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AERONAUTICAL TELECOMMUNICATIONS NETWORK PANEL

Working Group 2

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Bordeaux, France

30 September - 2 October 1998

SME V (Internet Communications Service) Status Report

Working Paper

Presented by Klaus-Peter Graf (Subvolume V SME)

Summary

This paper provides a summary on the status of the PDRs which have been raised against the ATN ICS SARPs (Subvolume 5).

There are currently four accepted PDRs concerning the ATN ICS SARPs waiting for final resolution. These PDRs including draft technical solutions are attached to this paper.

WG 2 members are invited to note the current status, to review the attached PDRs and to contribute to the development of appropriate technical solutions for the non-resolved PDRs.

1 Introduction

This paper provides a summary on the status of Proposed Defect Reports (PDRs) raised against the ATN Internet Communications Service (ICS) SARPs for information of WG 2 members.

2 PDR Status

Table 1 presents the list of those PDRs which have been submitted to the ATNP Configuration Control Board (CCB) since its establishment in spring 1997 and which apply to the Internet Communications Service (ICS) SARPs. Column 3 of Table 1 lists the status of these PDRs in the ATNP CCB process as of 28th September 1998 and column 4 the version of the ATN ICS SARPs in which the agreed technical solution of the resolved PDR has been included.

PDR Number	PDR Title	CCB Status	Resolved in
97060028	Transport Timers Configuration	RESOLVED	ICAO Version 2.2
97060029	Various Editorial Defects (1)	RESOLVED	ICAO Version 2.2
97060030	IDRP Timers	RESOLVED	ICAO Version 2.2
97100001	Incomplete specification for use of V.42bis by Mobile SNDCF	RESOLVED	ICAO Version 2.2
97100002	SNDCF Call Request/Confirm User Data Length Indicator	RESOLVED	ICAO Version 2.2
97100003	Various Editorial Defects (2)	RESOLVED	ICAO Version 2.2
97100048	LREF Directory Management	RESOLVED	ICAO Version 2.2
98040003	X.25 Address Extension Facility	RESOLVED	*)
98050001	IDRP Update Receive Process	RESOLVED	*)
98060003	Predicates in ISO/IEC 8473 APRL	RESOLVED	*)
98060004	Support of IDRP by Airborne Router implementing optional non-use of IDRP	RESOLVED	*)
98060005	Air/Ground Route Initiation APRL	RESOLVED	*)
98060006	Correlation of ATSC Class with A/G Subnetwork Type in Airborne Router	ACCEPTED	
98060007	Symmetry of Mobile SNDCF APRL and Route Initiation APRL	RESOLVED	*)
98060008	IDRP Traffic Typing	RESOLVED	*)
98080001	Segmentation of Error Report PDU	RESOLVED	*)
98090002	Incorrect term "24-bit ICAO Aircraft Identifier"	RESOLVED	*)
98090003	Downgrading of ATSC Class	ACCEPTED	
98090004	Backbone Hides Optimal Route to Off-Backbone BISs	ACCEPTED	
98090010	Value of SNCR in X.25 Call Request Packets	ACCEPTED	

Table 1: Status of ICS PDRs in the ATNP CCB Process

*): scheduled for Amendment 1 of ICAO Doc 9705 in November 1999

As illustrated in Table 1, a total of 20 PDRs have been raised against the ICS SARPs over the last 18 months. All these PDRs have been accepted by the ATNP CCB as potential defects and have been forwarded to the WG 2 SARPs Development Mechanism (SDM) for resolution.

2.1.1 Resolved PDRs

Sixteen of the accepted PDRs have been resolved by the WG 2 SDM and the proposed technical solution approved by the CCB. Concerning seven of these sixteen resolved PDRs the relevant technical modifications have been included in the ICAO Version 2.2 of the ATN SARPs and also brought forward to the Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN) - ICAO Doc 9705-AN/956 (first edition, 1998). This document currently contains the most mature and correct technical specification of the ATN Internet Communications Service.

The agreed technical solutions of the remaining nine resolved PDRs are scheduled for inclusion in Amendment 1 of ICAO Doc 9705-AN/956 which is expected for publication around November 1999.

2.1.2 Non-resolved PDRs

There are four PDRs which have been accepted by the CCB (three of them at its 7th meeting in Bordeaux) and which are waiting for resolution by the WG 2 SDM. These PDRs including draft technical solutions are attached to this paper (attachments B through E).

