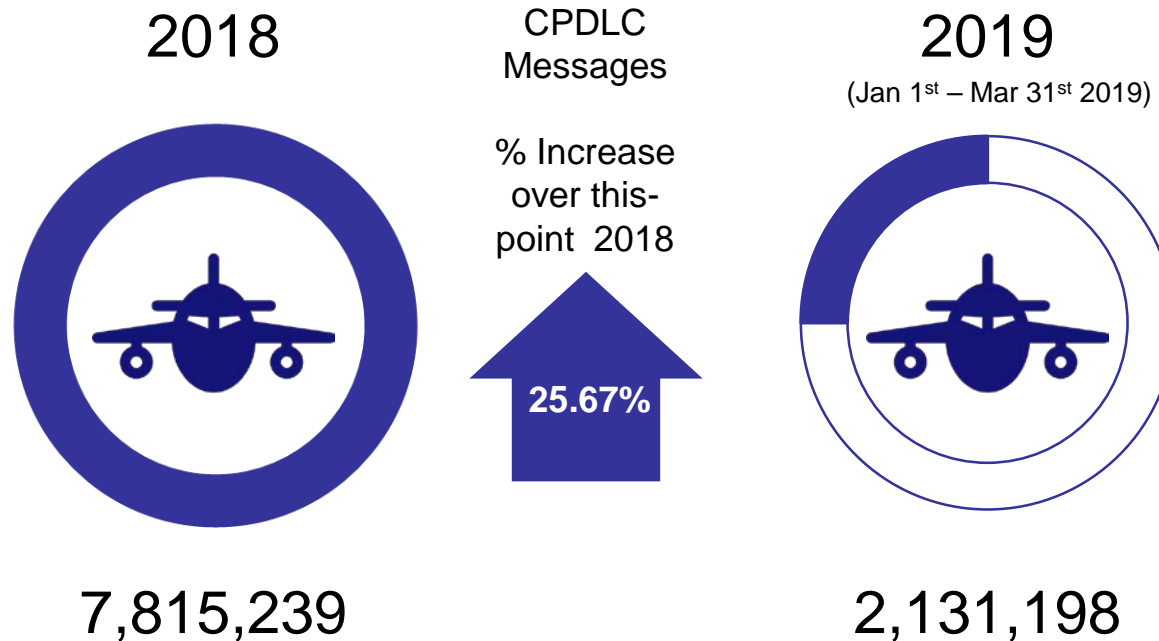


Prevented 7.35M Kgs of CO₂ Emissions



Prevented 78,100+ readback errors

CPDLC Messages Sent



Site Ops Rankings – 25-31 Mar

Top 25 Airports by
Eligible Flights

Site	Eligible Flights
ATL	3208
LAX	2864
DEN	2176
LAS	2039
JFK	1925
PHX	1882
ORD	1762
MCO	1696
MDW	1607
SFO	1595
BWI	1523
MIA	1515
SEA	1503
DFW	1450
DAL	1360
EWR	1357
SAN	1191
FLL	1123
HOU	1120
MSP	1037
OAK	1028
TPA	1020
MEM	971
BOS	916
SJC	888

Top 25 Airports by
Participation

Site	Eligible Flights	% Participated
RNO	216	100.0%
MEM	971	99.7%
MCO	1696	99.5%
SEA	1503	99.5%
EWR	1357	99.4%
SDF	651	99.4%
DCA	535	99.4%
CMH	349	99.4%
MCI	597	99.3%
MSY	635	99.2%
ONT	390	99.2%
SJC	888	99.1%
DTW	882	99.0%
JFK	1925	98.9%
SFO	1595	98.9%
SMF	665	98.9%
PHL	655	98.9%
ATL	3208	98.7%
MSP	1037	98.7%
IND	538	98.7%
CLT	397	98.7%
FLL	1123	98.6%
BOS	916	98.6%
DEN	2176	98.5%
LAS	2039	98.5%
PHX	1882	98.5%
BWI	1523	98.5%
TPA	1020	98.5%
BNA	880	98.5%

