

Steel-Belted Radius[®] Carrier Release Notes

Release 8.5.0
October 2018
Revision 1

These Release Notes support Release 8.5.0 of Steel-Belted Radius Carrier (SBRC). Before you install or use your new software, read these Release Notes in their entirety, especially [“Known Problems and Limitations” on page 7](#).

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Release Overview

These release notes cover Release 8.5.0 of the Juniper Networks Steel-Belted Radius Carrier product.

Before You Start

Before you use your new software, read these *Release Notes* in their entirety, especially the section *Known Problems and Limitations*.

Documentation

Table 1 on page 3 lists and describes the Steel-Belted Radius Carrier documentation set:

Table 1: Steel-Belted Radius Carrier Documentation

Document	Description
<i>Steel-Belted Radius Carrier Installation Guide</i>	Describes how to install the Steel-Belted Radius Carrier software on the server.
<i>Steel-Belted Radius Carrier Administration and Configuration Guide</i>	Describes how to configure and operate the Steel-Belted Radius Carrier and its separately licensed modules.
<i>Steel-Belted Radius Carrier Reference Guide</i>	Describes the settings and valid values of the Steel-Belted Radius Carrier configuration files.
<i>Steel-Belted Radius Carrier Performance, Planning, and Tuning Guide</i>	Provides tips, use cases, and tools you need to: <ul style="list-style-type: none"> • Improve SBRC performance through planning, analysis, and configuration • Increase SBRC throughput and reliability • Analyze specific use cases, in the lab or in the production environment, to identify areas of potential performance enhancement and to limit the impact of resource constraints and failure scenarios
<i>Steel-Belted Radius Carrier Release Notes</i>	Contains the latest information about features, changes, known problems, and resolved problems in Release 8.5.0.



NOTE: If the information in the Release Notes differs from the information in any guide, follow the Release Notes.

You can find these release notes in Adobe Acrobat (PDF) format on the Juniper Networks Technical Publications webpage, which is located at:

<https://www.juniper.net/support/downloads/?p=carrier#docs>

Release Highlights

Highlights include the following product enhancements:



NOTE: SBR Carrier 8.4.1 was the final version to support 32-bit builds. See https://www.juniper.net/support/eol/carrier_aaa_sw.html for the EOE and EOL dates of SBR Carrier 8.4.1.

Support for Red Hat Enterprise Linux Versions

The SBR Carrier server has been qualified with Red Hat Enterprise Linux 7.5, 7.4, 7.3, 7.2, 7.0, 6.9, 6.7, 6.6, 6.5, and 6.1 on Intel (Xeon) hardware.

Native Oracle SQL Plug-in for Linux

SBR Carrier 8.5.0 supports native Oracle SQL plug-ins on a Linux platform. SBR Carrier has been tested with Oracle database versions 11.2.0 and 12.2.0 on Linux.

Signalware Package Upgrade

SBR Carrier 8.5.0 supports the “Signalware 9 SP6.5” upgrade on both Solaris and Linux platforms. For more information about the installation procedure, see the *SBR Carrier Installation Guide*.

Performance Testing and Improvements

Performance improvements have been made to SBR Carrier on both the Linux and Solaris platforms. The updated performance results and benchmarks of standalone version of SBR Carrier on a RHEL 7.3 machine are measured and documented in the *Performance, Planning, and Tuning Guide*.

Enhancements to the sbrd Script

The `./sbrd start ssr --nowait-nodes=node-ids` command is newly introduced to start the cluster without waiting for the full cluster to be initialized. The `node-ids` variable specifies the comma-separated list of node IDs that are unreachable, for example: `./sbrd start ssr --nowait-nodes=51,52`. You must use this argument only if one half of the cluster has network connectivity, but has lost the ability to communicate with the other half. When the network connectivity between the two halves of the cluster is restored, you can start the remaining nodes with the normal startup scripts.

For more information about the sbrd script, see the *SBR Carrier Installation Guide*.

System Requirements

For complete details about the hardware and software requirements for running a standalone Steel-Belted Radius Carrier server or the optional SBR Carrier Session State Register (SSR), see “Meeting System Requirements” in the *Steel-Belted Radius Carrier Installation Guide*.

Software

SBR Carrier has been qualified and is supported on Oracle Solaris 10, 11.0, 11.1, and 11.3 (SPARC) and Red Hat Enterprise Linux 6.1, 6.5, 6.6, 6.7, 6.9, 7.0, 7.2, 7.3, 7.4, and 7.5 on Intel (Xeon) platforms.

