

**TDLS Meeting  
May 11, 2004  
Annapolis, Maryland**

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# Tower Data Link Services (TDLS)

*Data Link Users Forum*

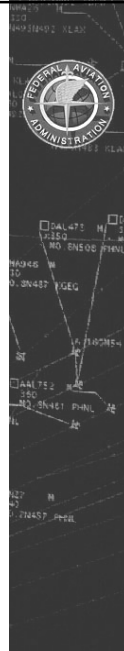
*Annapolis, MD*

*May 11, 2004*

Jeffrey Bass

Federal Aviation Administration

Terminal Services, ATO-T



## TDLS FAA Management Team

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## FAA DLUF NEEDS

- Soliciting user input to facilitate enhancement efforts
- Striving to address the needs of the user
- Move towards PDC/Departure Clearance compatibility with international community
- Develop enhancements that will minimize controller/pilot workload



## TDLS Evolution

- Initial criteria
  - 150K **air carrier** operations
  - 57 sites
- Expansion to TDLS2
  - Proposed 75K **total** operations as ultimate goal
  - Approximately 250 additional sites possible



## Initial TDLS Expansion Sites

- HNL – Honolulu
- DAL – Dallas / Love Field
- OKC – Oklahoma City
- PBI – West Palm Beach
- PVD – Providence
- HPN – White Plains
- ALB – Albany
- OMA – Omaha
- DAY – Dayton
- BOI – Boise
- RNO – Reno
- DAB – Daytona Beach
- LIT – Little Rock
- MHT – Manchester
- COS – Colorado Springs
- BHM – Birmingham
- PWM – Portland
- APA – Denver / Centennial
- OGG – Maui / Kahului
- RIC – Richmond
- FXE – Ft. Lauderdale Executive
- SHV – Shreveport
- TUS – Tucson
- GRR – Grand Rapids

## TDLS Proposed Changes

- **Current methodology will remain unchanged and in place for foreseeable future**
- **Pending changes to TDLS will not affect aircraft equipage!!**
  - Ground-to-ground changes only
  - Message delivery to aircraft (ACARS/Gate Printers) unchanged
    - Transparent to FAA

## TDLS Applications

### ➤ Pre-Departure Clearance (PDC)

- PDC provides the opportunity for participating aircraft to receive electronic clearances provided by the TDLS operator. The TDLS operator appends local airport departing aircraft operation information and transmit the clearance via data link to the participating airline/user host computers
- Reduces frequency congestion
- Reduces errors
- Saves time of cockpit crew and AT
- Delivered to “gate” printer or to cockpit (if so equipped)

## TDLS Applications (cont'd)

### ➤ Digital Automatic Terminal Information Service (D-ATIS)

- Provides ATIS information via data link to a server, where aircraft, airlines, and other users may retrieve the current information, and automatically generates a synthesized ATIS Voice Message (AVM) to alleviate the current manual generation requirements
- Distributes prevailing airport conditions via data link and VHF transmitter e.g.:
  - Weather
  - Active runways
  - NAVAID status
  - Pertinent operational information

## Current Data Link Methodology

### ➤ Pre-Departure Clearance (PDC)

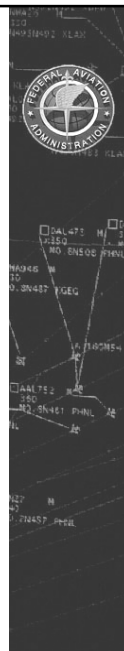
- Information delivered from each TDLS site “directly” to airline host via ARINC
- End user obtains data via:
  - ACARS (data delivered back from airline to ARINC for transmission)
  - “Gate printer” (internal infrastructure)
- Route of flight information is limited to 81 characters (ARINC 620 “like”)
  - Does not support larger message set needed for full route clearances



## Current Data Link Methodology (cont'd)

### ➤ Digital Automated Terminal Information Service (D-ATIS)

- Current architecture only allows for data delivery to ARINC
- Data “warehoused” on ARINC server and delivered via ACARS upon request



