NACC/WG/2 - WP/13
International Civil Aviation Organization 31/03/08
North American, Central American and Caribbean Office
Second North American, Central American and Caribbean Working Group Meeting (NACC/WG/2)
Ocho Rios, Jamaica, 12-16 May 2008

Agenda Item 3 **CNS Developments**

3.2 Follow-up on the Action Plan for the Implementation of Voice and Data Air-Ground Communications

3.3 Follow-up Activities for the Implementation of Ground-Ground Communications

FOLLOW-UP ACTIVITIES FOR THE IMPLEMENTATION OF AIR-GROUND AND GROUND-GROUND COMMUNICATIONS

(Presented by the Secretariat)

SUMMARY

This working paper presents a summary of aspects related with the implementation of voice/data air-ground and ground-ground communications. These aspects cover considerations and reference, the follow-up activities to action plans, progress in ATN standards and its applications and other issues related to the planning and implementation of these communications.

References:

- Report of the CAR/WG/1 Meeting
- Reports of the GREPECAS/13 and GREPECAS/14
- Global Air Navigation Plan, Doc 9750 AN/968
- Reports of the ACP/5 and ACP/6 Meetings

1. Regional Implementation Plans for air-ground data links and air-ground communications

1.1 As part of the analysis and update made by the First Meeting of the NACC/WG, formerly known as CAR/WG, held in Port of Spain, Trinidad and Tobago from 21 to 23 June 2007, the Meeting took note of the plan of activities, the programme for the implementation of air-ground data links and the review of FASID Table 2A – Aeronautical Mobile Service and AMSS, which were adopted by GREPECAS Conclusions 13/71 and 13/72.

1.2 Table CNS 2A has been updated and this update was informed to States through the proposal for amendment sent in State Letter Ref. EMX0274 dated 12 March 2008. This update serves different valid conclusions exposed in: GREPECAS Conclusion 14/53, C/CAR/DCA Conclusion 8/1, C/CAR/WG Conclusion 5/12 and CAR/WG Conclusion 1/5.

1.3 The recommendation to amend FASID Table CNS 2A indicated through CAR/WG/1 Conclusion 1/5, item b), will be considered in the next Meeting of the CNS Committee of the GREPECAS ATM/CNS Subgroup, considering that the Plan is applied to the CAR/SAM Regions and also, the future update of the Air Navigation Plan to the eANP electronic format.

1.4 FASID Table CNS 2B provides information on HF network designators for CAR/SAM aeronautical units, as well as on ITU standardized assignment area frequencies.

1.5 The CAR/SAM Regional Plans associated with the ATN implementation and applications, emanate from GREPECAS Conclusion 13/74 – *Proposal for Amendment to ATN Regional Plan*, which proposed to amend FASID Table CNS 1B by replacing the format with Table CNS1Ba - *CAR/SAM regional Plan of ATN routers*, Table CNS 1Bb – *CAR/SAM regional Plan of ground-ground applications*, as well as Table CNS 1Bc – *CAR/SAM regional Plan of air-ground applications*.

1.6 In the Fifth Meeting of the ATM/CNS Subgroup, the ATN Air-Ground Applications Plan (Table CNS 1Bc), which is presented in **Appendix A** to this working paper.

2. Regional Implementation Plans for ground-ground communications

2.1 Regional plans for ground-ground communications are described in different plans within the CAR/SAM Air Navigation Plan Doc 8733, Vol. II – FASID.

2.1.1 The *AFTN Plan* (Table CNS 1A) has been updated and its amendment has been sent to States according to paragraph 1.2 of this working paper. This update serves updates informed by States and GREPECAS Conclusion 12/37.

2.1.2 Also, the ATS Direct Speech Circuits Plan (Table CNS 1C) has been updated.

2.1.3 The update of the *CAR/SAM regional Plan of ground-ground applications* (Table CNS 1Bb) serves the updates informed by States and by GREPECAS Conclusion 13/75 – Request for information on plans to implement ATN ground-ground applications.

2.1.4 **Appendix B** to this working paper presents the format for the *CAR/SAM regional Plan of ATN routers* (Table CNS 1Ba).

2.2 A strategy and deadlines for the ATN deployment in the CAR/SAM regions was addressed by GREPECAS Conclusion 13/78, which contains the deployment of the ATN network and its applications, proposing the implementation of the AMHS System by 2015, at the latest.

