



Release Notes for Cisco Broadband Access Center 4.2

Revised: August 16, 2011, OL-24047-01

These release notes describe new software features and fixes to software issues in Cisco Broadband Access Center, Release 4.2.

See the [Installation and Setup Guide for Cisco Broadband Access Center 4.2](#) for more information about the installation procedure of Cisco BAC 4.2.

Contents

- [Introduction, page 2](#)
- [System Components, page 2](#)
- [Supported Devices, page 3](#)
- [Supported Standards, page 3](#)
- [New Features, page 4](#)
- [Caveats, page 9](#)
- [Related Documentation, page 12](#)
- [Notices, page 13](#)
- [Obtaining Documentation and Submitting a Service Request, page 15](#)



Americas Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

© 2010 Cisco Systems, Inc. All rights reserved.

Introduction

Cisco Broadband Access Center, referred to as Cisco BAC throughout this document, automates the tasks of provisioning and managing customer premises equipment (CPE) in a broadband service-provider network. The application provides a simple and easy way to deploy high-speed data, voice technology, and home networking devices.

Cisco BAC can be scaled to suit networks of virtually any size, even those deploying millions of devices. It also offers high availability, made possible by its distributed architecture with centralized management.

Cisco BAC incorporates support for many technologies to provide provisioning services for your network. These technologies include:

- DOCSIS high-speed data
- PacketCable voice service, both Secure and Basic workflows
- Non-secure CableHome
- OpenCable Set-top box

System Components

The Cisco BAC product comprises:

- The Regional Distribution Unit (RDU), which is the primary server in a Cisco BAC deployment. Through its extensible architecture, the RDU supports the addition of new technologies and services.
- The Device Provisioning Engine (DPE), which handles all device interactions with the RDU.
- Cisco Network Registrar extension points, which are the link between Cisco BAC and Network Registrar. Cisco Network Registrar provides Cisco BAC with the DHCP and Domain Name System functionality.
- The Key Distribution Center (KDC), which is a Kerberos server that authenticates PacketCable Multimedia Terminal Adapters (MTAs).
- An administrator user interface, which you can use to monitor and manage Cisco BAC.
- A Java provisioning application programming interface (API), which you use to integrate Cisco BAC into an existing operations support-system environment.

For information on system requirements, licensing, and upgrading, see [Before Installing Cisco BAC 4.2, page 6](#). See also the *Installation and Setup Guide for Cisco Broadband Access Center 4.2*.

Supported Devices

Cisco BAC provides provisioning and managing of residential devices, namely DOCSIS cable modems and set-top boxes (STBs), PacketCable embedded MTAs (eMTAs), CableHome devices, and computers.

Cisco BAC continues to support provisioning and managing:

- DOCSIS 2.0/3.0 IPv4 and IPv6 cable modems (IPv4 only, IPv6 only, or Alternate Provisioning Mode).
- IPv6 devices, including cable modems compliant with DOCSIS 3.0, computers, and set-top boxes (STBs).
- Variants of eSAFE (embedded Service/Application Functional Entities) devices, such as mixed-IP mode PacketCable MTAs. A mixed-IP mode MTA is an eSAFE device that consists of an IPv6 embedded cable modem and an IPv4 eMTA. This class of devices embeds additional functionality with cable modems, such as packet-telephony, home networking, and video.

As in previous releases, Cisco BAC continues to provision:

- Cable modems and STBs compliant with DOCSIS 1.0, 1.1, 2.0 and DOCSIS 3.0.
- eMTAs compliant with PacketCable version 1.5
- Devices compliant with CableHome 1.0.
- Computers.

