Q&A

Cisco 815 Integrated Services Router for Broadband Cable

Q. **What is the Cisco® 815 Integrated Services Router?**

A. The Cisco 815 Integrated Services Router is a fixed-configuration router with a single male F-connector interface for connection to the cable system and an integrated four-port 10/100 switch. It has integrated cable modem capability and directly connects computers and other customer premises devices at a subscriber site to the service provider cable, hybrid fiber-coaxial (HFC), and IP backbone network. Additionally, the Cisco 815 offers comprehensive security, advance quality-of-service (QoS) and service-level agreement (SLA) enforcement tools, and multiservice data for enterprise branch offices and small and medium-sized businesses (SMBs).

Q. **How is the design of the Cisco 815 different from the Cisco uBR905 Cable Access Router?**

A. The cable interface on the Cisco 815 has dedicated CPU and memory and is designed to adhere to the Embedded Cable Modem Module (ECMM) standard. For the Cisco uBR905, the DOCSIS® code ran completely within Cisco IOS Software. Therefore, with the Cisco uBR905, any change to the modem code required a change to the Cisco IOS Software image. With the Cisco 815, all the DOCSIS code resides on the cable modem daughter card itself and is run locally in the Broadcom chipset independently of Cisco IOS Software. This design allows the cable modem firmware to be upgraded independently of Cisco IOS Software.

Q. **Why should I migrate from the Cisco uBR905 to the Cisco 815?**

A. The reasons to migrate from the Cisco uBR905 to the Cisco 815 include:

- The Cisco 815 cable interface is DOCSIS 2.0 based, while the Cisco uBR905 is DOCSIS 1.1 compliant.
- The Cisco 815 achieves better performance.
- The Cisco 815 has integrated a four-port 10/100 Ethernet switch, while the Cisco uBR905 only has integrated 10BaseT hub ports.
- The Cisco 815 Cable Router has the additional 10/100 FE port that can be used as a WAN backup or for creating DMZ.
- The Cisco 815 cable daughter card has dedicated CPU and memory. This design separates the DOCSIS control plane from Cisco IOS Software and allows the independent management of the cable modem and router Cisco IOS Software.
- The Cisco 815 has better integration between DOCSIS QoS and Cisco IOS Software QoS.
- The Cisco 815 supports Multiprotocol Label Switching (MPLS) customer edge functionalities.
- The Cisco uBR905 has reached end of sale, software maintenance is no longer available, and the product will reach end of life on April 30, 2010.

Q. **What are the benefits of the integrated cable interface on the Cisco 815 over standalone cable modems?**

A. The integrated cable interface on the Cisco 815 provides the following benefits over two-box solutions (one cable modem and one router):

- Improved QoS

A typical cable modem has significantly higher LAN interface bandwidth than what is available on the cable WAN interface. The LAN peer (for example, router) cannot effectively enforce an upstream QoS policy because the upstream QoS does not receive any indication when the cable modem's WAN interface is congested. Therefore, to help ensure QoS enforcement, the LAN peer must shape the outgoing traffic to the committed access rate (CAR) or risk high-priority traffic being dropped.

The Cisco 815 integrates Cisco IOS Software QoS and DOCSIS QoS to address this issue. A congestion notification mechanism is implemented so that the cable modem can provide back pressure to Cisco IOS Software when it experiences congestion on the WAN interface. Cisco IOS Software will queue the outgoing primary service flow payloads and perform QoS to manage congestion.

Meanwhile, Cisco IOS Software will allow secondary service flow payloads to skip the queue to guarantee service on high-priority traffic. This method results in significantly improved upstream QoS performance and optimized utilization of the upstream available bandwidth.

- Better failover scheme

When a router is connected to an external cable modem Ethernet port, the router will not be notified when the cable connection goes down. If the cable modem is a primary connection, this will cause problems, because failover to the backup link might not take place or take time (depending on Dynamic Host Configuration Protocol [DHCP] lease settings). The cable high-speed WAN interface card (HWIC) sends real-time status to the Cisco router so that the failover will happen immediately if the cable link goes down.

- Better access to advanced services capabilities of Cisco router family

With the integrated cable interface on the Cisco 815, both cable operators and business users can use Cisco routers' advanced services capabilities such as security, multicast, and MPLS.

- Ease of management

Integration of the cable interface saves space and makes the deployment, management, and maintenance of equipment much easier. A cable operator can choose just to manage the cable WAN connection or both the cable WAN connection and the host router. Likewise, a business can integrate the cable modem and still choose what level of support and control it wants to have over the host router. It also reduces the probability of opportunistic theft.