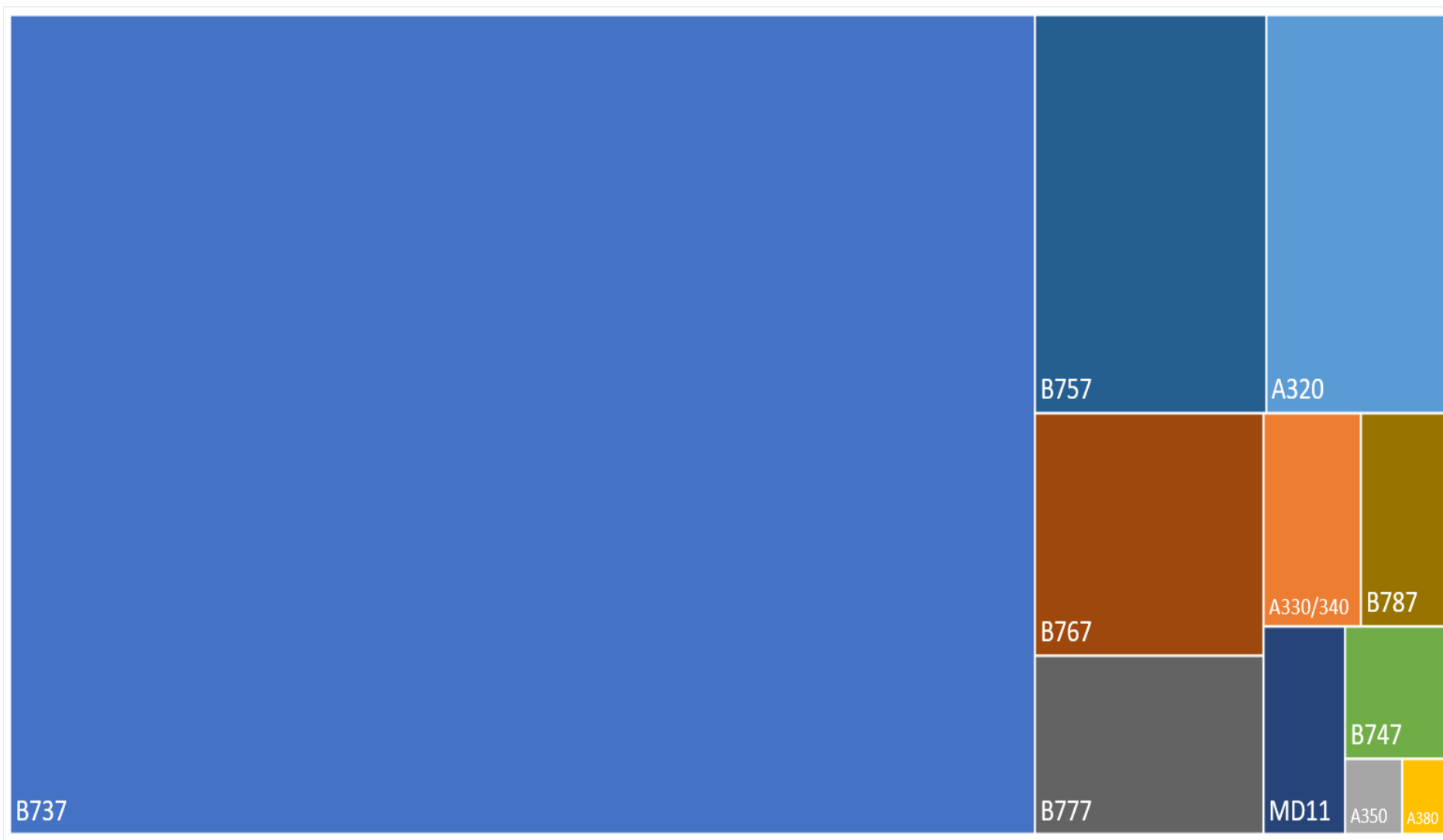
Top 25 Airports by
Success rate

Site	Eligible Flights	% Successful
BWI	1523	100.0%
DAL	1360	100.0%
SAN	1191	100.0%
IND	528	100.0%
SAT	485	100.0%
ABQ	263	100.0%
SEA	1503	99.8%
AUS	662	99.8%
ATL	3208	99.7%
HOU	1120	99.6%
PHX	1882	99.5%
SJC	888	99.5%
BNA	880	99.5%
MCI	597	99.5%
DCA	535	99.4%
DTW	882	99.3%
PDX	741	99.3%
BUR	416	99.3%
LAS	2039	99.2%
STL	869	99.2%
MDW	1607	99.1%
OAK	1028	99.1%
MEM	971	99.1%
LGA	546	99.1%
RNO	216	99.1%

