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Review of Draft SARPs for CPDLC and ADS

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Attachment 1 of this paper presents a set of review comments on the CPDLC SARPs for the ATN CNS/ATM-1 Package, version dated 6 October, 1995.

Attachment 2 of this paper presents a set of review comments on the ADS SARPs for the ATN CNS/ATM-1 Package, version dated 6 October, 1995.

The authors of these comments were part of the engineering team that developed the Boeing 747-400 FANS-1 package and their comments reflect the experience gained from that development.

The meeting is invited to consider these comments as they progress these documents.

Attachment 1 - Review of Draft SARPs for CPDLC

Corrections

1. In section 4.1.1, the ASN.1 notation defines uplink elements 26 - 29 with the variable [altitude]. The variable should be [level]. (Note that these elements are correctly defined with [level] in Table B-1).

2. In section 4.1.1, the ASN.1 notation defines the response attribute for downlink element 28 as 'Y'. The response attribute should be 'N'. (Note that the response attribute is correctly defined in Table B-19).

3. In section 4.1.1, remove the abstract notation for all variables which are unique to the TRACK DETAIL MESSAGE, as this message is no longer in the message set:

   TrackDetailMessage
   PointDetail
   DistanceToNextPoint
   PointLevel
   PointLevelBlock
   DateTimeGroup
   Date
   Day
   Month
   Year
   DistanceToNextPointEnglish
   DistanceToNextPointMetric
   TrackDetailMsgType

4. On page 4-21, the heading above the abstract notation for PositionReport should be "Position Report". (The word "report" is missing).

5. In section 7.3.4.11, near the end of the first line, the response attribute should be R, not A/N. (This looks like a cut-and-paste error).

Requested Changes

1. Remove 'abortmessage' choice from [uplinkPDUs] and define all errors via the [errorinformation] message element.

   RATIONALE: By creating the 'abortmessage' as a choice to the 'ATCUplinkMessage' (or the 'ATCDownlinkMessage'), the distinction between the application and the communication service has been blurred. It is unclear to us why the application on one end would inform its peer application of a communication service error or a CPDLC-user-abort. Are these messages to be used in a Disconnect type of situation only? A detailed description of how this type of message would be used is greatly needed.

   The other problem is that some of the "safety" checks built into the application are being bypassed because the 'abortmessage' format does not include the 'headerATCMessageHeader' variable. This header provides the identification number, reference number and time which are all an integral part of the application's operation. For example, the need for the time field came out of Boeing's Safety Analysis for the use of the ATC DL application.

2. Change definition of [timehhmmss] to match that of the DO-219 [timestamp] variable. ([timestamp] is defined as SEQUENCE Timehours, Timeminutes, Timeseconds).

   RATIONALE: The intent of the [timehhmmss] variable is the same as the DO-219 [timestamp] variable, so should be defined the same as [timestamp]. This will reduce the number of changes required to transition 622-based end systems to ATN.

3. The [tP4table] variable was removed from the definition for uplink element 163. If reasonable to do so, leave the definition of UL element 163 as defined in DO-219.

   RATIONALE: Maintaining the DO-219 definition of uplink element 163 will reduce the number of changes required to transition 622-based end systems to ATN.

4. Do not re-assign uplink element number 178. (formerly TRACK DETAIL MESSAGE). Leave this as an unrepresented message number.

   RATIONALE: This will reduce the number of changes required to transition 622-based end systems to ATN.

5. Define a new "place" variable to be used instead of [fixname] in [placebearingdistance], [placebearing], and [publishedidentifier]. The suggested abstract notation is:

```
Place ::= CHOICE
{
fixName [0] FixName
navaid [1] Navaid
airport [2] Airport
}
```

   RATIONALE: Use of the variable [fixname] is incorrect in these three cases, as the "place" portion of [placebearingdistance] and [publishedidentifier] could be a fix, navaid, or airport identifier.

6. Do not change the enumeration of the [errorinformation] error codes from the DO-219 definition. (Also see requested change 1, above).

   RATIONALE: Although it is understood that leaving the error codes as defined in DO-219 will require another bit for encoding of the [errorinformation], this will also reduce the number of changes required to transition 622-based end systems to ATN.

7. Remove the optional [latitudelongitude] from the definition of [publishidentifier], [placebearing], and [placebearingdistance]. Add [latitudelongitude] as an option to [fixname] and [navaid].

