International Civil Aviation Organization

AMHS/SWIM SEMINAR AND THE SEVENTH MEETING OF AERONAUTICAL TELECOMMUNICATION NETWORK (ATN) IMPLEMENTATION CO-ORDINATION GROUP OF APANPIRG (ATNICG/7)

Chiang Mai, Thailand, 5 – 9 March 2012

Agenda Item 2: Review outcome of relevant meetings/workshops

REVIEW OUTCOME OF TENTH WORKING GROUP MEETING OF AERONAUTCIAL TELECOMMUNICATION NETWORK IMPLEMENTATION COORDINATION GROUP (ATNICG WG/10)

(Presented by the Secretariat)

SUMMARY

Tenth Working Group Meeting of Aeronautical Telecommunication Network Implementation Coordination Group (ATNICG WG/10) was held in Jaipur, India from 26 to 29 September, 2011. This paper contains outcome of the meeting and includes recommended actions for the consideration of ATNICG.

This paper relates to -

Strategic Objective:
C - Environmental Protection and Sustainable Development of Air Transport

Global Plan Initiative
GPI – 22 Communication Infrastructure

1. INTRODUCTION

1.1 Tenth Working Group Meeting of Aeronautical Telecommunication Network (ATN) Implementation Co-ordination Group of APANPIRG (ATNICG WG/10) was held in Jaipur, India from 26 to 29 September 2011. The meeting was hosted by Airports Authority of India (AAI) and was attended by 48 participants from 11 States and an Industry Partner.

2. DISCUSSION

Agenda Item 2: Review of relevant Meeting Reports (ATNICG/6, CNS/MET SG/15 and APANPIRG/22)

2.1 Tenth Working Group Meeting of ATNICG reviewed the outcome of ATNICG/6, CNS/MET SG/15 and APANPIRG/22 on issues related to the provision and operation of Aeronautical Fixed Services (AFS) and Aeronautical Mobile Services (AMS). Significant outcome of the meetings were discussed and actions required to be progressed by ATNICG were noted. Meeting outcomes have been dealt in detail in the Working Paper 7.

2.2 Meeting was also informed about the significant developments that had taken place in the Fourteenth meeting of Aeronautical Communication Panel (ACP) Working Group – I (IPS) (ACP WG-I/14) and the Eighteenth Meeting of Working Group – M (Maintenance) (ACP WG-M/18). Both these Working Group Meetings were held in Montreal from 18 to 22 July, 2011.

2.3 Chairman, ATNICG briefing the meeting on the background of Aeronautical Communication Panel (ACP) informed that the Panel was created to address all the issues related to aeronautical communication. It was informed that there are three main documents, which are referred in the Panel deliberations and these are Doc 9705 (dealing with ATN over OSI), Doc 9880 (dealing with ATN over OSI and Internet Protocol network including subnet level) and Doc 9886 (dealing with ATN over IPS). It was informed that Doc 9705 had become obsolete with the transfer of relevant information in the Doc 9880. On the issue of Directory Services, it was informed that the service is not yet working, but will be an online tool that can impact AMHS operation when it is implemented. In the interim, the meeting was reminded that States should use AMC through AEROTHAI. The meeting was reminded about the importance of providing their up to date AMHS information through AEROTHAI since all operational or planned operational AMHS will refer to AMC database for AMHS addresses and other related information.

2.4 Following important issues related to implementation of ATN/AMHS were raised in the meeting:

i) It appears that ACP is giving quite a lot of importance to the implementation of VoIP, whereas in the APAC region, implementation of AIDC is being considered more important. Since, both these services are used for coordination across FIRs, the Group agreed that implementation of AIDC should take precedence, since it is a data based application, which is considered to provide more accurate exchange of information as compared to voice based service like VoIP;

ii) The meeting also recommended that AIDC, that is based on AFTN header be encouraged to use AMHS/AFTN gateway as the AFTN X.25 network protocol is becoming obsolete and is hard to maintain;

iii) An issue was raised that in ACP, a suggestion had been made to relegate ATN over OSI to the status of Recommended Practices and ATN over IPS to be kept as Standard. Chairman clarified that this proposal was opposed in ACP based on the argument that in the APAC region there is an implementation which is based on ATN over OSI only. It was also pointed out that Air-Ground implementations are predominantly OSI based hence it cannot be relegated to Recommended Practices status;

