Mobile solutions for access, core, roaming and interconnect

Solution overview

In this new decade, mobile service providers are in the early stages of a service delivery evolution encompassing both new communication services and new ways to deliver them. The goal of maximizing revenues while reducing costs is driving mobile service providers to:

- Consolidate networks
- Adopt next-generation technologies
- Innovate with new services
- Offload legacy networks

Session Initiation Protocol (SIP), Diameter and IP transport are the next-generation technologies that are at the heart of this transition, enabling both the replacement of legacy voice and messaging services and the creation of new forms of communication.

SIP is a proven technology that has been transforming fixed-line networks since the turn of the century. Diameter is the chosen IP signaling protocol to enable policy exchange within and between all-IP networks. Now, mobile service providers are turning to SIP and IP Multimedia Subsystem (IMS) architectures to benefit today and prepare for the future.

As 3G and 4G radio technologies increase broadband speeds, mobile service providers need to revamp their services portfolio to offset average revenue per user (ARPU) pressure and gain share in an increasingly complex and competitive marketplace. By tapping into SIP and IP, mobile service providers can realize both enhanced services and reduced costs. This can help mitigate threats from over-the-top providers as they aim to make service providers a “dumb pipe” for delivering the richness of the Internet.

Mobile service providers are now embarking on a multi-faceted migration involving:

- SIP or IMS service networks
- Integration of WiFi access and femtocells for fixed-mobile convergence (FMC)
- Deployment of 3G and 4G mobile broadband RANs
- Consolidation of all services on a single IP backbone transport network

As mobile service providers navigate this migration they face many challenges in the delivery of these new IP voice, video and data services. These challenges are the technical realities of IP networks and span the areas of:

- Security
- Service reach maximization
- Service level agreement (SLA) assurance
- Regulatory compliance
- Cost and revenue management

Acme Packet® provides solutions to address these challenges spanning access, core, roaming and interconnect aspects of mobile service provider networks.

Applications

- IP interconnect
- Core session routing
- VoLTE & 4G multimedia communications
- Rich Communication Suite/ SIP over 3G
- LTE data and voice roaming
- Policy aggregation
- Femtocell/small cell access
- Fixed mobile convergence
- MSC VoIP
- WiMAX VoIP

Benefits

- Revenue assurance
- New service enablement
- Lower total cost of ownership
- Faster time to market
- Service agility

Acme Packet edge

- Complete session border control solution
- Net-SAFE security
- Comprehensive interoperability
- Flexible routing
Acme Packet’s mobile solutions are based on the Net-Net® product family that provides session border control solutions for delivering IP communications services in mobile networks. The Net-Net product family includes:

**Session border controllers (SBCs)**

The Net-Net Session Director (SD) controls the secure, high-quality delivery of SIP/IMS voice, video, messaging and multimedia sessions across IP network access and interconnect borders. It secures service infrastructure, maximizes service reach, assures SLAs and enables regulatory compliance, which helps mobile service providers ensure revenue streams and reduce costs.

At 3G, 4G or FMC access networks, Acme Packet SBCs provide the P CSCF, E CSCF, IMS AGW, ATCF and ATGW functions in an IMS network. At interconnect borders, the Net-Net SD fulfills the I BCF and TrGW signaling and media control functions. For linear, non-disruptive scaling of access applications, Acme Packet SBCs can be used with the Net-Net Session aware Load Balancer (SLB) to create SBC clusters that support up to two million subscribers. IMS core service delivery functions can be added to an access SBC with Net-Net SIP Multimedia-Xpress (SMX).

**Multiservice security gateways (MSGs)**

The Net-Net Security Gateway (SG) securely connects mobile subscribers to their voice and data services via femtocells or WiFi access networks. It establishes and controls IPsec tunnels to secure connections over the Internet and supports UMA/GAN, SIP/IMS and femtocell architectures. The Net-Net SG provides SeGW, TTG and PDG/ePDG and femtocell security gateway functions. The Net-Net SG can be integrated with an Acme Packet SBC on the same hardware for SIP FMC applications.

