Cisco uBR-MC20X20V Broadband Processing Engine with Full DOCSIS 3.0 Support for the Cisco uBR10012 Universal Broadband Router

Product Overview

The Cisco® uBR-MC20X20V Broadband Processing Engine (BPE) is a next-generation line card for the Cisco uBR10012 Universal Broadband Router. It adds exciting features to the Cisco uBR10012 platform – including 20 upstream and 20 downstream channels – while supporting the industry benchmark standards for excellence and reliability that were established by the Cisco 5x20H BPE.

With the explosion of video traffic and social networking applications, speed and scalability are critical factors to keeping consumers happy. Cisco's Visual Networking Index (VNI) forecasts that by 2013, annual global IP traffic will reach two-thirds of a zettabyte (one trillion gigabytes), video traffic will exceed 90 percent of global consumer traffic, and the global online video will comprise 60 percent of consumer Internet traffic (up from 32 percent in 2009).

As consumer demand for high-quality media on any device grows daily, cable operators are considering new intelligent solutions for their medianets (all-IP Next-Generation Networks optimized for rich media).

Cisco provides an end-to-end, DOCSIS® 3.0-capable solution enabling multiple services to multiple devices over the same infrastructure to both residential and commercial subscribers.

This solution will allow service providers to deliver the best possible quality of experience, while minimizing operating expenses and differentiating next-generation services from those of their competitors.

Cisco's DOCSIS 3.0 solution with the Cisco uBR-MC20X20V card delivers **faster speeds and higher density** with a flexible and scalable architecture. The resulting benefits are **faster time to market, lower** total cost of ownership (TCO), and **higher revenues**, thus helping operators to prepare their networks for the exponential growth of IP traffic.

The Cisco uBR-MC20X20V, Figure 1, delivers support for DOCSIS and EuroDOCSIS 3.0, including full upstream and downstream channel bonding and Advanced Encryption Standard (AES) encryption. The line card provides the capability to have 160 downstream and 160 upstream interfaces in a single Cisco uBR10012 chassis and, when used with the DOCSIS 3.0-capable Cisco 1 Gbps Wideband Shared Port Adapter (SPA), can scale to 304 downstream channels. [**note: DOCSIS is another company's trademark, and not part of the SPA's product name**] This leads the industry in capacity. The Cisco uBR-MC20X20V is operationally exceedingly simple to upgrade from the Cisco 5x20H BPE or Cisco 5x20U BPE. Further, Cisco offers pay-as-you-grow flexibility with software licensing for downstream channels (0DS, 5DS and 20DS SW licenses are offered).

Figure 1.   Cisco uBR-MC20X20V Broadband Processing Engine

The Cisco uBR-MC20X20V is an integral part of Cisco's DOCSIS 3.0-capable Cable Modem Termination System (CMTS) product portfolio.

The Cisco uBR-MC20X20V BPE addresses the needs of cable operators who expect to cost-effectively deploy very high-bandwidth services with DOCSIS 3.0. The line card has been designed to offer an operationally simple upgrade path from the Cisco 5x20H or Cisco 5x20U in terms of both cabling and online insertion and removal (OIR) compatibility. The Cisco uBR-MC20X20V works with the Cisco RF switch with no cabling changes required from existing installations using the Cisco 5x20H. The Cisco uBR-MC20X20V further enhances Cisco's integrated and modular CMTS offering because it interoperates with the Cisco 1 Gbps Wideband SPA to provide even more downstream capacity in the same Cisco uBR10012 chassis (up to 304 Downstream channels).

Although the uBR-MC20X20V BPE offers 20 downstream (Annex A or Annex B) and 20 upstream channels, the physical port count remains exactly the same as the Cisco 5x20H, with 5 downstream ports and 20 upstream ports. Each downstream port is capable of carrying four frequency-stacked downstream channels. Each downstream channel is configurable as part of a DOCSIS 3.0 channel bonding group or DOCSIS 2.0/1.x channel (primary capable). The line card also supports an extended DOCSIS upstream frequency range of 5 to 65 MHz and downstream of 55 MHz to 1 GHz for DOCSIS operations. Each upstream channel can be configured into a DOCSIS 3.0 upstream channel bonding group while serving DOCSIS 2.0/1.x cable modems/devices at the same time.

The Cisco uBR-MC20X20V delivers cutting-edge features and a highly scalable architecture to enable cable operators to deliver carrier-class, IP-based, high-bandwidth, high-speed data, voice, and video services to subscribers.

