

STEEL-BELTED RADIUS CARRIER: EXTENDED SUPPORT FOR WiMAX

WiMAX Solution Provides Scalable, Reliable, Carrier-Grade AAA Mobility Management and Roaming

Challenge

WiMAX, a powerful and versatile technology for providing wireless broadband services to fixed or mobile users, places extraordinary demands on authentication, authorization, and accounting (AAA) systems required by WiMAX to support mobile IP session management, roaming and various Extensible Authentication Protocol (EAP) methods.

Solution

Juniper Networks Steel-Belted Radius Carrier fulfills all of the AAA requirements of WiMAX, with its support for multiple EAP methods, robust mobile IP session management capabilities, and key management functionality in Home Connectivity Service Network (HCSN) and Visited Connectivity Service Network (VCSN) scenarios.

Benefits

In addition to WiMAX, the SBR Carrier supports General Packet Radio Service (GPRS), Universal Mobile Telecommunications System (UMTS), High-Speed Packet Access (HSPA), Unlicensed Mobile Access (UMA), Femtocell, Public Wireless LAN (PWLAN), xDSL, and a variety of other access technologies. The SBR Carrier is designed for high performance, scalability and flexible deployment, and enjoys industry-wide acceptance as an AAA platform with extensive authorization capabilities and broad flexibility for customized business rules.

The Challenge

WiMAX's strategic value to service providers derives from both its utility as a wireless broadband technology and an enabler of Fixed-Mobile Convergence (FMC). The WiMAX network architecture incorporates four main functional components: Mobile Stations, Access Service Network Gateways (ASN-GWs), Mobile IP Home Agents (MIP-HAs) and AAA servers. Designed as a true next-generation access technology, WiMAX seeks to enable the delivery of rich multimedia content, networked applications and other interactive services.

The reference architecture, service flexibility and mobility supported by WiMAX demand a great deal from an AAA server platform. In addition to the authentication, authorization and accounting functionality required by other types of networks, WiMAX AAA servers require the intelligence and performance to manage mobility and roaming as well. In this respect, the role of the AAA server in WiMAX networks extends well beyond access security and accounting, and into the very enablement of WiMAX services.

User and device authentication in the WiMAX reference model is complex and requires AAA server interaction with a number of different devices and platforms. Upon connection to the network, the Mobile Station requests authentication against the ASN-GW. Depending upon the service strategy, the ASN-GW may authenticate the user, the Mobile Station or both. This requirement alone adds a layer of complexity to authentication; device authentication involves the presentation of a certificate, whereas user authentication may involve either a Universal Subscriber Identity Module (USIM) or a username/passcode combination. To authenticate both users and devices, WiMAX requires both certificates and username/passcode combinations.

The WiMAX requirement for the support of three different EAP methods adds significantly to the work required of the AAA server, and deserves further discussion. Each EAP method required by WiMAX has a specific purpose. EAP-TLS was designed as a vehicle to transport device certificates (such as those maintained by a Subscriber Identity Module or SIM card); it provides authentication against a Public Key Infrastructure (PKI) database. EAP-TTLS is an extension of EAP-TLS designed to transport usernames and passcodes and authenticates against LDAP directories (most commonly used by large service providers), SQL databases or proprietary AAA databases. EAP-AKA was designed specifically to transport USIM data generated by smart cards and performs authentication against mobile network Home Locator Registers. An AAA server must support all three EAP methods so as to address specific authentication requirements on a WiMAX network.

Mobility management adds yet another layer of complexity to the process, above and beyond the AAA requirements for seemingly similar UMA/GAN and Femtocell. As with mobile cellular service, mobile WiMAX must manage sessions in which the subscriber connects through a different network. In WiMAX networks, these sessions are managed by the AAA system on a subscriber's Home network (Home AAA or H-AAA) and the connecting network (Visiting AAA or V-AAA). Note that in certain scenarios, service providers may require a single AAA platform to perform both H-AAA and V-AAA functions.

The Juniper Networks AAA Solution for WiMAX

Juniper Networks® Steel-Belted Radius Carrier provides full support for WiMAX, including all required EAP methods, mobility management and roaming management. Moreover, SBR Carrier offers scalability, reliability, flexible deployment and life-cycle value that service providers need in order to realize the full potential of their WiMAX service offerings. SBR Carrier scales through its high-performance design, support for 99.999 percent uptime, and its ability to handle thousands of RADIUS requests per second on suitable hardware. SBR Carrier 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 modular design of SBR Carrier enables simultaneous fulfillment of both H-AAA and V-AAA functions. Furthermore, the SBR Carrier relies upon a standards-based approach to AAA and support for a variety of commonly used backend formats, including Structured Query Language (SQL), Lightweight Directory Access Protocol (LDAP), Home Location Register (HLR), and Proxy RADIUS. With all of these attributes, the SBR Carrier helps optimize the service provider's life-cycle CapEx and OpEx characteristics, regardless of service mix or access technologies.

