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Proposed SARPs Changes for Enhancements derived from WP-471 (Action 16/6)

Presented By Tony Whyman

Prepared by Tony Whyman

SUMMARY

In fulfilment of action 16/6, this paper provides proposed SARPs changes to Sub-Volume 5. The action required changes to address negative effects from rapidly changing connectivity. The proposal is, however, also a solution to PDR 98060006.

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1. Introduction

1.1 Background

The problem that results from rapidly changing mobile connectivity is due to the SARPs requirement in 5.3.5.2.10.5 that requires an Air/Ground Router to re-advertise routes to an airborne router when mobile subnetwork connectivity changes to that airborne router. Thus, for example, if an aircraft has an adjacency with an Air/Ground Router over AMSS and also comes into contact with the same Air/Ground Router through a VDL subnetwork, the Air/Ground Router will re-advertise the routes that it had previously uplinked to the aircraft. These may be uplinked over either subnetwork. Should the aircraft then go out of contact with the VDL subnetwork then another re-advertisement of the routes should also be expected, which then has to be over AMSS.

This becomes a serious issue when the aircraft is in a VDL fringe area and might go in and out of contact with the VDL subnetwork. The regular re-advertisement of the routes may then become a serious cost issue, especially on the satellite data link.

The reason for the re-advertisement of the routes was to keep the aircraft informed of the ATSC Class and traffic type restrictions (if any) applied to each air/ground subnetwork. However, PDR 98060006 showed this mechanism to be defective. WP471 then proposed a resolution to the PDR that made use of the ISH PDUs to uplinked the required information. This does not require a readvertisement of the routes.

Hence, if the solution proposed in WP471 is adopted together with the withdrawal of the requirement to re-advertise routes, the problems due to rapidly changing mobile subnetwork connectivity should also be fixed.

1.2 Scope

This paper provides proposed SARPs changes to implement the solution proposed in WP471, and the withdrawal of the requirements that cause the mobile subnetwork connectivity problems.

2. Proposed SARPs Changes

WP471 identified the following areas of the SARPs that need to be modified:

	Section	Change
1.	5.8.2	a) A new options parameter to be defined for use with the ISH PDU. This options parameter to convey the ATSC Class of the subnetwork over which the ISH PDU is transferred, and any restrictions on traffic types permitted to pass over the subnetwork. b) A new Router capabilities parameter to be added which can be used to declare Router capabilities as a bitstring. The only capability so far defined is the ability to receive information on ATSC class and Traffic Type Restrictions as an ISH PDU options parameter. Routers only process the capabilities bits they understand and ignore the rest.
2.	5.3.5.2.6	c) New requirement on Air/Ground Router to include the ATSC Class options parameter in each ISH PDU that it sends over an air/ground data link, identifying the ATSC

	Section	Change
		class of that data link d) New Requirement on Airborne Router to recognise this new options parameter when present and to update its local configuration data to record the actual ATSC Class of the data link as identified by the Air/Ground Router.
3.	5.3.5.2.10.5	This requirement may be modified so that the procedure is not performed if the Airborne Router is able to receive information on ATSC Class, etc as an ISH PDU Options parameter.
4.	5.8.3.2.4.1.1.(a)	The requirement on an Air/Ground Router to advertise Traffic Type restrictions to an Airborne Router as security path attributes is not longer needed when the Airborne Router receives this information on the ISH PDU. The requirement should be modified to effectively delete the "either advertised or" clause when the Airborne Router is able to receive Traffic Type information on the ISH PDU.

It should be noted that in discussion of WP471, it was agreed that a version number rather than explicit indication of capabilities would be used.

2.1 Proposed Change to 5.8.2

8.5.2.1 **General**

8.5.2.1.1 ATN Airborne and Air/Ground Routers directly connected to a Mobile Subnetwork (e.g. Mode S, AMSS or VDL) shall operate ISO/IEC 9542 over each such Mobile Subnetwork.

8.5.2.1.2 Configuration Information shall be exchanged by both ATN Air/Ground and Airborne Routers over each Mobile Subnetwork connection supporting an adjacency between them.

8.5.2.2 **ATN Version Number Parameter**

8.5.2.2.1 ATN Systems that generate an ISH PDU shall include an ATN Version Number Parameter.

Note.— This parameter is encoded in the ISH PDU Options part and uses a parameter code defined in this specification. The use of this parameter in ISH PDUs sent over data links other than ICAO mobile subnetworks is out of scope of this specification and may result in unpredictable behaviour.

