Adax Protocol Software: SCTP/T

Robust, Reliable Transport for LTE and IMS Networks

Overview

All-IP networks for wireless communications are expanding every day. LTE is delivering on its promise of mobile broadband data services and with the integration of IMS networks VoLTE is not far behind. As the number of LTE subscribers grow so does the number of Diameter transactions. This exponential growth in signaling demands a reliable, robust and high performing transport layer to maintain the high level of customer experience networks must deliver. Adax SCTP/T delivers this robust and reliable transport layer.

Network standards specify SCTP (Stream Control Transport Protocol) as defined by IETF RFC4960 as the transport layer to carry signaling messages over these IP networks. Adax SCTP for Telecom (SCTP/T) was designed specifically to meet the demands of LTE and IMS wireless networks and in particular for the thousands of simultaneous connections required by the small cell access gateways. Steeped in the tradition of telecom reliability and robustness, with thousands of SIGTRAN installations, Adax SCTP/T is ready to meet the challenges in today’s emerging networks.

Quality and Reliability of Service

Built to handle traditional PSTN equipment, Adax SCTP enables service providers to achieve signaling reliability by implementing signaling protocols and services that:

1) Perform vigilant in-service quality monitoring of the signaling link
2) Detect degradation of link quality at very short, programmable intervals
3) Provide redundancy via an enhanced version of multi-homing

These “special considerations for using SCTP to meet the requirements of telephony signaling over IP infrastructure” (see IETF “Telephony Signaling Transport over SCTP applicability statement”) are as applicable for today’s IP data mobile voice and data network traffic as they were when the standard was written. The Adax SCTP/T product provides the capabilities to address the issues necessary for reliable and effective signaling for IP voice and data networks.

The Adax Advantage

Adax SCTP/T achieves levels of signaling performance and capacity that are unsurpassed in the industry. The attributes of the product that provide these levels of service are:

- Support for thousands of associations
- An integrated hardware and software solution delivering high performance on many platforms
- Protocol implementation in the OS kernel for accurate timer control and quick recovery
- Offloading of CPU intensive procedures and tasks such as Heartbeat, CRC Computation, Encryption, Authentication, etc. on Adax Pkt2-AMC and Pkt2-PCIe boards.

- Multi-homing provisioning options that implement link monitoring and fail-over robustness and redundancy for IP signaling that rival the quality of SS7 narrowband and broadband networks.

Performance is in the Details

Capacity

LTE needs reliable, high performance, high capacity signaling capabilities similar to that provided by STPs in SS7 networks. The flat All-IP architecture of the LTE network requires a very large number of signaling connections as well as signaling concentration for efficient routing. As noted above, Diameter signaling is the bottleneck in LTE signaling performance and while a convenient and seemingly economical solution, the Linux-supplied SCTP for Diameter is simply not up to this task. Adax SCTP/T enables any Diameter node to resolve all of these issues within the bounds of the host Linux operating system resources.

How does Adax SCPT/T meet these demands of signaling in today’s LTE networks? The Adax SCTP/T advanced multi-core implementation allows the Linux host to provide thousands of Diameter associations, instantly ready to carry the traffic required by the host application. By supporting up to 10,000 simultaneous SCTP associations on the application’s Linux host, while utilizing less than 20% of the CPU, Adax SCTP/T leaves ample resources for any type of Diameter-based application. This efficiency is accomplished by taking advantage of the massive parallelism available in modern CPUs and Adax’ long experience in telecom signaling in general and SCTP in particular.

Detection of Path Failures

Adax SCTP/T is a Linux kernel implementation that:

- Utilizes kernel high resolution timers, enabling large capacity and quick recovery
- Detects failures in the signaling fabric in 1/10th, or less, of a second.

Heartbeat

More frequent heartbeats are required to detect and fix real-time failures and achieve service restoration through alternate destination addresses.

Multi-homing

Adax SCTP/T multi-homing provides both redundancy and fault tolerance for signaling applications. This feature provides physical path and network route redundancy for SCTP associations thus avoiding single points of network failure between nodes. Paths are continually monitored by the rapid heartbeat feature. If the primary path fails SCTP transparently switches to the secondary path, without packet loss or upper layer intervention.
Checksum Processing
The Checksum Processing of outbound and inbound SCTP PDUs is taxing on the application CPU.
- Adax SCTP/T provides hardware assist for both Adler-32 and 32-bit CRC checksum.
- In SCTP/T, the checksum computation is performed on each outbound and inbound PDU by the dedicated hardware on the Adax Cavium-based APR2, Ptik2-AMC or Ptik2-PCIe packet processing cards.

Security Processing
SCTP/T utilizes an MD5 algorithm to validate the MAC (RFC2104) in the State Cookie during init exchange.
- Computation of the MAC (RFC2104) in the State Cookie during init exchange is taxing on the application CPU.
- Adax SCTP/T utilizes the high performance Cavium processor on the Adax Cavium-based APR2, Ptik2-AMC or Ptik2-PCIe packet processing cards to compute the MAC in the State Cookie.
- Adax SCTP/T is also available as hardware independent software, able to take advantage of today’s enhanced Intel processors while leaving sufficient resources available to the host protocol stack and application.

Other secure hash algorithm implementations can be considered for customer implementation.

Maximum Number of Retransmissions

Other SCTP/T product features include:
- Passive or Active association initiation process
- Association reconnection and anti-spoofing management
- Network measurement and engineering (BellCore GR-2878)

API
SCTP/T supports a comprehensive API designed to the ULP-to-SCTP interface primitives, per Section 10 of RFC 2960.
- The user API for SCTP/T is implemented within the standard Unix DLPI.
  - The user API for SCTP/T is similar to, and consistent with, the Adax API for Diameter, SIGTRAN and traditional SS7 signaling offerings.
  - The API is common to all User Adaptation (UA) interfaces such as SUA, M3UA, IUA, M2PA, etc.

Standards
- IETF RFC 6733 SCTP as Transport for Diameter Base Protocol
- IETF RFC4960 Stream Control Transport Protocol
- IETF RFC2960 Stream Control Transport Protocol
- IETF RFC3309 Stream Control Transport Protocol Checksum Change
- IETF RFC2104 HMAC: Keyed-Hashing for Message Authentication
- IETF RFC1321 The MD5 Message-Digest Algorithm

Operating System Support and Adax Protocol Controllers
All Adax products are available for PCI, PCIe, Low Profile PCIe (LPe), PCIe EM, PMC and AMC architectures, supporting Linux and Solaris Operating Systems. Other OS support on request.

Adax Software Benefits
SCTP/T is just one of the many products in the Adax Protocol Software (APS) suite that has been designed for All-IP Networks and Legacy interworking. As well as a standalone transport for Diameter SCTP/T is also a part of the Adax SIGTRAN suite that includes M3UA, M2PA, and M2UA modules, and Signaling Gateways. Adax software provides the user with a set of common APIs that enables quick and easy integration of business applications and upper protocol layers with Adax signaling infrastructure and the Adax On-Board Protocol Processing frees up Host CPU resources to deliver fast, efficient and reliable application performance.

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 consistent and common API across products provides preservation of the user’s investment in the higher layer software and applications. The API commonality and compatibility enables quick upgrades to next generation requirements and easy field upgrades to expand the capabilities of installed systems.

Adax is an industry leader in high performance packet processing, security, and network infrastructure for the All-IP network delivering a highly flexible set of protocol controllers, packet processing boards, software protocols, and integrated systems. Adax meets today’s challenges of performance, scalability, cost-effectiveness and high availability with solutions for LTE networks and beyond whilst reducing CAPEX and OPEX.

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