2.3 As part of the regional planning for the implementation of the AMHS system in the region, an ICAO registry was created for the addresses and management domain identifiers that will be used in the message air traffic services message handling system (ATSMHS), which are based on the guidelines and indications sent by the Secretary General State Letter Ref. SP 54/1-03/39, dated 30 May 2003. The current information contained in this record, relevant to the NAM/CAR Region Administrations, is presented in **Appendix C** to this working paper. Likewise, this information is accessible electronically through the ICAO Aeronautical Communications Panel website (www.icao.int/anb/panels/acp/amhs/amhs.cfm).

3. Considerations and References for the Action Plan required to implement voice and data ground-air and ground-ground communications

3.1 GREPECAS Conclusion 12/32 – *ADS-B Implementation in the CAR/SAM Regions* urged to improve routing lists of the AFTN network in the CAR/SAM Regions.

3.2 GREPECAS Conclusion 13/71 – *Update and Implementation of the VHF, HF and Satellite Voice Communication of the AMS and AMSS Plan*, urged Aeronautical Administrations to support the implementation of improvement and mitigation plans for the VHF and HF/SMA coverage and implement satellite voice communications.

3.3 GREPECAS Conclusion 13/72 – *Regional Strategy for Updating Evolutionary Implementation of the Air-Ground Data Links Plan*, adopted the regional strategy for the updating and implementation of the air-ground data links, formed by an activities plan and an implementation programme.

3.4 GREPECAS Conclusion 13/79 – *Development of National Plans to Prioritize the AMHS and AIDC Implementation and Contribute to ATM Automation*, urged Aeronautical Administrations to develop these national plans.

3.5 Global Plan Initiative (Doc 9750) GPI-17 – *Implementation of Data Link Applications*, promotes the use of data link applications. To this regard, the GREPECAS/14 Meeting took note that the regional strategy adopted in Conclusion 13/72 is harmonised with this initiative.

3.6 Plan Initiative (Doc 9750) GPI-22 – *Communication Network Infrastructure*, offers the strategy for the evolution of the infrastructure of mobile and fixed aeronautical communications, that can be applied to voice and data communications, to adapt new functions and provide proper capacity and service quality to comply with ATM requirements.

3.7 Reference documentation for the AMHS system, the ATN network and the ATSMHS is contained in:

- Annex 10, Vol. III, Chapter 3, General description of the AMHS system and the ATSMHS service;
- Doc 9705 – Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN);
- Doc 9739 – Comprehensive Aeronautical Telecommunication Network (ATN) Manual;
- Doc 9880 – Manual on Detailed Technical Specifications of the ATN/OSI (to be published); and
- Doc 9896 – Manual for the ATN using IPS standards and protocols.

SARPs Development Status and ICAO Guidance Material

3.8 Amendment 83 to Annex 10 – *Aeronautical Telecommunications*, Vol. III, Parts I and III, applicable on 20 November 2008, introduces the Internet Protocol Suite (IPS) technology in the aeronautical telecommunications network (ATN) and the new dispositions for the displaced carrier in 8,33 kHz environment of a double sideband amplitude modulation (DSB-AM) of very high frequency (VHF).

3.9 The ICAO Aeronautical Communications Panel (ACP) reviews and updates SARPs and other guidance material for the implementation of improvements and future communications systems through its different working groups.

3.10 The Internet Protocol Suite Working Group (ACP/WG/I) is the team responsible for the development of Doc 9896 – Manual for the ATN using IPS standards and protocols. **Appendix D** of this working paper presents a presentation with the progress in the development of this document.

3.11 The Sixth Meeting of the ACP/WG/I, held in Montreal from 17 to 20 March 2008, worked on version No. 13f of Doc 9896, which included and updated several sections of the document, including information for the transition from IPv4 to IPv6. Within the considerations dealt by this meeting the following stand out:

- coordination with IANA for the IPv6 addressing space and autonomous numbering systems:
- updating of the IP Dialog Service for its inclusion in the support section for the application of Doc 9896;
- considerations for the guidance material on mobility and safety;
- ATN IPS (CoS) type of service definition to be applied when entering the network and to be integrated in Part I of the Manual;
- considerations for the guidance material on OLDI/FMTP implementation to habilitate AIDC services, to be included in Part III;
- the consideration of the Mobile IPv6 as a convergence level for mobile nodes;
- the inclusion of guidance material to document the flexibility of service providers (PMIP, Level 23), the global mobility options different to MIP, the evolution of mobile nodes through IETF Mobile IPv6 extensions, among other issues; and
- the adoption of Mobile IPv6 for air-ground mobility.