Supported Standards

Cisco BAC complies with these applicable Requests for Comments (RFCs), protocols, standards, and Internet Engineering Task Force (IETF) drafts:

- IPv6—Complies with RFC 2460 (IPv6 specification), 2461 (Neighbor Discovery protocol), 2462 (Stateless Address Autoconfiguration), 2463 (Internet Control Message Protocol–ICMP), 3513 (Addressing Architecture).
- DHCPv6—Complies with RFC 3315 (DHCPv6 specification), 3633 (IPv6 Prefix Options), 3736 (Stateless DHCP Service for IPv6), 4014 (Remote Authentication Dial-In User Service–RADIUS–Attributes Suboption for the Relay Agent Information Option), 4580 (Relay Agent Subscriber-ID Option), 4649 (Relay Agent Remote-ID Option), and 4704 DHCPv6 Client Fully Qualified Domain Name (FQDN) Option.
- IPv4 and IPv6 interoperability—Complies with RFC 4038 (Application of IPv6 Transition) and 4472 (Operational Issues and Considerations with IPv6 DNS).
- TFTP and ToD servers—Complies with RFC 868 (Time Protocol) and 2349 (TFTP Blocksize Option).

Additionally, Cisco BAC complies with these applicable CableLabs and Comcast standards:

- eDOCSIS
 - CM-SP-eDOCSIS-I20-1000611
- DOCSIS 2.0
 - CM-SP-RFIV2.0-C01-081104
 - CM-SP-DOCSIS2.0-IPv6-I04-110623
- DOCSIS 3.0

- CM-SP-MULPIv3.0-I08-080522
- CM-SP-SECv3.0-I08-080522
- DOCSIS Business Services
 - CM-SP-L2VPN-I09-100611
- DOCSIS Set-top Gateway (DSG)
 - CM-SP-DSG-I15-100611
- PacketCable MTA Device Provisioning Specification
 - PKT-SP-PROV1.5-I04-090624
 - PKT-SP-SEC1.5-I03-090624
- OpenCable specification
 - OC-SP-HOST2.1-CFR-I11-100507
- CableHome
 - CH-SP-CH1.0-C01-060728
 - CH-SP-CH1.1-C01-060728
- Cross Project
 - CL-SP-CANN-I02-080306
 - CM-SP-CL-SP-CANN-DHCP-Reg-I02-080306

New Features

Cisco BAC 4.2 consists of many new features and this section describes the most important changes made in this version.

- [Restricting Number Of Sessions Per User, page 4](#)
- [TFTP File-Naming Convention, page 5](#)
- [Linux Support, page 5](#)
- [RDU Migration Tool, page 5](#)
- [Cisco UCS Support, page 5](#)



Note

The Admin GUI of Cisco BAC, has a session timeout of 10 minutes.

Restricting Number Of Sessions Per User

The earlier releases of Cisco BAC RDU supported more than one session per user. This resulted in account sharing and was also a security threat. To overcome this issue, this release of Cisco BAC provides an option to restrict the number of concurrent sessions to a configured value. The default value for the number of concurrent sessions is 100 per user. The number of session restriction can be handled in the user sessions created through the Cisco BAC admin UI as well the API client sessions.

TFTP File-Naming Convention

The TFTP File-Naming Convention helps you customize the variable components of the dynamic TFTP filenames, and their order. The Groovy script generates the TFTP filename by using components like the DHCP discovered data as well as the other interfaces that are being exposed to it. The script can include any important information such as, the class of service name, discovered vendor name, downstream speed and so on. You can configure the script either in technology defaults or in system defaults. The default maximum filename length is 127 characters.

You can find Groovy script samples in `BAC_HOME/rdp/samples/groovy`. A sample Groovy script is included in the *Cisco Broadband Access Center Administrator Guide*.

Linux Support

This release of Cisco BAC supports installing and running of RDU and KDC on Red Hat Enterprise Linux 5 or Cent OS 5 using x86 and 64 bit hardware system. You can have the watchdog, and SNMP agent, along with any other supporting tools that are needed for RDU and KDC. It also supports the combination of any platforms that include RDU, DPE, KDC, and CNR DHCP extension running on Solaris or Linux. Data migration from a Solaris RDU to a Linux RDU is also made possible in this release. In the earlier release of Cisco BAC (4.1), only DPE and CNR-EP were supported on Linux. This release supports all components such as RDU, DPE, CNR-EP and KDC on Linux.

