

JUNIPER NETWORKS AAA SOLUTION FOR FEMTOCELL

Providing Security, Scalability, Flexibility, Reliability, and High Performance for Femtocell Technology

Challenge

By allowing networks to hand off subscribers to limited-range UMTS cells within their own homes, femtocell technology improves service quality, reduces network congestion, and brings GSM service providers one step closer to FMC. However, femtocell increases the importance—and the complexity—of AAA, because it introduces a new option for accessing GSM cellular core networks.

Solution

Juniper Networks SBR SIM Servers provide an AAA solution for femtocell environments with proven robustness, flexibility, scalability and compliance with industry standards. The SBR SIM helps service providers maintain seamless service during handoffs between conventional cell sites and femtocells, while maximizing use of existing AAA resources and ensuring cost-effective migration to FMC.

Benefits

The SBR SIM Server enjoys industry-wide acceptance as an AAA platform, with extensive authorization capabilities and broad flexibility for customized business rules. Moreover, SBR SIM has full support for RADIUS, maximizes its value as an integral AAA platform, and helps service providers usher in the era of FMC.

Femtocell technology improves Global System for Mobile Communications (GSM) service quality in the home, and offers service providers new economies and efficiencies through the installation of premises-based Universal Mobile Telecommunications System (UMTS) mini-base stations. These mini-base stations (referred to as “femtocells”) let subscribers route mobile calls over broadband Internet connections and offload standard cell sites. But while femtocells can benefit both subscribers and service providers, they introduce the need for business-critical AAA processes and, especially for service providers with existing AAA systems, add a new layer of complexity.

Fortunately, Juniper Networks® offers an AAA solution for femtocell that uses scalable, standards-based technologies, and extends AAA resources where they may already be deployed. Juniper’s AAA solution for femtocell provides full support for both RADIUS and DIAMETER protocols, and delivers maximum value for service providers both for femtocell service rollouts today, and for migration toward next-generation Fixed-Mobile Convergence (FMC) tomorrow.

The Challenge

Femtocell technology allows subscribers to leverage their broadband connections to improve service quality, and service providers to offer new services and to decrease network congestion. However, femtocell also requires service providers to authenticate and authorize this new access technology onto their networks. To head off the risks of fraudulent access, femtocell service providers need to implement AAA or to extend existing AAA capabilities. In addition, the implications for increased airtime and incremental value-add require separate tracking of femtocell usage, for billing, marketing and network planning purposes. Finally, femtocell requires secured control-plane and media communications between the wireless handset and the wireless core network, in a process that guarantees full service transparency for end users.

Like Unlicensed Mobile Access/Generic Mobile Access (UMA/GAN) technology, femtocell leverages the proliferation of broadband Internet connections within the home as a means of connecting mobile handheld devices to the mobile core network. Femtocell technology differs, however, from UMA/GAN in two respects:

- Femtocell uses standard UMTS radio links, while UMA/GAN uses 802.11-based wireless LAN links within the premises (or “homezone”).
- With femtocell, the radio device is authenticated onto the mobile network, whereas with UMA/GAN, the user device (or mobile handset) is authenticated.

Femtocell technology thus supports the use of existing UMTS mobile phones, while UMA/GAN requires subscribers to use specialized, dual-mode phones.

To enjoy the benefits of femtocell, mobile subscribers need to make only modest changes. To enable cellular radio signals to hand off to femtocells in the homezone, users only need a 3G/2.5G femtocell radio access device.

On the network side, service providers seeking to offer femtocell services require the following:

- A Security Gateway, to terminate IPsec tunnels between the wireless handset and the operator network
- A UMA Network Controller (UNC), to manage user connections to the mobile core (similar in function to the Base Station Controller)
- An AAA server, to authenticate femtocell devices onto the network and to authorize service delivery

With these components in place, a GSM handset is essentially handed off from a conventional UMTS cell to the femtocell whenever the subscriber walks within range, using much the same process as when users travel between adjacent mobile service cells.