**Session routing proxies (SRPs)**

The Net-Net Session Router (SR) overcomes the challenges inherent in routing large numbers of SIP-based voice, video, instant messaging (IM) and multimedia sessions within-and-between mobile, fixed-line and transit networks. In IMS networks, the Net-Net SR fulfills the role of the BGCF. SRPs address scaling problems when session routing decisions become much more complex, requiring a dynamic, real-time routing decision for each individual session for multiple sources and destinations within a network. These source and destinations are other SIP signaling elements such as session border controllers, Mobile Switching Centers (MSCs), IMS subscriber call control elements and CLASS 4 and 5 softswitches.

**Policy exchange controllers (PECs)**

The Net-Net Policy Director (PD) addresses critical security, interoperability, routing and scaling challenges in all-IP next generation networks. It supports multiple applications—LTE roaming, policy aggregation and federated service delivery—by enabling the exchange of policy information in service provider networks or across LTE network borders. The Net-Net PD provides session border control for Diameter signaling. These functions reduce costs, streamline networks and assure availability for LTE and IMS networks. Supporting numerous Diameter profiles used throughout IMS and LTE, the Net-Net PD is a standards-based Diameter proxy fulfilling 3GPP DRA and GSMA DEA functions.
Delivering value in mobile networks

Acme Packet mobile solutions simplify service roll-outs, enable the effective delivery of services and drive cost savings across multiple aspects of mobile networks. In short, they enable new revenue streams and optimize networks to help mobile service providers realize maximum profitability.

The Net-Net product family provides a low total cost of ownership due to the feature-richness delivered in compact form factors and purpose-built hardware for high-performance and scalability. For integrated service providers, Acme Packet’s Net-Net product family provides a single solution for access, interconnect and core needs across fixed and mobile domains.

Acme Packet mobile solutions help service providers:

• **Increase revenue** – providing a wide range of functions to protect the network, maximize the addressable market and enable delivery of new services over the Internet and IP RANs
• **Lower operational costs** – allowing mobile service providers to leverage IP network economics throughout the mobile network for reduced ongoing expenditures by overcoming challenges inherent in IP networks and simplifying architectures
• **Maximize network agility** – providing the normalization, mediation and policy-based control requirements that allows the network to scale with flexibility as networks migrate and expand

Key features and functions for mobile service delivery

Acme Packet’s Net-Net product family provides essential features and functions for enabling secure and high-quality delivery of IP voice, video and data services. These functions include:

**Security**

Designed to assure revenue, Acme Packet SBCs, MSGs and PECs protect the service provider border and core service delivery infrastructure from malicious attacks and non-malicious overloads. The hardware-based architecture provides security—including signaling rate limiting, access control, topology-hiding, DoS/DDoS attack prevention and encryption—that protect networks and session privacy without compromising performance or impacting revenue-generating services.

**Service reach maximization**

Aimed at increasing revenue potential while reducing time to service, Acme Packet Net-Net products provide numerous address and protocol translation capabilities to maximize the types of clients, service infrastructure and network topologies supported. This allows service providers to maximize their addressable customer base. They enable sessions to traverse data firewalls and NAT devices, bridge incompatible IP address spaces, mediate between different signaling, transport and encryption protocols, convert disparate codecs and translate telephone numbers, addresses and response codes.

**Service level agreement assurance**

Equipped to deliver subscriber quality of experience, the Net-Net product family ensures that the network has the capacity to support a session with high quality. Using local policies or external policy servers, Acme Packet products perform session admission control and also measure and report actual session quality for planning, troubleshooting and SLA reporting.

**Cost and revenue management**

Aimed at helping monetize and optimize networks, the Net-Net product family delivers routing, policing and accounting features that maximize billable sessions, assist troubleshooting and ensure the most cost-effective usage of the network.

**Regulatory compliance**

Outfitted to enable compliance with the growing list of government-mandated regulations for packet voice and SIP-based communications, Acme Packet products deliver call routing and replication features that enable emergency services and lawful intercept.
Mobile solutions

There are multiple mobile solutions enabled by Acme Packet’s Net-Net product family. These solutions span mobile service provider access, interconnect and core segments of networks and incorporate new service offerings as well as applications designed to deliver long-term cost savings.

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**IP interconnect**

For connections to other service providers or IPX/wholesale carriers, IP interconnects provide capital and operational savings, routing flexibility and improved call quality. IP interconnects can also be used to tie together disparate parts of a network using different mobile switching center (MSC) vendors due to growth or acquisition and extend the use of Transcoder Free Operation (TrFO), driving down costs and improving voice quality. Using IP-based trunks between service providers can also allow service providers to enable end-to-end delivery of new IP interactive communications that will not tolerate a TDM link in the transit path. SIP also enables new interconnect business models, including settlement-free peering and multi-lateral environments as well as federation with over-the-top providers.

