



International Civil Aviation Organization

**FOURTEENTH MEETING OF THE
COMMUNICATIONS/NAVIGATION/SURVEILLANCE
AND METEOROLOGY SUB-GROUP OF
APANPIRG (CNS/MET SG/14)**



Jakarta, Indonesia, 19 – 22 July 2010

Agenda Item 3: Aeronautical Fixed Service (AFS)

2) discuss other AFS related issues

STATUS OF DOC 9896 AND NOTES ON IPV6 IMPLEMENTATION

(Presented by the ICAO Secretariat)

SUMMARY

This Information Paper provides an update on recent activities within WG-I (Internetworking) of the Aeronautical Communications Panel. Key elements being addressed are; i) Status of work on VoIP and hence the latest edition of Doc 9896, Internet Protocol Suite Technical Manual, ii) Further work on Document 9896 and iii) On-going maintenance of the Doc 9896 and others documents by WG-M.

This paper relates to:

Strategic Objective:

D. Efficiency – Enhance the efficiency of aviation operations.

Global Plan Initiative: GPI -22 Communication Infrastructure.

1. Introduction/Background

1.1 Over the past year, WG-I has been active in a number of areas:

- a) Finalisation of material on VoIP and subsequent publication of Ed 2 of Doc 9896;
- b) Development of comprehensive guidance material to aid implantation and interoperability; and
- c) Methods to update and maintain standards and guidance material based on States' validation and implementation activities.

2. Status of Document 9896 Edition 2:

2.1 At the 10th meeting of WG-I, held in Montreal, Canada over April 26th-May 1st, 2009, it was agreed that the relevant material from EUROCAE Docs ED 136, 137 and 138 should serve as the basis for the material on VoIP, to be incorporated into Doc 9896.

2.2 The intention was to provide users with:

- a) Specific information not available in the EUROCAE Documents.
- b) References to the relevant sections of the EUROCAE Documents.

2.3 Approval of the material on VoIP was expected at the 12th meeting of WG-I to take place in May, 2010, however developments at the 11th meeting held in November, 2009 affected this.

2.4 At 11th meeting of WG-I, the US member explained that most EUROCAE standards were the result of joint activities between EUROCAE and their US equivalent, RTCA Inc, however the VOIP standards were developed with no US involvement. It was therefore requested that this material be subject to a detailed review by the US.

2.5 The review process was quite complicated however it was completed in a very short period of time. This involved coordination with other government agencies and industry. The former took place via the Interagency Group for International Aviation (IGIA) which is composed of members of Executive Branch agencies of the U.S. government, such as the Departments of Treasury, Commerce, State, Defense, the U.S. Trade Representative; the National Transportation Safety BASA Process.

2.6 The FAA also conducted a review of the EUROCAE standards. To accomplish this review, the FAA pursued two independent paths: an internal review and a Request for Information (RFI) to industry. A number of FAA groups were involved in the internal review and nine vendors responded to the RFI.

2.7 The information collected was analyzed and consolidated into a list of twenty six issues grouped into five categories:

- Four issues requiring minor changes to specifications
- Eleven FAA requirements not addressed by the specifications
- Four possible new FAA requirements that are being internally validated by FAA
- Four areas requiring clarification without necessarily requiring changes to the specifications
- Three FAA operational requirements deemed to have significant impact on the specifications

2.8 FAA representatives presented these issues at the 25th meeting of EUROCAE WG67, held in Bucharest this past April. In two very constructive and productive sessions, the FAA and EUROCAE representatives reached agreement on all issues under consideration, namely:

- Changes to ED-137 Part I (Radio) and Part II (Telephone)
- The creation of a U.S. specific Addendum to ED-136 to be developed by the FAA
- Agreement was also reached on the materials previously proposed for Doc 9896 Edition 2

2.10 The FAA is now currently collecting and validating information to become part of a U.S. specific Addendum to ED-136. In addition to this, the new FAA VHF/UHF A/G Radio Specification for terminal radio procurement was recently modified to incorporate a VoIP capability consistent with the latest version of ED-137 Part I.

