



International Civil Aviation Organization

**THE SEVENTH WORKING GROUP MEETING OF ATN
IMPLEMENTATION COORDINATION GROUP OF APANPIRG
(ATNICG WG/7)**



Bangkok, Thailand, 29 January 2010

Agenda Item: Review implementation status and activities

**IMPLEMENTATION OF ATN AND AMHS SERVICE
BETWEEN HONG KONG, CHINA AND MACAO, CHINA**

(Presented by Hong Kong, China)

SUMMARY

This Information Paper presents the preparation, testing, and transition arrangements made by Hong Kong, China and Macao, China to achieve smooth and successful launching of ATN and AMHS service between Hong Kong and Macao on 29 December 2009.

1. INTRODUCTION

1.1 Following satisfactory completion of interoperability tests and pre-operational trial, Hong Kong, China and Macao, China have smoothly and successfully launched ATN and AMHS service on 29 December 2009 in accordance with the APAC AMHS implementation plan. The new AMHS service replaced the previous AFTN circuit between the two communication centres and provides fast and reliable delivery of aeronautical and meteorological messages.

1.2 This paper presents the preparation arrangements including coordination, testing, pre-operational trials and cutover/fallback planning, for sharing by members.

2. Preparation and arrangements

2.1 To ensure smooth cutover from AFTN to AMHS service, the following planning, coordination and testing arrangement were made between Hong Kong, China and Macao, China:

2.2 *AMHS conformance test*

Conformance testing on the AMHS system was conducted separately by Hong Kong, China and Macao, China with satisfactory results during system acceptance tests, in accordance with Annex B of the APAC AMHS Manual. This test is important to ensure that the AMHS systems are compatible to the ICAO standards, as previous trials performed by Hong Kong, China, have revealed teething problems and interoperability issues between SARPS-compliant AMHS systems from

different manufacturers. Conducting the standard conformance test will save a lot of time and effort in compatibility testing of the AMHS systems between states.

AMHS conformance test requires assistance from the manufacturer who provides special testing tools for generation of valid and erroneous messages to verify correct handling of the AMHS under various simulated conditions that are not easily encountered in real operation. This also ensures that such incorrect handling will not occur as ad hoc problems after the AMHS system has been put into operational service.

2.3 *Coordination*

Hong Kong, China and Macao, China conducted two meetings in Q4 of 2009 to agree on the system configuration, arrangements, plans, procedures and coordination for system testing and cutover. The 2nd meeting was held about 3 weeks prior to the cutover to review the preparation status and readiness of both parties.

2.4 *ATN router connection test and AMHS interoperability test*

ATN router connection test in accordance with Annex C of the APAC AMHS Manual was first performed to ensure no incompatibility issues on the ATN routers at both ends. AMHS interoperability test was then performed using the ATN routers in accordance with Annex E of the same Manual. The results were satisfactory. The tests were to ensure that the AMHS systems at both sides can interoperate over the ATN. Based on our experience, these tests could be conducted using VPN over Internet to save the high cost and long acquisition lead-time of using leased line.

2.5 *Cutover and fallback planning*

Cutover and fallback procedures were devised in advance and agreed through the coordination meetings and email exchange. This is important to ensure a fast and orderly cutover to AMHS service including temporary message diversion to another comm. centre (Guangzhou in this case), and fast fallback to AFTN operation should the AMHS service be unstable or other critical problems arise. The cutover process was smooth and only took about 11 minutes for completion. The system configuration to facilitate cutover/fallback is given at Attachment 1, and the cutover and fallback procedures at Attachment 2 for reference.

The Hong Kong-Macao AFTN circuit is maintained ready for fallback operation for 3 months after the cutover.

2.6 *Safety and risk assessment*

To comply with the Safety Management System requirements, safety and risk assessment on the implementation of AMHS service was conducted by a team of technical and operational staff of Hong Kong Civil Aviation Department to identify and assess the risk, hazard and control measures prior to launching the new service. The assessment covered various aspects including impact to relevant parties, fallback arrangement, training, cyber security etc.