2.1.3 Editorial Corrections

In addition to the PDRs listed in Table 1 a substantial number of editorial defects has been identified during the review of the ATN SARPs ICAO Version 2.0 (distributed at the Langen ATNP meetings), ICAO Version 2.1 (distributed at the Redondo Beach ATNP meetings), ICAO Version 2.2 (distributed at the Rio ATNP meetings), and ICAO Doc 9705 (distributed at the Utrecht ATNP meetings). These editorial defects have been introduced by the ATN SARPs editing process within ICAO. These defects have been documented in three editorial PDRs which apply to multiple sub-volumes, including sub-volume V. These are summarised in the following table:

PDR Number	PDR Title	CCB Status	Resolved in
97060001	Corrections to ICAO V2.0 produced by ICAO secretariat	RESOLVED	ICAO Version 2.1
97110001	Corrections to ICAO V2.1 produced by ICAO secretariat	RESOLVED	ICAO Version 2.2
98040005	Corrections to ICAO V2.2 produced by ICAO secretariat	RESOLVED	ICAO Doc 9705
98070003	ICAO 9705 - Engineering Version Discrepancies and Editorial Errors	RESOLVED	*)

Table 2: Status of PDRs Documenting Editorial Defects of Sub-Volume V

*): scheduled for Amendment 1 of ICAO Doc 9705 in November 1999

3 New PDRs

Attachments B through D present the three new PDRs raised against the ATN ICS SARPs (Subvolume 5) since the last meeting of WG2 at Utrecht. The reported defects have been identified during testing of the ProATN Air/Ground BISs. Thanks to STNA for highlighting the defects.

The new PDRs are:

PDR Number	PDR Title
98090003	Downgrading of ATSC Class
98090004	Backbone Hides Optimal Routes to Off-Backbone BISs
98090010	Value of SNCR in X.25 Call Request Packets

Furthermore, PDR 98060006 is still waiting for a final technical solution. It is reproduced as attachment E to this status report. Although a technical solution has been prepared and agreed by WG2 at its last meeting and has passed the SDM process, preference for an alternative technical solution has been raised by some experts meanwhile. Therefore this PDR is tabled again for final resolution by WG2 at its Bordeaux meeting. The PDR and the technical solution agreed by WG2 at its last meeting are documented in Flimsy 3 of the 15th WG 2 meeting (in Utrecht).

4 Recommendation

WG 2 members are invited to

1. note the status information provided
2. agree on a final resolution of PDR 98060006
3. review the attached PDRs, and
4. progress the resolution of these PDRs.

Attachment A

Title:	Incorrect term "24-bit ICAO Aircraft Identifier"
PDR Reference:	98090002
Originator Reference:	
SARPs Document Reference:	ICS SARPs, Section 5.4.3.8.4.4
PDR Status:	RESOLVED
PDR Revision Date:	
PDR Submission Date:	15 September 1998
Submitting State/Organisation:	DFS/Germany
Submitting Author Name:	Schade, Thomas
Submitting Author E-mail Address:	schade@se.dfs.de
Submitting Author Supplemental Contact Information:	Tel: +49/6103/707 783 Fax: +49/6103/707 742
SARPs Date:	ICAO Version 2.2
SARPs Language:	English

Summary of Defect:
In section 5.4.3.8.4.4 of the ICS SARPs (Allocation of the ARS Field), it is said that the value of the ADS field shall be the "24-bit ICAO Aircraft Identifier". The term "24-bit ICAO Aircraft Identifier" is an incorrect term which is not specified by ICAO.

Furthermore, use of this term causes some inconsistency with section 2.2.1.3.4.3 (Aircraft Identifier), where the following note can be found: "This parameter contains the 24 bit ICAO address of the aircraft with which the contract is being made".

