

# TDLS/S-CAOSS & Equal Access/DC

How does it all tie  
together and how do we  
get there?

Presented to: DLUF – FAA Meeting

By: Russell Davis, Sr. Engineer - Comm

Date: 9 February 2007



Federal Aviation  
Administration



# 9-Feb-07 Presentation to Ad-Hoc note

- **The following presentation was presented to an FAA requested and run “ad-hoc” meeting that followed the Data Link User’s Forum at Annapolis, MD. The information presented up to the “Questions” slide is unaltered from the presentation, but does not represent the results of the meeting.**



# What are we going to cover today?

- **Departure Clearances**

- PDC Message set
- Influences – Original
- Influences – More recent
- What IS going to be different?
- What might be different?
- Sequence of events
- White board session and “enthusiastic” exchange of ideas on the details

# Pre-Departure Clearance (PDC)

- **No change to the existing PDC message formats**
- **Referred to as “plain old PDC” or “legacy PDC”**



# “Influences (original drivers)”

- **Data Link Service providers wanted and still want “equal access” to FAA provided data link messages (specifically PDC and D-ATIS) - External**
- **Individual TDLS2 sites do not have a coded time source for their processors – time is updated manually - Internal**
- **Subscriber list updates for each site only occur during two four day “windows” during each month using a manual process – Internal and External**

# “Influences (original drivers –cont’d)”

- **PDC currently does not support revisions to clearances – Designed that way on purpose**
- **PDC currently does not support revisions to flight plans – Designed that way on purpose**
- **PDC provides no notification to the subscriber in the event that a PDC is not possible for this flight – limitation of design**
- **PDC only allows for one call sign per airport per 24 hour period – limitation of design**



# “Influences (original drivers –cont’d)”

- **PDC currently does not support fleets where more than 10% of fleet is not capable of obtaining PDC from their AOC for a given airport (impacts AT operations for that 10%) – Internal FAA policy**
- **PDC currently does not support subscribers where a part of their operations are accomplished using a secondary carrier under the same call sign with a different AOC address (what we refer to as a “split carrier”) – Design limitation**

# **“Influences (more recent drivers)**

- **NADIN (FAA internal X.25 network currently used as a conduit for PDC and D-ATIS messages) is slated for dismantling – no specific timeline has been provided, but we have been advised that “sooner is better than later” for PDC and D-ATIS to vacate NADIN for significant cost savings to the agency – FAA investment decision external to TDLS**

# “Influences (more recent drivers - cont’d)

- **Safety portion of FAA has voiced concerns on how messages are currently handled for PDC – specifically that there is no positive acknowledgement of the PDC message handoff from FAA network to service provider network – same concern expressed for the “roger” message in terms of the FAA acknowledging the providing network**

# “Influences (more recent drivers – cont’d)”

- **FAA Data Comm organization is seeking early benefits prior to full NGATS implementation**
  - Provide flight plan revisions and departure clearance revisions while aircraft is still “on the pavement”
  - Full route clearances via data link to aircraft
  - Possibility of D-TAXI messages (FAA platform not yet set for long term – TDLS may be near term platform for initial capability)
  - Bridge some of the gaps between today’s terminal automation capabilities and NGATS to take advantage of “low hanging fruit” using **existing** aircraft data link capabilities

# What IS going to be different?

- **FAA investment decision has been made for NADIN to be eliminated within the FAA, which results in:**
  - NADIN will be eliminated as a means to convey data link departure clearances to the service providers
    - Current architecture “funnels” all traffic to ARInc
  - NADIN will be eliminated as a means to deliver D-ATIS messages to ARInc
    - Current architecture “funnels” all traffic to ARInc

# What IS going to be different? (continued)

- **Eliminate X.25 by migrating to TCP/IP as the means to deliver data link to the outside world**
- **Implement an “equal access” architecture using two points of demarcation for data link service providers**
- **Enhance the terminal clearance delivery data link capabilities to gain additional efficiencies in communication and operations**

# What IS going to be different? (continued)

- **Changes to how providers interact/connect to FAA**
  - Providers that come to the equal access points:
    - Required to have two simultaneously active points of connection to the following two FAA locations:
      - One at Herndon, VA
      - One at Salt Lake City, UT
    - Required to bear all the costs of connecting their network into both of these locations
    - Provider chooses “how much” bandwidth to buy “enough” for their business and pays for it themselves
    - Underlying network uses TCP/IP
    - The physical interface on the FAA end will be specified in the very near future by the FAA NAIMES organization along with details on how a provider can arrange for the two connections to the FAA
    - Will have to use Secure Sockets Layer (SSL) with a certificate in both directions (industry standard certificates)
    - Will be issued a discrete IP port number that is unique to the provider for AOC conversations