The safety assessment process ensures that the risks associated with the change are within acceptable level with the control measures in place such as staff training and fallback means/procedures.

2.7 *Pre-operational trial*

A pre-operational trial was conducted using the leased line intended for operational use, and live AFTN traffic was replicated to feed the AMHS system at both Hong Kong and Macao ends.

The messages received by the AMHS at each end for 7 consecutive days were checked for any message loss or corruption as compared with the live AFTN traffic.

This trial was to check the integrity of the ATN/AMHS system; and the capability of the system to cope with the real message traffic that may include ill-formatted AFTN messages. Inconsistencies in system configuration such as errors in routing and address tables were also revealed so that rectification could be done before the system is put into operation. The system configuration for the pre-operational trial is given at Attachment 3.

2.8 *Training*

The AMHS system in Hong Kong was commissioned in July 2009 and the cutover was planned for end December 2009. It is important that ample time is reserved for training of operational and technical staff to provide on-going support to the system. To prepare for the AMHS operation, Operator Training, Train-the-Trainer Training and Technical Training were provided to the operational and maintenance staff. On top of the manufacturer's training, a 2-week in-depth AMHS operation training was also arranged to operational staff who are required to perform supervisory duties. After the training, they were required to pass a validation check before performing the operational AMHS duties.

3. Planned ATN/AMHS trials and implementation in 2010

3.1 Hong Kong, China has planned ATN/AMHS interoperability test with China (Beijing) in early 2010. Coordination is underway for the arrangements. A tripartite test among Beijing, Hong Kong and Macao would also be arranged to verify proper operation of ATN and AMHS routing across the sites. The Beijing-Hong Kong ATN/AMHS will be put into operational service following successful interoperability trial and tripartite test with satisfactory results.

3.2 ATN and AMHS interoperability test with Salt Lake City (SLC) are also planned for early 2010, with a view to implement ATN and AMHS service between Hong Kong and the United States in mid or late 2010.

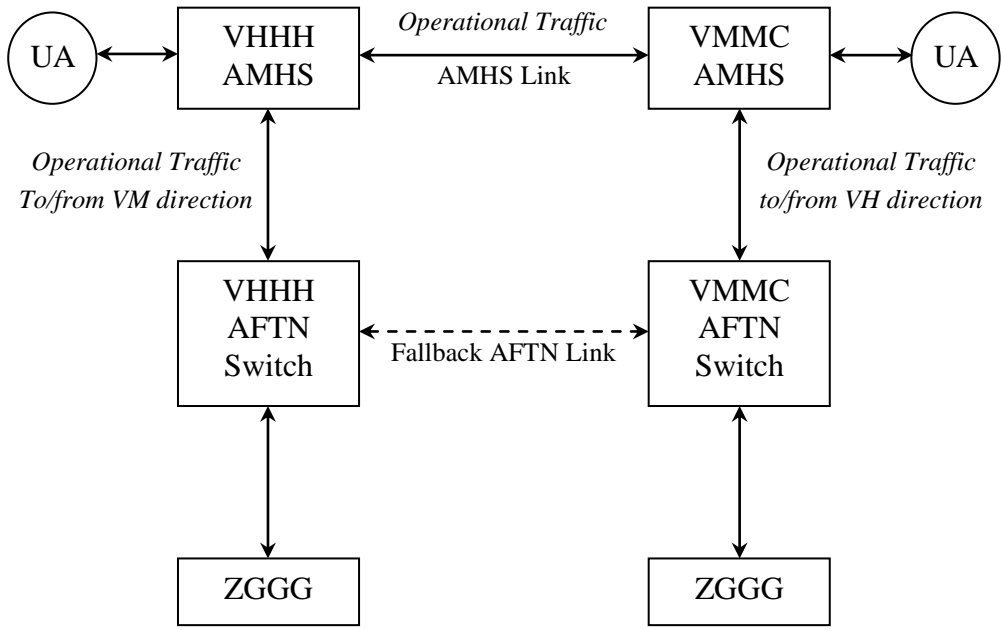
3.3 AMHS trial with local airlines using web access over a private (non-Internet) mesh network is also planned for mid 2010, after the implementation of cyber security measures including the provision of round-the-clock network security monitoring and support. After successful trial with satisfactory results, the existing AFTN connections to local airlines will be gradually migrated to secure AMHS web service.