SBR Carrier supports virtualization on Linux, VMware hypervisor, Kernel-based Virtual Machine (KVM) hypervisor, and logical domains on Solaris. SBR Carrier has been tested with VMware ESXi 5.1, 5.5, 6.0, and 6.5 versions and KVM hypervisor on a RHEL 7.3 machine. For more information on planning and tuning the performance of SBR Carrier running on the Linux and Solaris operating systems, see the *Performance, Planning, and Tuning Guide*.



NOTE: SSR cluster in virtualized environments is not officially supported. Juniper Networks may still provide support for known issues and for those where you can demonstrate the issue exists on the native OS.

Perl

Steel-Belted Radius Carrier has been tested with Perl 5.8.4 and 5.8.8. Multiple Perl installations in discrete directories are supported, but attempting to use other versions of Perl with SBR Carrier may cause problems.

LDAP Plug-in

The LDAP plug-in requires SASL, which is included with the SBR Carrier package only for Solaris versions and not for Linux versions. For a Linux machine, you must ensure that you have the SASL package installed before starting SBR.

Tested Browsers

The Web GUI can be launched in different browsers across different platforms. [Table 2 on page 5](#) lists the tested browser versions and the operating systems.

Table 2: Web GUI—Tested Browsers

Browser	Version	Operating System
Google Chrome	36 and later	Windows/UNIX
Internet Explorer	9 and later	Windows
Mozilla Firefox	31 and later	Windows/UNIX
Opera	23 and later	Windows/Mac
Opera	12 and later	UNIX



NOTE: When you upgrade from an earlier SBR Carrier version to the current version, clear your browser's cache before launching the Web GUI.

External Database Requirements

Steel-Belted Radius Carrier supports:

- Any external database with a compatible JDBC connector.
- Oracle native client versions 10, 11, and 12 to connect Oracle database versions 10, 11, and 12 on Solaris.
- Oracle native client versions 11 and 12 to connect Oracle database versions 11 and 12 on Linux.



NOTE: For SBR Carrier to act as an Oracle native client, the Oracle 64-bit client must be set up before installing 64-bit version of SBR Carrier, because the Oracle server location is used during installation.

- SBR Carrier has been tested with MySQL version 5.1.69, Oracle database versions 10.2.0, 11.2.0, and 12.1.0.2 on Solaris, and Oracle database versions 11.2.0 and 12.2.0 on Linux.

Signalware and SIM Requirements

To support the optional SIM authentication module, Signalware 9 with Service Pack 6.5 must be installed before installing SBR Carrier.



CAUTION: Service Pack 6.5 must be installed; otherwise, Steel-Belted Radius Carrier cannot use the Signalware communications stack.

For more information, see the *SBR Carrier Installation Guide*.



NOTE: SS7 cards are no longer supported for customers who consider upgrading to SBR Carrier release 8.5.0.

Modified Open-Source Software

Embedded in Steel-Belted Radius Carrier 8.5.0 is open-source software that Juniper Networks has modified. The modified software includes:

- HTTPClient from Innovation GmbH
- sunmd5.c from the OpenSolaris Project

- Spider Monkey 1.7 from Mozilla
- INIH parser from Google Project Hosting

You can obtain the source code for these modifications from Juniper Networks Technical Support. See [“Requesting Technical Support” on page 20](#).

Migrating from Earlier SBR Carrier Standalone Server Products

You can use the configuration script to move a number of files from selected previous SBR Carrier releases to the Release 8.5.0 environment when installing Steel-Belted Radius Carrier. The corresponding Release 8.5.0 files are also loaded on the system, but are not activated. You are responsible for merging new settings from Release 8.5.0 configuration files into the working (preexisting) configuration files. To support new features, SBR Carrier uses default values for any new settings that have not been merged into the working configuration files.

For complete details about migrating from the preceding releases, see the *SBR Carrier Installation Guide*.



NOTE: Skipping versions when upgrading the cluster using the rolling restart method is not supported. Since SBR Carrier 8.0.0 uses MySQL 5.5.37, and 8.4.0, 8.4.1, and 8.5.0 use 5.7.18 for Linux (see [Table 3 on page 7](#)), we strongly recommend that you not use the rolling restart method to upgrade the cluster version of SBR Carrier directly from release 8.0.0 to 8.4.x or later on a Linux machine. Instead, use the backup, destroy, and re-create method to upgrade or perform a clean install.

Table 3: MySQL and NDB Versions Used by SBR Carrier

SBR Carrier Version	MySQL Version	NDB Version
8.0.0	5.5.37	7.2.16
8.1.0	5.6.22	7.3.8
8.2.0	5.6.28	7.4.10
8.3.0	5.6.29	7.4.11
8.4.0, 8.4.1, and 8.5.0	Linux: 5.7.18	Linux: 7.5.6
	Solaris: 5.6.36	Solaris: 7.4.15

Known Problems and Limitations

This section lists known problems and limitations identified in SBR Carrier 8.5.0. For the most complete and latest information about known defects, use the Juniper Networks online [Problem Report Search](#) application.