## TDLS Enhancements

### ➤ PDC

- Support revisions to flight plan and/or PDC
- Currently, if the flight plan has been revised at any time prior to PDC issuance the flight cannot be a candidate for PDC
  - Allow for “internal” (FAA) revs to be accepted/processed/delivered
  - Once granted, allow for supplemental changes to be released



## TDLS Enhancements (cont'd)

### ➤ PDC

- Support both unsolicited (current implementation) and request/reply methods
  - Allows for future connectivity directly to aircraft
  - FAA will need to have prior knowledge of how each “customer” wishes to participate
    - Allows formatting of PDC in accordance with “customer” specification



## TDLS Enhancements (cont'd)

### ➤ PDC

#### ➤ Support Full Route PDC

- Currently abbreviated due to flight strip format
- Character count limitation

#### ➤ Multiple PDCs per day

- Currently limited to 1 per day per FLID/tail number per airport

### ➤ Support multiple service providers

- Current TDLS infrastructure (h/w and s/w) supports only one service provider

## TDLS Enhancements (cont'd)

### ➤ ATIS Enhancements

- ATIS information warehoused on FAA servers
- Format changes to be *ATN-ish*

## TDLS System Augmentation

- **Servers will be added at three points of presence in the NAS**
  - Provides triple redundancy – essentially eliminates loss of service
    - Ethernet based
    - ICD to be developed
  - Provides the means for:
    - Supporting multiple service providers
      - Any bona fide user can obtain data
    - Clearance revisions
      - Will require ARTCC Host change
    - Automated delivery of updates to user participant file at TDLS2 sites
      - Allows for near daily changes vice bi-monthly
    - Automatic Time Synchronization of each TDLS2 with UTC time

## TDLS Interoperability

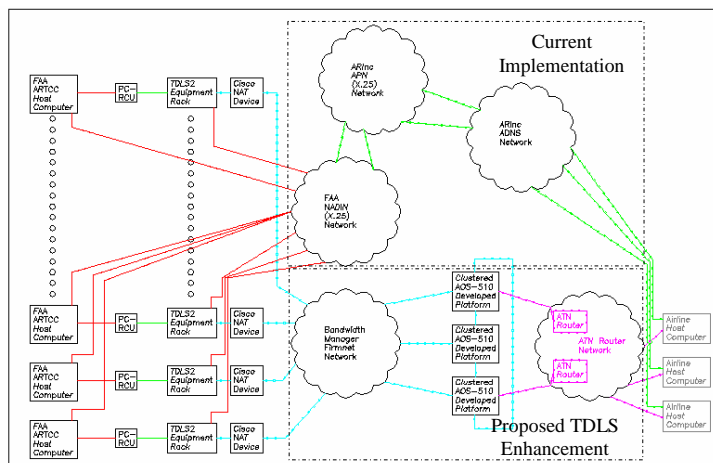
- **Desire to migrate directly to ATN-ish protocols (Ground to Ground ONLY) vice ARINC 623**
  - Minimizes non-recurring engineering effort
  - Standardized format for all message types
  - Will eventually give TDLS the capability to utilize the end user ATN address from the flight plan, eliminating the need for subscriber lists
- ***Initial changes need to be bounded and not significantly modify the current paradigm***

## Schedule

- **Initial efforts focused on stand up of NAS servers**
  - No new functionality at this time
  - Current data link functionality/procedures not changing
- **New functionality**
  - Employ “build a little/test a little” philosophy
    - Automatic user updates
    - Multiple clearances
    - PDC revisions
    - Full route clearances
  - ATIS changes to follow



## TDLS / Draft ATN Environment





## Flight 1 - What Continental “filed”:

- FP COA50 B/B772/E 483 IAH P1815 370  
IAH.LFK4.LFK.J29.MEM.J42.GVE.DYLIN2.EWR/0238 :NRP



## Flight 1 - What IAH saw:

- COA50 | 4023 | IAH | +LFK4 LFK J29 ELD+
- B/772/E | P1815 | | IAH LFK4 LFK J29./EWR
- 431 | 370 | | @NRP
- This is what was printed on the “flight strip” in the tower at IAH at approximately 17:45Z On 04 May 2004.



