Data Communications Program

Aeronautical Charting Forum Briefing

Presented To: ACF 15-01 Charting Group Audience

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Data Comm Program

Date: April 29, 2015
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 to be quickly and correctly loaded into an aircraft’s flight management system, upon acceptance by the pilot
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

Throughput/Efficiency
- Delay
- Fuel Burn

Controller Pilot/Efficiency
- Communication Time
- Controller Workload

Environmental
- Emissions (CO2)

Safety
- Read/hear back errors
- Loss of Comm events
- System Risk Event Reductions
S1P1 Tower Status

• Completed Tower Data Link Services (TDLS) V11 Tech Refresh – all TDLS locations – December 2014

• TDLS V12 developmental releases being delivered to support integration and test activities at the Tech Center
  – TDLS V12 with Data Comm turned off scheduled for Key Site operational use in April – May

• Completed ERAM hardware installation, integration, and test at Salt Lake City (ZLC) and Atlanta (ZTL) – June 2014

• ERAM software development complete
  – Successfully completed ERAM transition testing in January 2015

• FTI service cutover at Salt Lake City (ZLC) in January 2015 with Atlanta (ZTL) to be in April 2015

• Coordinating with air carriers to support test and deployment
  – Eight air carriers signed MOAs to participate in the equipage initiative

• Completed system-of-systems integration and test activities at WJHTC

• Installation @ BOI & SLC occurred in past 2 weeks
Air Traffic Concept of Use & Overview of the Departure Clearance (DCL) Service
Key Data Comm Terminology

• **Logon:** Pilot requests DCL service via logon. Logon processing performed to establish the identity and data communications capabilities of a flight desiring data communication services.

• **Correlation:** process to ensure a controller-to-pilot data link communications (CPDLC) session is established with *one and only one* aircraft and an individual flight plan.

• **Session:** a virtual connection between TDLS and the aircraft for the exchange of CPDLC messages.

• **Blocked List:** list of aircraft disallowed from logging on. Blocked status for an aircraft may be system-generated (e.g., too many invalid logon attempts) or manually added (or removed) from an AT Specialist Workstation.

• **Abbreviated Flight Information (AFI):** the subset of flight object information needed to provide DCL service.
Tower Data Link Services (TDLS) System

**TODAY:**
- Provides Pre-Departure Clearance (PDC) Service via Ground-Ground 2nd party delivery (FOC or Gate). User determines A-G or G-G after receipt.
  - One Shot Delivery capability
- Digital ATIS (D-ATIS) via local digitized voice broadcast & to subscribers from TIMS
- FDIO Emulation

**TOMORROW:**
- Adds Departure Clearance (DCL) Service via direct A-G connection to FANS equipped aircraft
  - Similar to voice in that it’s a two-way exchange with the Flight Crew
  - Provides multiple message exchange capability for revisions

**DCL is a new Data Comm Service**
- Does not replace PDC
- TDLS will support both PDC and DCL services
- Currently, not slated for all TDLS towers
DCL Operations

• For PDC aircraft
  – Same as today for Pilots
  – Same as today for Flight Dispatchers / Automation
  – Same as today for Clearance Delivery controllers
    • Uses slightly modified TDLS CHI
  – Same as today, go to voice when questions or backlog

• For Data Comm equipped aircraft:
  – Pilot must logon to receive DCL service
  – Clearance Delivery controller prepares and sends initial clearance electronically in same manner as revised clearance
  – Pilot receives, responds to, and enters initial clearance in same manner as revised clearance
  – Pilot proceeds with operation with minimal delay

• Two new functions (apply to both Tower & EnRoute)
  – Logon queries
  – Blocked List management
Data Comm FANS Message Data Flow

- Flight data update
- Logon/session status
- Logon request/response
- CPDLC Session message/response

National ERAM NAP Realm

Parent ERAM & Data Comm Tower

DCNS

FANS Equipped A/C

TDLS
Operational Comparison: PDC & DCL SERVICES

**PRE-DEPARTURE CLEARANCE**

- Clearance sent from TDLS to Flight Operations Center (FOC) / Aeronautical Operations Center (AOC)
- FOC / AOC delivers clearance to aircraft subscribed to PDC
- Controller issues departure clearance revisions verbally

**DEPARTURE CLEARANCE**

- Direct digital communications path between the controller and the pilot
- Clearances issued **ONLY** to the cockpit of suitably equipped aircraft
- Once the pilot accepts, they load the DCL into the aircraft’s FMS
- Dispatch Copy of departure clearance to FOC/AOC, when requested
- **DCL enables digital delivery of revisions**

Data Comm
April 2015
Pilot’s Perspective of DCL

- Pilot initiates Logon Request
- Pilot receives indication of response
- Pilot receives indication of session establishment (implies DCL is ready)
- When ready, pilot requests DCL
- Pilot receives uplink indication
- Pilot reviews DCL
- Pilot responds with WILCO, Roger, Standby, Unable
- Accepts Revisions as required
- Aircraft departs
- Session terminates ~10 mins after takeoff
1900z ATC UPLINK 1/2
STATUS
ABORTED

REVISED RTE.
CLEARED ROUTE CLEARANCE.
CASLN1.CASLN.
MAINTAIN 10000FT.
EXP F300 010.0 MILES
AFTER DEP. DEP FREQ
130.725 SQUAWK 1035.