4. Action by the meeting

4.1 The meeting is invited to note the arrangements made by Hong Kong, China and Macao, China in ensuring a smooth cutover to ATN/AMHS service with a high level of confidence and minimal risk. This experience sharing will facilitate the regional implementation of ATN and AMHS as planned.

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System Configuration for Cutover/Fallback Arrangement



Hong Kong/Macao ATN/AMHS

Cutover and Fallback Procedures

Ver 2.0

November, 2009

1. Introduction

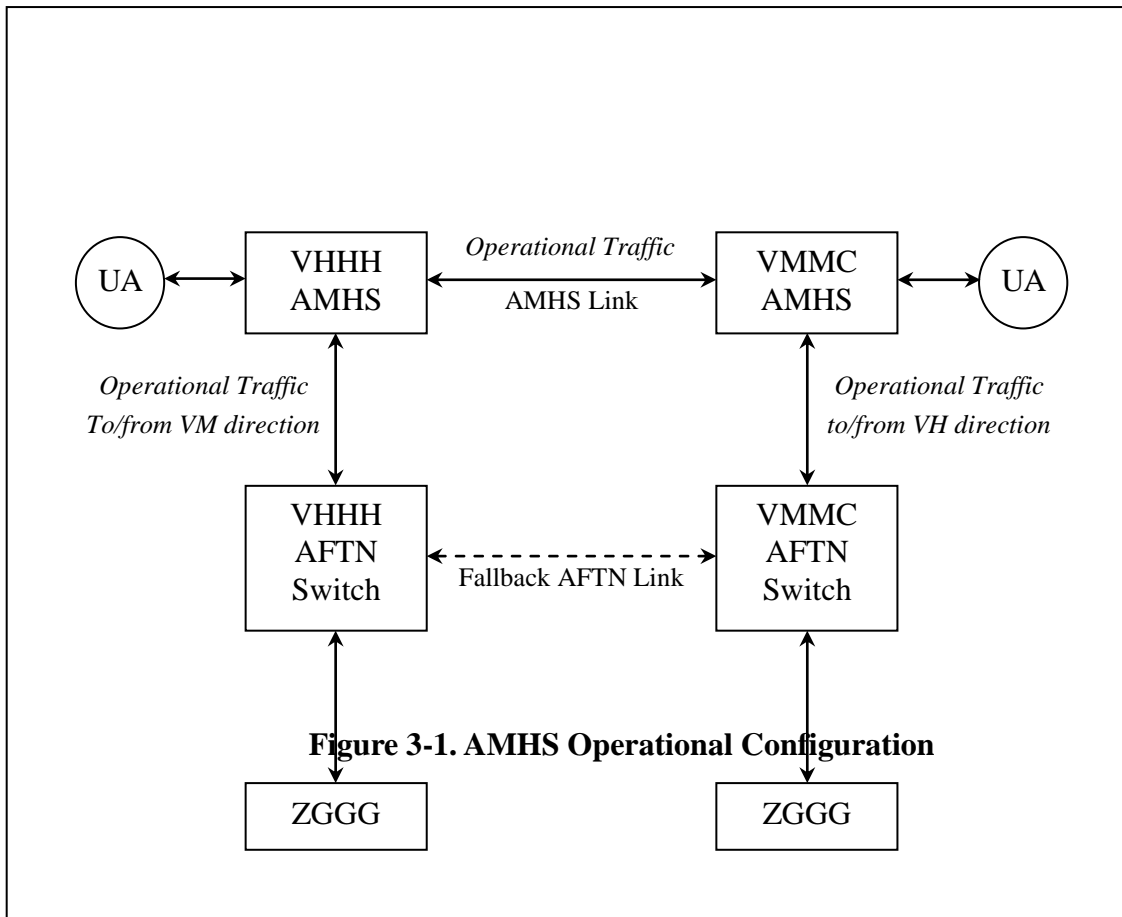
This document describes the cutover and fallback procedures for the ATN/AMHS circuit between Hong Kong and Macao.