As part of the future work of the Group, the following material will be developed for Doc 9896: ATN/IPS requirements for VoIP and Mobility; ATN/IPS Requirements in detailed Technical Specifications; ATN/IPS Guidance Material, ATN/IPS Addressing Plan, ATN/IPS Safety Material; ATN/IPS adaptations for ATN applications.

3.12 To obtain more details on this progress, it is recommended to visit the ACP website: http://www.icao.int/anb/panels/acp/.

3.13 The GREPECAS/14 Meeting took note that the goal is the use of Internet Protocol Version 6 (IPv6) as a network protocol for AMHS applications. However, as a result of a recent analysis made by the Third Meeting of the ATN Task Force of the CNS Committee, held in Miami, United States, from 21 to 23 March 2007, a preliminary approach for the IP Implementation in the CAR/SAM Regions was prepared.

4. Discussion

4.1 Taking into account the guidance provided by the ICAO Council, the Meeting has to follow-up on the implementation of voice communications and air-ground and ground-ground data, in accordance with the strategic objectives of the Organization. The defined strategy for these systems is the Global Air Navigation Plan, the SARPs and ICAO guidelines, as well as the regional guidance set by GREPECAS, providing follow-up on the implementation work by other sub-regional groups. Therefore, this paper proposes to review and follow-up on the following aspects:

Regional Plans for the implementation of air-ground data links and communications

4.2 Based on the regional plans referred to in section 1 of this working paper, the Meeting is proposed to review and comment on the plans contained in Tables CNS 2A and CNS 2B.

4.3 Regarding the global strategy and the regional strategy set by GREPECAS (Conclusion 13/78), the Meeting is proposed to contribute their considerations to complete Table CNS 1Bc.

Regional Implementation Plans for ground-ground communications

4.4 Based on the regional plans referred to in section 2 of this working paper, the Meeting is proposed to review and comment on the plans contained in Tables CNS 1A and CNS 1C.

4.5 In accordance with the global strategy and the regional strategy drafted by GREPECAS (Conclusion 13/78), and as follow-up to GREPECAS Conclusion 13/75, the Meeting is proposed to review the proposal for amendment to Table CNS 1Bb and contribute its considerations to complete Table CNS 1Ba.

4.6 Likewise, in order to update the address records and AMHS domain identifiers referenced in paragraph 2.3 and Appendix C, the Meeting was proposed to review and update the referred information.

AMHS National Implementation Plans

4.7 The Meeting is proposed to review and update the relevant parts of the CAR Region AMHS Implementation Plans Table, recorded in the CAR/WG/1 Meeting and attached in **Appendix E** to this paper.

National Action Plans for the Follow-up and Implementation of air-ground and ground-ground communications

4.8 Based on Conclusion 17 of the CAR/WG/1 Meeting, the background and analysis expressed in the preceding paragraphs, the Meeting is proposed to submit their national action plans for the implementation of voice communications and ground-ground and air-ground data, in accordance with the format recommended by the CAR/WG/1 Meeting.

4. Suggested Actions

4.1 The Meeting is invited to:

a) take note of the information contained in this working paper;

b) proceed with the actions mentioned in paragraphs 4.2 to 4.8 of this paper; and

c) consider and recommend any other pertinent actions.

– – – – – – – – – – – – – – – –

Table CNS 1Bc – ATN AIR-GROUND APPLICATIONS PLAN / Tabla CNS1 Bc – PLAN DE APLICACIONES AIRE-TIERRA ATN

ATN AIR-GROUND APPLICATIONS PLAN / PLAN DE APLICACIONES AIRE-TIERRA						
Administration and Center/ Administración y Centro	Application Type/ Tipo de Aplicación	Served air space / Espacio aéreo servidos	COM Infrastructure / Infraestructura COM	Used Standard / Norma usada	Implementation Date/ Fecha de Implementación	Remarks/ Observaciones
1	2	3	4	5	6	7

– – – – – – – – – – – – – – – – –

TABLE/TABLA CNS 1Ba – ATN ROUTERS REGIONAL PLAN / PLAN REGIONAL DE ENCAMINADORES ATN

Administration and Location/ Administración y Localidad	Type of Router / Tipo de Encaminador	Type of Interconnection/ Tipo de interconexión	Connected Router- Encaminador Conectado	Link Speed- Velocidad del enlace	Link Protocol- Protocolo del Enlace	Via Vía	Target Date / Fecha Meta	Remarks Observaciones
1	2	3	4	5	6	7	8	9