LDAP Authentication

- When you have a large number of LDAP connections configured, SBR Carrier may hang or take several minutes to shut down, and the sbrd script may display a shutdown failure message in the terminal. [PR847961](#)

SBRC Core

- The User Concurrency table does not display proxy realm names. [PR857901](#)
- In the rfc4679.dct file, the names of the Agent-Circuit-Id and Agent-Remote-Id attributes are not defined as mentioned by RFC 4679. Instead, the names are respectively mentioned as DSL-Agent-Circuit-Id and DSL-Agent-Remote-Id.
- Enhanced performance counters initialize peak-rate counter to total-requests counter's value when a HUP signal is sent. [PR1052592](#)
- When the **Framed-IPv6-Address** attribute is configured in both the user and profile return lists, the IPv6 addresses in both the return lists are returned if the **FramedIPv6AddressHint** parameter is set to **no**. For a workaround, see the PR record. [PR1303671](#)
- Web GUI allows users to configure Echo feature for Multi-Valued-Pair attributes though the Multi-Valued-Pair attribute has no support for Echo feature. [PR1306874](#)

SIM Authentication

- The authGateway and GWrelay processes must be restarted whenever SBR restarts. This is applicable only on a Linux platform. [PR1011144](#)

Logging

- Detailed EAP logging is supported only for TLS protocol version 1.0, and not for versions 1.1 or 1.2. [PR1219412](#)
- Transaction IDs are not logged for accounting packets when a Class attribute is not present in the packet. [PR917748](#)

Geo-Redundancy

- Memory leak issues exist when the Geo-redundancy feature is enabled. [PR1377772](#)

3GPP AAA Module

- The 3GPP AAA module does not initiate subscriber de-registration in the HSS. Subscriber de-registration is performed when SBR Carrier receives an HSS Registration-Termination-Request.
- The Diameter redirection indication is supported only over the SWx reference point. The redirection indication information in an AA-Answer message, received by a proxy server from SBR Carrier over the SWd reference point, is returned to the client without

attempting to forward the request to the Redirect-Host. That is, only routing rules configured by a system administrator are enforced.

- The Redirect-Host-Usage value included in a Multimedia-Authentication-Answer message and received over the SWx reference points is ignored. The value is assumed to be DONT_CACHE.
- In the SBR Diameter Administrator, the **Permanent Failures**, **Transient Failures**, and **Protocol Errors** statistics are updated based on Result-Code attribute values (not based on Diameter Experimental-Result-Code attribute values).

WiMAX

- On a Linux platform, WiMAX HA authentication gets rejected as IP addresses set to the WiMAX-hHA-IP-MIP4 attribute are populated in a reverse order. [PR1388743](#)

Documentation Updates

Information in this section updates the published Steel-Belted Radius Carrier 8.5.0 documentation set.

Session State Register Module

- If you start a management (M or SM) node without running the “configure 2 (create a new cluster definition)” option, as you would in the case of a rolling restart upgrade from Release 7.2.x to Release 8.5.0, you will see multiple warnings such as the following:



.....
 WARNING: 2010-11-30 15:25:23 [MgmtSrvr] WARNING -- at line 68: [api] Id is deprecated, use NodeId instead

These warnings can be safely ignored.

To avoid these warnings, make the following change in the /opt/JNPRhadm/config.ini file:

Change lines that read Id=<number> to NodeId=<number> on each management node.

Resolved Issues

This section lists the issues fixed in Steel-Belted Radius Carrier 8.5.0. For the most complete and latest information about resolved issues, use the Juniper Networks online [Problem Report Search](#) application.

- Sessions are not handled correctly when the length of the Acct-Session-Id attribute is greater than the default 24 octets. [PR719218](#)
- In high load scenario with smart static proxy, accounting packets are dropped as proxy threads are exhausted. [PR1319929](#)