8.5.2.2.2 The ATN Version Number Parameter shall be encoded in the options part of an ISH PDU with the following parameter code, length and value:

Parameter Code	1111 0000
Parameter Length	One octet
Parameter Value	2

Note.—This implies that the current ATN Version is version 2. Later versions of this specification will change this to an incrementally higher version number.

8.5.2.2.3 An ATN System receiving an ISH PDU containing an ATN Version Number Parameter shall use the parameter value to determine the version number of this specification implemented by the sending system. Absence of the parameter shall imply compliance with version one of this specification.

Note.—Backwards compatibility is a goal of all versions of this specification and this mechanism is used to determine whether features defined in later versions of the ATN SARPs can be used in communications with the remote system.

8.5.2.3 Subnetwork Information Parameter

8.5.2.3.2 ATN Air/Ground Routers shall include a Subnetwork Information Parameter with each ISH PDU they send over an Air/Ground Data Link.

Note.—The Subnetwork Information Parameter is used to inform the Airborne Router about the ATSC Class (if any) assigned to the subnetwork and any traffic type restrictions that apply to the subnetwork.

8.5.2.3.2 The Subnetwork Information Parameter shall be encoded in the options part of an ISH PDU with the following parameter code, length and value:

Parameter Code	1111 0001
Parameter Length	two octets
Parameter Value	As defined below

8.5.3.2.1 The first octet of the parameter shall identify the ATSC Class (if any) assigned to the subnetwork. The encoding and interpretation of this octet shall be as specified in Table 5.8-0, The second octet shall identify the set of permissible traffic types using the same encoding and interpretation as specified in 5.8.3.2.3.2.4 to 5.8.3.2.3.2.6 inclusive.

Value	**ATSC Class assigned to Subnetwork**
0000 0000	None
0000 0001	A
0000 0010	B
0000 0011	C
0000 0100	D
0000 0101	E
0000 0110	F
0000 0111	G
0000 1000	H

Table 5.8-0 Encoding of ATSC Class in first octet of Subnetwork Information Parameter

8.5.2.3.3 When an Airborne Router receives an ISH PDU over an Air/Ground Subnetwork that include this parameter, it shall take the ATSC Class specified by the parameter as the ATSC Class assigned to the subnetwork and respect any restrictions on traffic types identified by the parameter.

8.5.2.4 **ATN Protocol Requirements List - ISO/IEC 9542**

8.5.2.32.1 An implementation of the ISO/IEC 9542 protocol shall be used in ATN Airborne and Air/Ground Routers, if and only if its PICS is in compliance with the APRL given in Table 5.8-1.

Table 5.8-1 ISO/IEC 9542 - Intermediate System

Item	Protocol Function	Clauses	ISO Status	ATN Support
CI	Is configuration information supported over the associated subnetwork?	ATN SARPs Ref.: 5.8.2	O	M
RI	Is redirection information supported over the associated subnetwork?	ATN SARPs Ref.: 5.8.2	O	OX
	Are the following functions supported?			
ErrP	Protocol Error Processing	6.13	M	M
HCsV	PDU Header Checksum Validation	6.12	M	M
HCsG	PDU Header Checksum Generation	6.12	O	O
RpCf	Report Configuration	6.2, 6.2.2	CI:M	M
RcCf	Record Configuration	6.3, 6.3.1	CI:M	M
FlCf	Flush Old Configuration	6.4	CI:M	M
RqRd	Request Redirect	6.8	RI:M	OX
CfNt	Configuration Notification	6.7	CI:O	OX
CTGn	ESCT Generation	6.3.2	CI:O	OX
AMGn	Address Mask (only) generation	6.8	RI:O	OX
SMGn	Address mask and SNPA Mask generation	6.8	RI:O	OX
	Are the following PDUs Supported?			