– – – – – – – – – – – – – – – – –

APPENDIX C / APÉNDICE C

AMHS MD REGISTER FOR CAR/NAM REGION / REGISTRO AMHS MD PARA LAS REGIONES CAR/NAM

http://www.icao.int/anb/panels/acp/amhs

State		AMHS Address Specification					
Nationality Letters	Name	Country name (C)	ADMD name (A)	PRMD name (P)	Addressing scheme	Organization name (O*)	Remark
TQ	Anguilla (U.K.)	XX	ICAO	TQ	XF	AFTN	
TA	Antigua and Barbuda	XX	ICAO	TA	XF	AFTN	
TB	Barbados	XX	ICAO	TB	CAAS	AFTN	State Letter Confirmed
TU	British Virgin Islands (U.K.)	XX	ICAO	TU	XF	AFTN	
TF	French Antilles	XX	ICAO	TF	XF	AFTN	State letter confirmed
TG	Grenada	XX	ICAO	TG	XF	AFTN	
TR	Montserrat (U.K.)	XX	ICAO	TR	XF	AFTN	
TK	Saint Kitts and Nevis	XX	ICAO	TK	XF	AFTN	
TL	Saint Lucia	XX	ICAO	TL	XF	AFTN	
TD	Dominica	XX	ICAO	TD	XF	AFTN	
TV	Saint Vincent and the Grenadines	XX	ICAO	TV	XF	AFTN	
TT	Trinidad and Tobago	XX	ICAO	TT	XF	AFTN	
TN	Netherlands Antilles	XX	ICAO	TN	XF	AFTN	
TNCA	Aruba	XX	ICAO	TNCA	XF	AFTN	
MY	Bahamas	XX	ICAO	MY	XF	AFTN	
MU	Cuba	XX	ICAO	MU	CAAS	MU	State letter confirmed
MT	Haiti	XX	ICAO	MT	XF	AFTN	
MW	Cayman Islands (U.K.)	XX	ICAO	MW	XF	AFTN	
MB	Turks and Caicos Islands (U.K.)	XX	ICAO	MB	XF	AFTN	
MK	Jamaica	XX	ICAO	MK	XF	AFTN	
MD	Dominican Republic	XX	ICAO	MD	XF	AFTN	
TI	Virgin Islands (U.S.)	XX	ICAO	TI	XF	AFTN	
MZ	Belize	XX	ICAO	MZ	XF	AFTN	
MR	Costa Rica	XX	ICAO	MR	XF	AFTN	
MS	El Salvador	XX	ICAO	MS	XF	AFTN	
MG	Guatemala	XX	ICAO	MG	XF	AFTN	
MH	Honduras	XX	ICAO	MH	XF	AFTN	
MN	Nicaragua	XX	ICAO	MN	XF	AFTN	
MM	Mexico	XX	ICAO	MM	CAAS	MM	State letter confirmed
TX	Bermuda (U.K.)	XX	ICAO	TX	XF	AFTN	
TJ	Puerto Rico	XX	ICAO	TJ	XF	AFTN	
C*	Canada	XX	ICAO	C	XF	AFTN	
K*	United States	XX	ICAO	USA	CAAS		State letter confirmed

Date: 25 March 2008

– – – – – – – – – – – – – – – –

ICAO ATN/IPS Standardization (Internet Protocol Suite)

Current Status

Loftur Jónasson
Secretary Aeronautical Communications Panel (ACP)
ICAO ANB/CNS

Outline

- **Current Work program**
- **Present and planned documents**
- **ICAO ATN/IPS Doc 9896**
- **Impact on current and future AMHS implementations**

Current Work Program
ICAO Changes …

- From 36th Session ICAO Assembly;
  - "Change towards developing performance based SARPs"
  - "give more strength to outside Standards-making organizations and utilizing their work within the ICAO framework, thus avoiding duplication of work"
  - "to reduce the overall activity of panels and to refocus the Secretariat more on implementation of Standards and less on Standards-making"
- From ICAO Secretariat
  - Review of the work program by the ANC of all Panels. Beginning this year, work will need to demonstrate a direct linkage to a result area in the approved budget.
  - New work activities will need to be proposed using the Air Navigation program issue form and process agreed by the Air Navigation Commission (ANC)