Assigned SME: Subvolume V SME (K.-P. Graf)

Proposed SARPs amendment:
In para 5.4.3.8.4.4 replace "24-bit ICAO Aircraft Identifier" by "24-bit ICAO Aircraft Address"

SME Recommendation to CCB: ACCEPT proposed SARPS amendment

CCB Decision:

Attachment B

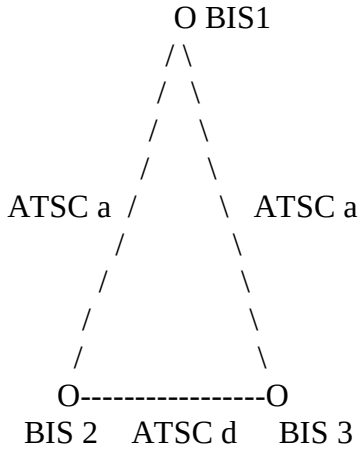
Title:	Downgrading of ATSC Class
PDR Reference:	98090003
Originator Reference:	
SARPs Document Reference:	ICS SARPs, Section5.8.3.2.4.2.1.d)
Status:	ACCEPTED
PDR Revision Date:	
PDR Submission Date:	22 September 1998
State/Organization:	STNA/Fance
Submitting Author Name:	Stephane Tamalet
Submitting Author E-mail Address:	stephane_tamalet@stna.dgac.fr
Submitting Author Supplemental Contact Information:	Tel. +33/(0)562/145483 Fax. +33/(0)562/145401
SARPs Date:	ICAO First Edition - 1998
SARPs Language:	English

Summary of Defect:

The ProATN A/G BIS development team has raised the potential ICS SARPS problem described below when performing tests on the STNA ProATN platform.
The problem is observed in an ATN network when a BIS downgrades the ATSC class of the routes as permitted by SARPs section 5.8.3.2.4.2.1.d).

The problem is illustrated by the example below:

Consider the following meshed topology with 3 BISs, each belonging to a different Routing Domain:



The links (BIS1-BIS2) and (BIS1-BIS3) are high speed, low transit delay links, and the routers are configured so that they will not downgrade the ATSC class of routes advertised over these links.

On the other hand, the link (BIS2-BIS3) is a high transit delay link, and routers BIS2 and BIS 3 are configured to downgrade the ATSC class of routes advertised over that link (according to SARPs section 5.8.3.2.4.2.1.d)).

For instance, it is assumed that Class A routes are downgraded to Class D routes when advertised over that link.

Let's assume that BIS 1 is currently advertising an ATSC Class A route (e.g. the route to the French RD).

BIS 2 receives this class A route from BIS 1 and re-advertises this route as a class D route to BIS 3. In the same way, BIS 3 receives this class A route from BIS 1 and re-advertises this route as a class D route to BIS 2.

The result of this is that BIS 2 knows two routes to the French RD:
- 1 class A route via BIS 1
- 1 class D route via BIS 3

In the same way, BIS 3 knows two routes to the French RD:
- 1 class A route via BIS 1
- 1 class D route via BIS 2

The problem is observed when BIS 2 has to forward a CLNP PDU with a class 'D' security tag and the destination of which is in the French RD.

According to its routing table BIS 2 forwards the CLNP PDU to BIS 3; then BIS 3 re-forward the CLNP PDU to BIS 2; and the ping-pong game continues until the lifetime of the CLNP PDU expires. The CLNP PDU never reaches its destination.

Assigned SME: Subvolume V SME (K.-P. Graf)

Proposed SARPs amendment:

SME Recommendation to CCB: ACCEPT PDR

CCB Decision:

Attachment C

Title:	Backbone hides optimal routes to off-backbone BISs
Reference:	98090004
Originator Reference:	
SARPs Document Reference:	ICS SARPs, Section 5.3.7
Status:	ACCEPTED
PDR Revision Date:	
PDR Submission Date:	22 September 1998
State/Organization:	STNA/Fance
Submitting Author Name:	Stephane Tamalet
Submitting Author E-mail Address:	stephane_tamalet@stna.dgac.fr Submitting
Submitting Author Supplemental Contact Information:	Tel. +33/(0)562/145483 Fax. +33/(0)562/145401
SARPs Date:	ICAO First Edition - 1998 SARPs
Language:	English

Summary of Defect:

The concept of the ATN backbone and the current ATN routing policy defined in section 5.3.7 of the ICS SARPs, are such that off-backbone A/G BISs may not know all the possible routes to an aircraft. Only backbone routers are assumed to know all possible routes to the aircraft.

Although off-backbone routers do not know all possible routes to the aircraft, they do not forward systematically the CLNP packets to the backbone: when an off-backbone router knows a route to an aircraft that is permissible for a CLNP packet, it prefers to forward the CLNP packet along this route rather than forwarding the packet to the backbone. This behaviour may lead to non-optimal forwarding decisions. For instance:

- an AOC CLNP packet with a security tag indicating preference for VDL over satellite may be forwarded over a satellite subnetwork even if a VDL route to the aircraft exists.

