International Civil Aviation Organization

The Third Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/3)

Bangkok, Thailand, 6 – 7 June 2005

Agenda Item 4: Review the airspace safety monitoring arrangements in the Asia/Pacific Region and the activities of regional airspace safety monitoring agencies

ISSUES ASSOCIATED WITH FREE TEXT MESSAGING IN CPDLC

(Presented by Australia)

SUMMARY

This paper provides information on the system monitoring of data link and identifies possible safety issues in relation to free text CPDLC messaging.

1. INTRODUCTION

1.1 Implementation of data link applications is becoming more widespread within the Asia/Pacific Region. Some Air Traffic Service Providers (ATSPs), particularly in the South Pacific, have achieved significant levels of experience with CPDLC messaging and have robust monitoring and reporting processes aimed at identifying problems in the operational system.

1.2 This paper provides information on the system monitoring of data link and identifies possible safety issues in relation to free text CPDLC messaging.

2. DISCUSSION

2.1 MONITORING REQUIREMENTS – FANS OPERATIONS MANUAL (FOM)

2.1.1 Routine collection of data is necessary in order to ensure that a nominated system continues to meet its specified performance, safety and interoperability requirements; and the operations and procedures are working as intended. The monitoring program is a two part process:

a) Summary statistical data should be produced periodically showing the performance of the system, and

b) Problems or abnormalities should be identified as they arise and tracked, analysed, corrected and reported on as required.

2.2 ATSP REPORTING

2.2.1 The ATS Providers of the South Pacific Region (Australia, New Zealand, Fiji, Tahiti and the USA) provide monthly reports to the Central Reporting Agency (CRA) covering system performance (end-to-end message delivery times and system availability) and message use statistics. Problem Reports are provided separately when an issue arises.

2.2.2 Communications service providers are also expected to submit FANS-1/A Periodic Status Reports on the performance of their networks at specified intervals. These reports may contain planned or current upgrades to the systems and may not be required as often as the reports from ATS providers.

2.3 DATA FORMATS

2.3.1 Most commercially available ATS data link systems record all message traffic being sent and received, however this traffic is generally recorded in the raw ACARS message formats that need to be translated into "readable" reports by translation software. Within the South Pacific Region each of the ATSPs has had to either create these translation programs in-house or to rely on other providers using ground systems of the same "brand" to provide translation services.

2.3.2 As these software programs have generally been developed by engineering staff in-house, often using different ground system designs, there is no level of standardisation across the various applications, although the output from each of the ATSPs is intended to be the same. This requirement for additional data translation has meant that it has taken a number of years before all ATSPs in the region have been able to provide system reporting.

2.4 STATISTICAL COMPILATION

2.4.1 The CRA maintains a database of all message performance reports, both system performance and message use statistics. The figures from each ATSP are recorded separately in monthly batches to identify any system performance issues relating to that specific facility and then combined on other spreadsheets to provide an overall view of the regional performance. Where provided, the figures are broken down into their individual components with CPDLC and ADS messages being tracked independently. The media used to deliver individual messages is also recorded separately (when provided by the ATSP) to assist with the identification of issues with either the local VHF installation or the overall SATCOM system.

2.4.2 Message use statistics are also recorded separately to keep track of the message elements being used within the system to assist with any future review and consolidation work. Message use statistics currently show that since January 2000 approximately 45% of the FANS Uplink Message Set has never been used within the South Pacific Region.

2.5 OPERATIONAL PERFORMANCE - INDIVIDUAL ATSP REPORTING

2.5.1 While not required by the FOM, some ATSPs also provide internal reports within their own organisations on the operational performance of the data link systems. In the case of Airservices Australia all uplinks and downlinks sent within the month are sorted into various files. Any uplink or downlink that contains a free text message element is sorted into a specific file and these messages are then reviewed manually to ensure that the free text messages are appropriate (i.e. have only been sent to cover the lack of an appropriate pre-formatted message element), are unambiguous and contain the use of "standardised' free text (FANS Operations Manual) where it has been defined.

