TSG-RAN Working Group 3 meeting #2
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Agenda: **12.1**

Source: **Motorola**

Title: **Iu Control Plane for IP Domain**

3GPP TSGRAN-WG3 **Tdoc R3-99-135**
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Key Issue: **I_U Reference Point**

1. Introduction

Regarding the I_U reference point, a number of agreements have been reached which are reflected in Chapter 9.8 of 23.20, "I_U Reference Point":

- The Core Network will encompass two domains: a PSTN/ISDN domain, and an IP domain.
- The Control and User Planes will be separate for each domain
- RANAP messages will be targeted for use over both the PSTN/ISDN domain and IP domain.

This contribution proposes an IP based control plane for the IP domain.

2. IP as Control Plane for IP Domain

The Control Plane for the IP Domain implementing IP shall utilize the following protocol stack.

Figure 2.1: Control Plane for IP Domain

Radio Access Network Application Part (RANAP)
RANAP Adaptation Layer (RAL)
Multi-network Datagram Transmission Protocol (MDTP)
User Datagram Protocol (UDP)
Internet Protocol (IP)
Transport Network Service
Physical Layer

2.1 UDP/IP

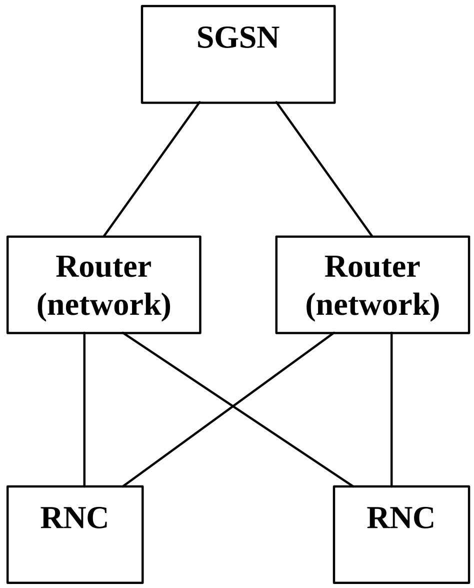
The IP layer shall be designed for communication with both IPv4 and IPv6 nodes. The IP Address will be used to identify a node or host. Internet Control Message Protocol (ICMP) shall be implemented for management of host communications. Address Resolution Protocol (ARP) shall be used to maintain routing information for communicating with other hosts. Internet Group Multicast Protocol (IGMP) should be implemented to support IP multicasting, broadcasting and directed broadcasting.

UDP will be used as a connectionless transport protocol. The Port Number will be used to identify an endpoint or process. The Checksum shall be used to provide protection of the UDP header and upper layer payload.

2.2 Multi-network Datagram Transmission Protocol (MDTP)

MDTP shall provide fault tolerant data communications between hosts, in either reliable or unreliable mode. Reliable mode will be used for critical signaling, such as call control. Unreliable mode may be used for non-critical and/or non real-time informational signaling. MDTP shall support and operate transparently over a multi-network configuration, as depicted in the following diagram:

Figure 2.2: Multi-network Configuration



If more than one path exists between two endpoints (e.g. redundant networks), MDTP will take advantage of the multiple networks by automatically switching to the alternate network if the datagram delivery becomes unavailable or inefficient (e.g., too many re-transmissions) on the current network. The network fault management is transparent to the upper layer protocols. The ability to handle multiple networks facilitates the implementation of traffic balancing schemes in upper level protocols.

MDTP provides reliable, in sequence, delivery of datagrams. MDTP handles datagrams which are received out of order, as well as receipt of duplicate datagrams, without intervention from upper layer protocols.

MDTP provides control over timers and configuration which is independent of the operating system. This enables greater flexibility in controlling the timing and operational characteristics to provide time critical, fault tolerant, reliable communications.

The draft MDTP specification can be found on the Internet at http://www.ietf.org/ as document "draft-sigtran-mdtp-01.txt".

2.3 RANAP Adaptation Layer (RAL)

The purpose of the RAL is to map the RANAP Application Programming Interface (API) to/from MDTP primitives. The following is an indication of this mapping:

Table 2-1: RANAP Adaptation Layer Mapping

RANAP API	MDTP Primitive
N-CONNECT Request	**Data.Request**
N-CONNECT Indication	**Data.Indication**
N-CONNECT Response	**Data.Request**
N-CONNECT Confirm	**Data.Indication**
N-DISCONNECT Request	**Data.Request**
N-DISCONNECT Indication	**Data.Indication**
N-DATA Request	**Data.Request**
N-DATA Indication	**Data.Indication**
N-UNITDATA Request	**Data.Request**
N-UNITDATA Indication	**Data.Indication**
N-STATUS Indication	**Error.Indication** **Restore.Indication** **Endpoint Discovery** **Translation Errors**

RAL is also responsible for address translation of RANAP Connection Identifiers to/from protocol specific IP and Port numbers. RAL can be statically defined with addressing information, or it can dynamically discover and maintain addressing information using DHCP and IGMP. RAL can be characterized by the following set of features:

- Transaction management by Connection Identifier so that a continuous session can span multiple message communications over the same or alternate networks.
- Dynamic scalability, enabling a node or endpoint to be added or removed without interrupting communications.
- Signaling Bearer transparency, whereby the upper layer protocols are abstracted from the details of the lower layer protocols.

3. Proposal

In section 5.2, “Signaling Bearer”, of TS S3.12, this contribution proposes the creation of two sub-chapters:

- The existing text in 5.2 shall be moved to sub-chapter 5.2.1, “Signaling Bearer for PSTN/ISDN Domain”.
- The text in chapter 2 of this contribution shall be added to TS S3.12 as a new sub-chapter 5.2.2, “Signaling Bearer for IP Domain”.

4. References

[1] Postel, J. (editor), “User Datagram Protocol”, RFC 768, USC/Information Sciences Institute, August 1980.

[2] Postel, J. (editor), “Internet Protocol”, RFC 791, USC/Information Sciences Institute, September 1981

[3] Stewart R.R., Xie Q. “Multi-network Datagram Transmission Protocol” , draft-sigtran-mdtp-01.txt, February 15, 1999.

[4] S3.12, Iu Signaling Plane, v0.0.2