RDU Migration Tool

Cisco BAC 4.2 supports database migration between different platforms such as Solaris and Linux. It also supports migration from earlier versions of Cisco BAC on Solaris to Cisco BAC 4.2 on Solaris. The migration is done using the script **migrateDb.sh**. The migration script (**migrateDb.sh**) is automatically installed when you run the Cisco BAC 4.2 installation program (**install_bac_solaris.sh**). Migration is accomplished by reading from the original database and writing it into a new database. For this purpose, you must allocate additional disk space for accommodating the newly created database.

The status of the first phase of migration is recorded in a migration log file, which is stored in the migrated database directory. The *migration.log* file identifies the version of the database that is being migrated and provides status messages for the migration process.

Cisco UCS Support

This release of Cisco BAC supports the running of all of its components on the Cisco UCS platform (Linux VMs). You can install and run each of the components such as RDU, DPE, KDC, and CNR Extension on the UCS platform in separate virtual machines.

Deprecated and Removed MIBs

In Cisco BAC 4.2, the CL-SP-MIB-CLABDEF-I02-020920 and DOCS-BPI2-MIB-ipcdn-08 MIBs are removed from the RDU default loaded MIBs list since they are the duplicates of CLAB-DEF-MIB and DOCS-BPI2-MIB respectively.

The references to any fully qualified MIB OIDs from the above removed MIBs should be replaced with the appropriate OIDs from the new MIBs in customer templates and scripts. However, the custom MIB option can be used to include these experimental OIDs. For more details about adding custom MIBs, see *Cisco Broadband Access Center Administrator Guide*.

Before Installing Cisco BAC 4.2

Review the following information before you begin to install Cisco BAC 4.2.

- [Licensing, page 6](#)
- [Installation Notes, page 9](#)

Licensing

Cisco BAC uses FlexLM based licensing system, a Cisco license management system. The new system provides enhanced reliability and security, ease of use, and flexible licensing options.

Obtaining Licenses

Each license in this release is available as a permanent license or an evaluation license.

- **Permanent**—You purchase a permanent license for use in your network environment and to activate the specific features for which it is intended.
- **Evaluation**—You purchase an evaluation license to enable functionality for a specific length of time.

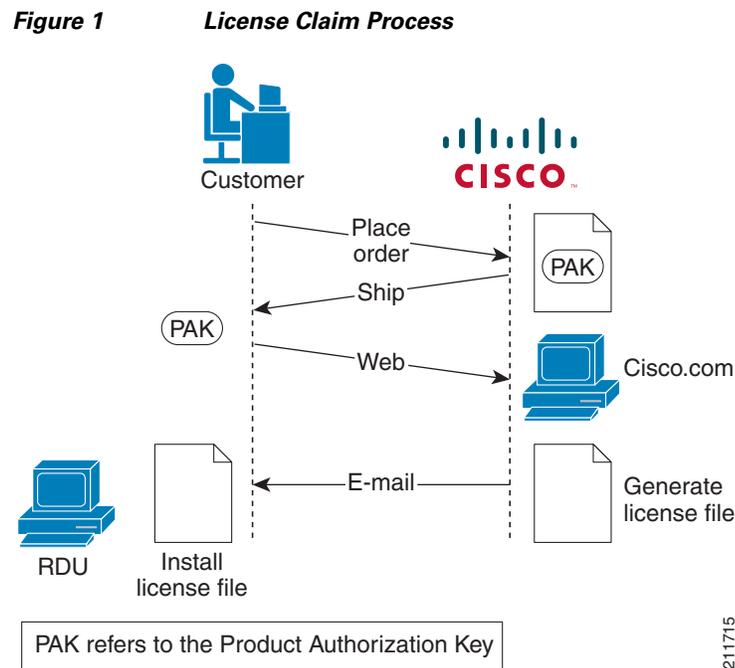


Caution

Do not attempt to deploy Cisco BAC into a fully operational network with an evaluation license. When the evaluation license expires, you will not be able to use Cisco BAC to provision the devices in your network.