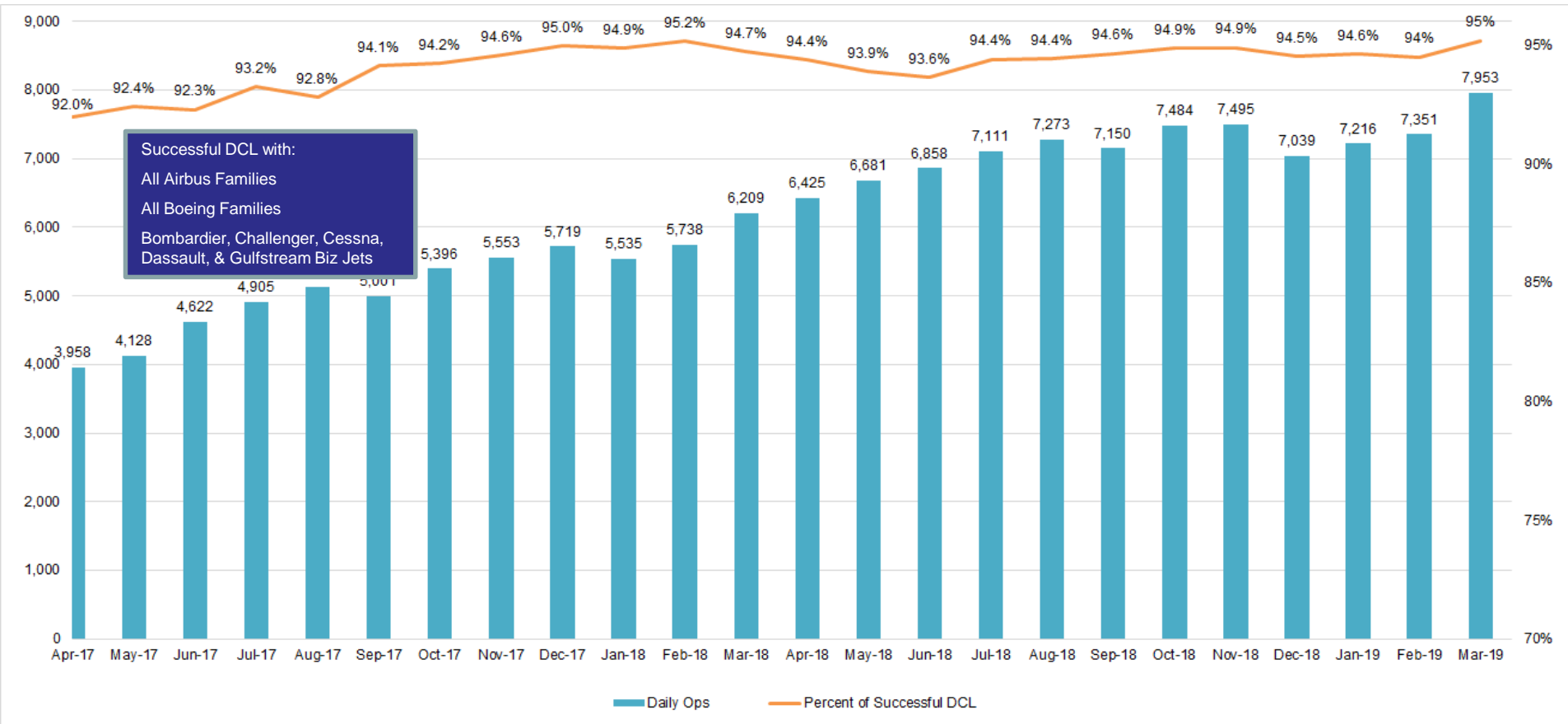
Top 25 Airports by
Percentage of
Data Comm

Site	Eligible Flights	% of IFR Departures
DAL	1360	83.0%
MDW	1607	82.6%
HOU	1120	82.1%
OAK	1028	67.6%
BWI	1523	65.0%
SAN	1191	58.3%
SMF	665	58.3%
SJC	888	57.4%
BUR	416	52.7%
LAS	2039	51.9%
ONT	390	51.6%
MCI	597	51.0%
MSY	635	49.8%
STL	869	49.7%
TEB	343	49.2%
TPA	1020	48.5%
MEM	971	48.3%
BNA	880	48.1%
SNA	545	47.9%
SAT	485	46.4%
JFK	1926	46.0%
MCO	1696	46.0%
ABQ	263	45.4%
LAX	2864	44.9%
SDF	651	44.9%

