



International Civil Aviation Organization

**THE SEVENTH MEETING OF AERONAUTICAL
TELECOMMUNICATION NETWORK (ATN)
TRANSITION TASK FORCE OF APANPIRG**

Shanghai, China, 18-22 April 2005.



Agenda Item 7: Review State's ATN Implementation/Operational Activities and Issues

DUAL PROTOCOL STACK ATN ROUTER

SUMMARY

Introduction to ATN router and multi-protocols gateway developed by Aero-Info Technologies Co. Ltd. China. The ATN router supports both ATN ICS and IP protocol suite which provides connectivity between the applications based on either TCP/IP or ATN.

1. Introduction

1. The ATN router developed by Aero-Info Technologies Co. Ltd. China for ATN Research project of CAAC realized ATN protocols based on ordinary IP routers. It is not only comply with the ISO/OSI protocol stacks but also support IP protocol stacks that are extensively used by more and more civil aviation systems. Therefore the ATN routers developed can be connected to those prevailing TCP/IP systems thus there are broader application area for them.

2. Background

2.1 Aeronautical Telecommunication Network (ATN) is specified by ICAO for the next generation of communication network used for international civil aviation. ATN routers supporting ATN protocols connect ground based and airborne systems which have to adapt to operational environment in all Countries and organizations to allow diversified aviation systems to exchange information.

2.2 Because most of application systems currently used by CAAC are based on TCP/IP protocol stacks and the platforms supporting these applications also have to support TCP/IP protocol stacks. In order to continue providing connectivity to these platforms and supporting the TCP/IP based applications it is necessary to develop ATN router with dual-stacks capability. This is the task given by ATMB/CAAC for development of the extended function to the standard ATN router.

3. Dual Protocol Stacks

3.1 Dual Protocol Stack Model

ISO10747(IDRP)				TCP/UDP
ISO9542 (ES-IS)	ISO10589 (IS-IS)	ISO8473 (CLNP)		IP
ISO8208(X.25)			ISO8802-2(LLC)	
ISO7776(LAPB)			ISO8802-3(CSMA/CD)	

3.2 OSI Protocol Stack

3.2.1 Complied Protocols

ATN routers supporting ISO/OSI protocol stacks, which comply with ICAO SARPs and technical provisions, include data-link layer, network layer and transport layer. The protocol stack

3.2.1.1 mainly consists of following protocols:

LAPB protocol of data-link layer (ISO 7776);
X.25 Packet Layer Protocol (ISO 8208);

3.2.1.2 Connectionless mode network protocol of network layer (ISO 8473 CLNP);

The main function of ATN routers is routing selection and relay,. Its ISO/OSI protocol stacks realizing core routing selection protocols are as follow:

-Inter Domain Routing Protocol-ISO10747(IDRP);
-Routing information interacting protocol between Intermediate Systems ISO10589 (IS-IS);
-Routing information interacting protocol between End Systems-ISO9542 (ES-IS).

3.3 TCP/IP Protocol Stack

3.3.1 Complied Protocols

TCP/IP protocol stack is also divided into data-link layer, network later and transport layer. The implementation of TCP/IP protocol stack enables ATN routers to possess functions of ordinary IP routers. The TCP/IP protocols that are realized in ATN routers include:

ISO8802 2 LLC and ISO8802 3 CSMA/CD of data link layer;
IP protocol of network layer;
TCP and UDP of transport layer.