- Web GUI is not launched after SSL errors are reported. [PR1334856](#)
- SBR Carrier does not send proxy accounting messages when the log partition is full. [PR798163](#)
- The **MainThreadStackSize** setting in **radius.ini** does not override default system stack size. [PR959984](#)
- Response for the SendRoutingInfoForLCS message from the HLR or HSS may not be received by authGateway if the HLR or HSS sends the message with the routing indicator in CalledPartyAddress set to "Route based on SSN". [PR987162](#)
- Diameter packets are not routed to HSS based on IMSI prefix (IMSI implicit routing). [PR1054108](#)
- An extra quote is added as part of the reject reason in authentication reports. [PR1219714](#)
- RADIUS process memory leak is observed during native user authentication. [PR1243586](#)
- Malformed packet parsing by RADIUS process causes CPU spike. [PR1277176](#)
- Geo-redundancy server populates some CST fields with NULL values. [PR1308295](#)
- SBR Carrier crashes while attempting to log certain EAP messages at Tracelevel=2. [PR1327378](#)
- The **MaxConcurrent** parameter in the **ldapauth.aut** file does not work as expected. [PR1329040](#)
- Reply-Message in Access-Reject response might contain unexpected characters when Reject Messages fields are empty in the Web GUI. [PR1332838](#)
- Authentication or accounting requests may fail with the "CProxyEx::CheckProxyByScript(): script execution failed" log message when JavaScript is enabled. [PR1335455](#)
- LDAP authentication requests utilizing JavaScript may stop being processed when the LDAP server times out. [PR1336441](#)
- SBR Carrier configure script asks to configure GWrelay before SS7. [PR1336444](#)
- SBR Carrier cores while using a lower version of LDAP with the **MaxConcurrent** parameter enabled. [PR1355210](#)
- LCI does not support inclusion of an equals sign (=) in usernames. [PR1358592](#)
- SBR Carrier cores when Geo-redundancy host is restarted or sent load. [PR1364214](#)
- Custom ports for RADIUS clients or proxy cannot be set (Solaris only). [PR1364469](#)
- SBR Carrier does not support session lookup by IPv6 addresses. [PR607113](#)
- SBR core dumps if process size is larger than 8 GB due to shutdown timeout. [PR1254580](#)
- Default values in sample.pro are not aligned with source code defaults. [PR1325376](#)
- SBR Carrier stops processing new requests under load when JavaScript is enabled. [PR1336492](#)
- Entering more than 124 characters for a native user password results in an erroneous rejection. [PR771505](#)

- The Inbound-from-Proxy control point is called after, not before, the inbound filters are applied. [PR889762](#)
- In Web GUI, the **Location Group** pane displays only the first 50 RADIUS clients and includes non-location group clients. [PR1237011](#)

Related Documentation

Requests for Comments

The Internet Engineering Task Force (IETF) maintains an online repository of Request for Comments (RFCs) at <http://www.ietf.org/rfc.html>. [Table 4 on page 11](#) lists the RFCs that apply to Steel-Belted Radius Carrier.

Table 4: RFCs Related to Steel-Belted Radius Carrier

RFC Number	Title
RFC 1035	<i>Domain Names - Implementation and Specification</i> . P. Mockapetris. November 1987.
RFC 1155	<i>Structure and Identification of Management Information for TCP/IP-based Internets</i> . M. Rose, K. McCloghrie, May 1990.
RFC 1213	<i>Management Information Base for Network Management of TCP/IP-based internets: MIB-II</i> . K. McCloghrie, M. Rose, March 1991.
RFC 2006	<i>The Definitions of Managed Objects for IP Mobility Support using SMIPv2</i> . D. Cong and others. October 1996.
RFC 2104	<i>HMAC: Keyed-Hashing for Message Authentication</i> . H. Krawczyk, M. Bellare, R. Canetti. February 1997.
RFC 2246	<i>The TLS Protocol</i> . T. Dierks, C. Allen. January 1999.
RFC 2271	<i>An Architecture for Describing SNMP Management Frameworks</i> . D. Harrington, R. Presuhn, B. Wijnen, January 1998.
RFC 2284	<i>PPP Extensible Authentication Protocol (EAP)</i> . L. Blunk, J. Vollbrecht, March 1998.
RFC 2433	<i>Microsoft PPP CHAP Extensions</i> . G. Zorn, S. Cobb, October 1998.
RFC 2548	<i>Microsoft Vendor-specific RADIUS Attributes</i> . G. Zorn. March 1999.
RFC 2607	<i>Proxy Chaining and Policy Implementation in Roaming</i> . B. Aboba, J. Vollbrecht, June 1999.
RFC 2618	<i>RADIUS Authentication Client MIB</i> . B. Aboba, G. Zorn. June 1999.
RFC 2619	<i>RADIUS Authentication Server MIB</i> . G. Zorn, B. Aboba. June 1999.
RFC 2620	<i>RADIUS Accounting Client MIB</i> . B. Aboba, G. Zorn. June 1999.
RFC 2621	<i>RADIUS Accounting Server MIB</i> . G. Zorn, B. Aboba. June 1999.