2.5.2 Other files are created, once again using internally developed software, to allow review of message use against nominated categories, such as compliance with the unit's Manual of Air Traffic Services and Local Instructions. Reports detailing any non-conformance issues or ambiguous/incorrect messages are forwarded to operational supervisors in the centres on a monthly basis for corrective action. Additionally, all downlink messages containing free text elements are reviewed manually. Where necessary, reports are sent to individual airlines, generally under agreements negotiated between the relevant safety areas, to assist with training and standardisation of messaging requirements.

2.6 NEED FOR SAFETY OVERSIGHT

2.6.1 Australia has been monitoring the performance of CPDLC messaging in the operational environment for some time. Significantly it has become apparent that there are a large number of messages transmitted, both uplink and downlink, where free text has been used in situations where relevant pre-formatted messages have been available. In many situations these free text exchanges between controllers and flight crews have been ambiguous, open to interpretation and fail to adequately close the communication loop. This has resulted in increased workload both for controllers and flight crews and a heightened risk of error through poor communication technique. Examples of observed free text messages are detailed in Attachment 1.

2.6.2 As with normal standardized voice phraseology, the use of standardised pre-formatted messages guards against misinterpretation and assists in mitigating the possibility of human error. As a result, States participating in RASMAG should be aware that inappropriate use of free text messaging could compromise safety and as such operational use of CPDLC needs to be monitored throughout the Asia/Pacific region as data link and the use of CPDLC is more widely implemented.

2.6.3 In many cases States may not have much control over the design of data link systems, or may already have systems in place. Where possible, States should ensure that the CPDLC interface displays a number of pre-formatted message elements when each message category is selected (or other more intuitive functionality) to restrict the amount of scrolling that controllers need to do through lists to find the necessary message element. It is also recommended that States monitor message uplink use, where possible, to ensure that the message lists accessed by controllers are ordered with the most used messages at the top, rather than being stored in order of message set element number.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) review the information provided in this paper;

b) note the work of Australia in relation to proactively monitoring CPDLC messaging; and

c) seek Secretariat support in highlighting to States the safety issues inherent with inappropriate use of free text messaging and the need for States to take action to resolve these issues.

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Examples of Observed Free Text Messaging

UL#169 is an uplink free text element. DL#67 is a downlink free text element

1.

```
AAA123 Thu Feb 10 19:16:12 2005
UL#169*CLEARED TO ENTER CTA AT xxxxx, TRACK TO xxxxx THEN VIA
PLANNED ROUTE*1*UL#169*ENTER AT FL340
```

This is an example of an uplink airways clearance consisting entirely of free text. A free text clearance cannot be loaded directly into the Flight Management Computer by the flight crew.

2.

```
BBB123 Fri Feb 13 05:00:25 2004
DL#48 POSITION REPORT 1128.3S 11108.6E 0500 350FL SAPDA 0504 DOMOM
1001 -41C 046/18 MODERATE 0.820Mach IPKON 0426 350FL
DL#67 REQST L20NM DUE WXR
```

This is an example of a downlink free text request for weather deviation added to a position report. In ADS reporting environments CPDLC position reports are not required and therefore the full contents may not be read by controllers. Many not required position reports are sent because pilots know that there is easy access to a free text element via the interface.

3.

```
CCC123 Tue Feb 15 11:42:37 2005
UL#169*REPORT BACK ON TRACK FOR HIGHER LEVELS
```

The pilot cannot arm the correct pre-formatted response (BACK ON ROUTE) on receipt of a free text uplink request. In order to arm many of the automatic responses the pilot must receive the correct pre-formatted uplink message, in this case UL#127 REPORT BACK ON ROUTE. A free text downlink is the pilot's only option when the correct uplink has not been sent and the pilot must remember to send it after being off track.

4.

```
DDD123 Fri May 7 01:20:58 2004
UL#169*REQUEST DOWNLOAD THE RC MESSAGE
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This is an example of an uplink message that the pilot would probably not understand – RC is not an approved abbreviation and the explanatory material is deficient.