iv) On the issue of Domain Name Server (DNS), meeting agreed that domain name, in addition to making the IPv6 addresses human readable also provides identity for the civil aviation related organizations. The meeting, hence, supported the proposal of having a domain name for civil aviation community; and

v) For air-ground communication, meeting was of the view that VDL-2 is ATN compatible, where as ACARS are not. Because of aircraft equipage, the transition to VDL-2 is going to take some time. Meeting was further informed that Communication Service Providers (including ARINC and SITA) had the option of providing both VDL-2 and ACARS and it was left to the States to choose between the two.

Agenda Item 3: Review ASIA/PAC Technical Specifications of AMHS

2.5 Asia/Pacific Technical Specifications for AMHS adopted by APANPIRG/22 were further discussed and a paper was presented under Agenda Item 4 to explain the developed specifications against the provisions made in the existing standards.

Agenda Item 4: Implementation Status and Issues

2.6 Since Hong Kong China was not able to attend the meeting, ATN/AMHS Planner was presented by India. The meeting reviewed and updated information provided in the Planner. The planner is being presented separately.

2.7 Thailand, presenting a report on the AMHS connection testing with Singapore, informed that the system provided in Thailand had been provided by Ubitech, where as the system at Singapore was from Comsoft. The inter-operability test was carried out from 30 May to 10 June, 2011. First part of the test was to verify the basic functionality between the two systems, while the second part of the test was carried out based on a portion of the Inter Operability Test procedure prescribed in Asia/Pacific AMHS Manual. It was further clarified that the testing was carried out between MTA to MTA, however the testing was not done exhaustively. It was informed that for the test purposes, IP/SNDCF will be used at the sub-net level and later for operation OSI will be used.

2.8 India informed the meeting about completion of AMHS implementation in Mumbai and its readiness to test with Oman, Thailand, Pakistan, Nepal, Bhutan etc. India plans to implement IP-based domestic ATN/AMHS at three other major international airports in Chennai, Kolkata and Delhi. India informed the meeting about the status of testing with China, Pakistan etc.

Agenda Item 5: IP Implementation documents (IP ICD, IP Subnet ICD)

2.9 A paper on ATN Ground-Ground Internet Protocol (IP) Sub-Network Dependent Convergence Function (SNDCF) Interface Control Document (ICD) was presented by USA. ICAO has defined an IP SNDCF in Doc 9880 which specifies provisions for running Contact-Less Network Protocol (CLNP)/Inter-Domain Routing Protocol (IDRP) over IPv4 or IPv6. But in the ICAO environment a fully meshed IP sub-network is assumed which includes support to carry parameters from CLNP internetwork to the IP sub-network. The Asia/Pacific environment initially being point-to-point, does not need to support internetworking parameters such as priority, QoS etc. at the sub-net layer. The IP SNDCF ICD presented was based on ICAO defined IP SNDCF: however parameters which do not apply on a point-to-point basis are profiled out which permits a simpler implementation until Asia/Pacific migrates to a fully meshed IP Internetwork running TCP over IP. It was recommended that the IP SNDCF ICD be forwarded to ATNICG/7 for final review and for recommendation to the CNS/MET SG for adoption.

Agenda Item 6: Development of ATN/AMHS Applications

2.10 Based on the recommendation made by ATNICG/6, Asia/Pacific AMHS Specifications were developed by an ad-hoc group and was presented to the CNS/MET Sub Group, which was subsequently adopted by APANPIRG/22 based on the recommendation of the CNS/MET SG/15 meeting. A comparison between the AMHS ICD PICs and Doc 9880 PICs were presented to the Working Group. The paper analyzed Table 1.1 of AMHS ICD against Table 4-4 and 4-10 of Doc 9880. Meeting was invited to comment on the recommendations. The ad-hoc expert group was invited to assign responsibility to define and schedule completion of analysis for the remaining tables in the AMHS ICD. It was agreed that six sections identified in the Asia/Pacific AMHS Specifications that needed to be updated be assigned to the members of the expert group, that is Hong Kong China, India, Japan, Singapore, Thailand and USA. An Action Item was developed assigning responsibility of coordination to the USA.