Table 4: RFCs Related to Steel-Belted Radius Carrier (continued)

RFC Number	Title
RFC 2622	<i>PPP EAP TLS Authentication Protocol</i> . B. Aboba, D. Simon, October 1999.
RFC 2719	<i>Framework Architecture for Signaling Transport</i> . L. Ong et al., October 1999.
RFC 2809	<i>Implementation of L2TP Compulsory Tunneling via RADIUS</i> . B. Aboba, G. Zorn. April 2000.
RFC 2865	<i>Remote Authentication Dial In User Service (RADIUS)</i> . C. Rigney, S. Willens, A. Rubens, W. Simpson. June 2000.
RFC 2866	<i>RADIUS Accounting</i> . C. Rigney. June 2000.
RFC 2867	<i>RADIUS Accounting Modifications for Tunnel Protocol Support</i> . G. Zorn, B. Aboba, D. Mitton. June 2000.
RFC 2868	<i>RADIUS Attributes for Tunnel Protocol Support</i> . G. Zorn, D. Leifer, A. Rubens, J. Shriver, M. Holdrege, I. Goyret. June 2000.
RFC 2869	<i>RADIUS Extensions</i> . C. Rigney, W. Willats, P. Calhoun. June 2000.
RFC 2882	<i>Network Access Servers Requirements: Extended RADIUS Practices</i> . D. Mitton. July 2000.
RFC 2960	<i>Stream Control Transmission Protocol</i> . R. Stewart and others. October 2000.
RFC 3046	<i>DHCP Relay Agent Information Option</i> . M. Patrick. January 2001.
RFC 3118	<i>Authentication for DHCP Messages</i> . R.Droms and others. June 2001.
RFC 3162	<i>RADIUS and IPv6</i> . B. Aboba, G. Zorn, D. Mitton. August 2001.
RFC 3344	<i>IP Mobility Support for IPv4</i> . C. Perkins. August 2002.
RFC 3539	<i>Authentication, Authorization, and Accounting (AAA) Transport Profile</i> . B. Aboba, J. Wood. June 2003.
RFC 3575	<i>IANA Considerations for RADIUS (Remote Authentication Dial-In User Service)</i> . B. Aboba, July 2003.
RFC 3576	<i>RFC3576 - Dynamic Authorization Extensions to Remote to Remote Authentication Dial In User Service</i> . Network Working Group, 2003
RFC 3579	<i>RADIUS (Remote Authentication Dial In User Service) Support For Extensible Authentication Protocol (EAP)</i> . B. Aboba, P. Calhoun, September 2003.
RFC 3580	<i>IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines</i> . P. Congdon, B. Aboba, A. Smith, G. Zorn, J. Roese, September 2003.
RFC 3588	<i>Diameter Base Protocol</i> . P. Calhoun, J. Loughney, E. Guttman, G. Zorn, J.Arkko. September 2003.

Table 4: RFCs Related to Steel-Belted Radius Carrier (continued)

RFC Number	Title
RFC 3748	<i>Extensible Authentication Protocol</i> . B. Aboba, L. Blunk, J. Vollbrecht, J. Carlson, H. Levkowitz. June 2004.
RFC 3957	<i>Authentication, Authorization, and Accounting (AAA) Registration Keys for Mobile IPv4</i> . C. Perkins and P. Calhoun. March 2005.
RFC 4005	<i>Diameter Network Access Server Application</i> . P. Calhoun, G. Zorn, D. Spence, D. Mitton. August 2005.
RFC 4017	<i>Extensible Authentication Protocol (EAP) Method Requirements for Wireless LANs</i> . D. Stanley and others. March 2005.
RFC 4072	<i>Diameter Extensible Authentication Protocol (EAP) Application</i> . P. Eronen, G. Zorn, T. Hiller. August 2005.
RFC 4186	<i>Extensible Authentication Protocol Method for Global System for Mobile Communications (GSM) Subscriber Identity Modules (EAP-SIM)</i> . H. Haverinen, J. Salowey. January 2006.
RFC 4187	<i>Extensible Authentication Protocol Method for Global System for 3rd Generation Authentication and Key Agreement (EAP-AKA)</i> . J. Arkko, H. Haverinen. January 2006.
RFC 4282	<i>The Network Access Identifier</i> . B. Aboba and others. December 2005.
RFC 4284	<i>Identity Selection Hints for the Extensible Authentication Protocol (EAP)</i> . F. Adrangi, V. Lortz, F. Bari, P. Eronen. January 2006.
RFC 4306	<i>Internet Key Exchange (IKEv2) Protocol</i> . C. Kaufman. December 2005.
RFC 4372	<i>Chargeable User Identity</i> . F. Adrangi and others. January 2006.
RFC 4510	<i>Lightweight Directory Access Protocol (LDAP) Technical Specification Road Map</i> . K. Zeilenga, June 2006.
RFC 4666	<i>Signaling System 7 (SS7) Message Transfer Part 3 (MTP3) - User Adaptation Layer (M3UA)</i> . K. Morneault, J. Pastor-Balbas. September 2006.
RFC 4668	<i>RADIUS Authentication Client MIB for IPv6</i> . D. Nelson. August 2006.
RFC 4669	<i>RADIUS Authentication Server MIB for IPv6</i> . D. Nelson. August 2006.
RFC 4670	<i>RADIUS Accounting Client MIB for IPv6</i> . D. Nelson. August 2006.
RFC 4671	<i>RADIUS Accounting Server MIB for IPv6</i> . D. Nelson. August 2006.
RFC 5281	<i>Extensible Authentication Protocol Tunneled Transport Layer Security Authenticated Protocol Version 0 (EAP-TTLSv0)</i> . P. Funk, S. Blake-Wilson. August 2008.
RFC 5448	<i>Improved Extensible Authentication Protocol Method for 3rd Generation Authentication and Key Agreement (EAP-AKA')</i> . J. Arkko, V. Lehtovirta, P. Eronen. May 2009.

