Asia/Pacific Regional Interface Control Document(ICD) For ATN Ground/Ground Boundary Intermediate System (BIS) Router

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Background

- ICAO Asia/Pacific region is developing a plan to recommend the implementation of a regional Aeronautical Telecommunication Network (ATN) backbone infrastructure which will support digital communications between ground users, and between ground users and aircraft.

Scope and Purpose

- This ICD specifies the layer 1 to layer 3 interface requirements for the Asia/Pacific regional ATN compliance ground/ground BIS routers.
- It will be used to guide the implementation of the ATN backbone infrastructure (over Layer 3 sub-network only) in the region.

ICD Overview

- A BIS router (ATN Class 4 router) accepts Network Protocol Data Unit (NPDU) from authorized source Routing Domain (RD) and forward them towards to their destination RD in accordance with routing information.
- This ICD is developed for G/G BIS Router based on ICAO 9705, 2nd edition
  - Layer 1 is specified to support point-to-point circuit and private/public packet network physical links
  - Layer 2 is specified to support Link Access Procedure Balanced(LAPB) protocol in Asynchronous Balanced Mode (ABM)

ICD Overview (cont'd)

- Layer 3
  - The sub-network is specified based on ISO 8208.
  - A Sub-network Dependent Convergence Function (SNDCF) is specified for sub-network access based on ISO/IEC 8473-3
  - Connectionless Network Protocol (CLNP) and Inter-domain Routing Protocol (IDRP) are specified in full compliance with ICAO 9705, 2nd edition .
- Intra-domain routing protocol is beyond the scope of this ICD

ATN Ad Hoc Meeting Recommendations

- Include ATN documentation tree in the front of this ICD
- Refer to ICAO Doc 9705, 3rd edition.
- Refer to ICAO 9705 and other international standards to the extend practical, only specify the exceptions
- IDRP interface requirements need to refer to "ATN Routing Policy for Asia and Pacific region"

Schedule

- Asia/Pacific ATN TTF WG B is actively developing this document.
- The details of the ICD development schedule will be as follows:
  - 2nd draft released for review, 18 February 2001
  - Working group reviews and update the document, the week of 11 March 2001
- The first draft is planning to be presented at the 4th ATN TTF in Mumbai, India, 2002.

Physical Characteristics (Layer 1)

- Physical layer interface requirements are specified in Section 3 of the ICD, Physical Characteristics (Layer 1)
- Primary Links
  - Point-to-point physical links
  - Private/public packet network physical links
- Physical layer: use ITU-T reference

Data Link Layer Control (Layer 2)

- Data link layer interface requirements are specified in Section 4 of the ICD, Data Link Layer (Layer 2)
- Data link layer is specified in accordance with LAPB procedures for DTE/DCE .
- The interface requirements include:
  - Procedures
  - Frame structure defines flag sequences, address field, control field, information field, frame check sequence, and command rejection condition
  - Link protocol parameters specifies timeout, retransmission attempts, number of outstanding I Frames, acknowledgement, busy condition, and recovery

Network Layer Control (Layer 3)
Sub-network (ISO 8208)

- The sub-network interface requirements are specified in Section 5.1, Sub-network Layer, and with recommended values defined in Appendix A of the ICD
- The sub-network layer is specified in accordance with ISO/IEC 8208 protocol
- The sub-network shall support both PVC and SVC
- DTE addresses:
  - DTE addresses shall be 10 digits for point-to-point circuit
  - DTE addresses shall be 14 digits and will be provided by private/public packet network service provider

Network Layer Control (Layer 3) (cont'd)
Sub-Network Dependent Convergence Function (SNDCF)

- The SNDCF requirements are specified in Section 5.2 of the ICD, SNDCF
- The SNDCF is specified in accordance with ISO/IEC 8473-3 (SNDCF for X.25) for both point-to-point circuit and private/public packet network

Network Layer Control (Layer 3) (Cont'd)
Network Protocol (CLNP)

- The network protocol interface requirements are specified in Section 5.3 of the ICD, Connectionless Network Protocol (CLNP)
- The interface shall support Connectionless Network Protocol (CLNP), as specified in ICAO 9705 Section 5.6, and shall be in accordance with the ATN Profile Requirements List (APRL) included in the appendix of the ICD
- CLNP packet format consists of a header (source and destination Network Service Access Point(NSAP) addresses, priority, traffic type, security label, AOC routing requirements, ATSC class, congestion notification, and QoS), user's data, and segmentation control field

Network Layer Control (Layer 3)(cont'd)
Inter-domain Routing Protocol (IDRP)

- The IDRP interface requirements are specified in Section 5.4 of the ICD, Inter-domain Routing Protocol(IDRP)
- The BIS router interface shall support Inter-domain Routing Protocol (IDRP), as specified in ISO/IEC 10747, IDRP, and shall be in accordance with the ATN Profile Requirements List (APRL) included in the appendix of the ICD
- Routing and control information is carried in BISPDUs which flows on interfaces between pairs of BIS routers. The interface shall support the following types of BISPDUs: OPEN PDU, UPDATE PDU, IDRP ERROR PDU, KEEPALIVE PDU, CEASE PDU, and RIB REFRESH PDU
- BISPDU shall support Type 1 authentication between RD's in Asia/Pacific region
- Refer to "ATN Routing Policy for Asia and Pacific Region"

FAA On-going effort for G/G BIS ICD

- Assess interface requirements to support ATN security, IDRP routing policy, network performance, and network management
- FAA is conducting inter-operability testing for various BIS routers

Acronyms

- ABM Asynchronobbbbbbbbbbus Balance Mode
- AOC Aeronautical Operational Control
- APRL ATN Profile Requirements List
- ATN Aeronautical Telecommunication Network
- ATSC Air Traffic Services Communications
- BIS Boundary Intermediate System
- BISPDU Boundary Intermediate System Protocol Data Unit
- CLNP Connection-less Network Protocol
- DCE Data Circuit Equipment
- DTE Data Terminal Equipment
- EIA Electrical Industry Association

Acronyms (Cont'd)

- ES End System
- G/G Ground to Ground
- ICAO International Civil Aviation Organization
- ICD Interface Control Document
- IDRP Inter Domain Routing Protocol
- IEC International Electrotechnical Commission
- IS Intermediate System
- ISO International Standard Organization
- LAPB Link Access Procedure - Balanced
- NPDU Network Protocol Data unit
- NSAP Network Service Access Point

Acronyms (Cont'd)

- PVC Permanent Virtual Circuit
- QOS Quality of Service
- RD Routing Domain
- SNDCF Sub-network Dependent Convergence Function
- SVC Switched Virtual Circuit
- TTF Transit Task Force
- WG Working Group