Simple in concept, femtocell nonetheless offers subscribers numerous benefits. The technology can help overcome the poor propagation characteristics associated with GSM cellular radio signals within homes and commercial buildings. It can also reduce network congestion by moving traffic off cell sites, extend coverage into rural and other areas where cellular infrastructure may remain poorly developed or cost-ineffective, and provide a viable alternative to landline telephony services. For the benefit of service providers, femtocell technology can decrease congestion in radio access network segments, offer a cost-effective alternative to installing in-building cell sites or repeaters, expand potential service offerings and creative bundling strategies, and bring service providers one step closer to FMC.

The Juniper Networks AAA Solution for Femtocell

The Juniper Networks SBR SIM Servers are offered to meet these challenges. This AAA server solution provides the scalability, reliability, flexible deployment and life-cycle value that service providers need to realize the full potential of their femtocell service offerings. The SBR SIM scales through its high-performance design, support for 99.999 percent uptime, and ability to handle thousands of RADIUS requests per second on suitable hardware. The product allows service providers to perform authentication and authorization in a single, combined

step or as two discrete steps, thereby ensuring high flexibility in implementation and support for a variety of business models. The SBR SIM relies upon a standards-based approach to AAA, offering full compliance with RADIUS, thereby facilitating femtocell integration and the eventual migration to FMC. With these attributes, the SBR SIM provides high life-cycle value with reduced operating expenses.

The SBR SIM Server provides mission-critical authentication and authorization during call setup, when a mobile subscriber with a standard UMTS handset moves within range of a femtocell (see Figure 1). With the SBR SIM AAA solution for femtocell, the call connection sequence works as follows:

- a. A femtocell radio access point is installed on a broadband connection at the user's home or business location.
- b. The femtocell, which is provisioned with a SIM by the mobile operator, opens and maintains an IPsec tunnel, (which is authenticated via IKE v2 using EAP-AKA, Extensible Authentication Protocol Method for UMTS Authentication and Key Agreement, as the credential protocol) to the mobile operator's security gateway.
- c. With the tunnel established, the femtocell registers on the UNC, and is now available for use by an authenticated UMTS handset.
- d. Upon entering the coverage vicinity, a UMTS handset detects the presence of the femtocell through conventional GSM and UMTS radio procedures.
- e. The handset is authorized onto the mobile network by one of two processes.
 - The femtocell radio access device relays a "whitelist," a list of pre-authorized handsets, to the SBR SIM Server, (or)
 - The femtocell radio access device acts as a mediation device, using standard RADIUS messages to authorize handsets.
- f. Upon successful authorization, the subscriber's current location information (as stored in the core network) is updated, and all mobile voice and data traffic is routed to the handset via the femtocell.

Throughout the call connection, session and completion stages, the SBR SIM provides high-reliability accounting capabilities that assure delivery of all transaction and session data to service provider billing systems.