- Improved availability

In addition to the enhanced failover capability, all the components of the Cisco 815 are designed and tested to help ensure they meet true business-class availability requirements and will provide a higher degree of availability than consumer-grade devices.

Q. What are the product numbers for the Cisco 815?

A. There are two SKUs: CISCO815 and CISCO815-VPN/K9. The difference between them is that CISCO815-VPN/K9 has a hardware VPN acceleration module, extra memory, and the Advanced Security image as shown below.

Product Part Number	Product Description
Cisco 815 Broadband Cable Routers	
CISCO815	DOCSIS-based 2.0 Broadband Cable Router with 4 10/100BASE-T switch ports, Cisco IOS IP Base image, 32MB flash, and 64MB DRAM
CISCO815-VPN/K9	DOCSIS-based 2.0 Secure Broadband Cable Router with hardware encryption, 4 10/100BASE-T switch ports, Cisco IOS Advanced Security image, 32MB flash, and 128MB DRAM

Q. In what scenarios are CISCO815 and CISCO815-VPN/K9 recommended?

A. If you need advanced secuirty features or IPSec encryption throughput greater than 500Kbps, the Cisco 815-VPN/K9 is recommended.

Q. Is the CISCO815 field upgradeable to CISCO815-VPN/K9?

A. Although the upgrade is less cost-effective and not recommended, CISCO815 can be upgraded to CISCO815-VPN/K9 by ordering the following:

- MEM1700-64U128D= DRAM upgrade
- MOD1700-VPN= Hardware Encryption VPN Module
- CD17-ASK9= CD pack for software upgrade
- FL17-ESK9-AESK9= Software Feature License for upgrade to Advanced Security

Q. Is the Cisco 815 compatible with DOCSIS 1.0, 1.1, and 2.0?

A. Yes. The Cisco 815 is based on the DOCSIS 2.0 standard and is designed to be backward compatible with DOCSIS 1.1 and 1.0.

Q. What is DOCSIS 2.0?

A. DOCSIS is the Data Over Cable Service Interface Specification defined by CableLabs®, a nonprofit research and development consortium dedicated to pursuing and helping bring to market new cable technologies. DOCSIS 2.0 is the latest standard from CableLabs, and it provides significant improvements in upstream throughput for cable modem connectivity. DOCSIS 2.0 is backward compatible to DOCSIS 1.1, which provided improved operational flexibility, security, and QoS features that enable real-time services, and DOCSIS 1.0, which was the first specification for cable modems. More information is available at http://www.cablemodem.com/primer.

Q. Is the Cisco 815 compatible with the Euro-DOCSIS or J-DOCSIS standard?

A. No.

Q. What are the downstream/upstream frequency ranges of the Cisco 815's cable interface?

A. The Cisco 815 supports downstream fequency range of 88-860 MHz (edge to edge) and upstream frequency range of 5-42 MHz (edge to edge).

Q. Are both Advanced Time Division Multiplex Access (ATDMA) and Synchronous Code Division Multiple Access (SCDMA) supported?

A. Yes.

Q. Has the Cisco 815 been certified by CableLabs?

A. The Cisco 815 is planned to be submitted to CableLabs for certificate wave 45 (CW45), which completes on August 10, 2006. Current status can be found at the CableLabs site at http://www.cablelabs.com/certqual/lists.

Q. With which cable modem termination system (CMTS) will the Cisco 815 have interoperability?

A. The Cisco 815 should have interoperability with any DOCSIS compliant CMTS, including the Cisco uBR7100 Series Universal Broadband Routers, Cisco uBR7246VXR Universal Broadband Router, and Cisco uBR10012 Universal Broadband Router. The complete list of qualified CMTSs is available at the following web sites:

- CableLabs: http://www.cablelabs.com/certqual/lists

Q. Does the Cisco 815 support PacketCable™ MultiMedia (PCMM)?

A. Yes. The Cisco 815 is based on DOCSIS 2.0. Thus it supports PacketCable MultiMedia, which defines QoS and accounting capabilities over DOCSIS 1.1 or 2.0 networks.

Q. Does the Cisco 815 support PacketCable 1.0 or 1.5?

A. No. Only PacketCable MultiMedia is supported.

Q. Does or will the Cisco 815 support DOCSIS 2.0B or DOCSIS 3.0?

A. No, the Cisco 815 only supports one upstream and one downstream channel and cannot be upgraded in the future to support channel bonding, as planned in DOCSIS 2.0B and 3.0.