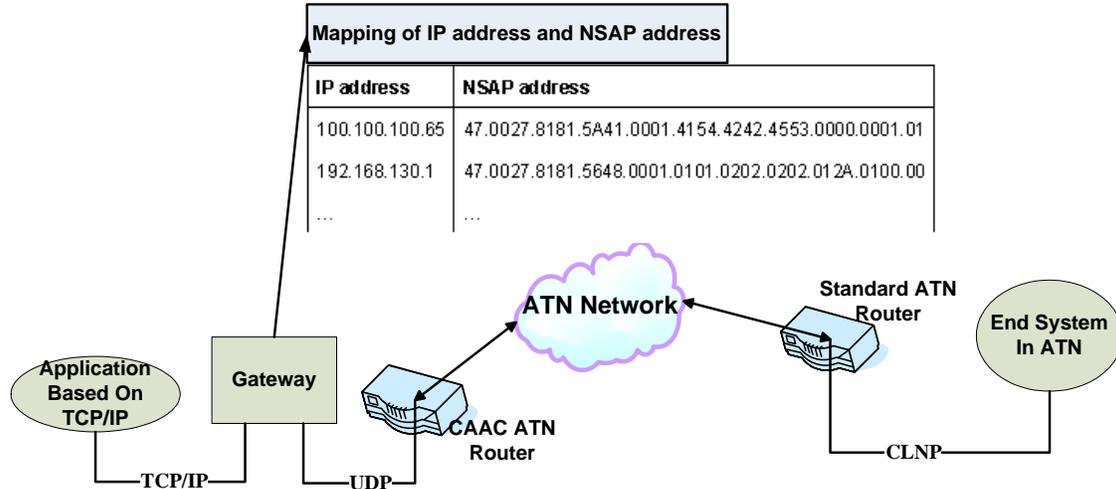
ATN routers could be used as ordinary IP routers that possess the functions of routing information selection and information relay. And the routing protocols that the protocol stack realize are as follow:

OSPF Open Shortest Path First ;
RIP Routing Information Protocol ;
IGRP Interior Gateway Routing Protocol etc.

4. Multi-protocols Gateway

4.1 Conversion Model

Conversion model between dual protocol stack of CAAC ATN routers are shown as following figure:



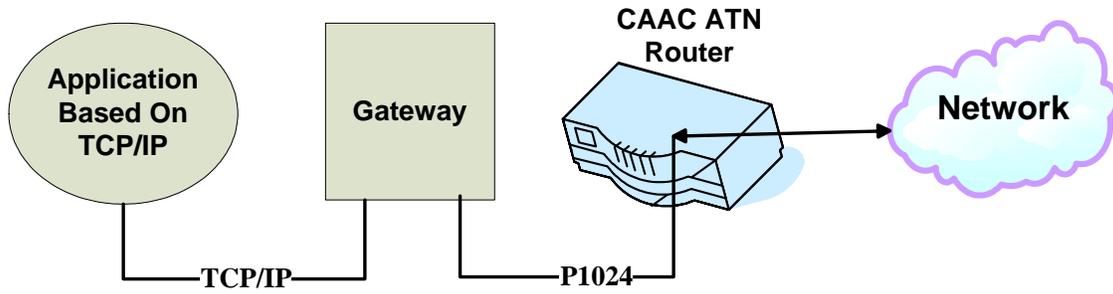
The main conversion work between different protocol stacks are realized through Gateway Server, to guarantee the seamless data communication between the applications based on different protocols, Gateway Server not only finalize TCP-To-P1024 converse and enable SITA message text easily enter TCP network transportation. And also realized conversion between TCP-To-TP4 which enable the complied ISO OSI protocol stack be put into TCP network environment.

4.2 TCP-To-TP4

Gateway Server carries TP4 packages through UDP channels that realized bridging between TP4 and TCP. Therefore, the application systems based on original TCP/IP environment could be used in the ATN environment, which guarantee that every application system could be fast compatible to the two network environments. This could save investment of users, shorten the R&D period, increase the engineering cycle, to ensure the most users benefit that network brought.

4.3 TCP-To-P1024

P1024 is one of the message text transfer protocol of SITA. Gateway Server converts P1024 protocol into TCP/IP protocol to fulfil message text transfer. This could realize direct P1024 message text transfer to TCP/IP network through routers, and reach destination host through TCP/IP network. Since the SITA message text are still used and to keep current coexistence status of many message texts, ATN routers need the most possible compatibility.



5. Action by the Meeting

5.1 The meeting is invited to note the information provided in this paper.