Table 4: RFCs Related to Steel-Belted Radius Carrier (continued)

RFC Number	Title
RFC 5997	<i>Use of Status-Server Packets in the Remote Authentication Dial In User Service (RADIUS) Protocol</i> A. DeKok. August 2010.
RFC 6733	<i>Diameter Base Protocol.</i> V. Fajardo, J. Arkko, J. Loughney, G. Zorn. October 2012.
RFC 6911	<i>RADIUS Attributes for IPv6 Access Networks.</i> W. Dec, B. Sarikaya, G. Zorn, D. Miles, B. Lourdelet. April 2013.

3GPP and 3GPP2 Technical Specifications

The Third-Generation Partnership Project (3GPP) and 3GPP2 maintains an online repository of Technical Specifications and Technical Reports at <http://www.3gpp.org> and <http://www.3gpp2.org>, respectively.

Table 5 on page 14 lists the 3GPP Technical Specifications that apply to Steel-Belted Radius Carrier.

Table 5: 3GPP Technical Specifications

3GPP TS Number	Title	Applicable Sections
3GPP TS 22.234 Version 12.0.0	<i>Requirements on 3GPP system to Wireless Local Area Network (WLAN) interworking</i>	<ul style="list-style-type: none"> Section 5.1.7: Interworking between PLMN and WLANs
3GPP TS 23.003 Version 12.6.0	<i>Numbering, addressing, and identification</i>	<ul style="list-style-type: none"> Section 2.2: Composition of IMSI
3GPP TS 23.008 Version 12.6.0	<i>Organization of subscriber data</i>	<ul style="list-style-type: none"> Section 3B: Definition of subscriber data I-WLAN domain
3GPP TS 23.234 Version 12.0.0	<i>3GPP system to Wireless Local Area Network (WLAN) interworking; System description</i>	<ul style="list-style-type: none"> Section 6.1: Reference Model Section 6.2: Network Elements
3GPP TS 23.402 Version 12.8.0	<i>Architecture enhancements for non-3GPP accesses</i>	<ul style="list-style-type: none"> Section 4.1: Concepts Section 4.3: Network Elements
3GPP TS 24.302 Version 14.4.0	<i>Access to the 3GPP Evolved Packet Core (EPC) via non-3GPP access networks; Stage 3</i>	<ul style="list-style-type: none"> Section 6: UE – EPC Network protocols Section 8: PDUs and parameters specific to the present document
3GPP TS 29.002 Version 12.7.0	<i>Mobile Application Part (MAP) specification</i>	<ul style="list-style-type: none"> Section 6: Requirements concerning the use of SCCP and TC Section 7.1: Terminology and definitions Section 7.2: Modelling principles Section 7.3: Common MAP service

Table 5: 3GPP Technical Specifications (continued)

3GPP TS Number	Title	Applicable Sections
3GPP TS 29.273 Version 12.7.0	<i>Evolved Packet System (EPS); 3GPP EPS AAA interfaces</i>	<ul style="list-style-type: none"> • Section 4: SWa Description • Section 5: STa Description • Section 6: SWd Description • Section 7: SWm Description • Section 8: SWx Description • Section 9: S6b and H2 Description • Section 10: Result-Code and Experimental-Result Values
3GPP TS 33.402 Version 14.2.0	<i>3GPP System Architecture Evolution (SAE); Security aspects of non-3GPP accesses</i>	<ul style="list-style-type: none"> • Section 6: Authentication and key agreement procedures • Section 7: Establishment of security contexts in the target access system • Section 8: Establishment of security between UE and ePDG • Section 9: Security for IP based mobility signalling • Section 14: Temporary identity management

WiMAX Technical Specifications

The WiMAX Forum Networking Group (NWG) maintains a repository of technical documents and specifications online at <http://www.wimaxforum.org>. You can also view the WiMAX IEEE standards, 802.16e-2005 for mobile WiMAX and 802.16-2004 for fixed WiMAX, online at <http://www.ieee.org>.