- an ATSC CLNP packet with a security tag requesting ATSC class B may be forwarded over an ATSC class F route even if an ATSC class B route to the aircraft exists.

The problem is illustrated by the example below:

Consider the following topology: an ATN Island with a backbone, and two off-backbone RDs (RD1 and RD 2). RD1 and RD2 are directly interconnected with the backbone.

An aircraft is currently in contact with both RD1 and RD2: we assume that this aircraft is in contact with RD1 via a (class F) satellite subnetwork, and in contact with RD2 with a (class B) VDL subnetwork.

The result of this is that:
- RD1 routers know the class F route to the aircraft (but not the class B route)
- RD2 routers know the class B route to the aircraft (but not the class F route)
- backbone routers know the two existing routes

The consequence is that an upgoing class B CLNP traffic between an ES in RD1 and the aircraft will go through the local class F satellite subnetwork rather than going through the available remote class B VDL subnetwork.

Reversely (but this seems to be more acceptable), an upgoing class F traffic between an ES in RD2 and the aircraft will go through the local class B VDL subnetwork rather than going through the available remote class F satellite subnetwork.

Assigned SME: Subvolume V SME (K.-P. Graf)

Proposed SARPs amendment:
This problem could be easily fixed in the SARPS by adding a new policy rule for backbone and off-backbone routers (to advertise the routes to a given aircraft to all off-backbone routers advertising another route to the same aircraft). But the impact of such a modification could be strong for the implementations. This would also increase the routing traffic in an Island.

SME Recommendation to CCB: ACCEPT PDR

CCB Decision:

Attachment D

Title:	Value of SNCR in X.25 call request packets
Reference:	98090010
Originator Reference:	
SARPs Document Reference:	ICS SARPs, Section 5.7.6.1.1 Note 5 Section 5.7.6.2.1.5.6 Section 5.7.6.2.1.5.12
Status:	ACCEPTED
PDR Revision Date:	
PDR Submission Date :	15 September 1998
State/Organization:	STNA/France
Submitting Author Name:	Henri DENIS
Submitting Author E-mail Address:	denis_henri@stna.dgac.fr Submitting
Submitting Author Supplemental Contact Information:	Tel. +33/5/6214 5489 Fax. +33/5/6214 5402
SARPs Date:	ICAO First Edition - 1998
SARPs Language:	English

Summary of Defect:

The paragraph 5.7.6.2.1.5.6 of the ATN ICS SARPs specifies that in a call request packet, the SNCR (Subnetwork Connection Reference) field shall be set to the number of virtual circuits currently established between the calling and called DTEs.

This strategy is not satisfactory and prevents under certain circumstances the establishment of multiple parallel Virtual Circuits between the same pair of DTEs. The condition under which this strategy is considered to be defective is described in the following example scenario:

a) We consider 2 routers A and B the SNDCFs of which are configured to allow for the establishment of multiple (e.g. up to 3) parallel VCs between A and B.
b) A first Virtual Circuit is established between A and B with a SNCR field set to 0
c) A second VC is established between A and B with SNCR 1
d) For some reasons the first VC (i.e. the one with the SNCR set to 0) is cleared.
e) Router A attempts to re-establish this VC. A call request is issued, with the SNCR field set to 1 accordingly with the SARPs clause 5.7.6.2.1.5.6.
f) In this case, according to ISO 8473-3, the router B will accept the new VC but will clear the older VC which was already established with SNCR 1.

The result is that 2 routers will never succeed anymore in establishing a second parallel VC.

In order to solve this problem, it is proposed to replace the paragraph 5.7.6.2.1.5.6. by:

"5.7.6.2.1.5.6.The value encoded in this field shall be the lowest available SNCR value in the range from 0 up to one less that the number of Virtual Circuits required at this call priority."

It is additionally proposed to fix another problem related to the attribution of value to the SNCR field when a call request is issued over a mobile subnetwork in the case of a hand-over and with maintenance of the LREF directory. With the current SARPs, it is not very clearly

specified whether, during a hand-over, the new call request has to convey an SNCR field value different from the one of the old VC, or not. It is assumed, since the new VC is intended to replace the old VC, that the new call request must convey the same SNCR value as the one previously used for the establishment of the older VC. However, an implementation may consider that the clause 5.7.6.2.1.5.6. contradicts this logic and implement the opposite solution.