2.11 Future System: USA informed the meeting about future evolution of ground-ground messaging system, which will include SWIM. The paper was based on the presentation made by AENA (the Spain ANSP) to the Fourth Working Group of the Whole meeting of Aeronautical Communication Panel (ACP WG-W/4) held from 13 to 16 September, 2011 in Montreal. The paper updated the definitions, structure and strategy to develop SWIM within Europe. The paper also identified most important topics that ICAO will have to take into account regarding this new concept and its coexistence with AMHS. Following high lights were included in the presentation.

i) SWIM should be a ‘middleware’ between user applications (e.g. FDPS) and distribution application (e.g. AMHS) and underlining network (e.g. PENS or IP Network);

ii) Specific requirements of the user applications should be processed by centralized SWIM rather than built in to individual user applications;

iii) Gateway to address different types of protocols and messages should be part of SWIM rather than building dual stacks to individual applications;

iv) SWIM should concentrate its processing to message type rather than user applications;

v) The need to coordinate with SESAR/NextGen should be considered to ensure SWIM infrastructure takes advantage of the new service and application offered; and

vi) SWIM region can be implemented within its region and with non-SWIM regions using phased processes to implement fully meshed SWIM environment;

2.12 The purpose of SWIM is to provide flexibility to support dynamic network without impacting operational environment. SWIM can minimize the modification to existing user applications and AMHS. It also emphasizes the need of AMHS which is binary based to support variety of messages and AMHS underlining network using Internet Protocol. Implementation of SWIM in Europe and its coexistence with AMHS was also discussed in the meeting. History of ATN Directory Service, planning and results of the study of ATN Directory operational requirement analysis was also discussed. Concern of network compatibility, on-line ATN DIR versus the off-line AMC operation, the transition from AMC to ATN DIR and recommended ATN DIR approach for Europe region were also discussed. The recommendation is to use centralized ATN DIR within

European region and each AMHS in the region to use Directory Service Agent (DSA) to maintain the ATN DIR data using the Directory Information Shadowing Protocol (DISP) for replication of information. The current ICAO Doc 9705 specifies Directory Access Protocol (DAP) which remains mandatory for access to the directory by management applications, the use of Lightweight Directory Access Protocol (LDAP) as given in IETF RFC 4511 is considered as a cost-effective alternate to incorporate a Directory User Agent (DUA) into applications with limited directory requirements. Asia/Pacific cannot consolidate all States into a network domain for ATN DIR purposes, however a bilateral ATN DIR between AMHS domains within the region should be considered.

Agenda Item 7: Any other business

2.13 Republic of Korea presented the proposed Composition of Bypass Route for International Aeronautical Communication Network. Prior to commissioning of Gimpo-Beijing AMHS link, the connectivity was provided through satellite network, with alternate routing provided through Gimpo-Fukuoka-Beijing (RK-RJ-ZB). In the proposed composition, the alternate routing will be Gimpo-Beijing (RK-ZB)over AFTN in the event of failure of Gimpo-Beining ATN/AMHS circuit. India informed about the software patch they had developed in-house for implementing Amendment-1 to the Fifteenth Edition of ICAO Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM Doc 4444) for accommodating amended flight plans. The software patch developed will make it possible for India to accept the new flight plan messages, when it becomes applicable on 15 November 2012. Thailand raised the issue that since the ANSP was not the owner of the information provided in the Flight Plan; they did not have the authority to change it. So Thailand has worked out a coordination procedure with the airline operators to facilitate change. An application has been developed to process the information between AFTN/AMHS and FDPS. AEROTHAI presented the updated information on AMC. AMC information regarding AMHS in Asia/Pacific was displayed by accessing AMC through internet during the meeting. The meeting was reminded about the information that can be updated on-line and the information that can be updated only through AEROTHAI – EUROCONTROL. States were invited to contact Mrs. Jittima regarding information on the subject on the e-mail address tima14@aerothai.co.th . UBITECH presented information about their AMHS system and updated the meeting about the status of their various implementations in the region.