Third-Party Products

For information about configuring your Ulticom software and hardware, or your access servers and firewalls, consult the manufacturer's documentation.

General Statement of Compliance

Table 6 on page 15 lists Steel-Belted Radius Carrier Release 8.5.0 compliance with applicable RFCs.

Table 6: Compliance of Steel-Belted Radius Carrier Release 8.5.0 with Applicable RFCs

RFC Number	Name	Notes
1155	Structure and Identification of Management Information for TCP/IP-based Internets	—
1213	Management Information Base for Network Management of TCP/IP-based internets: MIB-II	—
2058	Remote Authentication Dial In User Service	Obsoleted by RFC 2138

Table 6: Compliance of Steel-Belted Radius Carrier Release 8.5.0 with Applicable RFCs (continued)

RFC Number	Name	Notes
2059	RADIUS Accounting	Obsoleted by RFC 2139
2104	HMAC: Keyed-Hashing for Message Authentication	—
2107	Ascend Tunnel Management Protocol	—
2138	Remote Authentication Dial In User Service	Obsoleted by RFC 2865
2139	RADIUS Accounting	Obsoleted by RFC 2866
2271	An Architecture for Describing SNMP Management Frameworks	Obsoleted by RFC 2571
2284	PPP Extensible Authentication Protocol (EAP)	Updated by RFC 2484
2433	Microsoft PPP CHAP Extensions	—
2548	Microsoft Vendor-specific RADIUS Attributes	—
2607	Proxy Chaining and Policy Implementation in Roaming	—
2618	RADIUS Authentication Client MIB	Obsoleted by RFC 4668
2619	RADIUS Authentication Server MIB	Obsoleted by RFC 4669
2620	RADIUS Accounting Client MIB	Obsoleted by RFC 4670
2621	RADIUS Accounting Server MIB	Obsoleted by RFC 4671
2716	PPP EAP TLS Authentication Protocol	Obsoleted by RFC 5216
2809	Implementation of L2TP Compulsory Tunneling via RADIUS	—
2865	Remote Authentication Dial In User Service (RADIUS).	—
2866	RADIUS Accounting	—
2867	RADIUS Accounting Modifications for Tunnel Protocol Support	—
2868	RADIUS Attributes for Tunnel Protocol Support	—
2869	RADIUS Extensions	—
2882	Network Access Servers Requirements: Extended RADIUS Practices	—
2903	Generic AAA Architecture	—

Table 6: Compliance of Steel-Belted Radius Carrier Release 8.5.0 with Applicable RFCs (continued)

RFC Number	Name	Notes
2904	AAA Authorization Framework	—
2905	AAA Authorization Requirements	—
2906	AAA Authorization Requirements	—
2977	Mobile IP Authentication, Authorization, and Accounting Requirements	—
2989	Criteria for Evaluating AAA Protocols for Network Access	—
3012	Mobile IPv4 Challenge/Response Extensions	—
3162	RADIUS and IPv6	—
3575	IANA Considerations for RADIUS (Remote Authentication Dial In User Service)	—
3579	RADIUS (Remote Authentication Dial In User Service) Support For Extensible Authentication Protocol (EAP)	—
3580	IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines	—
3748	Extensible Authentication Protocol (EAP)	—
3770	Certificate Extensions and Attributes Supporting Authentication in Point-to-Point Protocol (PPP) and Wireless Local Area Networks	—
4014	Remote Authentication Dial-In User Service (RADIUS) Attributes Suboption for the Dynamic Host Configuration Protocol (DHCP) Relay Agent Information Option	—
4017	Extensible Authentication Protocol (EAP) Method Requirements for Wireless LANs	—
4072	Diameter Extensible Authentication Protocol (EAP) Application	—
4137	State Machines for Extensible Authentication Protocol (EAP) Peer and Authenticator	—
4186	Extensible Authentication Protocol Method for Global System for Mobile Communications (GSM) Subscriber Identity Modules (EAP-SIM)	—
4187	Extensible Authentication Protocol Method for 3rd Generation Authentication and Key Agreement (EAP-AKA)	—