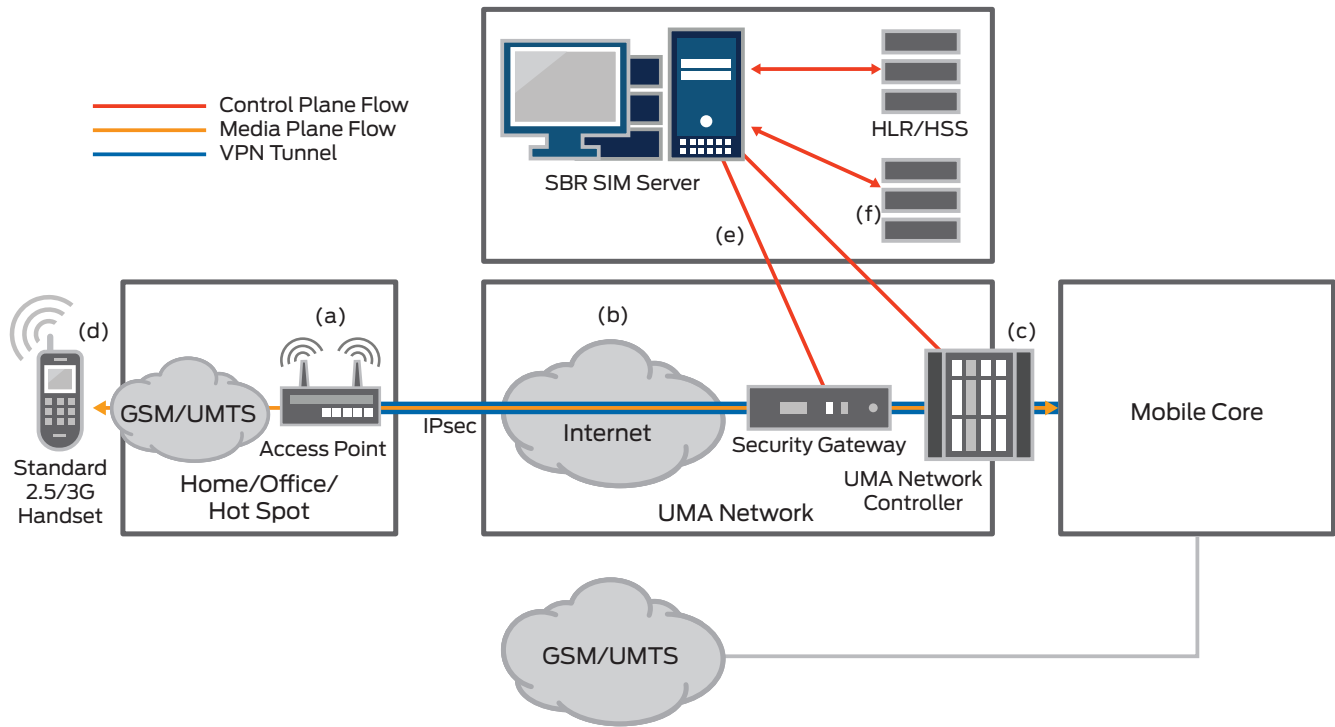


Figure 1: Juniper Networks AAA solution for femtocell

Features and Benefits

- Full-function RADIUS/AAA server for GSM and Code Division Multiple Access (CDMA) operators
- Proven reliability and scalability
- Offer IP-based services to your GSM customers, without having to upgrade your customer care infrastructure
- Customize network connections according to authorization strings set up in HLR/AuC

Deployed as an AAA solution for femtocell service platforms, the SBR SIM offers the right combination of service transparency, flexibility and overall life-cycle value. Key benefits include:

- Fully compliant with RADIUS and RADIUS accounting RFCs
- Reliable accounting, with guaranteed delivery of accounting records
- Simplified real-time usage tracking (as an example, for prepaid services)
- Integrates seamlessly with existing subscriber data and billing systems
- Supports a wide variety of service delivery and business models
- Offers a clear migration path to DIAMETER-based Third-Generation Partnership Project (3GPP) IP Multimedia Subsystem (IMS) solutions

Summary—Why Choose SBR SIM Server for Femtocell?

Femtocell technology offers service providers a vehicle for improving service quality and reach, decreasing access network congestion, extending service coverage, and expanding options for services and service bundles. To fully leverage femtocell services, however, service providers need AAA systems that are reliable, seamless and extensible, in order to maximize strategic options.

The SBR SIM Server has proven itself in some of the world's busiest networks, and brings service providers the knowledge that comes with over 12 years of experience in both service provider and enterprise networks. The SBR SIM is a trusted solution industry-wide and provides full support for Kineto and other industry-standard UNC systems.

With its scalability, reliability, flexibility and high performance, the SBR SIM Server offers exceptional value to service providers seeking to support femtocell services. With support for both RADIUS and DIAMETER, the SBR SIM Server offers unsurpassed value to service providers developing femtocell as a part of a comprehensive migration strategy toward FMC.

Next Steps

Whatever the access mode, service mix or business model, Juniper Networks SBR SIM Server can play a vital role in policing network access, tracking usage patterns, and integrating legacy assets with next-generation elements. Contact your Juniper Networks representative today to discover how the SBR SIM Server can expand the potential of your networks.

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.

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