To fix this problem, the following change is proposed:
Insert the following new paragraph after paragraph 5.7.6.2.1.5.13:
"5.7.6.2.1.5.14 When the request for Local Reference directory is used, the Subnetwork Connection Reference (SNCR) of the call request packet shall be set to the same value as the one previously used by the former Virtual Circuit established in the same Subnetwork Connection Group."

Proposed SARPs amendment:

SME Recommendation to CCB: ACCEPT PDR

CCB Decision:

Attachment E

Title:	Correlation of ATSC class with a/g subnet type in Airborne Router
Reference:	98060006
Originator Reference:	
SARPs Document Reference:	ICS SARPs, Section 5.8.3.2.3.3
Status:	ACCEPTED
PDR Revision Date:	
PDR Submission Date:	22 June 1998
Submitting State/Organisation:	DFS/Germany
Submitting Author Name:	Klaus-Peter Graf
Submitting Author E-mail Address:	klaus.graf@unibw-muenchen.de
Submitting Author Supplemental Contact Information:	Tel: +49/89/6004 4123 Fax: +49/89/680 735 13
SARPs Date:	ICAO Version 2.2
SARPs Language:	English

Summary of Defect:

Section 5.8.3 specifies two types of security tag sets, namely the air/ground subnetwork type security tag set and the ATSC class security tag set, to convey subnetwork type specific or traffic type specific details respectively about available routes between adjacent BISs.
Whereas the information provided in the air/ground subnetwork type security tag set(s) (i.e. the A/G subnetwork type and the permissible traffic type) is associated with the particular air/ground subnetwork(s) being components of the concerned route, the information provided in the ATSC Class security tag set (i.e. the available ATSC Class) is associated with the route.

Whereas A/G Routers are assumed to be in a position to relate the route-specific information of the ATSC Class security tag set to the air/ground subnetwork-specific information of the air/ground subnetwork type security tag set(s) due to configured relevant a priori knowledge, this correlation cannot be performed by Airborne Routers as they will not have this a priori knowledge available onboard in general.

Therefore, there are difficulties for the Airborne Router to relate the ATSC Class received on a route to the individual subnetworks received on the same route, if more than one subnetwork is available over the air/ground adjacency.

For example, if the Airborne Router receives a route with the following security information:
air/ground subnetwork type security tag 1 = VDL, ATSC traffic allowed
air/ground subnetwork type security tag 2 = AMSS, ATSC and AOC traffic allowed
ATSC Class security tag = Class B

should it update its FIB so that it forwards ATSC Class B traffic via the VDL subnetwork or via the AMSS subnetwork or via both ?

Assigned SME: Sub-Volume V SME (K.-P. Graf)

Discussion:
Alternative fixes to the above reported problem appear to be

1. to require a prior knowledge (concerning ATSC class) by an airborne router of all a/g subnetworks that it may come in reach of, or
2. to include the ATSC class on the ISH PDU by some extension mechanism, or
3. to link the information in the ATSC Class security tag to the information in the air/ground subnetwork type security tag by a modification of the protocol, e.g. by merging the two individual security tag sets into a common security tag set or by expanding the existing security tag structure, or
4. to uplink individual routes to Airborne Routers for each pair of ATSC Class security tag and air/ground subnetwork type security tag, or
5. to ignore the ATSC class parameter on the air/ground hop when routing packets from air to ground.

Proposed SARPs amendment:
At its Utrecht meeting in June 1998, WG2 has developed a proposed SARPs amendment concerning the above reported problem. As this change proposal requires text modification at multiple locations within Chapters 5.3 and 5.8 of the ICS SARPs, it has been documented in the form of strike-out and amendment text on the relevant pages of the ICS SARPs. Consequently the proposed SARPs amendment cannot be included in this PDR but may be downloaded from the directory atnp/ccb/sme5 at the CENA archive. The coresponding file name is utr_fl3.zip.

This file contains Revision B of Flimsy 3 of the Utrecht/WG2 meeting. This revision includes the changes to Revision A agreed at the 1 July morning session of the meeting.

SME Recommendation to CCB:

CCB Decision: