Cisco uBR10012 Performance Routing Engine 5 for the Cisco uBR10012 Universal Broadband Router

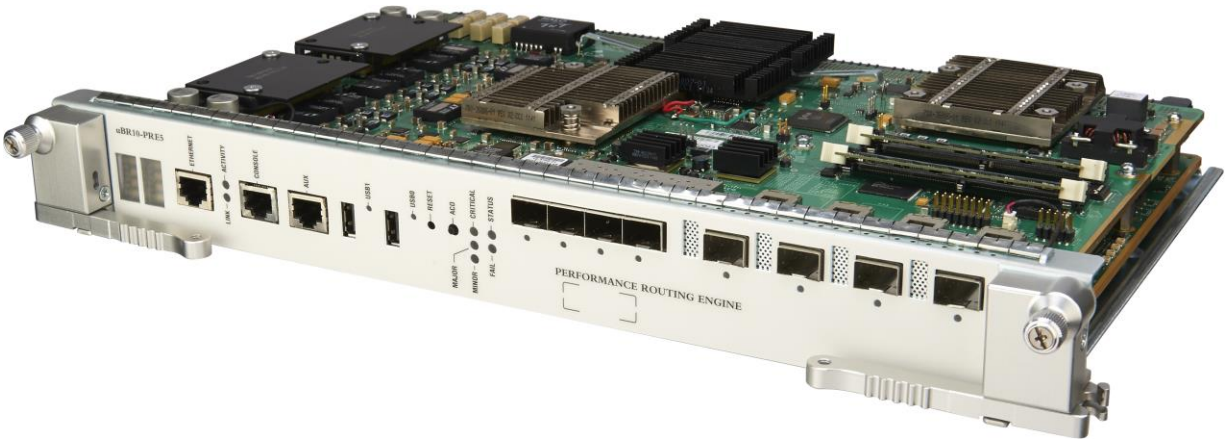
Product Overview

The Cisco® uBR10012 Universal Broadband Router has been widely deployed in cable networks to address emerging service needs. It can be easily scaled to support capacity growth by adding new route processors and higher density line cards.

The Cisco uBR10012 Performance Routing Engine 5 (UBR10-PRE5) is the next-generation high-performance route processor for the Cisco uBR10012 Universal Broadband Router. With the Cisco uBR10012 PRE5 (Figure 1), the Cisco uBR10012 provides cable operators with an easy, flexible upgrade path toward a Converged Cable Access Platform (CCAP) and an all-IP infrastructure, while reducing the effect on operations, capital expenditure (CapEx) and rack space requirements.

The Cisco uBR10012 PRE5 is designed to deliver higher performance and better scalability and is optimized for video on a Cisco uBR10012 chassis. It also integrates the backhaul capability, which frees up two WAN shared port adapter (SPA) slots that can be used to provide additional downstream capacity.

Figure 1. Cisco uBR10012 Performance Routing Engine 5 (UBR10-PRE5) for the Cisco uBR10012 Universal Broadband Router



Outstanding Performance and Scale to Meet Main CCAP Objectives

A Cisco uBR10012 equipped with a Cisco PRE4 can support eight Cisco uBR-MC3GX60V Broadband Processing Engines with backhaul oversubscription. Given the need for an all-IP network that can accommodate the massive growth of IP video and personalized and interactive services, a new performance routing engine is essential to facilitate the migration. As part of the Cisco DOCSIS® 3.0 solutions portfolio, the addition of the Cisco uBR10012 PRE5 adds exceptional scalability, while significantly reducing the per-channel cost of the cable modem termination system (CMTS). These reductions are promoted by the combination of Cisco uBR-MC3GX60V, Cisco uBR-MC20X20V and Cisco 3 Gbps Wideband Shared Port Adapter (SPA-UBR10-DS-HD). When used with these line cards, the Cisco uBR10012 PRE5 would effectively double WAN backhaul capacity available on the Cisco

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uBR10012 by fully utilizing existing Cisco UBR-MC3GX60V and Cisco10000 Series SPA Interface Processor-600 slot capacity for DOCSIS connectivity. The radio frequency (RF) channels supported on a single Cisco uBR10012 chassis can reach 1152 (Euro-DOCSIS 864) downstream channels and 480 upstream channels. With the Cisco uBR10012 PRE5 and various high-density line cards, the Cisco uBR10012 offers an incremental deployment approach and meets most of CCAP objectives today.

Flexibility with Cisco Software Licensing

As the existing Cisco uBR-MC3GX60V and Cisco uBR-MC20X20V, the Cisco uBR100012 PRE5 provides a flexible pay-as-you-grow licensing model. The software licensing capability allows customers to activate the 10 Gigabit Ethernet Enhanced Small Form-Factor Pluggable (SFP+) ports for backhaul and switching capacity based on their bandwidth requirements.

