WP WG3/9 -__

AERONAUTICAL TELECOMMUNICATIONS NETWORK PANEL

WORKING GROUP 3 MEETING

Phuket, Thailand, 4 - 6 March 1997

Agenda Item 4: VALIDATION OF SUB-VOLUME 2

4.1 CHAIRMAN'S' REPORT ON SG 2 PROGRESS

Presented by M J A Asbury

1. INTRODUCTION

1.1 Sub Group 2 has held two meetings since the last meeting of WG 3 in Alexandria. The 11th Meeting was held at Level 7 Ltd, Bracknell, UK, from 16 - 20 December 1996, and the 12th at CENA in Toulouse, from 10 - 14 February 1997.

1.2 The Agenda (effectively the work programme of the SG, and common, with minor variations, to all meetings of the SG post ATNP/2) is at Appendix A.

2. OUTPUT FROM 11TH MEETING

2.1 The 11th meeting reviewed the output from ATNP/2, and what was required before the Working Group of the Whole meeting. There were two significant outcomes, namely -

- Amendments to the SARPS arising from Validation and review work, and
- Draft Guidance Material.

2.2 Proposed SARPs amendments were reviewed, and, where accepted, were incorporated into the general defect reporting and proposed amendments paper for the relevant application, to be presented at this meeting for review by the WG, and incorporation as required.

2.3 A refined template for Guidance Material (GM), applicable to all air/ground applications, was also prepared, and is attached as Appendix B to this paper. Early draft GM for all air/ground applications has been prepared and is presented in another paper for review.

3. OUTPUT FROM THE 12TH MEETING

3.1 This meeting reviewed the proposals of the CCB, the draft GM and validation reports and the status of the validation programme. In addition, the ICCAIA members presented material on the FANS-1

and FANS-A programmes, as part of the general work relating to application compatibility. The meeting also reviewed the output from the recent ADSP WG meetings in Atlanta.

3.2 With regard to the CCB proposals, the SG felt that there was perhaps one too many levels of consultation in the process, and were concerned that the whole process would‘ be too time and effort consuming. The SG agreed that since the proposed Subject Matter Experts (SME) were in fact a focal point for the work, with a strong administrative overhead, there would not really be a need for two representatives to cover air/ground applications, as had originally been proposed by the SG2 Chairman at ATNP/2. Because of the administrative overhead, the SG 2 Chairman had originally offered to act as SME for the a/g applications (SV2). However, the French administration kindly offered to make time available for the FIS editor to act as SME, and this offer was gratefully accepted by the SG.

3.3 Draft GM was presented. Due to the short timescales involved prior to the next WG 3 meeting, this would be worked on during the period immediately prior to the Phuket meeting, and would be presented in consolidated form at that meeting.

3.4 The meeting reviewed the current status of the validation programme as best they knew it. Work was in progress, but due to the technical complexity and state and international organisation resource limitations, not as much work had been done as had been hoped. However, the meeting noted that there had been few, if any, defects presented which had affected sections 3 and 5 of the SARPs, which were the key sections relating to interoperability. The SG agreed a report and recommendations on the validation work, which is attached as Appendix C to this paper. This validation report will also be presented as a cover paper to the air/ground SARPs validation report.

3.5 The input from the ICCAIA representatives were seen as a valued contribution to the work of the SG. Where possible, proposed changes which had been raised in reply to accepted defects to the SARPs arising from the validation process were made in a manner which would support system compatibility and the overall work programme of the Panel regarding different systems.

3.6 The ADSP WG had identified several new operational requirements. In general these would not be applicable to the CNS/ATM -1 package initial validation programme, and would be incorporated into future work in the normal course of events. However, there was at least one proposal, relating to the ending of the CPDLC service with messages outstanding, which directly contradicted previously agreed operating procedures. Both IFALPA and IFATCA users were emphatic that without this capability the system would be unusable, and therefore unacceptable for incorporation. Work has been done to incorporate this functionality (which does not affect interoperability). Incorporation of this change does not result from a defect in the technical SARPs, but as a result of a defect in the ORs. This modification could be said to enhance the operating flexibility of the system, in that local implementation and procedures can be developed to allow the original system if required, whereas the opposite is not the case.

4. CONCLUSIONS

4.1 The last two meeting of Subgroup 2 have been very productive, with considerable work done on the correction and improvement of the SARPs, in the light of work being done on the validation programme. A proposed position paper on validation has been prepared.