SBCs address the legacy infrastructure shortcomings as MSC servers lack security and mediation functions to deal with the diversity of SIP. Acme Packet Net-Net SBCs at the interconnect border provide the I-BCF and TrGW functions in IMS networks to manage signaling and media. With unique SIP to SIP-I/T interworking, the same SBC can be used to manage voice traffic from MSC servers for circuit-switched mobile voice services as well as new SIP services like RCS or VoLTE. With robust security controls and the ability to leverage on-board or external routing databases and flexible call admission control policies, Acme Packet SBCs provide the requisite features to allow mobile service providers to profit from the benefits of IP interconnects.

**Core session routing**

Leveraging IP backbones, core session routing alleviates challenges associated with scaling and managing routing with a highly distributed architectures. Decoupling routing from applications and centralizing routing information provides mobile service providers with a streamlined architecture that routes all SIP sessions to-and-from all IP and TDM access and interconnect borders. Core session routing also provides superior scalability when routing demands dynamic, real-time decisions for each session for multiple sources and destinations.

In Acme Packet’s Open Session Routing (OSR) architecture the Net-Net Session Router uses industry-standards—ENUM, SIP, XML or DNS—to leverage a world-class ecosystem of routing database products and services from Acme Packet partners. The powerful combination of Acme Packet’s SRP and its partner ecosystem results in extremely fast session routing performance and increased network capacity, as well as lower overall network costs compared to legacy architectures in which the routing function is distributed among several SIP elements.
Voice over LTE and 4G multimedia communications

Long Term Evolution (LTE) is the next evolutionary step for mobile broadband. While initially targeted for mobile Internet access services, the world’s first mobile all-IP RAN can serve as an access network for voice and rich multimedia communication services, not just high-speed data. Providing voice and other IP interactive communications is essential for increasing ARPU and competitive viability in the era of ubiquitous mobile broadband Internet. The industry has selected a single architecture—IMS—to deliver voice over LTE (VoLTE) today as well as multimedia communications in the future.

The Net-Net SD connects LTE mobile devices to IMS-based services and applications including voice, messaging, interactive video, gaming, streaming video and IPTV. In the System Architecture Evolution (SAE), Acme Packet SBCs serve as the P-CSCF to connect all access networks to the IMS network, including:

- LTE and 3G RANs
- Trusted non-3GPP IP access networks such as DSL, cable, FTTx, CDMA and WiMAX
- Untrusted non-3GPP IP access networks such as the Internet and Wi-Fi networks

Acme Packet SBCs feature critical functions for VoLTE service delivery, such as IMS-AKA, IPv4-v6 interworking and E-CSCF support. New ATCF and ATGW functions, as part of the access SBC, provide seamless call handover between LTE and circuit mobile networks. In VoLTE roaming scenarios, Acme Packet SBCs act as the Visited-P-CSCF, providing Optimal Media Routing with flexibility to anchor media remotely or route media to the home network. For fixed-mobile converged applications, Acme Packet’s Net-Net 5G fulfills the role of the Evolved Packet Data Gateway (ePDG) to deliver voice and data services within IPsec tunnels over the untrusted Internet or Wi-Fi networks.

Rich Communication Suite (RCS) & SIP services over 3G

Mobile service providers can exploit the ample bandwidth in 3G RANs to offer new, SIP-based interactive communications, including VoIP, IM, presence and multimedia sharing. One such initiative is the GSMA Rich Communication Suite (RCS), a program focused on the delivery of IMS-based services over 3G that complement today’s circuit-switched voice services. These services are aimed at increasing ARPU and competitive viability.