- Base hardware and one 10 Gigabit Ethernet license constitute the minimum configuration supported.
- Additional optional licenses (with increments of 10 Gigabit Ethernet can be purchased up to the full capacity of 40 Gigabit Ethernet on one Cisco uBR10012 PRE5.
- Cisco Software licensing infrastructure helps simplify licensing.

The ability to purchase and activate capacity as needed through software licensing allows cable operators to closely match their capital expenditures to their bandwidth growth requirements. Cable operators can also reduce their operating expenses by designing their DOCSIS networks to accommodate future growth and then simply installing upgrade licenses to add capacity when needed. This approach avoids complex and costly hardware upgrades.

Enhanced IPTV Video over DOCSIS

The Cisco uBR10012 PRE5 significantly enhances the capabilities of the Cisco uBR10012 for delivering IP video services. To date, most DOCSIS networks have been optimized for delivering “bursty” traffic with low average data rates per user, which is characteristic of applications such as web browsing. For these applications, the WAN backhaul capacity required on the CMTS is much lower than the DOCSIS channel capacity. However, the rapid growth of IP video services, which have sustained traffic and much higher average data rates per user, requires higher WAN backhaul capacity, potentially as high as the DOCSIS channel capacity, to avoid a bottleneck at the CMTS. By increasing the WAN backhaul capacity of the Cisco uBR10012 to 40 Gbps, the Cisco uBR10012 PRE5 nearly eliminates oversubscription of the DOCSIS downstream channels, even when fully equipped with eight Cisco uBR-MC3GX60V line cards and eight Cisco 3 Gbps Wideband SPA modules. With the Cisco uBR10012 PRE5, cable operators can fully use the DOCSIS channel capacity of the Cisco uBR10012 to deliver IP video services.

The Cisco uBR10012 PRE5 also improves the scalability and performance of the Cisco uBR10012 for DOCSIS 3.0 IP multicast services, including multicast video. With the Cisco uBR10012 PRE5, cable operators can take full advantage of the efficiency of multicast delivery on their DOCSIS networks to reduce the CMTS capacity and cost, as well as the RF spectrum required to deliver IP video services. The Cisco uBR10012 supports both static and dynamic multicast, allowing operators to deliver both broadcast and switched linear TV services. With the higher performance of the Cisco uBR10012 PRE5, more subscribers can access either type of multicast video service simultaneously.

Features and Benefits

- Provides up to 10 million packets per second (mpps) of processing power for both IPv4 and IPv6 with typical configurations (The IPv6 data plane is redesigned to significantly improve forwarding performance.)
- Supports four 10 Gigabit Ethernet SFP+ backhaul interfaces on the front panel

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- Supports either load sharing or backup mode between the WAN backhaul interfaces on active and standby Cisco uBR10012 PRE5s. Any pair of 10 Gigabit Ethernet interfaces can be configured as backup mode either on the same PRE5 or across PRE5s.
- Significantly improves the video over DOCSIS (VDOC) channel change performance to better support VDOC services.
- Offers flexible software license features to effectively utilize capital
- Delivers enhanced storage options for larger and more complex configurations, including:
  - 16 MB nonvolatile random-access memory (NVRAM)
  - 4 GB double data rate type 3 (DDR3) synchronous dynamic random-access memory (SDRAM)
  - 4 GB internal embedded USB (eUSB) flash memory, used as internal system memory for image saving and log saving
  - External USB disk (up to 4 GB), which replaces the compact flash card used on the Cisco PRE4

Product Specifications

Table 1 provides product specifications for the Cisco Performance Routing Engine 5.

Table 1. Product Specifications

Feature	Description
Product compatibility	Compatible with the Cisco uBR10012 Universal Broadband Router
Software compatibility	Compatible with Cisco IOS® Software Release 12.2(33)SCH2 and later Cisco IOS Software Release 12.2 images supported on the Cisco uBR10012 Router
Connectivity and controls	• 10, 100, and 1000 Mbps Ethernet port network management interface with RJ-45 connector • Console serial port • Auxiliary (modem) port • Push-button reset
Line card compatibility	• uBR-MC20X20V • uBR-MC3GX60V • SPA-24XDS-SFP • SPA-UBR10-DS-HD
Fan tray and power supply requirements	• UBR10-PWR-AC-PLUS • UBR10-PWR-DC-PLUS • UBR10012-FAN-PLUS
Supported SFP	• SFP-10G-LR • SFP-10G-LRM • SFP-10G-SR • SFP-10G-LR-X • SFP-10G-SR-X
Features and functions	• Supports four 10 Gigabit Ethernet backhaul interfaces per Cisco uBR10012 PRE5 • Supports eight 10 Gigabit Ethernet backhaul interfaces with redundant Cisco uBR10012 PRE5 setup (configured in WAN load sharing model) • Supports up to 10 mpps IPv6 traffic forwarding