2.14 ATNICG WG recorded its appreciation for the excellent meeting arrangements made by the host and thanked Airports Authority of India for hosting the meeting and other social programmes. Chairman specially thanked Dr. S.N.A. Zaidi, Secretary Civil Aviation, Govt. of India and Mr. V.P. Agrawal, Chairman AAI for their presence during inauguration. Thailand offered to host the next Working Group meeting and a Workshop on AMHS implementation. Though the venue of the meeting was informed as Chiang Mai, the schedule of the meeting was still not fixed. The meeting ended with thanks to the Chair.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) review the outcome of ATNICG WG/10 meeting;

b) progress the Action Items developed by the meeting;

c) progress on the recommendations developed by the meeting; and

d) meeting is also invited to review the IP SNDCF ICD placed at the Attachment.

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ATNICG WG/10 – WP/6
Agenda Item 5
26/09/11

TENTH WORKING GROUP MEETING OF AERONAUTICAL TELECOMMUNICATION NETWORK IMPLEMENTATION CO-ORDINATION GROUP (ATNICG WG/10)

Jaipur, India, 26 - 29 September 2011

Agenda Item 5: IP Implementation Documents

AISA/PAC ICD FOR

ATN GROUND-GROUND ROUTER

IP SNDCF

(Presented by USA)

SUMMARY

This Working Paper presents the Draft ATN Ground-Ground Router Internet Protocol (IP) Sub-Network Dependent Convergence Function (SNDCF) Interface Control Document (ICD).

This paper relates to:

Strategic Objectives:
A – Safety
C – Environmental Protection and Sustainable Development of Air Transport

Global Plan Initiatives:
GPI 22 – Communication Infrastructure

1. Introduction

1.1 The *Strategy for Implementation of ATN in the ASIA/PAC Region* calls for initially implementing AMHS Message Transfer Systems over an ATN/OSI network, which is running them over CLNP as the internetworking layer and X.25 point-to-point links as the sub-network layer.

1.2 The next step in the strategy is to begin deployment of an ATN/IPS network. In this step ATN/OSI router connections (running CLNP/IDRP) will be migrated from X.25 to IP sub-network connectivity. It is important to note that in this phase X.25 point-to-point connections will be migrated to IP point-to-point connections.

1.3 In the future, the plan is to eventually phase out the ATN ICS, at least for AMHS. In this case an AMHS MTA will operate using the ATN/IPS as specified in ICAO Doc 9880 section 3.2.2.2.3.

2. Discussion

2.1 ICAO has defined an Internet Protocol (IP) Sub-Network Dependent Convergence Function (SNDCF) in ICAO Doc 9880 which specifies provisions for running CLNP/IDRP over IPv4 or IPv6. But in the ICAO environment a fully meshed IP sub-network is assumed which includes support to carry parameters from the CLNP internetwork to the IP sub-network. The ASIA/PAC environment being intially point-to-point does not need to support internetworking parameters such as Priority, QOS, etc. at the sub-network layer.

2.2 The IP SNDCF ICD presented in this Working Paper is based on the ICAO defined IP SNDCF; however, parameters which do not apply on a point-to-point basis are profiled out which permits a simpler implementation until ASIA/PAC migrates to a fully meshed IP Internetwork running TCP over IP.

3. Action Taken by the Meeting

3.1 The meeting is invited to review and provide comments on the attached draft document.

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International Civil Aviation Organization

Asia and Pacific Office

ASIA/PACIFIC

INTERFACE CONTROL DOCUMENT

FOR
AERONAUTICAL TELECOMMUNICATION NETWORK
GROUND-GROUND ROUTER

IP SNDCF

Draft First Edition – September 2011

EXECUTIVE SUMMARY

The Aeronautical Telecommunication Network (ATN) is a global inter-network that provides digital communications to satisfy the increasing telecommunication demands of air traffic service communication, aeronautical operational control, aeronautical administrative communication, and aeronautical passenger communication.

The ATN is composed of a network infrastructure and applications that provide the global communication for ground-ground (G/G) and air-ground services. The ATN network infrastructure includes ATN backbone communication links, ATN routers, and end systems. The ATN applications include among others context management (CM), controller-pilot data link communication (CPDLC) and air traffic service message handling service (ATSMHS).

