

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 Regional ATN Implementation Strategy

Proposal to Enhance the ATN Backbone Network of the APAC Region

(Presented by Hong Kong, China)

SUMMARY

This Working Paper reviews the existing ATN backbone infrastructure in the APAC region, and presents a proposal to strengthen the network resilience by adding a new ATN link between APAC and NAM regions and a new intra-region ATN link. This will also increase the ATN handling capacity to cope with air traffic growth as well as to facilitate early implementation of AMHS operations within the APAC region.

1. Background

1.1 In line with the APAC Regional Implementation Plan, both Hong Kong, China and Macao, China have successfully launched AMHS service (ICAO SARPs Edition 3 compliant) over ATN since 29 December 2009. It is also known that other states in the APAC region, in particular the ATN backbone sites, are in the process of commissioning their ATN and AMHS systems. According to the conclusion of ATNICG/3, all backbone sites in the APAC region should implement OSI ATN by 2010 and dual stack AMHS by 2011. Moreover, APANPIRG/20 recommended that all ATN backbone sites should implement dual stack ATN (ATN/OSI and ATN/IPS) by 2011. With all ATN backbone sites up and running and inter-regional connections in place, the ATN should be able to immediately support global ground-ground operation, initially mainly for AMHS and AIDC, and in the future to cover other CNS/ATM systems like ADS-C, CPDLC, FIS etc. through air-ground ATN.

1.2 To support the global operation of CNS/ATM systems, a seamless, robust and highly resilient ATN network is definitely required. There should be adequate inter-regional connections between the backbone sites in APAC and other regions to provide the necessary link redundancy to cater for backbone site and link failures. The backbone sites themselves should also be interconnected to form an effective mesh network with adequate link diversity for efficient and reliable routing of ATN traffic within and outside the region.

2. The existing planned ATN infrastructure in APAC Region

2.1 The existing planned ATN infrastructure of APAC region is shown in Fig 1. The APAC region is connected to EUR region by four ATN backbone links via Bangkok, Beijing, Fukuoka, and Singapore. As for connections to the NAM region, there are three ATN backbone links to Salt Lake

City (SLC) of the United States, i.e. from Fukuoka direct, Melbourne direct, and Brisbane to SLC via Nadi; and a non-backbone link from Brisbane to SLC via Christchurch.

2.2 However, the current inter-regional connections between APAC and NAM may not be optimal in respect of network resilience to handle backbone site/inter-regional link failures as explained below. The Brisbane-Nadi-SLC link is actually a parallel circuit to the Brisbane-Christchurch-SLC ATN link and will not be able to serve as a backup connection for message traffic diversion in case the ATN router system at Brisbane is unserviceable. These two parallel links can only be considered as a single independent ATN backbone link between APAC and NAM. Hence in the existing plan, there are only three independent (for effective network resilience) ATN backbone links between APAC and NAM regions, i.e. Fukuoka-SLC, Brisbane-SLC and Melbourne-SLC, as compared to four between APAC and EUR regions. These three ATN backbone links are also not well distributed to achieve a high degree of diversity. To strengthen the ATN ground-ground infrastructure required to efficiently and reliably support full ATN operation including air-ground, an additional ATN backbone link between APAC and NAM regions is considered necessary to provide adequate network resilience.

2.3 Also, a close examination of the existing planned ATN infrastructure of APAC region reveals that the APAC ATN backbone configuration is not adequately meshed to provide a balanced traffic distribution and optimal network resilience with high diversity.

2.4 The above network deficiencies could be resolved by the provision of an additional ATN backbone link between APAC and NAM regions and another one to Australia (Brisbane or Melbourne) within the APAC region. This will significantly enhance network resilience which is particularly important during the initial implementation of ATN and AMHS in the next 2 years, as not too many backbone states have adequate technical expertise and operational experience in ATN to support operations of new CNS/ATM systems. These additional ATN links will also enhance the traffic handling capacity of the intra- and inter-regional ATN and cope with the anticipated air traffic growth in the forthcoming years.

3. ATN Infrastructure enhancement proposals

Proposed new ATN link between APAC and NAM regions

3.1 The new inter-regional ATN backbone link should be terminated at a backbone site in both APAC and NAM regions so as to achieve the necessary network resilience to cope with backbone sites/links failure. More importantly, these backbone sites should have dual stack ATN/AMHS by 2011 as required by the ICAO. This is to ensure that the backbone network is ready in time to facilitate migration from AFTN to ATN/AMHS operations.

3.2 In this respect, Hong Kong, China satisfies the above condition and is willing to implement the above said new ATN backbone link with Salt Lake City or another city in the United States that has operational AMHS meeting the ICAO SARPs Edition 3 requirements.