4/2/2008 3

Current Work Program
ICAO Annex 10, Volume III, Part 1

- Restructured to become more high-level
- Amended version accepted last May at ACP/1; it introduces two technical options for ATN deployment: "ATN/OSI" and "ATN/IPS"
- State letter from ICAO invited comments on the proposed amendments by 15 Oct 2007. Responses to the comments have been consolidated by the Secretariat and have been agreed to by the ANC
- The Annex 10 amendment proposal will be submitted to the Council for final approval in March 2008
- The foreseen applicability date of the amended Annex 10 is November 2008

4/2/2008 4

Current Work Program
ICAO ACP WG Maintenance (WG-M)

- ICAO ACP Maintenance Procedures
  - Former ATNP maintenance procedures are no longer applicable since the ACP re-organisation
  - ACP WG-M is now responsible for maintenance
  - Tentative WG-M meetings are scheduled once a year and the meeting will be convened if there are issue to address (next tentative date is June 2008)
  - Any Proposed Defect Reports (PDRs) are to be forwarded to WG-M chairman and ACP Secretary

4/2/2008 5

Current Work Program
WG-I Scope

- Working Group Internet (WG-I) is tasked to define the Internet Protocol Suite (IPS) of the ATN and conclude by November 2008
- WGI concentrates its work on the following document set:
  - ✓ Annex 10, Volume III, Part 1
  - ✓ Doc 9896 “Manual for the ATN using IPS standards and protocols” which will contain several parts covering technical provisions and guidance material (will be a merge of current drafts of ATN/IPS manual and guidance material)
- The ATN IPS is principally driven by de-facto IP industry standards

4/2/2008 6

Present and Planned Documents

Status of current ICAO ATN/OSI Documents Doc 9705, Doc 9880 & Doc 9739

- Document 9705 (ATN/OSI Manual): instead of releasing Edition 4, Document 9880 is being prepared
  - Part I Air-ground applications (CM/PM-CPDLC) => *has been approved, pending publication*
  - Part II Ground-ground applications
    - Part IIA (AIDC) => *has been approved, pending publication*
    - Part IIB (ATSMHS) => *has been approved, pending publication*
    - Part III (ULCS) => *not yet approved, work in progress*
- Further migration of Doc 9705 Edition 3 content to Doc 9880 has been suspended temporarily due to lack of ICAO resources
- Doc 9739 (ATN/OSI Guidance Material): Unlikely that Edition 2 (available on old ATNP website) will ever be published

4/2/2008 7

Present and planned documents

Coexistence of the ATN/OSI and ATN/IPS

- ICAO Reference Documents
  - ✓ Annex 10 SARPS will introduce ATN/IPS in parallel to ATN/OSI
  - ✓ Doc 9705 Edition 3 (+ PDRs) is still applicable but will eventually be superseded by Doc 9880 Part IIB
  - ✓ Doc 9896 (ATN/IPS) will have provisions for ATSMHS over TCP/IP while specifying an IPv6 network service
- External Reference Documents
  - ✓ Mature Standards referenced rather than developing our own
  - ✓ RFCs developed by the Internet Society (ISOC) Internet Engineering Task Force (IETF) are referenced in the new Annex 10 amendment and Doc 9896 as appropriate.
  - ✓ EUROCAE and RTCA documents may also be referenced.

4/2/2008 8

ICAO ATN/IPS Doc 9896
"Networking"

- Under development in WG-I, ground networking elements are relatively stable, based on IPv6 and BGP routing
- Compatible with on-going IP implementations
- Includes:
  - Networking protocols
  - ✓ Provisions for mobility management
  - ✓ Provisions for security (IPSec, SSL/TLS, ATN Security)
  - ✓ VoIP material (references)

4/2/2008 9

ICAO ATN/IPS Doc 9896
"Applications"

- Similar to the ATN/OSI Manual Document 9705/9880, the ATN/IPS Manual Document 9896 will contain application-related provisions, especially to accommodate already existing applications:
  - ATSMHS: RFC2126/RFC1006 (1st step), other IP native alternatives will be considered e.g. SMTP (potential 2nd step)
  - AIDC/OSI: Too complex to migrate; no existing implementations. OLDI/FMTP is being considered as one alternative. Other alternatives may be used as well.
  - A/G applications: Re-direction of Dialogue Service invocations to a TCP interface is being considered
  - CM: Will involve changes, assess alternatives in IP environment
  - ULCS: Support within the ATN/IPS may not be required
- New applications developed at a later stage to utilize the ATN/IPS, may be accommodated individually, in Doc 9896, or in other Documents which reference the ATN/IPS SARPs