# What IS going to be different? (continued)

- **Changes to how providers interact/connect to FAA (cont'd)**
  - Providers that come to the equal access points (cont'd):
    - Eventually will be issued a discrete IP port number that is unique to the provider for subscriber list manipulation (GA providers only)
    - Logical connections will be “inside” a VPN tunnel so that others on the network (mostly other providers) cannot “see” their traffic
    - May receive a message from one FAA location and acknowledge the message to the “other” location
    - May issue a message to one FAA location and receive the response from the other FAA location

# What IS going to be different? (continued)

- **Changes to how providers interact/connect to FAA (cont'd)**
  - Providers that come to the equal access points (cont'd):
    - For data link messages, the FAA proposes to use the recent ARInc/SITA Project-X framework (specifically XATAP) on the FAA side of the interface to ensure that each message is properly accounted for and acknowledged back to the FAA side of the interface – essentially an XML “wrapper” around the type B message (payload) – each message handoff to a provider will be acknowledged individually using some form of message number assigned by the FAA
    - For data link messages, the provider will utilize XATAP on their side of the interface to ensure that each message is properly accounted for and acknowledged back to the provider side of the interface – again, essentially an XML “wrapper” around the message – each message handoff to the FAA will be acknowledged individually using some form of message number assigned by the provider

# What IS going to be different? (continued)

- For non PDC departure clearance requests coming from the cockpit:
  - FAA side of network has to “remember” which provider handed the FAA the original aircraft request so that the FAA can send the response to the requesting provider
  - FAA will remember aircraft call sign/tail no/address (“who did we give the original clearance to”) in the event that revision(s) is/are necessary so the FAA can initiate the revision process directly to the flight deck using data link

# So what might be different? (continued)

- **If we can directly converse with aircraft, then we can support revisions to flight plans and revisions to departure clearances (assuming TDLS can overcome the flight strip limitations of today) – currently envision using HADDS data via IP until ERAM data can be accessed directly using IP**
- **For GA (once the AT procedures are developed), we will support multiple PDC clearances per day per airport – biggest issue appears to be an issue of “how long is long enough” before issuing the next clearance to the same call sign – in other words how can we ensure that this is a different flight**
- **Departure Clearance Revisions and Flight Plan Revisions will come after equal access is implemented**



# So what might be different? (continued)

- **Possible Clearance Types envisioned:**
  - Verbal Clearance – use the radio or telephone – no data link departure clearances for this flight – exists today
  - Plain Old PDC - no enhancements – exists today
  - PDC with indications of Denial along with reason for denial (possible new message type to the AOC and new response message from the AOC)
  - 623 conversation with aircraft
  - 623 conversation with aircraft (carbon copy to AOC)
  - ATN conversation with aircraft
  - ATN conversation with aircraft (carbon copy to AOC)
  - Other avionics protocols that can support delivery of clearances

# So what might be different?

- **To the end users of plain old PDC – no visible change**
  - PDCs continues to be deposited on subscriber's AOC host computer just as they are today – we just use a different “conduit” to get from the FAA network to the service provider's networks
  - Timeout values remain the same as they are today (120 seconds)
  - Essentially “no change” to current implementation seen by AOCs and end users

# So what might be different (cont'd)?

- **To the service providers that connect directly to the FAA – change would have to be seen**
  - IP based gateway service to get from the FAA network to the service providers networks
  - Positive assurance of message handoffs between FAA network and service provider network on a per message basis (sent by or received from the FAA)

# So what might be different (cont'd)?

- **Each subscriber in the FAA clearance subscriber database will carry additional “tags” to indicate how they are going to play the “clearance game”**
    - Does subscriber want the FAA to accommodate clearance delivery for any of the following data link equipages:
      - Aircraft with no data link on board, but want to use PDC (yes or no)
      - Aircraft with 620 only (yes or no)
      - Aircraft with 623 (yes or no)
      - Aircraft with ATN (yes or no)
      - Possibly other standards as well assuming that the standard in question can support departure clearance interactions
- If so, then there will be a combination of tags to indicate there is a desire to accommodate the types listed for that subscriber

# So what might be different (cont'd)?

- Does this subscriber operate at airports with a partner or code share entity in such a way that the other entity handles their own data link with a different AOC provider (possibly a different data link provider)?
- Does the subscriber want/need to know that for a given flight desiring PDC that PDC is not possible for that flight (as in PDC is denied – assuming PDC was the type of clearance requested)?