Features and Benefits

Fully DOCSIS 3.0 Capable
Fully DOCSIS and Euro-DOCSIS 3.0 capable, the Cisco uBR-MC20X20V supports downstream and upstream channel bonding at DOCSIS line rate that enables cable operators to offer very high-speed data services to residential and commercial subscribers while continuing to offer IP voice services. The line card supports bonding of four, eight, and even higher number of channels, and other DOCSIS 3.0 features including IPv6, multicast, and S-CDMA.

Superior Downstream RF Performance
The Cisco uBR-MC20X20V features an upconverter module that is based on industry-leading Direct Digital Synthesizer (DDS) technology. DDS technology offers superior RF performance in a much smaller footprint than older analog designs. The upconverter complies with DOCSIS Downstream RF Interface (DRFI) specifications. The upconverter also operates all the way to 1 GHz.

DOCSIS 3.0 MAC

The DOCSIS 3.0 MAC on the Cisco uBR-MC20X20V is an internally developed Cisco feature providing dedicated MAC layer hardware for line-rate performance in large-scale deployments. The DOCSIS 3.0 MAC hardware enables scalability for thousands of cable modems and CPE, simultaneously providing hardware acceleration for sophisticated security features including AES encryption while continuing to support older DOCSIS 1.x and 2.0 encryption features. Cisco's DOCSIS 3.0 MAC design allows for unprecedented feature flexibility and robust defect correction.

Interoperation with Cisco's DOCSIS 3.0-Capable Wideband SPA

The Cisco uBR-MC20X20V supports the ability to build MAC domains with downstream channels being shared from the DOCSIS 3.0-ready Cisco 1 Gbps Wideband SPA. The Cisco uBR10012 platform can be configured to support up to 304 downstream channels in an Integrated or Modular deployment.

Flexibility with Cisco Software Licensing

The Cisco uBR-MC20X20V is available in three licensed options that offer customers a pay-as-you-grow model:

- UBR-MC20X20V-0D: Includes base hardware and software licenses for 0 downstream and 20 upstream channels

- UBR-MC20X20V-5D: Includes base hardware and software licenses for five downstream and 20 upstream channels

- UBR-MC20X20V-20D: Includes base hardware and software licenses for 20 downstream and 20 upstream channels

Downstream upgrade licenses for the UBR-MC20X20V-0D and UBR-MC20X20V-5D are available. Capacity upgrades are thus a simple matter of upgrading the license on the existing uBR-MC20X20V rather than having to purchase and deploy brand new hardware every time a capacity upgrade is required.

Table 1. Product Features and Benefits

Feature	Benefits
High port and channel density	• Reduces per-port cost • Provides easy upgrade path from the Cisco 5x20H BPE
Upstream features	• Operates up to 65 MHz (EuroDOCSIS mode) • Supports up to two frequencies per port
Dense connector	• Reduces installation time • Reduces mean time to repair (MTTR)
Onboard spectrum analyzer hardware	• Reduces return-path monitoring costs • Enhances remote troubleshooting capabilities
Dedicated MAC layer hardware	• Provides hardware acceleration of DOCSIS (3.0/2.0/1.x) features • Enables scalability of data and voice deployment • Optimizes cable modem registration time • Provides hardware-based Layer 2 QoS • Allows use of best-of-class physical layer (PHY)
DOCSIS, EuroDOCSIS, and extensions to support DOCSIS operations in Japan	• Provides operational savings • Lowers capital expenditures (CapEx) • Increases flexibility
Compatible with the Cisco uBR 3x10 RF Switch	• Provides line card redundancy for carrier-class operation
Interoperation with Cisco 5x20H and Cisco 5x20U	• uBR-MC20X20V can interoperate with the 5x20H/5x20U in the same uBR10012 chassis • uBR-MC20X20V can act as Protect for both 5x20H/5x20U in the same uBR10012 chassis