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ATC COMM TERMINATED

LOG>
Logon Queries

• **Purpose:** Identify reason a pilot attempt to log on was unsuccessful
  – Pilot receives indication that LOGON request failed
  – Cannot receive DCL service without accepted LOGON
  – Reasons for an unsuccessful LOGON
    • Ground or air system anomaly
    • Data corruption
    • **Pilot data entry error**
      • Suspected duplicate aircraft registration
      • Aircraft intentionally blocked from logging on (i.e., on Blocked List)

• **Logon processing and status is maintained within ERAM (including failure reason(s))**

• **Logon queries**
  – Real-time using Logon Query View is conducted @ 2 National ERAMs by Flight Data Communications Specialists (FDCS)
Program Requirement/Recommendation

• Add “CPDLC” information to the Airport Diagram, Terminal Procedures Pages & updates to the Airport Facility Directory

• Ensures advance notification for Flight Operations to prepare the flight correctly

• Will help flight crews select the appropriate Data Comm application to participate in CPDLC services now & in the future (avoid confusion with legacy 623 DCL)

We need this incorporated in the next chart cycle in October 2015
Program Impact if Recommendation Not Adopted

- Incorrect flight ops preparation
- Confusion for flight crews on what service is provided
- Increased flight crew/controller workload needed to clarify service provision during flight preparation
Future Requirement

• **Evolution of the LOGON requirement**
  – En Route services require single LOGON for all of US
  – Reduces communication workload on transition between Towers and Centers

• **Will change from individual airport codes to a single national data communications code**
  – e.g., KMEM to KUSA

• **Increased charting needs for external transition into the NAS**

*Needed to support En Route Operations beginning in 2018*
### Data Comm S1P1 Tower Waterfall

#### Keysite (3 Towers)

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Site ID</th>
<th>ARTCC ID</th>
<th>IOC</th>
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<tr>
<td>KS 1: Salt Lake City</td>
<td>SLC</td>
<td>ZLC</td>
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<td>KS 2: Houston Int'l</td>
<td>IAH</td>
<td>ZHU</td>
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<td>KS 3: Houston Hobby</td>
<td>HOU</td>
<td>ZHU</td>
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#### Group A (19 Towers)

<table>
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<td>Dallas FTW (x2)</td>
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<td>Minn-St Paul</td>
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<td>Chicago O'Hare</td>
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- **Waterfall reflects challenge schedule dates (calendar year)**
  - Baseline schedule Tower deployment dates are 2016-2019
- **Will deploy En Route Services to all 20 ARTCCs starting in 2018 (challenge date)**
The Data Comm Stakeholder Cloud

Airspace Users
- American Airlines
- Delta Airlines
- Southwest Airlines
- United Airlines
- FedEx
- UPS

Unions
- AFA
- ALPA
- IAM
- NATCA
- NAG
- SEIU

Trade Associations
- IATA
- AACE
- NBAA
- RTCA
- EUROCAE
- EASA
- AIA
- AMA
- RAA
- SESAR

Standards Groups
- FAA
- ICAO
- US DOT
- ATM Coordination Board

Global ANSPs
- NATS
- NAV CANADA
- Nav CAN

Aircraft OEMs
- Boeing
- Airbus
- Gulfstream
- Bombardier

Avionics Suppliers
- Honeywell
- Thales
- Rockwell Collins
- SITA

Ground System Providers
- Harris
- AIRTEL ATN

Trade Associations
- AFI
- AVS
- AOV
- AEG
- AJE
- AJM
- AJT
- AJV
- AJW

Unions
- SEIU
- NAG

Standards Groups
- FAA
- ICAO
- US DOT

Global ANSPs
- NATS
- NAV CANADA
- Nav CAN

Aircraft OEMs
- Boeing
- Airbus
- Gulfstream
- Bombardier

Avionics Suppliers
- Honeywell
- Thales
- Rockwell Collins
- SITA

Ground System Providers
- Harris
- AIRTEL ATN
Thank You !!!
Service Components

ERAM
- Processes logon information
- Performs Logon-to-FP Correlation
- Flight Data, Logon Data for proposed flights to TDLS
- Provides security gateway (PGW FEP & DCGS BEP)

TDLS
- Requests correlated logon-to-flight data from ERAM
- Initiates session with the aircraft
- Sends DCL to aircraft

Tower Controller
- Picks flight from Pick List
- Processes initial DCL
- Processes revised DCL
- Solves the issue of multiple proposed flight plans, if necessary

AOC/FOC
- Populates subscriber list
- Files FPs w/preferences
- Sends Gate ID when Dispatch Copy is received
- Coordinates w/Crew on revisions, if necessary

Aircraft
- Processes Logon, Requests & Responses
- Establishes Sessions
- Processes Pilot DCL Requests & responses
- Provides indications to Pilot

Pilot
- Initiates Logon
- Requests initial DCL
- Responds when DCL or Revised DCL is received
- Coordinates with AOC/FOC on revisions, if necessary