

Interworking packet switched and circuit switched networks for SS7 over IP

Overview

The Adax M3UA software module is part of the Adax Protocol Software (APS) SIGTRAN suite that has been designed for Convergence, Wireless and Intelligent Networks. M3UA is a SIGTRAN protocol designed to transport SS7 MTP-3 signaling stacks over an IP Network. M3UA provides a seamless operation of MTP-3 – User peers (ISUP, SCCP, TCAP and TUP) in both SS7 and IP domains. In an all IP network it operates in a point to point configuration, known as an IPSP (IP Signaling Point).

Specifically M3UA is used for interworking packet switched and circuit switched networks at the Signaling Gateway or Softswitch. Using M3UA, Signaling Gateways can be configured to function as an SS7 SEP (Signaling End Point) or STP (Signaling Transfer Point). Because of its inbuilt flexibility M3UA has been adopted by the 3G consortium as the standard for carrying SS7 over IP in 3G networks.

M3UA has many applications and alongside other SIGTRAN protocols, it can be used as a building block in a Softswitch, Signaling Gateway or Media Gateway Controller in the VoIP domain.

Quality and Reliability of Service

The future of Intelligent Networks is IP and SIGTRAN combined with SS7. As most operators face increased signaling demand, M3UA coupled with SCTP can meet the required demands while preserving the investments in SS7 upper layer applications. M3UA delivers optimum utilization of highbandwidth data links and is backward compatible with legacy MTP-3 software running over the Adax SS7 board and driver.

The Adax M3UA module creates high-speed IP links for SS7 MTP transfer when it is used with the Adax ATM and HDC series of boards. It does this by supporting SIGTRAN and SS7 signaling over IP at T1/E1 and OC3/STM-1 data rates, providing a highly reliable transmission service to the signaling layer above it.

MTP-3 is only defined for 56/64 kbps signaling links. However M3UA is also compatible with MTP-B, the broadband definition for SS7. The immediate result is that current upper layer SS7 applications can run on new high speed IP signaling networks without software change, maximizing the performance of the solution without increasing costs and protecting investment in the application.

Using Adax M3UA enables higher densities and efficiencies of SS7 transmission, while still preserving reliability and compatibility.

Performance Benefits

M3UA provides the upper interface of MTP-3 to the higher SS7 layers (e.g. ISUP and SCCP) and performs the following functions:

- Address Translation and Mapping;
- SG or ASP Redundancy;
- SCTP Stream Mapping;
- Congestion Control, Seamless Network Management Interworking;
- Management Inhibit or Un-inhibit;
- Active Association Control;
- IPSP to IPSP Communication without SS7 Inter-networking;
- M3UA Dynamic Stack Model.

Adax has also made some additional enhancements to M3UA to increase its functionality and performance including:

Memory and Timer subsystems interface

Adax provides extended access to the internal memory allocation systems and the timer management systems to increase the ease of integration into an existing architecture. Adax has increased the ease with which a custom memory management system or a custom timer subsystem can be integrated with the M3UA stack through our custom porting module facility.

Multiple SCTP support via distributed architecture framework Adax has adapted the system to support multiple redundant, load sharing lower layers. Using the message passing interface, it is possible to configure several different interfaces that are all running Adax SCTP/T in separate signaling systems. The M3UA stack will distribute transfer requests to each of the lower layers, handling the possibility of failure among any one of them. This eliminates the possibility of failure due to link loss. Combining this feature with the rest of the redundancy capabilities present in the M3UA stack further increases the reliability of the complete solution.

Application Areas

Example application areas for M3UA include:

Signaling Gateways and IP based signaling points

M3UA is used between a Signaling Gateway (SG) and a Media Gateway Controller (MGC) or IP telephony database. At the Signaling Gateway, the M3UA layer provides interworking with MTP-3 management functions to support the seamless operation of signaling between the SS7 and IP networks. For example, the SG indicates to remote MTP-3 users at IP endpoints when an SS7 signaling point is reachable or not, or when SS7 network congestion or restrictions occur. The M3UA at an IP endpoint, keeps the state of the routes to remote SS7 destinations and may request the state of remote SS7 destinations from the M3UA layer at the SG. It may also indicate to the SG that M3UA at an IP endpoint is congested. In other words the M3UA is used to forward a message from the Signaling Gateway (SG) to an IP destination when requested.

3G Networks

M3UA is the standard SIGTRAN adaptation sub layer for sending SS7 over IP in 3G networks. It is used to interconnect 3G/UMTS node with IP networks, and enables existing IP applications to run unaltered, while taking advantage of the higher capacity associated with fiber optic transmission. Using SCTP as the transport mechanism, M3UA replaces MTP-3 B, with the higher layers, SCCP, RANAP etc. remaining the same, therefore the application runs unaltered. M3UA and SCTP together, therefore enable the connection of the 3G Radio Network to the Packet Switched Network over the IuPS interface between the RNC and SGSN.

API

M3UA supports a comprehensive API in accordance with the requirements of RFC 3332 including ULP-to-SCTP interface primitives as per section 10 of RFC 2960.

- The user API for M3UA is implemented within the standard Unix DLPI.
- The user API for M3UA is similar to, and consistent with, the Adax API for traditional SS7 signaling offerings.
- The API is common to all User Adaptation (UA) interfaces such as SUA, M3UA, IUA, M2UA, etc.

Standards

- RFC4666 Signaling System 7 (SS7) Message Transfer Part 3 (MTP-3) - User Adaptation Layer (M3UA)

Operating System Support and Adax Protocol Controllers

M3UA is available for Linux and Solaris Operating Systems. Other OS support on request.

All Adax products are available for PCI, PCIe, Low Profile PCIe (LPe), PCIe EM, PMC and AMC architectures.

Adax Software

M3UA is just one of the many products in the Adax Protocol Software (APS) SIGTRAN suite that has been designed for Convergence, Wireless and Intelligent Networks.

Other Adax SIGTRAN products include SCTP, M2UA, M2PA, and Signaling Gateways. Adax Protocol Software (APS) is designed to provide the customer with the greatest benefit to their application and from each Adax hardware product.

The Adax Software provides the user with a set of common APIs that enables integration of business applications and upper layers with Adax signaling infrastructure.

Fastest Time to Market

Adax provides extremely fast time to market through simplicity of design and a modular product range. The common software interface ensures a simple migration path and provides a flexible and portable solution. The API's between products remain the same preserving the investment in the higher layer software and applications. This compatibility enables quick upgrades to next generation requirements and easy field upgrades to expand the capabilities of installed systems.

M3UA 0916/04

Adax is an industry leader in high performance packet processing, security and network infrastructure for Legacy to LTE networks. Modular, scalable and flexible, the Adax LTE-EPC solutions, SIGTRAN and SS7 Signaling platforms, as well as the DPI, IPsec Security, and GTP acceleration products enable customers to build the solutions they need, creating a smarter network infrastructure for all.



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