The Acme Packet SIP services over 3G solution features the Net-Net SD deployed at the access border of the SIP/IMS service network. These new interactive communication services require the same security and control mechanisms as packet voice and Acme Packet has enhanced its SBCs for RCS service delivery, including MSRP support, DoS protection and overload control for IM/presence traffic and presence signaling scalability. Since RCS services are designed to cross service providers boundaries (i.e., they are not walled garden services), Acme Packet interconnect SBCs are used to securely tie together and interwork the greater RCS community. For RCS release 2 services, Acme Packet’s Net-Net Security Gateway provides authentication and IPsec termination for fixed broadband RCS clients.
LTE data and voice roaming

Access to communications and data regardless of location is essential to the success of mobile communications. Many hundreds of millions of subscribers roam from home networks annually and roaming traffic is growing significantly each year. However, the legacy SS7 network cannot be used to enable roaming for LTE and an all-IP architecture using Diameter signaling has been defined as the solution by industry standards bodies.

Acme Packet’s LTE roaming solution incorporates the Net-Net Policy Director which secures the IP border between visited and home service providers so subscribers can access both data and voice services while roaming. The Net-Net PD also enables wholesale IPX carriers and roaming hubs to enable multilateral LTE roaming services. With Net-Net security, comprehensive layer 3–layer 5 interworking features and a powerful routing engine, the Net-Net PD provides interoperability and intelligence at the LTE roaming border. For VoLTE roaming applications, the Net-Net PD can be integrated with the Net-Net SBC to seamlessly combine SIP and Diameter security and controls in the same physical system, providing a low total cost of ownership.

Policy aggregation

Policy exchange uses Diameter signaling to transmit subscriber authorization, location, charging and quality of service (QoS) information in LTE and IMS networks. Service providers migrating to the all-IP networks of LTE and IMS face complex signaling and interoperability challenges and as well as an extensive mesh of Diameter connections that can negatively impact network scalability.

Acme Packet’s policy exchange controller simplifies provisioning and routing of Diameter and provides interoperability between vendors and elements within a LTE or IMS network. Acme Packet’s Net-Net PD, deployed at the EPC-IMS border or core of the network, provides critical security, interoperability, routing, and SLA assurance functions for Diameter signaling, allowing the network to scale cost effectively and provide a centralized point for management and reporting of Diameter messages.
Femtocell and small cell access

Femtocells and small cells (higher capacity enterprise and public-space femtocells and picocells) present mobile service providers with an opportunity to reduce the total cost of ownership of their voice and data services while improving customer loyalty and capitalizing on new revenue opportunities. Delivering voice and packet data services to standard handsets, femtocell access points connect to a fixed broadband access connection to the Internet or IP network. Mobile service providers can leverage either the existing MSC infrastructure or new SIP/IMS core networks for voice services.

Acme Packet’s femtocell access solution features the Net-Net SG deployed at the access border of Internet and the legacy mobile core or the IMS/SIP service network. It is responsible for terminating and controlling IPsec tunnels used to transport voice and data services to the femtocell access point. With leading tunnel density, high-performance IPsec processing and layer 3/4 DoS protection, Net-Net SGs deliver best-of-breed capabilities with a low total cost of ownership. For SIP-based femtocells the solution also features a Net-Net SBC, which can be deployed as an integrated product on a single hardware platform or as two separate products.

Fixed-mobile convergence (FMC)

Seeking to deliver user-centric ubiquitous services, improve customer loyalty and reduce capital and operating expenditure through a migration to IP, mobile service providers are turning to FMC. Using Generic Access Network (GAN) or I-WLAN architectures, mobile service providers can deliver voice and data services to dual-mode endpoints on WiFi access networks with improved indoor and geographic coverage and reduced strain on the macro network.

Acme Packet’s FMC solution consists of the Net-Net SG deployed at the Internet access border of a mobile service provider’s network to authenticate endpoints and establish encrypted tunnels (IPsec, TLS, SRTP) for the secure delivery of services. With leading tunnel density, high-performance IPsec processing and layer 3/4 overload protection, Net-Net SGs deliver best-of-breed capabilities with a low total cost of ownership. For SIP FMC solutions, Acme Packet’s Net-Net SD—integrated with the Net-Net SG or deployed as a separate system—provides SIP session border control to satisfy security, service assurance and regulatory compliance requirements.

MSC VoIP

As an interim step to IMS service migration, mobile service providers can leverage their existing MSCs to provide voice and messaging services to SIP endpoints over mobile and fixed line broadband access networks. Using signaling and media gateways on the access side of the MSC, voice services are converted to SIP and RTP for delivery to broadband-connected devices. MSC VoIP can be used to for LTE voice and messaging services and extend mobile services to softclients on laptops for a FMC solution.