The Asia/Pacific region is implementing an ATN network to support regional and global ATN services. This Interface Control Document (ICD) specifies the IP sub-network interface requirements for ATN G/G Boundary Intermediate Systems that form nodes of the Asia/Pacific ATN regional backbone network and/or have inter-State connectivity, to ensure interoperability between States. This ICD applies to point-to-point IP sub-network connections between Boundary Intermediate Systems.

1.0 Introduction

1.1 Purpose and Scope

This document provides Interface Control Document guidelines for IP sub-network connections used to communicate between the ATN Ground-Ground Routers that form nodes of the Asia/Pacific regional network Backbone and/or have inter-State/Organization connectivity within the Asia/Pacific region, to assure interoperability.

The scope of this ICD and its relationship to the ATN Router ICD and IP ICD is shown in Figure 1-1. This ICD addresses the sub-network layer of the ATN G/G router using the IP SNDCF specified in ICAO Doc 9880.

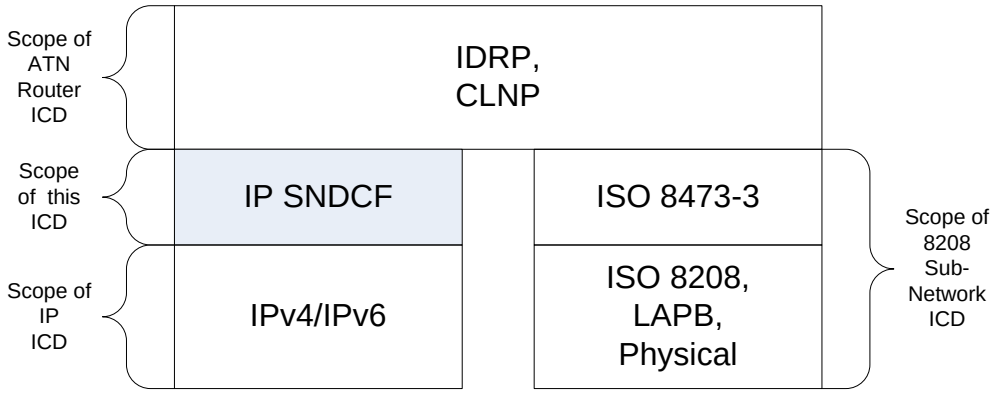

Figure 1-1: ATN Router Protocol Stack and Scope of this Document

1.3 Reference Documents

1.3.1 ICAO

[1] ICAO Doc 9880-AN/466 – Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI standards and protocols, Part III Chapter 3 – Internet Communications Service

1.3.2 ASIA/PAC

[2] ASIA/PAC Interface Control Document for Aeronautical Telecommunication Network Ground-Ground Router, Second Edition, April 2005

[3] ASIA/PAC Interface Control Document for Aeronautical Telecommunication Network Ground-Ground Router ISO/IEC 8208 Sub-Network, First Edition, April 2005

[4] ASIA/PAC Interface Control Document for the Internet Protocol, To Be Developed (TBD)

1.3.3 IETF

[5] RFC 1791, Internet Protocol – DARPA Internet Program Protocol Specification, September 1981

[6] RFC 2460, Internet Protocol, Version 6 (IPv6) Specification, December 1998

[7] RFC 2474, Definition of Differentiated Services Field (DS Field) in IPv4 and IPv6 Headers, December 1998

1.3.4 ISO/IEC

[8] ISO/IEC 8473-1, Information Technology – Protocol for providing the connectionless-mode network service: Protocol specification, 1994

[9] ISO/IEC 9542, Information processing systems – Telecommunications and information exchange between systems – End system to Intermediate system routing exchange protocol for use in conjunction with the Protocol for providing the connectionless-mode network service (ISO/IEC 8473), 1988

[10] ISO/IEC 10747, Information processing systems – Telecommunications and information exchange between systems – Protocol for exchange of inter-domain routeing information among intermediate systems to support forwarding of ISO 8473 PDUs, 1994

2.0 IP SNDCF

The purpose of a Subnetwork Dependent Convergence Function (SNDCF) is to provide the connectionless SN-Service assumed by the ATN Internet Protocols over real sub-networks.

The ATN Internet Protocols which use the Subnetwork Service (SN-Service) provided by an SNDCF are the ISO/IEC 8473 Internetwork Protocol [8] and the ISO/IEC 9542 End System to Intermediate System Protocol [9] entities.