Product Specifications

Table 2 lists product specifications for the Cisco uBR-MC20X20V

Table 2. Product Specifications

Description	Specification
Physical	• Occupies a single slot in the Cisco uBR10012 chassis • Interface: line card single mode with intermediate reach connector • Hot-swappable; no slot dependency • Weight: 16 lb (7.26 kg) • Dimensions (H x W x D): 20 x 1.36 x 16 in. (50.80 x 3.55 x 10.64 cm)
Power	• Unit power: 230W at 40℃
Reliability and availability	• Designed for five 9s of availability
Environmental	• Operating altitude: –197 to 13,123 ft (–60 to 4000m) • Storage temperature: -–4 to 149℉ (–20 to 65℃) • Operating temperature, nominal: 41 to 104℉ (5 to 4 0℃) • Storage relative humidity: 5 to 95% • Operating relative humidity: 10 to 90%
Software release	• Cisco IOS® Software Release 12.2(33)SCC or later
Regulatory Compliance	
Safety	• CAN/CSA-C22.2 No. 60950-1 1st ed. / UL 60950-1 1st ed. (Safety of Information Technology Equipment) • EN/IEC 60950-1 (Safety of Information Technology Equipment) • AS/NZS 60950.1 (Safety of Information Technology Equipment)
Electromagnetic Emissions	• EN55022, Class B • CISPR 22, Class B • FCC 47CFR15, Class B • ICES-003, Class B • VCCI, Class B • AS/NZS CISPR 22, Class B • KN 22, Class B • IEC/EN61000-3-2 Power Line Harmonics • IEC/EN61000-3-3 Voltage Fluctuations and Flicker
Electromagnetic Immunity	• IEC/EN61000-4-2 Electrostatic Discharge Immunity • IEC/EN61000-4-3 Radiated Immunity • IEC/EN61000-4-4 Electrical Fast Transient Immunity • IEC/EN61000-4-5 Surge • IEC/EN61000-4-6 Immunity to Conducted Disturbances • IEC/EN61000-4-11 Voltage Dips, Short Interruptions, and Voltage Variations
ETSI/EN	• EN 300 386 Telecommunications Network Equipment (EMC) • EN55022 Information Technology Equipment (Emissions) • EN55024 Information Technology Equipment (Immunity) • EN61000-6-1 Generic Immunity Standard
Network Equipment Building Systems (NEBS): Level 3	Designed to meet requirements of: • GR-63-CORE, Issue 3, March 2006 • GR-1089-CORE, Issue 4, June 2006

Mechanical	• Weight: 16 lb (7.26 kg) Dimensions (H x W x D): 20 x 1.36 x 16 in. (50.80 x 3.55 x 40.64 cm) • Operating altitude: −197 to 13,123 ft (−60 to 4000m) • Storage temperature: −4 to 149℉ (−20 to 65℃) • Operating temperature, nominal: 41 to 104℉ (5 to 4 0℃) • Storage relative humidity: 5 to 95% • Operating relative humidity: 10 to 90% • IEC 68-2-1, IEC 68-2-2, IEC 68-2-56: Operational temperature and humidity • IEC 68-2-27: Operating shock • IEC 68-2-64, IEC 68-2-6, IEC 68-2-47: Operating and non-operating vibration • IEC 68-2-32: Non-operating freefall drop • IEC 68-2-40: Non-operating altitude • IEC 68-2-27, IEC 68-2-32: Non-operating mechanical shock • IEC 68-2-3: Non-operating humidity • IEC 68-2-14, IEC 68-2-33: Non-operating temperature shock

LED	• One power LED (green)
	• One status LED (green/yellow): solid green indicates the processor has booted and passed its diagnostics; LED blinks green on a protect card, yellow when in one of the booting states
	• Maintenance (yellow): indicates the line card can be removed
	• One upstream-enabled LED on each upstream port (green): upstream path is configured and able to pass traffic
	• One downstream-enabled LED on each downstream port (green): downstream path is configured and able to pass traffic through the upconverter at RF
	• LIC1-LIC4 (green) indicate DS licenses installed
	  ◦ No LED illuminated indicates: 0DS License
	  ◦ LIC1 illuminated indicates: 5DS License
	  ◦ LIC1-LIC4 illuminated indicate: 20DS License
	  ◦ LIC1-LIC4 blinking indicate: No valid license installed. Card will become operational only when a valid license is installed.

Network Management Information	
Standard MIBs	• IF-MIB (RFC-2233) • IP-FORWARD-MIB (RFC-4292) • ENTITY-MIB (RFC-2737) • MIBII (RFC1213) • EtherLike-MIB (RFC-2665) • IGMP-MIB (RFC-2993) • RMON-MIB (RFC-1757) • IP-MIB • ENTITY-SENSOR-MIB
Expression MIBs	• SNMPv2-SMI • SNMPv2-TC • SNMPv2-MIB • IANAifType-MIB
Simple Network Management Protocol Version 3 (SNMPv3) MIBs	• SNMP-FRAMEWORK-MIB (RFC-2571) • SNMP-MPD-MIB (RFC-2572) • SNMP-NOTIFICATION-MIB (RFC-2573) • SNMP-TARGET-MIB (RFC-2573) • SNMP-USM-MIB (RFC-2574) • SNMP-VACM-MIB (RFC-2575)