Table 6: Compliance of Steel-Belted Radius Carrier Release 8.5.0 with Applicable RFCs (continued)

RFC Number	Name	Notes
4284	Identity Selection Hints for the Extensible Authentication Protocol (EAP)	—
4306	Internet Key Exchange (IKEv2) Protocol. C. Kaufman. December 2005.	—
4334	Certificate Extensions and Attributes Supporting Authentication in Point-to-Point Protocol (PPP) and Wireless Local Area Networks (WLAN)	—
4372	Chargeable User Identity	—
4603	Additional Values for the NAS-Port-Type Attribute	—
4668	RADIUS Authentication Client MIB for IPv6	—
4669	RADIUS Authentication Server MIB for IPv6	—
4670	RADIUS Accounting Client MIB for IPv6	—
4671	RADIUS Accounting Server MIB for IPv6	—
4672	RADIUS Dynamic Authorization Client MIB	Not supported
4673	RADIUS Dynamic Authorization Server MIB	Not supported
4675	RADIUS Attributes for Virtual LAN and Priority Support	Not supported
4679	DSL Forum Vendor-Specific RADIUS Attributes	—
4746	Extensible Authentication Protocol (EAP) Password Authenticated Exchange	Not supported
4763	Extensible Authentication Protocol Method for Shared-secret Authentication and Key Establishment (EAP-SAKE)	Not supported
4764	The EAP-PSK Protocol: A Pre-Shared Key Extensible Authentication Protocol (EAP) Method.	Not supported
4818	RADIUS Delegated-IPv6-Prefix Attribute.	—
4849	RADIUS Filter Rule Attribute	—
4877	Mobile IPv6 Operation with IKEv2 and the Revised IPsec Architecture.	Not supported
4962	Guidance for Authentication, Authorization, and Accounting (AAA) Key Management	—

Table 6: Compliance of Steel-Belted Radius Carrier Release 8.5.0 with Applicable RFCs (continued)

RFC Number	Name	Notes
5030	Mobile IPv4 RADIUS Requirements	—
5080	Common Remote Authentication Dial In User Service (RADIUS) Implementation Issues and Suggested Fixes	—
5090	RADIUS Extension for Digest Authentication	Not supported
5106	The Extensible Authentication Protocol-Internet Key Exchange Protocol version 2 (EAP-IKEv2) Method	—
5169	Handover Key Management and Re-Authentication Problem Statement	—
5176	Dynamic Authorization Extensions to Remote Authentication Dial In User Service (RADIUS)	—
5216	The EAP-TLS Authentication Protocol	—
—	3GPP2 X.S0011-D, Version: 1.0, Version Date: February, 2006	MIPv6 not supported
5281	Extensible Authentication Protocol Tunneled Transport Layer Security Authenticated Protocol Version 0 (EAP-TTLSv0) P. Funk, S. Blake-Wilson. August 2008.	—
5448	Improved Extensible Authentication Protocol Method for 3rd Generation Authentication and Key Agreement (EAP-AKA'). J. Arkko, V. Lehtovirta, P. Eronen. May 2009.	—
5997	Use of Status-Server Packets in the Remote Authentication Dial In User Service (RADIUS) Protocol. A. DeKok. August 2010.	—
6733	Diameter Base Protocol. V. Fajardo, J. Arkko, J. Loughney, G. Zorn. October 2012.	—
6911	RADIUS Attributes for IPv6 Access Networks. W. Dec, B. Sarikaya, G. Zorn, D. Miles, B. Lourdelet. April 2013.	—

SBR Carrier Documentation and Release Notes

For a list of related SBR Carrier documentation, see
<https://www.juniper.net/support/downloads/?p=carrier#docs>.

If the information in the latest release notes differs from the information in the documentation, follow the *Steel-Belted Radius Carrier Release Notes*.

To obtain the most current version of all Juniper Networks technical documentation, see the products documentation page on the Juniper Networks website at <https://www.juniper.net/documentation/>.

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- Document name
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- Software release version

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For international or direct-dial options in countries without toll-free numbers, visit <https://www.juniper.net/support/requesting-support.html>

When you contact technical support, be ready to provide:

- Your Steel-Belted Radius Carrier release number (for example, Steel-Belted Radius Carrier Release 8.5.0).
- Information about the server configuration and operating system, including any OS patches that have been applied.
- For licensed products under a current maintenance agreement, your license or support contract number.
- A detailed description of the problem.
- Any documentation that may help in resolving the problem, such as error messages, core files, compiler listings, and error or RADIUS log files.

Revision History

October 2018—SBR Carrier Release 8.5.0

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