Obtaining a Permanent License

To request a permanent license, follow the procedure that [Figure 1](#) depicts.



Note

With FlexLM licensing, you receive a Product Authorization Key (PAK) for each software CD package that you purchase. The PAK is affixed as a sticky label on the Software License Claim Certificate card that is included in your CD-ROM package.

To obtain a permanent license:

1. Keep your PAK handy and access <http://www.cisco.com/go/license>. You must have a valid Cisco.com account to log in to this site.
The Product License Registration website appears.
2. Complete the steps detailed at the Product License Registration page.



Note

During license registration, submit each PAK that you have received. For each PAK that you submit, a license file is generated and sent to you via e-mail.

3. Once you receive your license file, install it using the procedure described in [Installing the License, page 8](#).

Obtaining an Evaluation License

For an evaluation license, contact your Cisco representative, who will generate the necessary key from the Cisco licensing website and e-mail it to you. Once you receive your license file, install it using the procedure described in [Installing the License, page 8](#).

Installing the License

Before installing the license file, ensure that you back up your licenses in case you have to reinstall the Cisco BAC software.

To install a permanent or evaluation license:

Step 1 Once you receive your license file, save each file to the system on which you plan to launch the Cisco BAC administrator user interface.

Step 2 Launch your web browser on that system.

Step 3 Enter the administrator's location using this syntax:

`http://machine_name:port_number/`



Note To access the administrator user interface via HTTPS, enter:

`https://machine_name:port_number/`

- *machine_name*—The machine on which the RDU is running.
- *port_number*—Port on which the server side of the administrator application runs. The default port is:
 - 8100 for HTTP over TCP
 - 8443 for HTTP over SSL

The main login page appears.

Step 4 Enter the default username (**admin**) and the default password (**changeme**).

- a. If you are logging in for the first time, the Change Password screen appears.
- b. Enter a new password and confirm it.

Step 5 Click **Login**.

The Main Menu page appears.

Step 6 Click the license link at the top of the Main Menu page, or choose **Configuration > License Keys**.

The Manage License Keys page appears.

Step 7 In the License File field, enter the complete path to the location of the license file on your local system. Remember to include the name of the license file while specifying the pathname. Or, click **Browse** and navigate to the license file.

Step 8 Click **Add**.

The details regarding the number of services and the DPEs that you are licensed to use appear.

Installation Notes

Review the following notes before installing Cisco BAC 4.2.

- Ensure that your system meets the requirements described in [Licensing, page 6](#).
- Ensure that you download and install the recommended patches from the Operating Systems support sites.
- Obtain the Cisco BAC license file, as described in [Obtaining Licenses, page 6](#). Then install the license, as described in [Installing the License, page 8](#).
- In case of Solaris, verify the file-system block size of the directory in which you intend to install the Cisco BAC database and database transaction log files. For optimum performance and reliability of the Cisco BAC database, configure the file system or systems that contain the database files and database log files with an 8 KB to 64 KB block size.

Linux does not support ZFS (Zeta File System) block size configuration.

- Ensure that the file system in which you place database files is configured to support files larger than 2 GB.

For complete information on installation procedures, see the *Installation and Setup Guide for Cisco Broadband Access Center 4.2*.

Caveats

This section lists the customer-found problems that were either fixed in Cisco BAC 4.2 or are still open.



Note

To obtain more information about known problems, access the Cisco Software Bug Toolkit at <http://www.cisco.com/cgi-bin/Support/Bugtool/home.pl>. (You will be prompted to log into cisco.com).

Resolved Problems

[Table 1](#) lists the bugs resolved in this Cisco BAC 4.2 release.