2. Cutover date and time

The cutover will take place at 0200UTC on 29 Dec 2009.

3. System configuration for cutover

The following system configuration will be used for cutover and subsequent operations before removal of the AFTN link.



4. Cutover Procedures

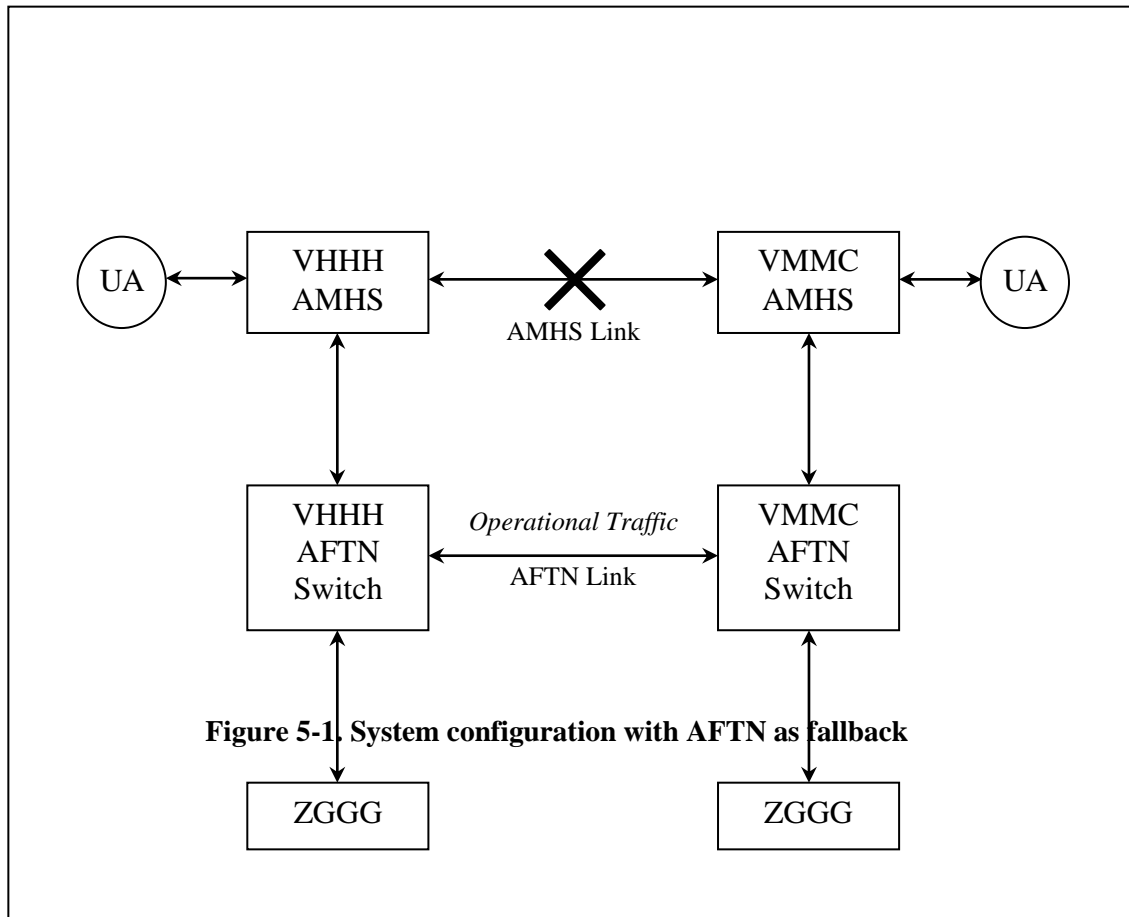
Date: 29 Dec 2009

H = 0200UTC (Commencement of cutover)

