

## Cisco uBR-MC88V Broadband Processing Engine with full DOCSIS 3.0 Support for the Cisco uBR7200 Series Universal Broadband Router

### Product Overview

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 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<sup>®</sup> 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 provide subscribers with 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<sup>®</sup> uBR-MC88V Broadband Processing Engine (BPE) 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, and **higher revenues than previously possible**, thus helping operators prepare their networks for the exponential growth of IP traffic.

The Cisco uBR-MC88V, Figure 1, is a next-generation line card for the Cisco uBR7200 Series Universal Broadband Router. It supports an unprecedented array of capabilities that address the needs of cable operators, multiunit (MxU) businesses, and Internet service providers (ISPs) to cost-effectively deliver high-bandwidth, carrier-class IP-based data, voice, and video services to large number of subscribers. The line card meets full DOCSIS 3.0 Annex A and B requirements. With this next-generation line card, the Cisco uBR7200 Series Universal Broadband Router has become the most advanced and ideal platforms for entry or mid-level cable modem termination systems (CMTSs) today.

**Figure 1.** Cisco uBR-MC88V Broadband Processing Engine



The Cisco uBR-MC88V is capable of eight downstream (Annex A or Annex B) and eight upstream channels. The port count remains exactly the same as the Cisco uBR-MC28U, with two downstream ports and eight upstream ports. This enables the Cisco uBR-MC88V to offer a simple upgrade path from the older line card used on the Cisco uBR7200VXR platform without any change to the cable wiring. Each downstream port is capable of carrying four frequency-stacked downstream channels. Each downstream channel is configurable as part of DOCSIS 3.0 channel bonding or DOCSIS 2.0/1.x channel. The line card also supports an extended DOCSIS upstream frequency range of 5 to 65 MHz and downstream of 70 MHz to 1 GHz for DOCSIS operations.

## Features and Benefits

### Fully DOCSIS 3.0 Capable

Fully CableLabs® and EuroCableLabs DOCSIS 3.0 capable, the Cisco uBR-MC88V supports downstream and upstream channel bonding at a DOCSIS line rate that enables cable operators to offer very high-speed data services to subscribers. The line card supports bonding of 4, 8, and even more channels and other full DOCSIS 3.0 features including IPv6, multicast, Advanced Encryption Standard (AES) encryption, and Synchronous Code Division Multiple Access (S-CDMA).

### High Port Density

The Cisco uBR-MC88V supports eight DOCSIS 3.0 downstream channels through two quad-stacked physical connectors and eight upstream channels each on a unique physical connector. It significantly expands the capacity of the Cisco uBR7200 Series Universal Broadband Router to address growing subscriber bandwidth demands and enable cost-effective scalability of services.

### Superior RF Performance

The line card is compliant with DOCSIS Downstream RF Interface (DRFI) specifications and is designed with an extended frequency range up to 1 GHz by using a highly integrated and low-power-consumption upconverter. With the advanced spectrum management, ingress cancellation, and S-CDMA, the Cisco uBR-MC88V will mitigate ingress noises in the hybrid fiber/coaxial (HFC) plant to achieve better RF performance.

### Rich Cisco Technology-Specific Features

The line card supports Cisco technology-specific features such as Dynamic Bandwidth Sharing (DBS), advanced spectrum management, and Subscriber Traffic Management (STM). DBS is the dynamic allocation of bandwidth for wideband and integrated cable interfaces sharing the same downstream channel, which allows each channel to claim the bandwidth unused by others. The DBS feature interacts with DOCSIS 2.0 load balancing to fully utilize bandwidth resources. The STM feature allows service providers to identify and control subscribers who exceed the maximum bandwidth allowed under their registered quality of service (QoS) profiles. This feature helps ensure that a minority of users will not consume a majority of the bandwidth in the cable network.