Proposed new ATN link within the APAC Region

3.3 The new intra-regional ATN link to Australia should be connected to a backbone site such that the enhanced ATN infrastructure will have a balanced traffic flow and maximum network resilience. In the existing planned ATN infrastructure of APAC region, all backbone sites with no connection to Australia, i.e. Bangkok, Beijing and India, already have 5 or more ATN backbone links except Hong Kong which has only three. From the traffic load sharing point of view, Hong Kong will be the optimal site for this new intra-regional ATN link to Australia. Due to time difference in

ATN and AMHS implementation, there will not be adequate operational backbone sites to provide the necessary link diversity during the initial phase of ATN and AMHS implementation. This new ATN link will effectively provide the link diversity required to strengthen the network resilience.

3.4 With a robust ATN backbone network in place, other non-backbone sites will find it more justifiable to speed up their ATN/AMHS implementation so as to reap the benefits brought by ATN/AMHS.

4. **Action by the Meeting**

4.1 The meeting is invited to consider the proposals of:

- (i) establishing a new inter-regional ATN link (Hong Kong, China – United States) between the APAC and NAM regions to strengthen the ATN resilience and traffic handling capacity; and

- (ii) establishing a new intra-regional link (Hong Kong, China – Australia) to enhance the resilience of the APAC regional ATN infrastructure and facilitate the regional transition to ATN/AMHS operation.

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Figure 1 – ATN Routing Backbone Architecture

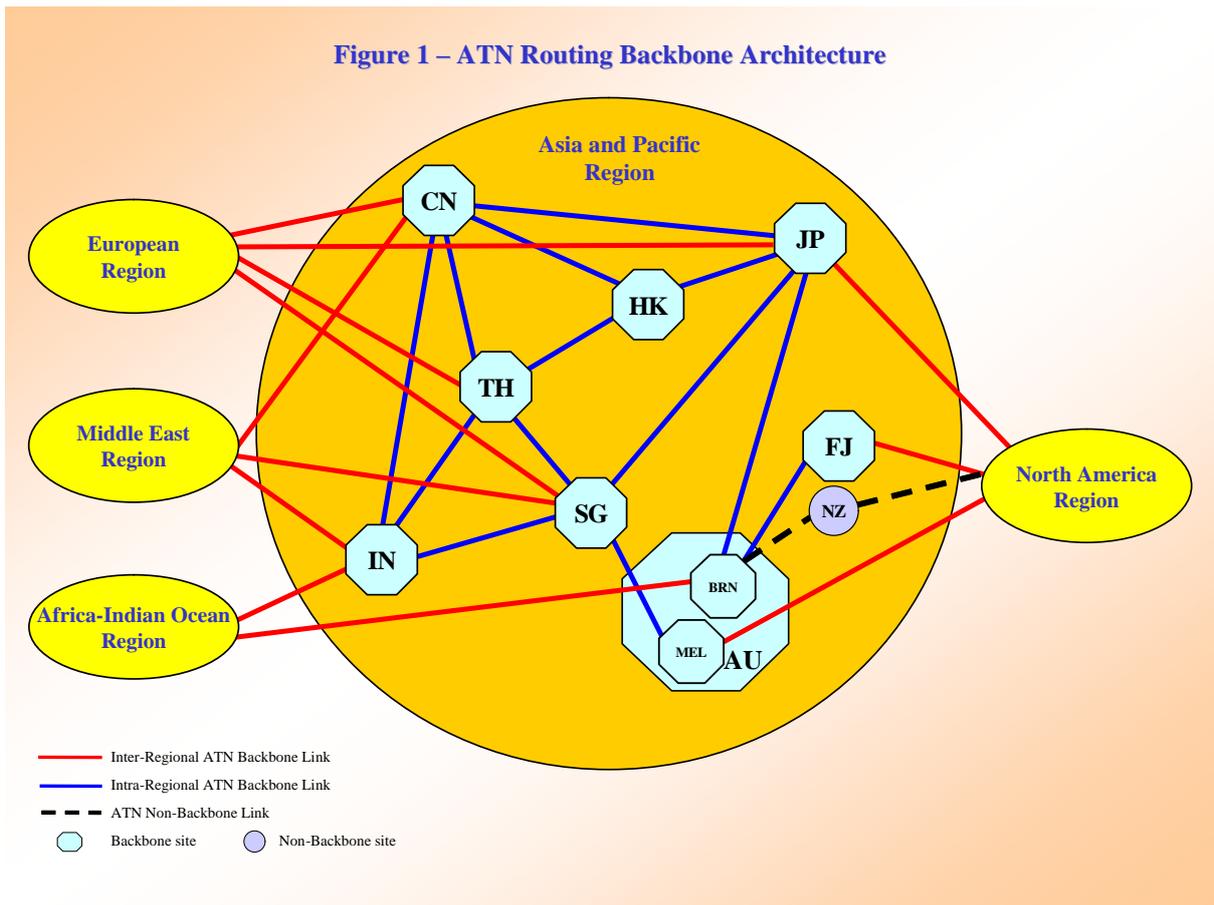


Figure 2 - ATN Routing Backbone Architecture with Proposed New ATN Connections