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Feature	Description
LEDs	Alarms: Critical, major, and minor (yellow, three per card) • ON indicates an alarm condition. • OFF indicates no alarm. Fail (yellow, one per card) • ON indicates that a major failure has disabled the Cisco uBR10012 PRE5. • OFF indicates that the Cisco uBR10012 PRE5 is operating properly. Status (bicolor, one per card) • Flashing yellow indicates that the system is booting. • Green indicates that the Cisco uBR10012 PRE5 is active (as a primary). • Flashing green indicates that the Cisco uBR10012 PRE5 is standby (as a secondary). • OFF indicates no power to the Cisco uBR10012 PRE5. Ethernet activity and link (green, two per card) • Activity: Green indicates packets are being transmitted and received. • Link: Green indicates a carrier detected; the port is able to accept traffic. Front-panel LED display signifies licenses installed. USB 0: Green – ON indicates USB0 is active. USB1: Green – ON indicates USB1 is active. SFP+ LED: Green indicates a carrier detected; the port is able to accept traffic.
Memory	• Route processor memory: 4 GB DDR3 SDRAM • Onboard memory: 4 GB internal eUSB, 16 M NVRAM • Removable memory: Up to 4 GB external USB disk • Packet memory: 1 GB ECC protected
Performance	Parallel Express Forwarding (PXF) performance: Up to 10 mpps for both IPv4 and IPv6.under typical configuration
Reliability and availability	• Supports online insertion and removal (OIR) • Supports nonstop forwarding (NSF) and stateful switchover (SSO) • Supports In-Service Software Upgrades (ISSUs)
MIBs	A partial list of supported MIBs includes: • SONET MIB • Frame Relay MIB • MIB II (Interfaces MIB, RFC 1213) • TCP MIB • UDP MIB • RS232 MIB • OSPF MIB • BGP4 MIB • IGMP MIB • IPMROUTE MIB • PIM MIB • RMON MIB • Cisco RTTMON MIB • Cisco CAR MIB • Cisco IP Stat MIB • Cisco Config Copy MIBCisco CDP MIB • Cisco Config Management MIB • Cisco Image MIB • Cisco IPMROUTE MIB • Cisco Memory Pool MIB • Cisco Ping MIB • Cisco TCP MIB • Cisco Entity Sensor MIB (replaces ENVMON MIB) • Cisco Process MIB • Entity MIB (Replaces OLD-CISCO-CHASSIS-MIB) • Cisco Bulk File MIB • Cisco FTP Client MIB

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Feature	Description
Network management	Network management is provided through: • Telnet (command-line interface [CLI]) • Console port (through the CLI) • Simple Network Management Protocol (SNMP) RFC 2665
Physical dimensions	Dimensions (H x W x D): 16.0 x 1.91 x 10.65 in. (40.64 x 4.84 x 27.05 cm) Weight: 11.1 lb (5.05 kg)
Power	248W
Regulatory and compliance	Safety • UL60950 & CAN/CSA-C22.2 No. 60950. Information technology equipment • AS/NZS 60950 • IEC/EN 60950 Information technology equipment • 73/23/EEC Electromagnetic Emissions Certification • AS/NZS:CISPR22:2009+A1 • EN55022: 2010 Class A • CISPR 22: 2008 Class A • 47 CFR Part 15: 2011 Class A • ICES-003:2012 • VCCI V-3/ 2012.04 • CNS-13438: 2006 Class A • GR1089: 2011 Immunity • EN300386: 2010-TNE EMC requirements; product family standard; high priority of service; central office and noncentral office locations • EN50082-1: 1992/1997 • EN50082-2: 1995-Generic Immunity Standard, Heavy Industrial • CISPR24: 2010 • EN55024: 2010-Generic ITE immunity standard • EN61000-4-2: 2009 ESD, Level 4/8 kV contact, 15 kV air • IEC-1000-4-3:2010+A2-Radiated Immunity, 10 V/m • IEC-1000-4-4: 2007+corr 2-Electrical Fast Transients, Level 4/4 kV/B • IEC-1000-4-5: 2006-DC Surge-Class 3; AC Surge-Class 4 • EN61000-4-6: 2009-RF conducted immunity, 10 Vrms • EN61000-4-11: 2004-Voltage Dips and Sags • ETS300 132-2: 2011.12 • GR1089:2011 Network Equipment Building Standards The module meets the following Networking Equipment Building Standards (NEBS): • GR-1089-CORE: 2011 • GR-63-CORE: 2012 European Telecommunication Standards Institute (ETSI) • ETSI 300 386-1 – Levels for equipment with a high priority of service, installed in locations other than telecommunication centers • ETSI 300 386-2:1997 – Levels for equipment with a high priority of service, installed in locations other than telecommunication centers • ETSI 300 132-2: 2011 12 – Power supply interfaces at the input to telecommunications equipment Sections 4.8 and 4.9
Environmental	Storage temperature: –40 to 158°F (–40 to 70°C) Operating temperature, nominal: 41 to 104°F (5 to 40°C) Operating temperature, short term: 23 to 122°F (–5 to 50°C) Storage relative humidity: 5 to 95 percent relative humidity (RH) Operating humidity, nominal: 5 to 85 percent RH Operating humidity, short term: 5 to 90 percent RH Operating altitude: –60 to 4000m (up to 2000m conforms to IEC/EN/UL/CSA 60950 requirements)