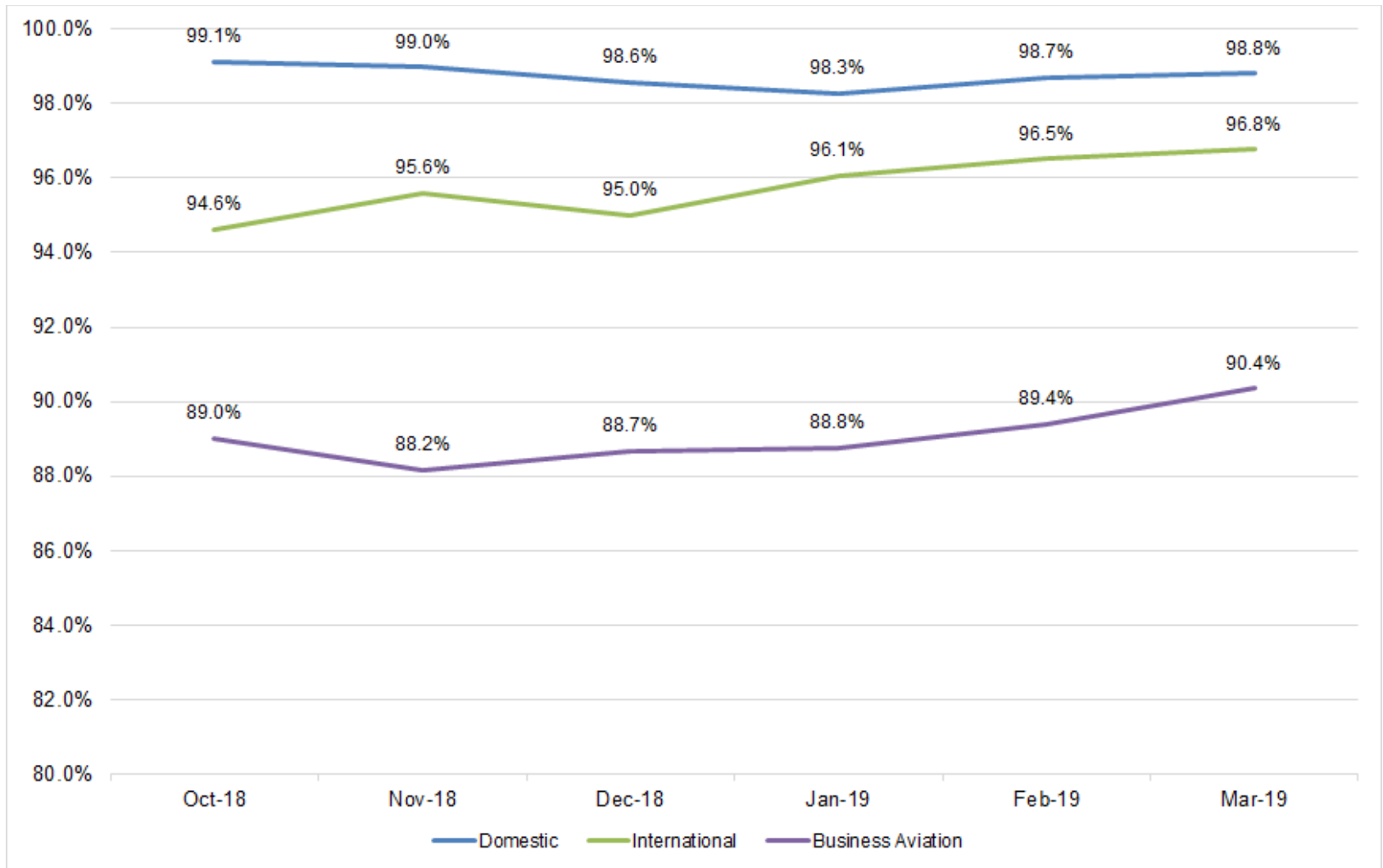
CPDLC DCL Operations by Aircraft Type



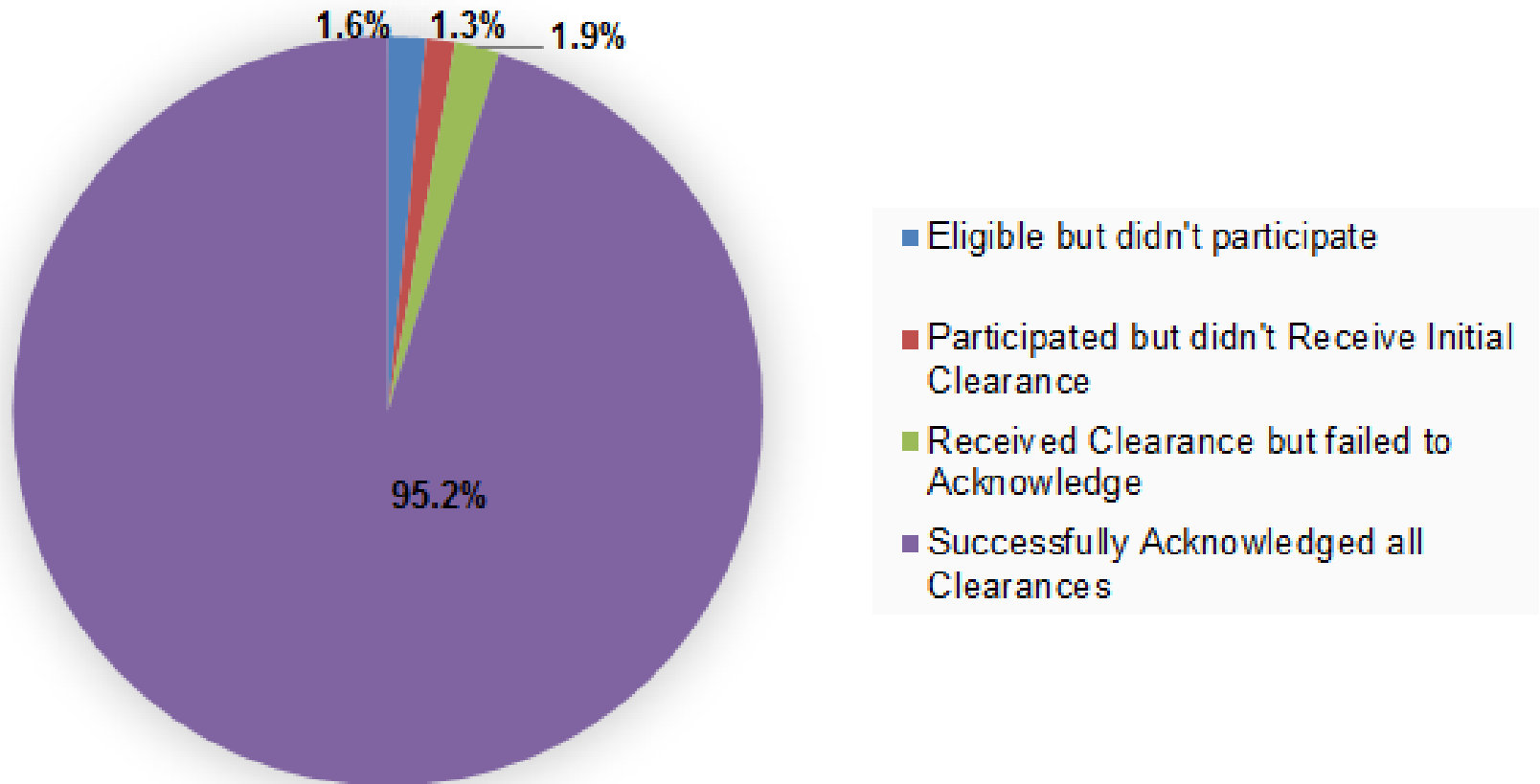
CPDLC DCL Usage Summary



DCL Success Rate

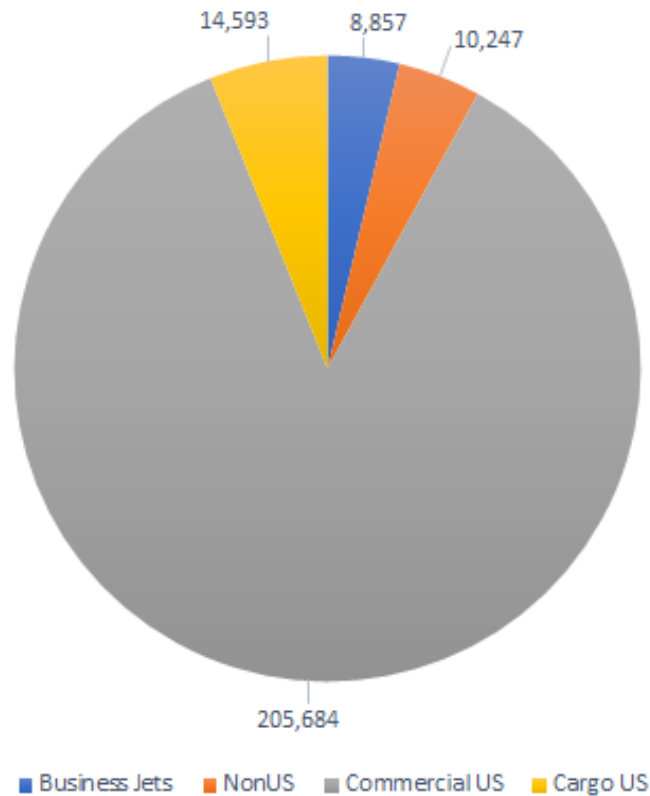


Flight Success – March 2019

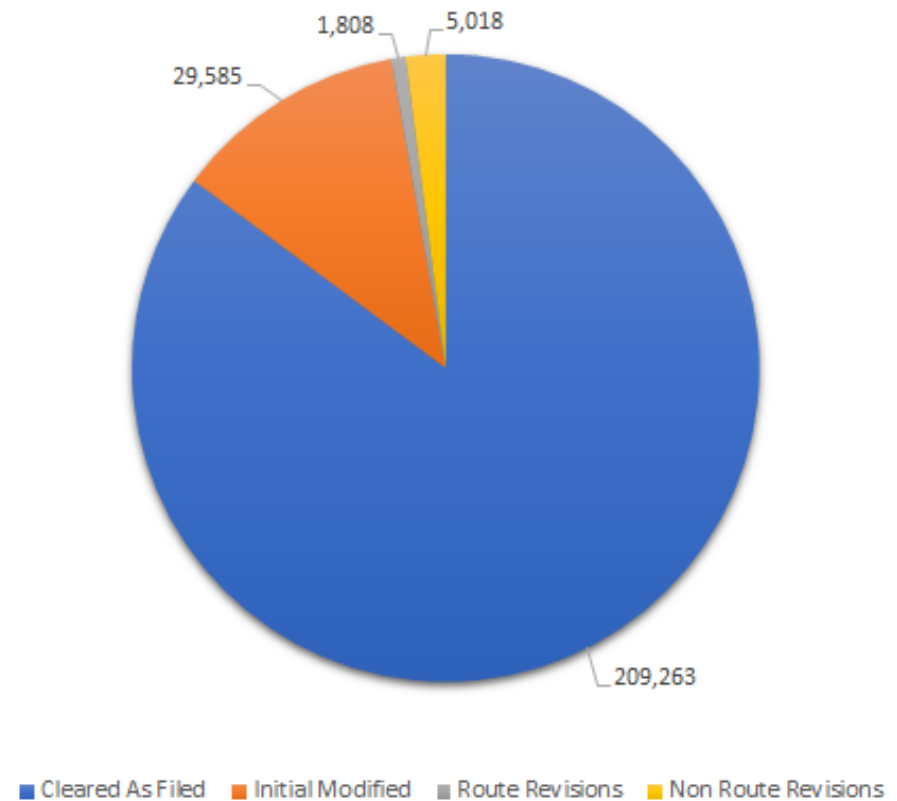


DCL Operations – March 2019

Received Clearance



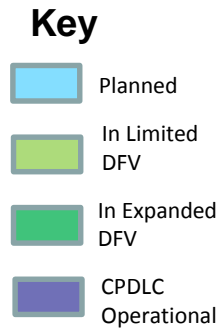
DCL Messages Sent



En Route Initial Services

- **Data Comm En Route test program**
 - Tested June through December 2018 at Indianapolis (ZID), Kansas City (ZKC), and Memphis (ZME)
 - Most major air transport aircraft types and avionics configurations represented
- **Discovered avionics and air-ground network issues**
 - Impacted user acceptability and delayed implementation of Data Comm services
- **Government shutdown halted all site testing and training activities**
- **Re-started en route testing March 25th at ZID and ZKC**
 - Started 24x7 ops at ZKC on April 17th
 - Started 24x7 ops at ZID on April 22nd
- **Air-ground interoperability issues**
 - Avionics issues (CMU/radio)
 - VDL Mode 2 station handoffs, multi-frequency, radio issues, and more
 - Air-ground networks required updates
 - Some updates mitigate issues on aircraft
- **Interoperability issues resulted in a significant impact to the Data Comm deployment schedule**
 - Impacts were magnified by the timing of the government shutdown in late 2018/early 2019