The Subnetwork Service (SN-Service) provided by an SNDCF as specified in this ICD is provided directly to the ISO/IEC 8473 Internetwork Protocol entity and indirectly to the ISO/IEC 10747 Inter-Domain Routing Protocol [10] entity.

Table 2-1 identifies the Subnetwork Services and Associated Parameters used Asia/Pac entities.

Table 2-1 SN-Services and Associated Parameters

Parameter	**SN-UNITDATA Request**	**SN-UNITDATA Indication**
SN-Source-Address	Mandatory	Mandatory
SN-Destination-Address	Mandatory	Mandatory
SN-Priority	Optional	Optional
SN-Quality-of-Service	Optional	Optional
SNS-Userdata	Mandatory	Mandatory

Asia/Pac is planning to use the IP SNDCF on a point-to-point basis and so requirement that might otherwise apply to an IP sub-network such as Priority and QOS do not apply. Table 2-2 contains a Point-to-Point Profile for the IP SNDCF.

Table 2-2 Point-to-Point Profile for the IP SNDCF

Item	Function	Doc 9880 Reference	G-G Router Support
Title	Provision of the SN-UNITDATA.Request Service Element	3.7.10.3	
Title	Service Element Parameters	3.7.10.3.1	
	For IPv4, the SN-Source-Address and SN-Destination-Address parameters shall be 32-bit IP Addresses.	3.7.10.3.1.1	Yes
	For IPv6, the SN-Source-Address and SN-Destination-Address parameters shall be 16-octet IP Addresses.	3.7.10.3.1.2	Yes
	As a local matter, the SN-Source-Address shall either be used to indicate the SNPA from which the encapsulated PDU is to be sent, or set to a null value.	3.7.10.3.1.3	Either
	As a local matter, the SN-Quality-of-Service subparameters, if present, other than priority shall either be ignored by the IP SNDCF, or used to determine the Differential Service Requirements for the encapsulating IP Packet header.	3.7.10.3.1.4	Ignored
	The priority subparameter of the SN-Quality-of-Service service parameter shall be used to determine the value of the Differentiated Service field indicated in the encapsulating IP Packet header as described in the procedures below.	3.7.10.3.1.5	No
	The SN-Userdata shall be an unconstrained octet-string (e.g. an encoded CLNP PDU including the CLNP header and user data).	3.7.10.3.1.6	Yes
Title	Procedures	3.7.10.3.2	N/A
Title	IPv4 Subnetworks	3.7.10.3.2.1	N/A
	When the IP SNDCF SN-UNITDATA.Request service element is invoked, an IPv4 datagram shall be constructed with the SN-Userdata as the data portion of the datagram (the payload).	3.7.10.3.2.1.1	Yes
	The IP datagram header shall be constructed according to RFC 1791 [5]	3.7.10.3.2.1.2	Yes
	The protocol shall be set to decimal 80	3.7.10.3.2.1.2.a	Yes
	The source address shall be the IP Address assigned to	3.7.10.3.2.1.2.b	Yes

	the interface from which the packet is sent.		
	The destination address shall be the SN-Destination-Address.	3.7.10.3.2.1.2.c	Yes
	The Time to Live shall be set to a locally specified value, which shall be configurable.	3.7.10.3.2.1.2.d	No
	The 3 topmost bits of the Differentiated Service Code Point (DSCP, former precedence subfield) of the Type of Service (TOS) field shall be set depending on the value of the priority subparameter of the SN-Quality-of-Service service parameter, as follows: IP Precedence — CLNP Priority 000 — 0,1,2,3,4,5 001 — 6,7 010 — 8,9 011 — 10 100 — 11,12,13 101 — 14 110 — N/A 111 — N/A	3.7.10.3.2.1.2.e	No
	As a local matter, the remaining Differentiated Service bits shall be set to correspond to the SN-Quality-of-Service parameter or to a locally specified default value.	3.7.10.3.2.1.2.f	No
	The last two bits of the TOS field (i.e. bits 6 and 7), shall be set to zero.	3.7.10.3.2.1.2.g	No
	The resulting IP datagram shall be forwarded to its addressed destination on the IP Network.	3.7.10.3.2.1.3	Yes
Title	IPv6 Subnetworks	3.7.10.3.2.2	
	When the IP SNDCF SN-UNITDATA.Request service element is invoked, an IPv6 header shall be constructed with the SN-Userdata as the payload of the complete datagram.	3.7.10.3.2.2.1	Yes
	The IP datagram header shall be constructed according to RFC 2460 [6]	3.7.10.3.2.2.2	Yes
	The Next Header field shall be set to decimal 80 unless extension headers are present, when the Next Header field of the final header shall be set to decimal 80.	3.7.10.3.2.2.2.a	Yes
	The source address shall be the IP Address assigned to	3.7.10.3.2.2.2.b	Yes