# So what might be different (cont'd)?

- In addition to the address that is currently in use, there will be a “provider tag” to indicate which provider the subscriber wishes to use. Eliminates paying for third party message transport when it is not desired (assuming the desired provider is tied directly into the equal access network)

# So what might be different (cont'd)?

- **For GA – no more FAA arbitrated provider conflicts – each tail will carry a “start date/time” and “stop date/time” for the clearance delivery subscription**
- **Eventually, GA providers will be able to add/delete from their own subscriber list. If the call sign/flight ID/tail number is in some other provider’s list for the same time period, you simply can’t claim it until the other provider turns loose of it or eliminates the overlap in subscription dates/times – this forces coordination between the losing and gaining providers and takes the FAA out of the “coin flip” business for being the “middleman” for breaking subscription ties.**

# So what might be different (cont'd)?

- **Eventually, GA providers would be able to “pull” lists of their own subscribers from the FAA network**
- **Changes to subscriber lists can be scheduled in advance and implemented on the subscriber/provider schedule not when the FAA “gets around to it” for implementation**

# So what might be different (cont'd)?

- **For those subscribers that desire it, there would be a query issued to their AOC which would obtain answers to the following:**
  - What kind of clearance do you need from the attached list clearance types available for this flight (list is based on subscriber preferences list and site's capabilities) for this particular flight?
  - If the subscriber has indicated a desire, does the AOC conversation for this flight need to go somewhere else instead of the standard destination (support for “split carrier”)?
  - As part of this query process, there is the possibility of obtaining some/all of the information mentioned in the previous presentations this week to support TFM and advances in automation

# So what might be different (cont'd)?

- **For non PDC departure clearance requests coming from the cockpit (continued):**
  - On a subscriber by subscriber basis, offer the option for “carbon copy to other” capability for departure clearance messages – i.e., if we send a departure clearance to the flight deck, on the same message, we could also address the airline AOC so that the airline is aware of the clearance and contents
  - FAA will have to determine what is the proper amount of time to wait for the “WILCO/UNABLE” response before timing out the clearance and reverting to voice

# So what might be different (cont'd)?

- **For departure clearance requests (non PDC) coming from the cockpit (continued):**
  - FAA will have to determine when (as in where on the airport surface) is the “point of no return” for issuing departure clearances/revisions and it becomes a TRACON or en-route issue to deal with the change in question

# So what might be different (cont'd)?

- **Implementation Issues:**

- Each provider will have to undergo compatibility testing with the FAA using the test network in Oklahoma City (no, you don't have to bring your AOC to Oklahoma City, just an IP communications link between your AOC and our lab in Oklahoma City)
- For non GA, each subscriber will have to tell the FAA which provider they want to handle their AOC traffic from the FAA

# So what might be different (cont'd)?

- **One provider per subscriber (not a way to support multiple providers for a single subscriber in this instance) for AOC traffic. For an FAA originated conversation, we have to rely on subscriber provided information.**
- **For those subscribers that want 100% of their traffic to be non PDC, envision that they will have to retrieve their clearances sometime between PTime minus 29 minutes and PTime minus 15 minutes (or some other time frame to be agreed for all). If the clearance is not requested during that time frame, then it will be cancelled and everything reverts to voice**

# So what might be different (cont'd)?

- **Need to know how long the cockpit 623 avionics will wait for a clearance after issuing the departure clearance request before avionics' timeout occurs – is there even a timeout for this kind of event?**
- **Need to know how long the cockpit ATN avionics will wait for a clearance after issuing the departure clearance request before avionics' timeout occurs – is there even a timeout for this kind of event?**

# So what might be different (cont'd)?

- **Questions?**



# White Board Session

- **It was agreed that the FAA would keep track of a given subscriber's provider so that any traffic initiated by the FAA is sent to the desired provider using the equal access capabilities that are under development at the FAA.**

# White Board Session

- **It was agreed that the FAA will keep track of the types of clearances that a given subscriber is interested in obtaining.**
- **It was agreed that for mixed fleet operators, PDC would be sent as the initial contact to the designated AOC for this subscriber. As part of the AOC reply (the “roger” message), the AOC would respond with:**
  - “S” in the case that the flight in question is going to request 623 from the cockpit.

# White Board Session

- “F” in the case that the flight in question is going to request FANS from the cockpit. (placeholder)
- “A” in the case that the flight in question is going to request ATN from the cockpit.
- “Y” in the case that the flight in question is going to use PDC as it is currently implemented.
- “N” in the case that the flight in question is going to use voice communications for clearance.

# White Board Session

- **For those situations where the existing ED-85A specifies a timer or timeout value as regards clearances, the FAA will implement what is in ED-85A.**
- **Efforts by both the FAA and the DLUF will work towards a modification to ED-85A to create a Version 2 of the departure clearance message set to allow for revisions and full route of flight to be placed in the uplink message. This is expected to be developed by a joint RTCA/EUROCAE(WG53) activity.**