2.11 In the near future, the FAA will:

- Continue working on reviewing and validating ED-136/137/138 in cooperation and coordination with EUROCAE WG67;
- Incorporate references to ICAO ATM VoIP documents in the NVS Specification;
- Develop and integrate an end-to-end VoIP Test Bed at the FAA Technical Center, in Atlantic City, New Jersey;
- Continue participating in VOTE, WG67, SESAR, and ETSI Plugtest activities;
- Conduct an independent FAA VoIP Interoperability Test at the FAA Technical Center:
 - Similar to the Plugtests already conducted by ETSI
 - Tentatively scheduled for May 2011
 - Intended to validate the latest updates to ED-137 Parts I and II; and
 - All vendors will be invited to participate

2.12 The US and Europe (EUROCONTROL) also requested a number of changes to Doc 9896. These will be incorporated into a new revision, which will be submitted for approval at the 13th meeting of WG-I to be held in Montreal in November, 2010. If approved, this document will become Edition 2 of Doc. 9896.

2.13 Any changes resulting from ongoing work will be reviewed by the either ACP Working Group I or M and incorporated into the document using the process explained later in this paper.

3. Current Status of Work on ATN/IPS

3.1 At WG-I/12, the group began discussion on the work programme approved at WG-W/3 in January, 2010.

3.2 The work programme shifts the direction of the group from the development of technical standards, to developing guidance material for the implementation of a global IPS-based ATN, which meets aviation standards. The intention is to take the lessons learnt from Regional and State implementations and make these available globally for the benefit of all States. The task of developing the technical standards is near completion and will result in the publication of Doc 9896 Ed 2.

3.3 Four work programme items were identified as having a high priority and were examined by the meeting. In some cases, WG-I members with expertise in these areas were designated as points of contact for any work to be undertaken by the group. The items and points of contact were as follows:

- Addressing (Vaughn Maiolla, Terry Davis)
- IPV4- IPV6 transition (Liviu Popescu, Hoang Tranh)

- Security (Vic Patel, Jean-Yves Piram)
- DNS Naming (tbd)

3.4 A clear policy on addressing is needed as it was pointed out that Europe had already taken steps in this regard, having secured a block of /32 addresses. Nonetheless, it was agreed that a global addressing prefix for aviation was needed. Hence the Addressing task was broken into three sub-tasks:

- To evaluate and assess existing addressing schemes
- To pursue a global IP address prefix for aviation communications
- Acquisition of a high-level domain name.

3.5 Work on addressing is expected to be concluded in approximately 12 months.

3.6 It had been explained to the meeting that work on Security (under SESAR Project 15.2.10) was about to commence in Europe and that this would be complete at the end of 2012.

3.7 It was accepted that WG-I could not achieve much until SESAR Project 15.2.10 was near completion. In the meantime it was agreed that WG-I should have a standing agenda item, asking for a report on security related issues from EUROCONTROL, FAA and other States.

3.8 Background on IP Version 6 Addressing

As work on IPS addressing using IP version 6 will take further effort, it is worth revisiting the case for IP version 6.

3.8.1 Why IP version 6

From time to time there is discussion about the pros and cons of IP version 6 (IPv6) vs. IP version 4 (IPv4). The reason behind the decision to standardize IPv6 for aviation use is that IPv4 address space is just about exhausted, and steps by the industry towards a transition to IP version 6 are already taking place. Today's routers, computers and operating systems (Windows XP, Vista, 7; Linux, Mac OS...) are already IPv6 ready. In the light of this trend, and the fact that implementations in the aviation industry should always be considered in the long term, it would be inadvisable to develop new systems based on a technology which has already reached the end of its foreseen lifespan.

3.8.2 Public vs. Private address space

3.8.2.1 With IPv4, use of private address blocks has been common practice. These private address blocks have been used mainly as a stopgap measure to extend the lifespan of the limited address scheme, by providing the ability for having many computers on a local network sharing one external IP address through network address translation (NAT).

3.8.2.2 A NAT by itself may provide a rudimentary means of firewalling by obscuring access of traffic which originates on the public network, however it makes more robust, additional security mechanisms such as IP Security (IPSec) problematical.