Table 1 **Resolved Problems**

| Bug ID | Summary |
|------------|--|
| CSCtk48173 | Errors occurred when converting back and forth between *.cm and *.groovy file formats. |
| CSCtI91708 | BAC 4.1 could not unload SNMP MIBs without an RDU restart. |
| CSCtn56550 | BAC 4.1.x EP installation for Linux used wrong value for DHCP server. |
| CSCtq50195 | JVM MaxGCPauseMillis argument increased garbage collection time for RDU. |
| CSCtq69518 | The DPE native code responsible for PacketCable SECURE provisioning contained a memory leak. |
| CSCto04793 | A lot of security related issues were addressed as part of the 1.6.0_24 release. |
| CSCtI84741 | You were not able to invoke Groovy scripts from custom extensions. |
| CSCtn62389 | Duplicate MIB's. |
| CSCtr17670 | changeUser() API asked for authentication mode when it was not changed. |

Table 1 **Resolved Problems**

| Bug ID | Summary |
|------------|---|
| CSCtr70321 | LeaseQuery to secondary CNR did not return lease query data. |
| CSCtr72092 | DOCS-BPI2-MIB-ipcdn-08 was not removed from System Defaults during upgrade. |
| CSCtr59885 | WD TLV Cache should be disabled by default. |
| CSCtn68722 | BAC 4.1.0.2 DPE Upgrade Process was not documented. |
| CSCtr13226 | addUser and changeUser API methods required the RDU_AUTH_MODE property. |
| CSCtr19659 | Encoding failed for DOCSIS Option 22.11.1 and 60.11.1. |
| CSCtr99182 | ulimit -n unlimited option not supported for non root users in Solaris. |
| CSCtr99672 | Read only user showed all the capabilities were disabled in provisioning group. |
| CSCtr17387 | Non-root user could not start/stop BAC RDU DPE processes. |
| CSCtr96369 | DPE log was missing from Admin UI. |
| CSCti98378 | <i>runCfgUtil</i> decoder truncates the output TLV numbers. |
| CSCtj09014 | UnexpectedInternalException was found in DPE logs when interface IP was enabled for both IPv4 and IPv6, and provisioning group communication not enabled. |
| CSCti56191 | The DPE crashed under load after you installed the Solaris patch. |
| CSCte10940 | The DPE crashed, when a configured IP interface was down. |
| CSCtr09060 | File type validation and compilation were not done while replacing file from Admin UI. |
| CSCtt02605 | Customer migrated from 2.7 to 4.1 and was using some lease query properties. Some properties previously prefixed with <i>/cnrQuery</i> have been changed to start with <i>/dhcpLeaseQuery</i> . |

Known Problems

Table 2 lists major software issues open in the Cisco BAC 4.2.

Table 2 **Known Problems**

| Bug ID | Description | Workaround/Resolution |
|------------|--|--|
| CSCtl44226 | Stack Trace is present in RDU log after rebooting the server. | Use init 6 command for physical server reboots and use Power Off (Soft) option in the VSphere client to reboot the VMware server. |
| CSCtn38815 | Unable to restart KDC when it is in backoff mode due to a license failure. | Instead of restarting the KDC component alone, restart the whole bprAgent process. To do this, run; <i>/etc/init.d/bprAgent restart</i> |
| CSCtq15061 | MTA FQDN auto generation does not require domain for some API calls. | Add or modify the device using the Administration UI. |
| CSCtq51693 | Space validation needs to be done while you install for DPE FQDN. | Use only lower case letters for FQDN inputs during installation. |