## Flight 1 - PDC from IAH:

1. <SOH>OU DDLXCXA
2. .IAHTWXA 041745
3. <STX>PDC
4. 276
5. COA50 4023 IAH
6. B/B772/E P1815
7. 431 370
8. -LFK4 LFK J29 ELD-
9. IAH LFK4 LFK J29/.EWR
10. @NRP
- 11.
- 12.
13. MAINT 4000 EXP REQ ALT 10 MIN AFT T/O
14. DEPT FREQ 132.25
15. CONTACT RAMP CONTROL WHEN READY TO PUSH
16. ;
- 17.
- 18.
- 19.
20. <ETX>



## Flight 1 – Continental’s acknowledgement of PDC:

1. <SOH>
2. .QU IAHTWXA
3. .DDLXCXA 041745
4. <STX>PDC
5. COA50 276 Y C N78001 P1815 G
6. <ETX>



## Flight 1 - What was *not seen*\* by anybody at Continental:

- > Flight ID: COA50
- > Equipment: B/B772/E
- > Computer ID: 483
- > Departure Point: IAH
- > Proposed Time: P1815
- > Requested Altitude: 370
- > Route of Flight: IAH
- > Fix1: LFK4
- > Fix2: LFK
- > Fix3: J29
- > **Fix4: MEM**
- > **Fix5: J42**
- > **Fix6: GVE**
- > **Fix7: DYLIN2**
- > Fix8: EWR
  
- > Remark: NRP (National Route Program)

\* Bolded/italicized items *not seen* by anyone at Continental



## Flight 2 - What Continental “filed”:

FF KZNYZRZX KZNYZRZX  
 052058 KFCFCOAU  
 (FPL-COA60-IS  
 -B764/H-SHGXYR/S  
 -KEWR2300  
 -N0476F330 DCT MERIT DCT HFD DCT PUT DCT BOS DCT TUSKY N77B  
 YQX/M082F340 NATX LIMRI/M082F340 NATX DOLIP/N0485F350 UN523 CRK  
 UM140 DYR W71 VABIK W70 KOK KOK3A  
  
 -EBBR0627 EHAM  
 -EET/CZQM0047 CZQX0132 50N050W0218 52N040W0304 EGGX0347 2N020W0428  
 EISN0448 EGT0523 EBUR0605 REG/N59053 SEL/AMCP RALT/CYJT EINN  
 DAT/VS COM/TCAS RMK/AGCS 02.X330 03.W340)



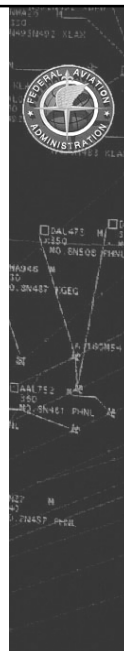
## Flight 2 - What EWR saw:

- COA60 | 2311 | KEWR | KEWR MERIT HFD PUT BOS
  - H/764/Q | P2300 | | TUSKY N77B YQX NATX\*\*\*EBBR
  - 313 | 330 | | °ICAO YQX/M082F340 LIMR\*\*\*
- This is what was printed on the “flight strip” in the tower at EWR at approximately 23:02Z On 05 May 2004.



## Flight 2 - PDC from EWR:

1. <SOH-QU DDLXCXA
2. EWRTWXA 052239
3. <STX>-PDC
4. 484
5. COA60 2311 KEWR
6. H/B764/Q P2300
7. 313 330
8. KEWR MERIT HFD PUT BOS
9. TUSKY N77B YQX NATX\*\*\*EBBR
10. @ICAO YQX/M082F340 LIMR\*\*\*
- 11.
- 12.
13. NEWARK SEVEN DEPARTURE
14. EXPECT REQ ALT 10 MIN AFTER TAKE-OFF
15. DEPARTURE FREQUENCY 119.2
16. CONTACT FLOW CONTROL NOW 132.45
17. ;
- 18.
- 19.
20. <ETX>