3.8.2.3 While NAT is central to a modern IPv4 firewall due to the use of private address space on intranets, modern firewalls do not rely on NAT for firewalling purposes. Firewalling is ensured through a variety of means, the most important being stateful packet filtering, application gateways and proxy servers.

3.8.2.4 In IPv6, trickery like NAT is not required, as there is abundant address space. However, for strictly local applications, where there is no intent of routing outside of the local area network, private address space has been defined and is described in RFC4193. The private address space defined in RFC4193 is a /8 in total size, 88 bits larger than the total amount of available IPv4 address space. If there is any intent of routing through commercial IPv6 providers, e.g. for long-haul wide area network (WAN) connectivity or for provision of a non time-critical service to a local user, then private address space is not a cost effective option, since it involves NAT, with added complications and potentially reduced level of safety (see discussion on IPSec). On the other hand, the configuration of IP addresses can be modified as requirements evolve during the lifespan of an ATN/IPS system.

3.8.3 How to get IPv6 addresses

Two types of IPv6 address space:

1. Provider Aggregatable (PA), allocated to Local Internet Registrar (LIR)/Assigned by LIR
2. Provider Independent (PI), assigned to End User

An end user can be sponsored by a LIR, an end user can sign a contract directly with the Regional Internet Registrar (RIR) (AfriNIC, RIPE NCC, ARIN, APNIC, LACNIC), or an end user can become a LIR.

3.8.4 Registration fee

All IP addresses are regarded as a public resource and cannot be bought or sold. The RIR charges its members annual service fees for the administrative work involved in allocating address space. A typical charge (2009) is 1300 EUR for a /32 address space. As this cost can easily be borne by a State or ANSP, this option is worthy of further consideration.

4. Maintenance of Standards and Guidance Material

4.1 As mentioned above WG-I will continue to support the documentation suite to support the ATN/IPS. In the longer term documentation support will be handed over to WG-M (maintenance). WG-M today is actively working on numerous documents, i.e; 9880, 9776, 9816 and 9861.

4.2 Part of the task of WG-M will be to keep the documents current. Where industry standards have been incorporated by reference, it will be WG-M's job to track changes to industry standards and update the ICAO documentation suite accordingly.

4.3 Use of Industry Standards for ATN/IPS

4.3.1 The use of industry standards is covered by Assembly Resolution 36-13. Appendix A, Item 4 resolves that:

“In the development of SARPs, procedures and guidance material, ICAO should utilize to the maximum extent appropriate and subject to the adequacy of a verification and validation process, the work of other recognized standards-making organizations.”

4.3.2 The ATN/IPS has proven to be an ideal candidate to apply this resolution, as IPS standards are mature and maintained by the Internet Engineering Task Force (IETF) with updates applied through the Request for Change (RFC) process.

4.3.3 This is a stable yet dynamic process. The process is stable as published RFCs are never rescinded or modified. RFCs are structured in such a way that they are applicable in their entirety, hence all aspects of an RFC will be valid.

4.3.4 It is dynamic, as new RFCs are constantly submitted and their status assessed, as per the following categories. The status of all RFCs, are readily accessible via the IETF web-site.

Informational

Experimental

Best Current Practice

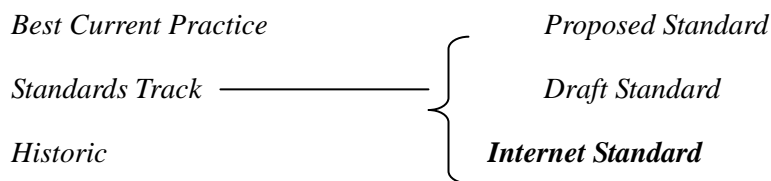
Standards Track

Historic

Proposed Standard

Draft Standard

Internet Standard



4.3.5 Given the above the ACP considers the use of references to industry-standards and in particular those related to the ATN/IPS to be a manageable and practical approach to the future development of standards.

5. Information on ACP Activities

All of the above information is available on the ACP web-site. Meeting participants are urged to regularly consult this site and in particular review the meeting reports.

5.1 The ACP web-site address is as follows:

<http://www.icao.int/anb/panels/acp/index.cfm>

6. Action required by the Meeting

6.1 The meeting requested to note the information above and for consideration in its deliberations.