	the interface from which the packet is sent.		
	The destination address shall be the SN-Destination-Address.	3.7.10.3.2.2.2.c	Yes
	The Hop Limit shall be set to a locally specified value, which shall be configurable.	3.7.10.3.2.2.2.d	No
	The Flow Label shall be set to zeroes.	3.7.10.3.2.2.2.e	Yes
	The Traffic Class shall be set according to RFC 2474 [7]. The value of the first six bits (the DSCP) shall be set to the value xxx000, where the bits 'xxx' are set depending on the value of the priority subparameter of the SN-Quality-of-Service service parameter and according to Doc 9880 (i.e. they are set to the value of the precedence bits in Doc 9880).	3.7.10.3.2.2.2.f	No
	The last two bits of the Traffic class shall be set to zero.	3.7.10.3.2.2.2.g	No
Title	SN-UNITDATA.Indication Service Element	3.7.10.4	
Title	IPv4 Subnetworks	3.7.10.4.1	
	The system shall be configured such that IP packets with a protocol id of 80 are passed to the IP SNDCF.	3.7.10.4.1.1	Yes
	All IP Datagrams passed to the IPv4 SNDCF by the IP Network Service provider shall result in an SN-UNITDATA.Indication, constructed as follows	3.7.10.4.1.2	Yes
	The SN-Source-Address shall be set to the value of the source address field of the IP Datagram header.	3.7.10.4.1.2.a	Yes
	The SN-Destination-Address shall be set to the value of the destination address field of the IP Datagram header.	3.7.10.4.1.2.b	Yes
	The SN-Userdata shall be the data portion of the IP datagram.	3.7.10.4.1.2.c	Yes
	No SN-Quality-of-service parameter shall be present.	3.7.10.4.1.2.d	No
Title	IPv6 Subnetworks	3.7.10.4.2	
	The system shall be configured such that IP packets with a next header byte for the payload set to 80 are passed to the IP SNDCF.	3.7.10.4.2.1	Yes
	All IP Datagrams passed to the IPv6 SNDCF by the IP Network Service provider shall result in an SN-UNITDATA.Indication, constructed as follows	3.7.10.4.2.2	Yes
	The SN-Source-Address shall be set to the value of the	3.7.10.4.2.2.a	Yes

	source address field of the IPDatagram header.		
	The SN-Destination-Address shall be set to the value of the destination address field of the IPDatagram header.	3.7.10.4.2.2.b	Yes
	The SN-Unitdata shall be the payload of the IP datagram.	3.7.10.4.2.2.c	Yes
	No SN-Quality-of-service parameter shall be present.	3.7.10.4.2.2.d	No
Title	ICMP Message Handling	3.7.10.5	
	If a “Destination Unreachable” or “Time Exceeded” ICMP message is received by the IP SNDCF, this should be reported to a layer management function indicating the destination IP Address for which the problem is reported, so that appropriate action may taken.	3.7.10.5.1.1	Yes
	An ICMP message indicating a “Parameter Problem” may indicate a software or configuration error and this should be notified to layer management so that the error is noted and fixed by a network manager.	3.7.10.5.1.2	Yes
Title	Resilient Operation	3.7.10.6	
	When it has more than one interface to an IP network, an ATN system implementing the IP SNDCF shall rely upon the configuration, topology and management of an underlying IP Subnetwork, including IP functions implemented by the ATN system itself, in order to support resilient operation.	3.7.10.6.1	Yes
	Even if the ATN system has more than one interface to the IP network, a single IP address shall be used to support an adjacency with a given remote BIS.	3.7.10.6.2	Yes