DOCSIS and EuroDOCSIS MIB	• DOCS-IF-MIB (RFC 4546) • DOCS-CABLE-DEVICE-MIB (RFC-2669) • DOCS-BPI-PLUS-MIB (Rev 5) • DOCS-QOS-MIB (Rev 4) • DOCS-CABLE-DEVICE-TRAP-MIB • DOCS-SUBMGT-MIB (Rev 2) • DOCS-IF3-MIB • DOCS-QOS3-MIB • DOCS-DRF-MIB • DOCS-LOADBAL3-MIB • DOCS-DIAG-MIB • DOCS-SUBMGT3-MIB • CLAB-TOPO-MIB • DOCS-MCAST-AUTH-MIB • DOCS-MCAST-MIB • DOCS-SEC-MIB • DOCS-IETF-BPI2-MIB • DOCS-IETF-QOS-MIB
Cisco DOCSIS MIBs	• CISCO-DOCS-EXT-MIB • CISCO-DOCS-REMOTE-QUERY-MIB • CISCO-DOCS-QOS-EXT-MIB • CISCO-CABLE-SPECTRUM-MIB • CISCO-CABLE-AVAILABILITY-MIB • CISCO-DOCS-EXT-CAPABILITY-MIB • CISCO-CABLE-WIDEBAND-MIB
Cisco Generic MIBs	• CISCO-SYSLOG-MIB • CISCO-SMI-MIB • CISCO-TC-MIB • CISCO-PRODUCTS-MIB • CISCO-FLASH-MIB • CISCO-CONFIG-MAN-MIB • CISCO-CONFIG-COPY-MIB • CISCO-MEMORY-POOL-MIB • CISCO-BULK-FILE-MIB • CISCO-SONET-MIB • CISCO-TCP-MIB • CISCO-RTTMON-MIB • CISCO-FTP-CLENT-MIB • CISCO-IPMROUTE-MIB • CISCO-QUEUE-MIB • CISCO-IMAGE-MIB • CISCO-ENVMON-MIB • CISCO-ENTITY-VENDORTYPE-OID-MIB • CISCO-PRODUCTS-MIB

Table 3.   System Requirements

Item	Description
Power Supplies	Dual AC or DC PEMs must be installed at all times
Hardware	Dual Cisco UBR10-DTCC are required
Flash Memory	At least 1 GB of Flash memory is required for Cisco IOS Software
Software	Cisco IOS Software Release 12.2(33)SCC is required

Warranty Information

Warranty information is available on Cisco.com at the Product Warranties page.

Ordering Information

To place an order, visit the Cisco Ordering Home Page. To download software, visit the Cisco Software Center.

Table 4.   Ordering Information

Product Name	Part Number
Cisco 20x20V DOCSIS 3.0 Broadband Processing Engine — Base hardware + 20 downstream and 20 upstream license	UBR-MC20X20V-20D
Cisco 20x20V DOCSIS 3.0 Broadband Processing Engine — Base hardware + 5 downstream and 20 upstream license	UBR-MC20X20V-5D
Cisco 20x20V DOCSIS 3.0 Broadband Processing Engine — Base hardware + 0 downstream and 20 upstream license	UBR-MC20X20V-0D
+5 downstream upgrade license	L-UBR-SWLIC-5DS=
+15 downstream upgrade license	L-UBR-SWLIC-15DS=
+20 downstream upgrade license	L-UBR-SWLIC-20DS=

Note: License configurations that result in 0 downstream and 20 upstream, 5 downstream and 20 upstream, and 20 downstream and 20 upstream are supported.

Cisco Services

Cisco Services make networks, applications, and the people who use them work better together.

Today, the network is a strategic platform in a world that demands better integration between people, information, and ideas. The network works better when services, together with products, create solutions aligned with business needs and opportunities.

The unique Cisco Lifecycle approach to services defines the requisite activities at each phase of the network lifecycle to help ensure service excellence. With a collaborative delivery methodology that joins the forces of Cisco, our skilled network of partners, and our customers, we achieve the best results.

For More Information

For more information about the Cisco uBR-MC20X20V Broadband Processing Engine, visit http://www.cisco.com/en/US/products/hw/modules/ps4969/prod_literature.html.