Q. How many upstream service flows does the Cisco 815 support?

A. The Cisco 815 supports one primary upstream service flow and 15 secondary upstream service flows.

Q. Which Cisco IOS Software release supports the Cisco 815?

A. The Cisco 815 will be first introduced on Cisco IOS Software Release 12.4(6)XE Special on June 19, 2006. It is expected to be supported on the T train in November 2006.

Q. What Cisco IOS Software images does the Cisco 815 support?

A. The Cisco 815 has two SKUs, which support different images. Cisco 815 supports IP Base image, and Cisco 815-VPN/K9 supports Advanced Security image.

Q. Is the MAC address on the Cisco 815 cable interface statically set?

A. Yes, the MAC address of the Cisco 815 cable interface is statically set at the factory and does not change. There is a sticker with the MAC address placed on the faceplate of the cable interface per the DOCSIS specification.

Q. How are upgrades to the cable modem firmware performed on the Cisco 815?

A. The cable modem firmware upgrades are triggered by a CMTS. Users cannot upgrade the cable modem firmware from the router command-line interface (CLI). When a firmware upgrade is needed, the cable service provider will set a flag and specify new firmware release ID in the cable modem configuration file on the CMTS. The cable modem gets the new configuration file and compares the firmware release ID with the current firmware version. If they are different, the cable modem will retrieve the new firmware from the CMTS.

Q. How can I find out the cable modem firmware version on the Cisco 815?

A. The cable firmware version can be shown by issuing a **show controllers Cable-Modem <port> status command** on the router CLI. Here is a sample screen output of the **show** command:

```
Cable Modem Information:
   Software version           2.103.1013
   Software Hidden version    2.103.1013c
   Hardware version
   Cable IP address           10.0.0.102/24
   DOCSIS mode                2 (1_1)
   BPI status                 1 (DISABLED)
   Uptime (seconds)           3172
   Current state              16 (OPERATIONAL)
   Cable MAC address          00d0.59e1.201d
   Internal MAC address       00d0.59e1.201e
   Internal IP address        192.168.100.1/24
   Downstream buffers free    256
   Downstream buffers used    0
   Upstream buffers free      254
   Upstream buffers used      0
   MAC SDRAM free (Kbytes)    20576944
   MAC SDRAM used (Kbytes)    7321072
   MAC Flash free (Kbytes)    1811540
   MAC Flash used (Kbytes)    2349996
```

Q. What kind of cable modem provisioning and management capabilities do end users of the Cisco 815 have using a Cisco IOS Software router?

A. End users of the Cisco 815 can manage services related to Cisco IOS Software on the cable modem interface by configuring services such as IP Service Level Agreements (SLAs), Embedded Event Manager (EEM), Network-Based Access Recognition (NBAR), NetFlow, AutoQoS, AutoSecure, and so on.

Q. What kind of cable modem provisioning and management capabilities do cable service providers have through the cable interface?

A. Cable service providers can push the DOCSIS configuration file from the CMTS to the cable modem on the Cisco 815 to manage parameters such as maximum rate, burst rate, class of service, baseline privacy, and so on. The cable modem firmware upgrade is also managed by the DOCSIS configuration file using the cable interface.

Q. Why can the IP address not be configured on the cable modem interface of the Cisco 815?

A. DOCSIS standards mandate that a cable modem interface must use DHCP to acquire an IP address.

Q. What is the configuration process for the cable modem interface on the Cisco 815?

A. The cable modem interface on the Cisco 815 requires both the DOCSIS configuration from the CMTS and the Cisco IOS Software configuration from the Cisco IOS Software CLI to work properly.

The cable modem obtains the DOCSIS configuration from the CMTS to specify the communication between the cable modem and the CMTS. Per the DOCSIS spec, this configuration cannot be altered by the Cisco router and can only be driven from the cable operator/CMTS.

A DOCSIS configuration file is a binary file containing the parameters for cable modems to come online in accordance to what the ISP is provisioning. Parameters in a DOCSIS configuration file include maximum downstream and upstream rates, maximum upstream burst rate, class of service or baseline privacy, MIBs, and many other parameters. Several different tools are available to build this file. Cisco Broadband Configurator, previously called DOCSIS CPE Configurator, is a Java-based tool that greatly simplifies the creation and maintenance of DOCSIS configuration files.

The cable modem interface must be configured from the Cisco IOS Software CLI to specify services related to Cisco IOS Software such as IP address, ACL, NAT, QoS, and so on. A Cisco IOS Software configuration file is an ASCII file.

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Printed in USA C67-351606-00 06/06