## Flight 2 - Continental's acknowledgement of PDC:

1. <SOH>
2. .QU EWRTWXA
3. .DDLXCXA 052239
4. <STX>PDC
5. COA60 484 Y C N59053 P2300 G
6. <ETX>



## Flight 2 - What was *not seen*\* by anybody at Continental:

- |                       |              |               |              |
|-----------------------|--------------|---------------|--------------|
| ➤ Flight ID:          | COA60        | <b>Fix12:</b> | <b>UM140</b> |
| ➤ Equipment:          | H/B764/Q     | <b>Fix13:</b> | <b>DVR</b>   |
| ➤ Computer ID:        | 484          | <b>Fix14:</b> | <b>W71</b>   |
| ➤ Departure Point:    | KEWR         | <b>Fix15:</b> | <b>VABIK</b> |
| ➤ Proposed Time:      | P2300        | <b>Fix16:</b> | <b>W70</b>   |
| ➤ Requested Altitude: | 330          | <b>Fix17:</b> | <b>KOK</b>   |
| ➤ Route of Flight:    | KEWR         | <b>Fix18:</b> | <b>KOK3A</b> |
| ➤ Fix1:               | MERIT        | <b>Fix19:</b> | <b>EHAM</b>  |
| ➤ Fix2:               | HFD          | Fix20:        | EBBR         |
| ➤ Fix3:               | PUT          |               |              |
| ➤ Fix4:               | BOS          |               |              |
| ➤ Fix5:               | TUSKY        |               |              |
| ➤ Fix6:               | N77B         |               |              |
| ➤ Fix7:               | YQX          |               |              |
| ➤ <b>Fix8:</b>        | <b>LIMRI</b> |               |              |
| ➤ <b>Fix9:</b>        | <b>DOLIP</b> |               |              |
| ➤ <b>Fix10:</b>       | <b>UNS23</b> |               |              |
| ➤ <b>Fix11:</b>       | <b>CRK</b>   |               |              |

Nor were any of the detailed equipage or "center boundary crossing parts of the ICAO portion of the flight plan.

\* Bold/italicized items *not seen* by anyone at Continental



## Current PDC Message Details:

|     | Description  | Max Length (chars) |
|-----|--|--------------------|
| 1.  | <SOH> QU DDLXCXA CR LF   | ADNS Rules         |
| 2.  | EWRTWXA 052239 CR LF   | ADNS Rules         |
| 3.  | STX PDC Space CR LF  | Message Type       |
| 4.  | Sequence Number (modulo 1000) CR LF                            | 3                  |
| 5.  | Aircraft ID TAB Mode 3/A Beacon Code TAB Departure Point CR LF | 9                  |
| 6.  | Number, Heavy Jet Indicator/TAB Departure Time CR LF           | 14 / 5             |
| 7.  | Computer Identification Number TAB Altitude CR LF              | 3 - 3              |
| 8.  | Route Information CR LF  | 29                 |
| 9.  | Route Information CR LF  | 29                 |
| 10. | Route Information/Remarks CR LF                                | 29                 |
| 11. | Estimated Departure Clearance Time CR LF                       | 5                  |
| 12. | Revision Number/Strip Request Originator of an SR CR LF        | 19                 |
| 13. | {Departure Frequency data field 1} CR LF                       | 39                 |
| 14. | {Altitude Restriction data field 1} CR LF                      | 39                 |
| 15. | {Standard Instrument Departures data field 1} CR LF            | 39                 |
| 16. | {Free Text} CR LF  | 39                 |
| 17. | {Free Text} CR LF  | 39                 |
| 18. | {Free Text} CR LF  | 39                 |
| 19. | {Free Text} CR LF  | 39                 |
| 20. | ETX  | ADNS Rules         |

\* Bold/italicized items *not seen* by anyone at Continental

## PDC Acknowledgement

1. <SOH> CR LF
2. QU EWRTWXA CR LF
3. .DDLXCXA ddhhmm CR LF
4. <STX>PDC CR LF
5. COA60 484 Y C N59053 P2300 G CR LF
6. <ETX>

## Flight Plans and Revisions

- **Current implementation does not provide full route clearance information to airline/aircraft**
- **Revisions to “omitted” segments of the flight plan/PDC**
  - Transparent to airline/aircraft
  - Will require voice transmission



## Questions