   RATIONALE: As there are thousands of duplicate navaid and fixname identifiers throughout the world, providing for an optional [latitudelongitude] would minimize the confusion which can result when an identifier with duplicates is included in a CPDLC message. This would allow the optional latitudelongitude to be specified for [atwalongtrackwaypoint], [interceptcoursefrom], [holdatwaypoint], [waypointspeedaltitude], and [rtarequiredtimearrival].

8. Change the [intercepcoursefromselection] from the currently specified CHOICE to [position].

   RATIONALE: This is consistent with the definition of the other [routeinformationadditional] variables.

Requested Clarifications

1. The closure response requirement for those uplink elements with new response attribute of 'Y' (Ref section 7.3.4.14), is unclear. For example, I would interpret the requirement to say that if the airborne end system receives UL element 136 (CONFIRM ASSIGNED LEVEL) and then the pilot transmits 23 (REQUEST [procedurename]), the message containing downlink element 23 should contain an MRN equal to the MIN of the message containing UL element 136 and should close that uplink message. As their is only one logical response to each of the uplinks with response attribute 'Y', the document ought to specify which DL element is the valid response for each of those uplink elements.

Questions

1. Will the CNS/ATM -1 package be backward compatible with DO-219? (ref section 2.4)

2. In the ASN.1 notation for variables defined as SEQUENCEs, sequence number (if that is the correct term) are assigned only to the OPTIONAL variables. In DO-219, each constituent variable is assigned a number. Please confirm that this change in notation does not impact the encoding of those variables.

3. The integer ranges for variables [frequencyvhf] (4680..5520 vs. 117000..138000) and [frequencyuhf] (9000..15999 vs. 225000..399975) are different than those in DO-219. (The encoding ranges are the same in the two documents). Why was this change made?

Attachment 2 - Review of Draft SARPs for ADS

Corrections:

1. Sections 1.3.2.2.4 and 1.3.3.2.3 - An ADS report can also contain a non-compliance in place of a positive acknowledgment. This is indicated by the following statement: "An ADS report can contain a positive acknowledgment or a non-compliance notification indicating acceptance of all or part of the contract."

2. Section 1.3.6.1.2 - Change "reporting rate" to "reporting period" and "contract rate" to "contract period". Also need a minimum of 1 second for the emergency periodic period. e.g. if the existing periodic reporting period is at 1 second then the emergency reporting period should be limited to 1 second as well, not 0.5 second.

3. Section 1.3.6.1.4 - Change "reporting rate." to "reporting period as determined in section 1.3.6.1.2.".

4. Section 3.11.3.1 - Change the last statement "Its abstract syntax is NULL." to "Its abstract syntax conforms to the ASN.1 abstract syntax ADSEmergencyReport.".

5. Sections 5.1.4.31 and 5.1.4.32 - In these Time sequence rules, if at the time that the emergency mode is canceled by the flight crew a cancel emergency request is received, the ADS ground cancel emergency confirmation should be negative acknowledgment.

Request for Change:

1. Section 1.3.3.1.3 - A waypoint change report should also be triggered on a next+1 waypoint change on the active route. If flying an offset path, the equivalent of the next or next+1 waypoint changes on an offset path should also trigger a waypoint change report.

2. Section 7.1.2.2 - Current avionics cannot support a 0.5 second timing requirement for ADS periodic or emergency periodic period accuracy. This timing requirement is currently at 2.5 seconds.

3. Section 7.1.2 - Add a timing requirement for the event reports time stamp to be within 5 seconds of the actual event occurrence.

4. General - Add a requirement for ADS to disconnect with a reason code (may be a new disconnect reason code for flight complete) at flight completion.

5. General - Current specifications would have the avionics acknowledge ADS event requests even when the parameter which would determine the event trigger is invalid, leaving ATC in a false presumption that an ADS report will be sent at time of the event. One proposed solution would be for the avionics to NAK the event requests when the avionics is incapable of determining the event trigger.

Clarification/Questions:

1. Section 1.3.3.1.6 - This section indicates that "if the avionics cannot comply with the request, it sends a negative acknowledgment." Please clarify "cannot comply". Our understanding is that if the avionics cannot comply (fully or partially) to the request we always respond with a non-compliance.

2. Pages 4-8 and 4-9 - The maximum time interval of 16 hours or number of waypoints of 128 for the Extended Projected Profile Request seems too high. What is the logic behind imposing such a time consuming requirement?