Table 2 Known Problems

| Bug ID | Description | Workaround/Resolution |
|------------|--|---|
| CSCtq77295 | Warning Messages are displayed while you uninstall 4.2 Linux. | These warning messages are generated by RPM packaging system. You can ignore these warning messages. During the package removal, the configuration files such as <i>rdu.properties</i> and <i>dpe.properties</i> are saved by the RPM system with the <i>.rpmsave</i> extension. If required, you can take a copy of these files before removing the <BPR_HOME> and <BPR_DATA> directories. |
| CSCtq90931 | Issues like exceptions, no help seen with Scripts present in the DPE. | Help option is not supported in these scripts. The proper usage for the scripts are <i>./createDbTar.sh</i> <target tar file> <i>./extractDbTar.sh</i> <tar file> <i>./compareDpeCaches.sh</i> <pg name> <cache dir1> <cache dir2>. |
| CSCtr85371 | You need to delete the <i>env</i> folder from the <i>temp</i> directory for installation to be successful. | Remove the directory <i>/tmp/env</i> , manually. |
| CSCtr87133 | Force login attempt of RADIUS user always fails when you exceed the supported maximum session. | <ul style="list-style-type: none"> The existing user session will be expired after the configured session expiry time (10 minutes by default). Try logging in after the session expiry time. For immediate need of a force login, execute <i>./setLogLevel.sh -show</i> at RDU. This will forcefully create and clear a session for the user. Then try logging in through the Admin UI. |
| CSCtr93324 | Upgrade or Add Components fail if the current directory has no write permission. | The current working directory should have write permission while executing installation script. |
| CSCtj03983 | BAC RDU CM dual-stack support enhancement. | Use cable modems only in single, IPv4 or Ipv6, stack mode. |
| CSCth16781 | <i>runCfgUtil.sh</i> fails to generate PacketCable 2.0 dial plan TLV. | The TLV values should not be more than 1024 characters. |
| CSCtg71861 | Groovy scripts do not have binding for device. | If device object bindings are used in the Groovy script, the scripts cannot be encoded or decoded using <i>runCfgUtil</i> . It can however be used in the RDU to generate the config files. |
| CSCtj25387 | Illegal argument exception thrown in DPE logs for emic configurations. | <ul style="list-style-type: none"> Use encrypted secret while configuring emic shared secret in DPE CLI using option 7. Use plain text while configuring emic shared secret in DPE CLI using option 0. |

Table 2 Known Problems

| Bug ID | Description | Workaround/Resolution |
|------------|---|---|
| CSCth16251 | CNR extensions expect relay agent information in DHCPINFORM messages. | Check whether any additional configuration option needs to be set on the CMTS, which would cause it to add the relay-agent option to DHCPINFORM messages. |
| CSCtj30159 | <i>db.RunRecoveryException</i> is thrown while restoring database using relative path. | Provide the absolute path as the input for <i>recoverDb.sh</i> . |
| CSCsm43002 | <i>captureConfiguration.sh</i> not archiving agent/conf files. | Copy agent/conf/*, manually. |
| CSCti60751 | Many PCs behind one modem cause DPE to drop the RDU connection. | Ensure that only minimum number of PCs are added behind a modem. |
| CSCts08631 | Error message contains wrong Cisco Network Registrar version while installing CNR_EP without Cisco Network Registrar. | As indicated in the compatibility matrix, use Cisco Network Registrar 7.1.2.1 or higher. |

Related Documentation

See the following documents for more information about installing, configuring, and managing Cisco BAC 4.2:

Table 3 Related Documentation

| Document Title | Available Formats |
|--|--|
| <i>Installation and Setup Guide for Cisco Broadband Access Center 4.2</i> | <ul style="list-style-type: none"> PDF on the product CD-ROM On Cisco.com: http://www.cisco.com/en/US/products/sw/netmgtsw/ps529/prod_installation_guides_list.html |
| <i>Cisco Broadband Access Center DPE CLI Reference 4.2</i> | <ul style="list-style-type: none"> PDF on the product CD-ROM On Cisco.com: http://www.cisco.com/en/US/products/sw/netmgtsw/ps529/prod_command_reference_list.html |
| <i>Administrator Guide for Cisco Broadband Access Center 4.2</i> | <ul style="list-style-type: none"> PDF on the product CD-ROM On Cisco.com: http://www.cisco.com/en/US/products/sw/netmgtsw/ps529/prod_maintenance_guides_list.html |
| <i>Release Notes for Cisco Broadband Access Center 4.2 (This document)</i> | <ul style="list-style-type: none"> PDF on the product CD-ROM On Cisco.com: http://www.cisco.com/en/US/products/sw/netmgtsw/ps529/prod_release_notes_list.html |