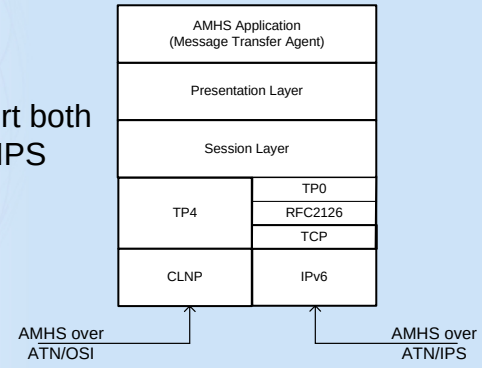
4/2/2008 10

ICAO ATN/IPS Doc 9896
"Guidance Material"

- ATN/IPS Input – Guidance Material
  - Connection oriented and connectionless transmission
  - Transport layer addressing
  - Multicast services for surveillance
  - AS numbering and addressing schemes
  - IPv4/IPv6 migrations and translation
  - Inter-domain routing
  - Quality of Service (QoS) management
  - …

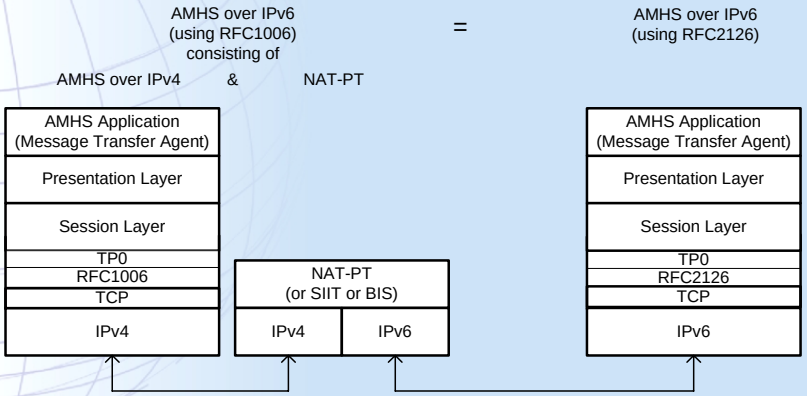
Impact on current and future AMHS implementations

A dual stack implementation is envisaged to support both ATN/OSI and ATN/IPS when necessary



Impact on current and future AMHS implementations

AMHS implementations over IPv4 and IPv6 are interoperable



Impact on current and future AMHS implementations

- Industry support for the IPS is guaranteed for the foreseeable future
- Support for the ISO/OSI stack is dwindling, and costs are increasing. The Telecom Industry has largely dropped the X.25/X.400 based services in favour of TCP/IP

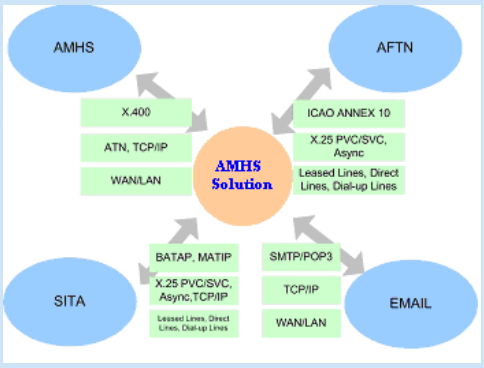
Impact on current and future AMHS implementations

- The ACP WG-I is developing ICAO material which will enable implementation of the ATN, solely based on the IPS. The WG-I recommends that to the extent possible, implementation of ATN/IPS material should be promoted
- The ICAO NAM, CAR/SAM and NAT/EUR regions have opted for implementing the AMHS, using the IPS
- In the AFI region there are plans for dual stack solutions
- It has been suggested that the MID region may even delay implementation of the AMHS and go directly to SMTP over IPS, a possible alternative to the AMHS
- Ongoing discussions within ICAO on whether to adopt a native IPS "industry standard" type solution as an alternative to AMHS, for instance using SMTP

15

Impact on current and future AMHS implementations

- The figure below is from an information paper presented by China to the APANPIRG ATNICG/1, in May 2006
- Trends already indicate that the end state will most likely be SMTP over IPS



4/2/2008

16

APPENDIX E

AMHS IMPLEMENTATION PLANS IN THE CAR REGION

AMHS Implementation Plans in the CAR Region	
Date	**Administration**
Implemented	COCESNA and Central American States
2007	Atlanta (United States) and Puerto Rico
2008	Dominican Republic and Jamaica
2009	Cuba, Haiti, Trinidad and Tobago and others

- END -