Acme Packet’s MSC VoIP solution features the Net-Net SD at the access border between the broadband access network and the signaling and media gateways. Key functions include: DoS attack/overload prevention, NAT/firewall traversal and IP address and signaling protocol mediation.

WiMAX VoIP

To increase ARPU and competitive viability for WiMAX service providers, these all-IP fixed and mobile broadband access networks can be used to deliver voice and other IP interactive communications to residential and business subscribers. Using an IMS or SIP service core, service providers can leverage the all-IP RAN to deliver double and tripleplay service bundles.

Acme Packet’s WiMAX VoIP solution features the Net-Net SD at the access border of the SIP or IMS service network. The Acme Packet SBC provides critical control functions to deliver high quality interactive communications—voice, video and multimedia sessions—across WiMAX IP access network borders.
Acme Packet is one of the most experienced IMS vendors in the world, with more than 100 trial, pilot and commercial projects globally. Results from the June 2010 Infonetics Research survey *IMS Product Features and Vendor Ratings* ranked Acme Packet as the top vendor on the IMS vendor scorecard and number two for brand recognition.

Acme Packet’s Net-Net product family provides critical functions in IMS architectures. While building standards-compliant products and serving as an active contributor to the relevant standards bodies, Acme Packet is focused on delivering pragmatic solutions to service providers. Acme Packet products go above-and-beyond the standards to solve all challenges associated with delivering trusted, first-class IP communications and data services across IP network borders.

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<td>P-CSCF</td>
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<td>ePDG/PDG/TTG</td>
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Acme Packet’s commitment to focus on real-world requirements include:

- Acme Packet’s implementation of the P-CSCF supports an advanced SIP signaling firewall to protect itself and the IMS infrastructure from attacks and overloads
- Distributing service delivery intelligence to the edge of the network to maximize security, improve service reach and service quality, reduce costs and enhance manageability
- Integrating signaling and complex media control functions in a single system improves network security and interoperability and lowers the total cost of ownership with fewer systems
- Delivering interoperability features, including programmable SIP header manipulation and interworking for TCP/UDP/SCTP and IPv4/v6, speed time-to-market and maximize the number of vendors and networks that can be used
- Providing a comprehensive collection of capabilities for enabling the delivery of IMS services to fixed-line enterprise customers, including surrogate registration of IP PBX connected phones and H.323- to-SIP interworking
- Building on DRA routing functions for PCRF servers, Acme Packet extends complete session border control to Diameter signaling including iron-clad security, comprehensive interoperability and flexible routing features
For mobile service providers that do not see the business case for IMS, place it on a three-to-five year roadmap, or are looking for an alternative solution, Acme Packet offers Net-Net SIP Multimedia-Xpress (SMX). Net-Net SMX combines core service delivery functionality with session border control to reduce the complexity and cost of delivering high-value, revenue-generating SIP multimedia services. Net-Net SMX can be used to deliver a broad range of SIP services including residential or business voice, RCS services and FMC.

For diverse needs, ranging from small subscriber populations or initial service rollouts to a large-scale IMS networks, Net-Net SMX is a cost-effective alternative to a fully decomposed IMS infrastructure while delivering its key benefits. Net-Net SMX minimizes upfront cost and risk while also providing seamless evolution to standards-based Smart Border IMS architectures. Net-Net SMX also offers a migration path to decomposed IMS architectures that preserves the SBC investment.

Net-Net SMX adds core session control functions—a SIP Registrar and requisite interfaces to other functional elements—to an Acme Packet access SBC to create an integrated, single-system service delivery solution. This solution reduces the equipment cost of an IMS service delivery core by approximately 50% to 75% across a wide range of subscriber counts. With fewer systems, Net-Net SMX streamlines the signaling model and is easier to operate, maintain and troubleshoot, resulting in lower capital and operating expenditures.
About Acme Packet

Acme Packet (NASDAQ: APKT), the leader in session border control solutions, enables the trusted, first-class delivery of next-generation voice, data and unified communications services and applications across IP networks. Our Net-Net product family fulfills demanding security, service assurance and regulatory requirements in service provider, enterprise and contact center networks. Based in Bedford, Massachusetts, Acme Packet designs and manufactures its products in the USA, selling them through over 140 reseller partners worldwide. For more information visit www.acmepacket.com.