See the following documents for information about CNR:

| Document Title | Available Location |
|--|---|
| <i>User Guide for Cisco Network Registrar 7.2</i> | <ul style="list-style-type: none"> On Cisco.com: http://www.cisco.com/en/US/products/sw/netmgtsw/ps1982/products_user_guide_list.html |
| <i>Installation Guide for Cisco Network Registrar 7.2</i> | <ul style="list-style-type: none"> On Cisco.com: http://www.cisco.com/en/US/products/sw/netmgtsw/ps1982/prod_installation_guides_list.html |
| <i>CLI Reference Guide for Cisco Network Registrar 7.2</i> | <ul style="list-style-type: none"> On Cisco.com: http://www.cisco.com/en/US/products/sw/netmgtsw/ps1982/prod_command_reference_list.html |
| <i>Release Notes for Cisco Network Registrar 7.2</i> | <ul style="list-style-type: none"> On Cisco.com: http://www.cisco.com/en/US/products/sw/netmgtsw/ps1982/prod_release_notes_list.html |

Notices

The following notices pertain to this software license.

OpenSSL/Open SSL Project

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>).

This product includes cryptographic software written by Eric Young (eay@cryptsoft.com).

This product includes software written by Tim Hudson (tjh@cryptsoft.com).

License Issues

The OpenSSL toolkit stays under a dual license, i.e. both the conditions of the OpenSSL License and the original SSLeay license apply to the toolkit. See below for the actual license texts. Actually both licenses are BSD-style Open Source licenses. In case of any license issues related to OpenSSL please contact openssl-core@openssl.org.

OpenSSL License:

Copyright © 1998-2007 The OpenSSL Project. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions, and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. All advertising materials mentioning features or use of this software must display the following acknowledgment: “This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>)”.
4. The names “OpenSSL Toolkit” and “OpenSSL Project” must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact openssl-core@openssl.org.
5. Products derived from this software may not be called “OpenSSL” nor may “OpenSSL” appear in their names without prior written permission of the OpenSSL Project.
6. Redistributions of any form whatsoever must retain the following acknowledgment:
 “This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>)”.

THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT “AS IS” AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

This product includes cryptographic software written by Eric Young (ey@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

Original SSLeay License:

Copyright © 1995-1998 Eric Young (ey@cryptsoft.com). All rights reserved.

This package is an SSL implementation written by Eric Young (ey@cryptsoft.com).

The implementation was written so as to conform with Netscapes SSL.

This library is free for commercial and non-commercial use as long as the following conditions are adhered to. The following conditions apply to all code found in this distribution, be it the RC4, RSA, lhash, DES, etc., code; not just the SSL code. The SSL documentation included with this distribution is covered by the same copyright terms except that the holder is Tim Hudson (tjh@cryptsoft.com).

Copyright remains Eric Young’s, and as such any Copyright notices in the code are not to be removed. If this package is used in a product, Eric Young should be given attribution as the author of the parts of the library used. This can be in the form of a textual message at program startup or in documentation (online or textual) provided with the package.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgement:
 “This product includes cryptographic software written by Eric Young (ey@cryptsoft.com) ”.

The word 'cryptographic' can be left out if the routines from the library being used are not cryptography-related.

4. If you include any Windows specific code (or a derivative thereof) from the apps directory (application code) you must include an acknowledgement: "This product includes software written by Tim Hudson (tjh@cryptsoft.com)".

THIS SOFTWARE IS PROVIDED BY ERIC YOUNG "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The license and distribution terms for any publicly available version or derivative of this code cannot be changed. i.e. this code cannot simply be copied and put under another distribution license [including the GNU Public License].

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

© 2010 Cisco Systems, Inc. All rights reserved.