Time	Actions by both Hong Kong and Macao	Remark
H-60 to H-30	Check the operating status of the ATN and AMHS.	
H-30	Exchange SVC message via AFTN to confirm that the cutover will be carried out as planned if the status is good. Otherwise, abort the cutover.	
H	(1) Close both the AMHS and AFTN circuits to stop sending traffic to peer. (2) Activate AFTN traffic diversion via Guangzhou. (3) Exchange final score on KOA/OKA via Guangzhou.	Missing message(s), if any, should be repeated after cutover via AMHS. Defer cutover in case Guangzhou circuit failure.
H to H+30	Configure routing parameters of AMHS to route traffic received from peer to AFTN switching system for onward delivery.	
H+30	(1) Stop AFTN traffic diversion. (2) Re-open the AMHS circuit for sending traffic to peer after coordination via IDD. (3) Exchange a test message (VHHHYUAA, VMMCYUAA) to ensure the AMHS circuit is operative.	
H+30 to H+60	Check whether the traffic received from AMHS circuit can be delivered correctly to the recipients.	
H+60	Exchange SVC message to confirm the cutover is completed and successful.	

5. Fallback Procedures (with AFTN link)

5.1 The system configuration is as follows:



5.2 Fallback Procedures

- H1 = time of detection of ATN/AMHS failure
H2 = time of activation of backup AFTN circuit
H3 = time of recovery of ATN/AMHS
H4 = time of restoration of the ATN/AMHS circuit

Time	Action	Remark
H1	Upon detection of failure of the AMHS or interruption of ATN/AMHS link, either Hong Kong or Macao shall call the peer station via IDD to activate the backup AFTN circuit at an agreed time (H2).	The time of activation of the backup AFTN link (H2) shall be as early as possible.
H2	<ol style="list-style-type: none">(1) Reconfigure the routing parameters as appropriate to ensure that the traffic to peer station will route via the backup AFTN circuit instead of the AMHS circuit.(2) Re-open the backup AFTN circuit if necessary.(3) Repeat those messages, which are queued on AMHS, to peer station via the backup circuit.	For step 3, after repetition via AFTN, the messages queued on AMHS shall be removed to avoid redundant delivery after recovery of the AMHS. AFTN circuit stay connected and exchange CH H24.
H3	Upon detection of the recovery of own ATN/AMHS, both Hong Kong and Macao shall inform peer station the readiness of their ATN/AMHS either via AFTN or IDD call. The time of restoration of the ATN/AMHS circuit (H4) shall be agreed when both sides are ready.	
H4	<ol style="list-style-type: none">(1) Exchange a test message on the ATN/AMHS circuit to ensure the circuit is operative.(2) Reconfigure the routing parameters as appropriate to ensure that the traffic to peer station will route via the normal ATN/AMHS circuit.	

6. Fallback procedures (without AFTN link)

- 6.1 When the AFTN link is not available, divert traffic via Guangzhou AFTN if the ATN/AMHS is down.
- 6.2 Repeat messages queued in AMHS via AFTN.

7. Coordination

The primary means is IDD and the secondary means is AFTN.

AFTN

Hong Kong	VHHHYFYX
Macao	VMMCIFYF

IDD

Hong Kong	852-29106222
Macao	853-88982201

FAX

Hong Kong	852-29101117
Macao	853-28861145

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System Configuration for Pre-Operational Trial