Data Comm En Route Initial Services Waterfall



En Route Initial Services

Network and Avionics Issues (1 of 2)

- **MAS Fail with Pilot Response**

- SITA fix put in place on 1/29
- ARINC fix deployment complete at the key sites as of 2/25
- Fewer abnormal ERR indicators (MAS Fails) and fewer timeouts
- Improved situational awareness between pilot and controllers and reduction in associated workload

- **CSP Switching**

- CSP switching enhancement complete
- Fewer abnormal ERR indicators (MAS Fails) and fewer logon/session timeouts and failures

- **Multi-Frequency (MF)**

- Fixed GRAIHO logic on (11/29) and turned MF back on for SWA (12/1); ARINC only VDL MF
- ARINC closed MF gap in ZID on 1/28
- Increased aircraft using multi-frequency (configuration)
- SITA VDL MF enabled
- Fewer abnormal ERR indicators (MAS Fails) and fewer timeouts
- Reduction in NO COMM situations

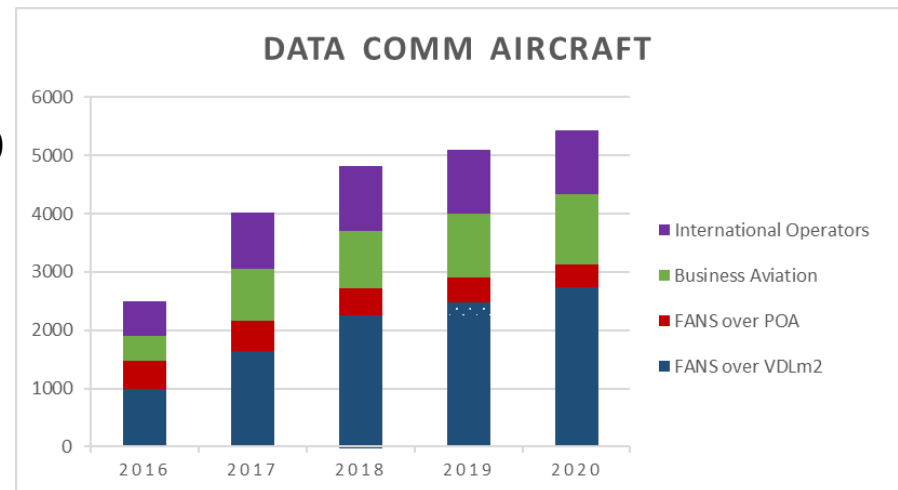
En Route Initial Services

Network and Avionics Issues (2 of 2)

- **Ack/Toss Ground Mitigations**
 - SITA had implemented ack/toss mitigation (9/30/18)
 - ARINC Ack/Toss mitigation planned for 5/17/19
- **Participation for aircraft with broken avionics has stopped**
 - Many issues were known & fixed via software updates prior to 2018
 - Some fixes were missing certifications – limiting airline's ability to update
 - Radio updates were known & available – but not installed
 - Limited ability for some operators to track radio software (service bulletin) versions
- **Establishing a framework for validating and recommending avionics versions**
 - Agenda item for DCIT in May 2019
 - Working to identify issues earlier in the cycle to avoid finding problems in the field

Avionics Equipage

- **Initial service deployed with Future Air Navigation System (FANS) 1/A communications avionics**
 - Integrated avionics functionality supports all Segment 1 Tower and En Route services
 - Leverages avionics in operation in the NAS and Ocean today
- **Air-ground network is VHF Data Link (VDL) Mode 2**
 - Program accommodating VDL Mode 0 radios for Tower Service
 - Established monitoring framework related to VDL Mode 0 in En Route airspace
 - Affected operators working with their applicable Communications Service Provider (CSP) to investigate implementation options for VDL-0 in En Route
- **Equipage Initiative**
 - No rulemaking required for Segment 1 services
 - Program includes a target of at least 1,900 Data Comm capable aircraft
 - 6,030 Data Comm equipped aircraft operating in the NAS (as of 10 Apr)
 - 2,399 of the 6,030 were equipped through the incentive (as of 10 Apr)
 - Additional DoD aircraft are equipped with Data Comm capable avionics