SBR Carrier authenticates WiMAX users and devices through support for all three EAP methods, as well as through an architecture that provides robust performance. As shown in Figure 1 below, SBR Carrier for WiMAX authentication works as follows:

- Upon connecting to the radio network, the Mobile Station is challenged by the ASN-GW to authenticate, using EAP as the protocol for the exchange of credentials. The Mobile Station can respond to the challenge by authenticating the device, the user or both. Device authentication involves the presentation of a certificate. User authentication can be done either via a Universal Subscriber Identity Module (USIM) or a username/passcode combination. WiMAX uses certificates and username/passcode combinations to authenticate both users and devices.
- The ASN-GW forwards the EAP response to the AAA server for authentication.
- If accepted, the AAA server responds with an "accept" message that provides all information necessary for the ASN-GW to initiate a mobile IP tunnel for the subscriber to the Constrained Shortest Path (CSP).

Mobility management adds another layer of complexity to the process, above and beyond the AAA requirements for seemingly similar mobile data networks like GPRS/UMTS, UMA/GAN and Femtocell. As with mobile cellular service, mobile WiMAX must manage sessions in which the subscriber connects through a different network. In the WiMAX reference architecture, certain functions belong to the Network Access Provider, while others belong to the Network Service Provider. To accommodate mobility, the AAA system on an H-AAA maintains responsibility for authenticating that subscriber regardless of whose network is serving that subscriber. The V-AAA routes the subscriber's authentication request to the H-AAA. (SBR Carrier is fully capable of performing both H-AAA and V-AAA functions simultaneously.)

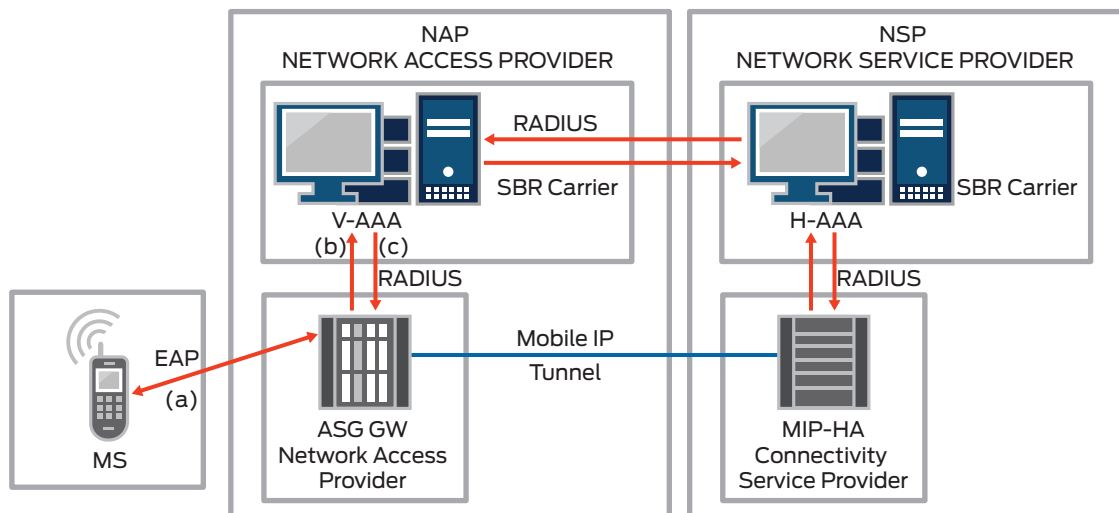


Figure 1: WiMAX authentication using Juniper Networks Steel-Belted Radius Carrier

Summary—SBR Carrier Combines Scalability, Reliability and Flexible Deployment

WiMAX technology offers service providers a vehicle for rolling out FMC, mobile data and a variety of other wireless broadband services today. Unlike other wireless access technologies, robust AAA is critical for WiMAX, not only as a means to enforce security and policies but to manage mobility and roaming functionality as well. More than 120 service providers worldwide rely on SBR Carrier today to meet their mission-critical AAA needs. With its scalability, reliability, flexibility and high performance, Juniper Networks Steel-Belted Radius Carrier offers strategic value to service providers seeking to support WiMAX services.

Juniper Networks serves the most demanding businesses, including:

- The top 100 service providers worldwide—wireline, wireless, cable and content providers
- Major defense, intelligence and civilian agencies, and top research and educational institutions
- 99 of the Fortune 100 enterprises, exchanges, banks, insurance firms and healthcare organizations

Next Steps

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

Corporate and Sales Headquarters

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, CA 94089 USA
Phone: 888.JUNIPER (888.586.4737)
or 408.745.2000
Fax: 408.745.2100
www.juniper.net

APAC Headquarters

Juniper Networks (Hong Kong)
26/F, Cityplaza One
1111 King's Road
Taikoo Shing, Hong Kong
Phone: 852.2332.3636
Fax: 852.2574.7803

EMEA Headquarters

Juniper Networks Ireland
Airside Business Park
Swords, County Dublin, Ireland
Phone: 35.31.8903.600
EMEA Sales: 00800.4586.4737
Fax: 35.31.8903.601

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