Item	Protocol Function	Clauses	ISO Status	ATN Support
ESH-r	<r> End System Hello	7.1, 7.5	CI:M	O
ISH-<r>	<r> Intermediate System Hello	7.1, 7.6	CI:O	M
ISH-<s>	<s> Intermediate System Hello	7.1, 7.6	CI:M	M
RD-s	<s> Redirect	7.1, 7.7	RI:M	OX
RD-r	<r> (ignore) Redirect	6.9, 7.1, 7.7	M	M
	Are the following PDU fields supported?			
FxPt	<s> Fixed Part <r> Fixed Part	7.2.1, 7.2.7 7.2.1, 7.2.7	M M	M M
SA-r	<r> Source Address, one or more NSAPs	7.3.1/2/3	CI:M	M
NET-s	<s> Network Entity Title	7.3.1/2/4	M	M
NET-r	<r> Network Entity Title	7.3.1/2/4	ISH-r:M	ISH-r:M
DA-s	<s> Destination Address	7.3.1/2/5	RI:M	OX
BSNPA-s	<s> Subnetwork Address	7.3.1/2/6	RI:M	OX
Scty-s	<s> Security	7.4.2	O	O
Scty-r	<r> Security	7.4.2	O	O
Pty-s	<s> Priority	7.4.3	O	O
Pty-r	<r> Priority	7.4.3	O	O
QoSM-s	<s> QOS Maintenance	7.4.4	RI:O	OX
AdMk-s	<s> Address Mask	7.4.5	RI:O	OX

Item	Protocol Function	Clauses	ISO Status	ATN Support
SNMk-s	<s> SNPA Mask	7.4.6	RI:O	OX
ATNVer-s	<s> ATN Version Number	SARPs: 8.5.2.2		ISH-<s>:M
ATNVer-r	<r> ATN Version Number	SARPs: 8.5.2.2		ISH-<r>: M
ATNSub-s	<s> ATN Subnetwork Information	SARPs 8.5.2.3		ISH-<s>^AGR: M
ATNSub-r	<r> ATN Subnetwork Information	SARPs 8.5.2.3		ISH-<r>^ABR:M
ESCT-s	<s> Suggested ES Configuration Timer	7.4.7	CI:O	OX
ESCT-r	<r> (ignore) Suggested ES Configuration Timer	7.4.7	ISH-r:M	ISH-r:M
OOpt-r	<r> (ignore) unsupported or unknown options	7.4.1	M	M
OOpt-s	<s> Other options		P	P
	Parameter Ranges			
HTv	What range of values can be set for the Holding Time Field in transmitted PDUs ?	ATN SARPs Ref.: 5.3.5.2.9	M	M from: 0 seconds to: 65535 seconds with a tolerance of: 10%
CTv	If configuration information is supported, what range of values can be set for the Configuration Timer ?	ATN SARPs Ref.: 5.3.5.2.5	CI:M	M from: 0 seconds to: 65535 seconds with a tolerance of: 10%

AGR = If Air/Ground Router then true else false

ABR = If Airborne Router then true else false

Note 1.— In case where IDRP is used over the Air/Ground link, the Holding Time field of transmitted ISH PDUs is preferably set to 65534 seconds as recommended in 5.3.5.2.9. The purpose of this recommendation is to effectively suppress the regular generation of ISH PDUs on the Air/Ground link.

Note 2.— In case where the procedures for the optional non-use of IDRP are used on the Air/Ground link, the Holding Time field of the transmitted ISH PDUs and the Configuration Timer are set appropriately based on operational experience so that the exchange of ISH PDUs ensures a regular update of the respective FIBs in both the Air/Ground and Airborne Routers, without overloading the Air/Ground link.

2.2 Proposed Change to 5.3.5.2.6

Add the following notes to the end of the section

Note 1.—As specified in 5.8.2.2, the ISH PDU exchange is also used by the Airborne and Air/GroundRouter to inform each other about the highest version number of this specification to which they are compliant.

Note 2.—As specified in 5.8.2.3, the Air/Ground Router also uses the ISH PDU to inform the Airborne Router of the ATSC Class (if any) assigned to subnetwork and the set of permissible traffic types that apply to the subnetwork.

2.3 Proposed Changes to 5.3.5.2.10.5

5.3.5.2.10.5 Furthermore, if and only if the Airborne Router's ISH PDU indicated that the Airborne Router is compliant with a version of this specification no greater than version one, then the Air/Ground Router shall re-advertise all routes affected by the change in subnetwork connectivity that are contained in the Adj-RIB-Out associated with the remote ATN Airborne Router subsequent to the update of the security path attribute*****s security information of these routes as specified in 5.8.

2.4 Proposed Changes to 5.8.3.2.4.1.1(a)

Change the text to:

a) ~~either advertised or~~ received by an Air/Ground Router over an adjacency supported by one or more Air/Ground Subnetworks, and