4.2 However, the SG has noted that much of the work on validation has been against the version of the SARPs prepared at the 7th meeting in Munich, and subsequently presented to the ATNP/2. The revised version produced by ATNP/2 has only been available for about 14 weeks, and this short timescale is reflected in the amount of work done specifically on this version to date.

4.3 In addition, there has been little new validation material presented, since those working are reluctant to present two written reports - to the SG and to the WG 3 meeting proper. It is therefore expected that validation reports for presentation to the Working Group of the Whole will be updated on the basis of work presented to the WG 3 meeting at Phuket.

4.4 In addition, considerable progress has been made towards the development of Guidance Material, which is considered to be most important, given the complexity of the original material. This is expected to be available in final form on schedule by the end of the year.

5. DATE AND PLACE OF NEXT MEETING

5.1 It is proposed to hold the next meeting from 28th April to 2nd May 1997 in Vancouver.

Appendix A

AGENDA

for

MEETINGS OF ATNP WG3/SG2

1. Notes, Briefing and out come of Relevant Meetings (e.g. CCB, ADSP WGs etc.)
2. Defect Reports, and Consequent SARPs Amendments
3. Validation Progress Reports
    - Work in Progress
    - Amendments to ATNP/2 Validation Papers
    - Validation Report for WG 3
3. Guidance Material
    - Content
    - Format
    - Preparation Timetable
4. Input to Next Working Group 3 Meeting (Phuket, Thailand, 4-6 March 1997)
5. AOB
6. Dates and Places of next Meetings

End

Appendix B

OUTLINE FORMAT OF GUIDANCE MATERIAL

1. Introduction

   Reason for GM

   Chap 1

      One long paragraph of overview and commentary

   Chap 2 etc...

2. Overall general functionality - Air/Ground Topology etc.(?)

3. Functionality (or Service) based

   e.g. Logon...

4. Chapter based (Sweep-up)

5. Indexes/Tables

6. Example - Scenarios (Possible Annex)

   DSC user

   NDA user

7. Example - Encoding (Possible Annex)

8. Dimensions (Possible Annex)

End

Appendix C

VALIDATION REPORT - AIR/GROUND APPLICATIONS.

1. INTRODUCTION

1.1 The four air/ground applications cover by this paper are -

- Context Management (CM)
- Automatic Dependent Surveillance (ADS)
- Controller Pilot Data Link Communications (CPDLC), and
- Flight Information Systems (FIS)

1.2 ICAO Standards and Recommended Practices (SARPs) for these applications have been developed by Subgroup 2 (SG2) of Working Group 3 (WG3) of the Aeronautical Telecommunications Network Panel (ATNP). The ATNP, at its second meeting (ATNP/2, November 1996), recommended that these SARPs be forwarded to the ICAO Air Navigation Commission (ANC) after the ATNP Working Group of the Whole had met to review the results of the continued programme of validation work then considered outstanding.

1.3 This paper briefly reports the continuing validation work, reviews the current progress in SARPs refinement, and recommends a course of action for the Working Group.

1.4 Validation reports for each of the above applications were prepared for the WG3 meeting in Alexandria, refined, and appended to the overall validation report presented to ATNP/2. Updated versions of these reports are attached as Appendices A - D to this paper.

1.5 It should be emphasises that, although the four air/ground applications have been developed in parallel, they may be validated, implemented and certificated/approved separately, with the proviso that the ATN shall support CM when ever any of the other air/ground applications are supported (System Requirement 20). In addition, such is the configuration of the ADS SARPs that it will be possible to validate and implement the air/ground element without being required to validate or implement the ground/ ground element.

2. VALIDATION UPDATE

<u>EUROCONTROL</u>

2.1 EUROCONTROL data link work is to a great extent being carried out under the aegis of the Trials End System (TES) programme. System qualification testing is expected to be finished in February 1997. this will be followed by air/ground system validation tests. Since it will have been the same organisation, it cannot be considered a full interoperability test. There are 20 aircraft simulated in the system. CM and upper layer interoperability testing with FAA systems is currently being progressed. Latest reports will be available for Phuket.

2.2 Some work is being done integrating the TES software with the transport and network layers. Porting work to get a full OSI 7 layer implementation all on the same group of systems is going ahead. The results of this have been a series of defect reports, raised and conveyed to the CM, ADS & CPDLC editors. It should be noted that the TES is based on version 3.0 of the SARPs (i.e. that presented to

ATNP/2), so only some of the defects identified early on (and brought to the attention of ATNP/2) have been incorporated in the TES programme. (This is an important interoperability consideration.)

2.3 Plans for the future include interoperbility testing operations with ARINC and the FAA. This will involve CM, ADS and CPDLC (and Upper Layers) running over a 'commercial off the shelf' (COTS) X.25 or Transport Connection Protocol/Internet Protocol (TCP/IP) connection. Final delivery of software from the TES contractors is expected in mid-April, with tests to follow.

ICCAIA

2.4 Hughes Aircraft of Canada have a joint programme with the University of British Columbia using sophisticated computer tools for the formal methods testing of Upper Layers ADS and CM, with an outline report expected in March 1997. Initial work was based on version 3.0 of the SARPs, but work is going ahead to incorporate the version developed at ATNP/2. Hughes had also implemented CM, CPDLC and partial ADS in both air and ground simulations. Although not using Packed Encoded Rules, functionality is replicated. Plans with NAV CANADA to integrate the Hughes-developed upper layers and applications with the NAV CANADA-provided transport, lower layers and router are being investigated. Possible expansion of the programme to co-operate with Eurocontrol, ARINC and FAA in interoperability tests by mid-1997 is under review.

2.5 Boeing have carried out a full independent engineering inspection of ADS and CPDLC SARPs highlighting implementation defects, and possible incompatibilities. The FANS-1 programme has provided a wealth of operational expertise, which, if not directly related to much of the technical work, has provided support for the operational requirements on which the SARPs are based.
...

3. SARPS REFINEMENT

3.1 Working Paper 31 to ATNP/2 contained proposed changes to the SARPs material developed since July 1996. These were all incorporated into the version made available by ICAO at the end of that meeting. Since then, continuing validation work, editorial changes and urgent evolving operational requirement have resulted in defect reports being raised against all applications. Due to the similarity in configuration, several defects have been common across the board.

3.2 In addition, as required by the Panel, the editors have been reviewing the SARPs with the object of trying to achieve better compatibility with existing data link implementations. This has also led to the reporting of some 'defects', which, although not defects in the true sense of the word, are area which could be brought in line with existing systems with a minimum of disruption. This is entirely consistent with Technical Validation Objective No 8 ('To determine if the provision for future migration has been addressed').

3.3 It is appreciated that defects in CNS/ATM-1 resulting from changes to operational requirements should have been shut out before ATNP/2, but the SG was informed that without the changes being implemented, the SARPs, while technically correct based on the earlier operational requirements, would be operationally unacceptable under the current operating methods, and would never be used by either the pilot or Air Traffic Control community. Again, the attempt to make the SARPs consistent with user requirements is consistent with the stated Validation Objectives.

3.4 Defect reports highlighting serious functional and/or interoperability shortcomings are now very rare - in addition, the rate of defects being reported appears to be tailing off, despite increased work being done on various applications. There are almost no changes occurring in sections 3 and 5 of the applications, which relate to Abstract Service and Protocol definition, which are the real interoperability core of the material.
...

4. CONCLUSION

4.1 Those responsible for the preparation of the SARPs are confident that the CM, CPDLC and the air/ground element of the ADS SARPs have been subject to sufficient independent scrutiny, simulation and early trials work such that no major problems affecting interoperbility are likely to be discovered during implementation. In addition, those applications have been demonstrated to be consistent with the Upper Layers Architecture and operations.

4.2 The same cannot be said for FIS. There is considerable disappointment that virtually no work is currently being carried out on this application, possibly because there is no perceived early development and introduction of a suitable infrastructure. However, since it has been developed in parallel with the other applications, and is of a similar structure to the ADS SARPs, and because it appears to be of a longer term implementation such that lessons may be learned from earlier use of the other applications, it is thought unlikely that any major defects will come to light when (or indeed if) significant work is carried out on this application.

4.3 The same comments could be said to apply to the ground/ground element of ADS also, but again, since this has also been developed as an intrinsic part of the overall ADS SARPs, the lack of trials work on this part of the application should not preclude its adoption into SARPs. However, the structure of the ADS SARPs is such that the air/ground element alone can be implemented.

5. RECOMMENDATION

5.1 Based on the work to date, it is recommended that the CM, the air/ground element of the ADS and CPDLC SARPs be accepted as being able to meet the required interoperability standards, and should be forwarded to the ANC for approval.

5.2 In addition, there is considerable confidence in the preparation of the ADS ground/ground element and FIS material such that major interoperability problems are unlikely to occur, but this has not yet been checked to the level of detail required. Nevertheless it is recommended that this material should be approved by the ANC for circulation to States and International Organisations for review and comment as part of the consultative procedure, with the objective of making a final decision on the basis of possible future work and comments returned by States at the next Working Group of the Whole meeting at the end of 1997.

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