Program Summary

- **Completed Tower Service Implementation Waterfall**
 - Tower Services operational at all 55 CPDLC airports – 29 months ahead of schedule and under budget
 - Completed implementation of CPDLC DCL service at 7 additional airports – 13 months ahead of schedule
- **Ensuring CPDLC DCL services are supported operationally**
 - Continuing engagement with stakeholder community – benefits, metrics, and forward equipage
- **Re-planning Initial En Route Services CPDLC site deployment waterfall following the government shutdown**
 - Continuing to address avionics and air-ground network interoperability issues with manufacturers, airlines, and CSPs
- **Moving forward with En Route Full Services software development**
 - Full Speeds has been added to the baseline



Back-up



En Route CPDLC Charting Examples

- Chart providers have multiple ways to indicate availability of CPDLC
 - Chart information
 - AIM style information
 - Electronic vs Paper

2:32 PM

High IFR

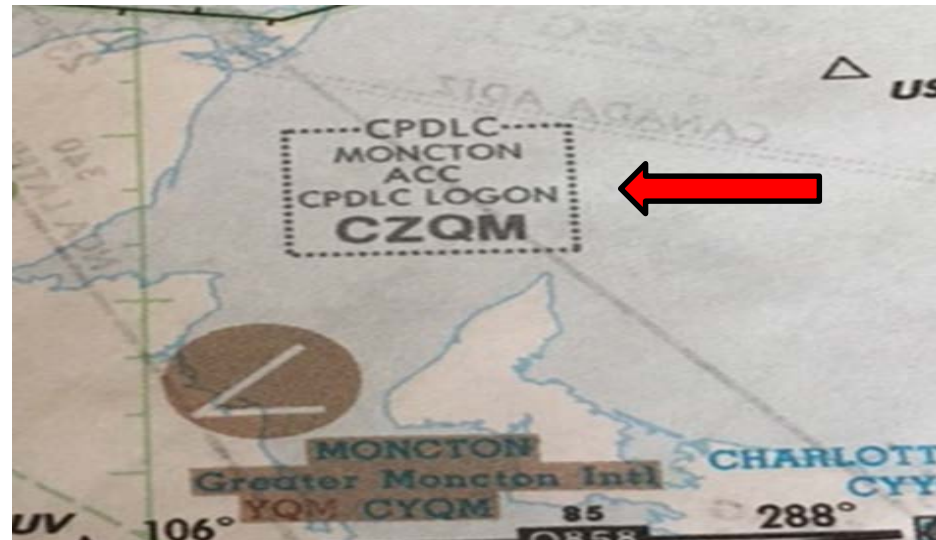
< CZVR (FIR) Communications

CPDLC

CPDLC SERVICES ARE AVAILABLE WITH LOGON ADDRESS OF CZVR IN VANCOUVER FIR. FLIGHTS ENTERING CANADIAN DOMESTIC AIRSPACE CPDLC AREA FROM A NON-CPDLC DATA LINK AREA SHOULD PERFORM A LOGON 45 TO 15 MINUTES PRIOR TO ENTERING AIRSPACE.

ACC

Vancouver Centre	123.87 MHz
Vancouver Centre	124.07 MHz



En Route Charting Recommendation

- The FAA has implemented a single CPDLC LOGON for all US Continental airspace operations
- **KUSA is the standard identifier**
 - For ground operations: Tower CPDLC-DCL Service
 - For airborne operations: En Route CPDLC Services
- **US boundary information will continue to have FIR Identifiers posted e.g., KZSE**
 - Unlike other ANSP's, facility specific ID's will not be used for CPDLC logon information
 - Example – CZVR is both the FIR boundary for Vancouver Center airspace and is also used as a logon identifier for CPDLC operations
- **Recommended US Implementation**
 - Keep existing Tower pages as is with KUSA vs unique ID's
 - Chart the LOGON ID for En Route CPDLC as **KUSA** per the example at right
 - Stands out, similar to prior Canadian example
- **Publish NOTAM for service activation during mid-cycle as appropriate**
- **Decide in 2020 if alternate method(s) is/are more appropriate**