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System Requirements

Hardware Requirements

- New power supplies are required to support Cisco uBR10012 PRE5: Cisco part numbers UBR10-PWR-AC-PLUS and UBR10-PWR-DC-PLUS.
- New fan tray is required: Cisco part number UBR10012-FAN-PLUS=.
- New chassis cover or new fan filter is required: Cisco part number U-CHAS-COVER-EXT or UBR10-FAN-FILT-E. Select either a new chassis cover or new fan filter.

Software Requirements

Cisco IOS Software Release 12.2(33) SCH2 is the minimum release that supports the Cisco uBR10012 PRE5 on the Cisco uBR10012.

Ordering Information

To place an order, visit the Cisco Ordering homepage. Table 2 lists the ordering information for the Cisco uBR10012 Performance Routing Engine 5 (uBR10012 PRE5).

Table 2. Ordering Information

Product Description	Part Number
Cisco uBR10012 PRE5 Hardware	
Performance Routing Engine 5 For UBR10K Platform, Base HW	UBR10-PRE5
Performance Routing Engine 5 For UBR10K Platform, Base HW Spare	UBR10-PRE5=
Spare PRE5 w/ 0 license	UBR10-PRE5-SP=
Software License	
10G license, must configure with PRE5 only	SWLIC-PRE5-10G
1 count 10G license for PRE5	L-PRE5-10G
PAK Container For PRE5	L-PRE5-SWLIC=
Accessories For Cisco uBR10012 PRE5	
Enhanced Fan Filter For The UBR10012	UBR10-FAN-FILT-E
Enhanced Fan Filter For The UBR10012 spare	UBR10-FAN-FILT-E=
Board to board cable for PRE5 interconnection	CAB-PRE5-BTB
Board to board cable for PRE5 interconnection Spare	CAB-PRE5-BTB=
New chassis cover for the UBR10012 with PRE5	U-CHAS-COVER-EXT
Cable holder for PRE5 in redundant modeling	PRE5-CAB-HOLDER
Cable holder for PRE5 in redundant modeling Spare	PRE5-CAB-HOLDER=
Cable management kit for redundant PRE5	PRE5-HA-CABMG-KIT
Cable management kit for redundant PRE5 Spare	PRE5-HA-CABMG-KIT=
1GB USB Flash Token, spare	MEMUSB-1024FT=
SFP Optics	
10GBASE-LR SFP Module	SFP-10G-LR
10GBASE-LRM SFP Module	SFP-10G-LRM
10GBASE-SR SFP Module	SFP-10G-SR
10GBASE-LR SFP Module for Extended Temp range	SFP-10G-LR-X
10GBASE-SR SFP Module for Extended Temp range	SFP-10G-SR-X

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Notes on Configuration:

- A minimum configuration of one 10 Gigabit Ethernet license is required when purchasing Cisco uBR10012 PRE5 hardware.
- For redundancy, we strongly recommend purchasing the same license counts on active and standby Cisco uBR10012 PRE5s to maintain consistency.
- In redundancy mode, a cable management kit is required to facilitate fiber routing and board-to-board connections (between active and standby Cisco uBR10012 PRE5s). The cable management kit includes one cable holder (PRE5-CAB-HOLDER) and four board-to-board cables (CAB-PRE5-BTB).

Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you to protect your network investment, optimize network operations, and prepare the network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, see Cisco Technical Support Services or Cisco Advanced Services.

For More Information

For more information about the Cisco uBR10012, visit http://www.cisco.com/en/US/products/hw/cable/ps2209/index.html or contact your local account representative.

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