**Table 1.** Features and Benefits

Feature	Benefit
<b>Category</b>	
<b>High port density with frequency stacking</b>	<ul style="list-style-type: none"> <li>Provides easy upgrade path from Cisco uBR-MC28U with minimal cable wiring change</li> <li>Reduces per-port cost</li> </ul>
<b>Onboard spectrum analyzer hardware</b>	<ul style="list-style-type: none"> <li>Reduces return-path monitoring costs</li> <li>Enhances remote troubleshooting capabilities</li> <li>Improves operational efficiency</li> </ul>
<b>Dedicated MAC layer hardware</b>	<ul style="list-style-type: none"> <li>Provides hardware acceleration of DOCSIS (3.0/2.0/1.x) features</li> <li>Enables scalability of data and voice deployment</li> <li>Optimizes cable modem registration time</li> <li>Provides hardware-based Layer 2 QoS</li> <li>Allows use of best-of-class PHY</li> </ul>
<b>DOCSIS and Euro DOCSIS support on one line card</b>	<ul style="list-style-type: none"> <li>Provides operational savings</li> <li>Lowers capital expenditures (CapEx)</li> </ul>
<b>DOCSIS 3.0 IPDR/SP</b>	<ul style="list-style-type: none"> <li>Enables efficient and reliable delivery of high-volume data records from the service elements to any systems, such as mediation systems and BSS/OSS</li> </ul>
<b>AToM pseudowire for cable L2VPN</b>	<ul style="list-style-type: none"> <li>Transports Ethernet frames over an MPLS network</li> <li>Extends the existing DOCSIS Layer 2 VPN feature</li> </ul>
<b>S-CDMA and logical channel</b>	<ul style="list-style-type: none"> <li>Increases protection against electronic impairments, allowing for a more robust operating environment</li> <li>Improves S-CDMA ingress and impulse noise immunity</li> </ul>
<b>Wideband modem resiliency</b>	<ul style="list-style-type: none"> <li>Provides the best possible service in the event of non-primary radio frequency channel disruptions</li> </ul>

## Product Specifications

Table 2 lists product specifications for the Cisco uBR-MC88V.

**Table 2.** Product Specifications

Description	Specification
<b>Physical</b>	<ul style="list-style-type: none"> <li>Occupies a single slot in the Cisco uBR7200VXR chassis</li> <li>Maximum two line cards per uBR7225VXR chassis and four line cards per uBR7246VXR chassis</li> <li>Hot-swappable; no slot dependency</li> <li>Dimensions (H x W x D): 1.4 x 15.154 x 11.531 in (3.55 x 38.49 x 29.29 cm)</li> <li>Weight: 6.06 lbs (2.749 kg)</li> </ul>
<b>Power consumption</b>	<ul style="list-style-type: none"> <li>90 watts (307 BTUs per hour) at 25°C</li> </ul>
<b>RF output power range</b>	<ul style="list-style-type: none"> <li>52 to 62 dBmV</li> </ul>
<b>Modulation</b>	<ul style="list-style-type: none"> <li>Downstream: 64-QAM, 256-QAM</li> <li>Upstream: QPSK 8-, 16-, 32-, 64-QAM</li> </ul>
<b>Downstream frequency range</b>	<ul style="list-style-type: none"> <li>DOCSIS: 6 MHz Annex B, 70MHz-1GHz</li> <li>Euro-DOCSIS: 8 MHz Annex A, 70MHz-1GHz</li> </ul>
<b>Upstream frequency range</b>	<ul style="list-style-type: none"> <li>DOCSIS: 6 MHz Annex B, 5-42 MHz</li> <li>Euro-DOCSIS: 8 MHz Annex A, 5-65 MHz</li> </ul>
<b>Environmental</b>	<ul style="list-style-type: none"> <li>Operating altitude: -197 to 13123 ft (-60 to 4000m)</li> <li>Storage temperature: -4 to 149°F (-20 to 65°C)</li> <li>Operating temperature, nominal: 41 to 104°F (5 to 40°C)</li> <li>Storage relative humidity: 5 to 95 percent</li> <li>Operating relative humidity: 10 to 90 percent</li> </ul>
<b>Safety</b>	<ul style="list-style-type: none"> <li>UL/CSA 60950-1 (Safety of Information Technology Equipment, Including Electrical Business Equipment)</li> <li>EN 60950-1 / IEC 60950-1 (Safety of Information Equipment Technology, Including Electrical Business Equipment)</li> <li>ACA TS001, 1997 Test Report and Statement of Compliance AS/NZS3260</li> </ul>

<b>Electromagnetic emissions</b>	<ul style="list-style-type: none"> <li>• EN55022: 1998 Class B</li> <li>• CISPR 22: 1997 Class B</li> <li>• CFR 47 Part 15 Class B</li> <li>• ICES -003, Issue 2, Class B, April 1995</li> <li>• VCCIV-3/2000.04</li> <li>• AS/NZS 3548: 1995 Class B</li> <li>• CNS-13438 Class B-BSMI (BCIQ) in Taiwan</li> </ul>
<b>Electromagnetic immunity</b>	<ul style="list-style-type: none"> <li>• EN50082-1: 1992</li> <li>• EN50082-1: 1997</li> <li>• EN55024: 1998</li> <li>• EN61000-3-2: 1995</li> <li>• EN61000-3-3: 1995</li> <li>• EN61000-4-2: 1995 [including AMD1 + AMD2] ESD immunity</li> <li>• EN61000-4-3: 1997 Radiated RF field immunity</li> <li>• EN61000-4-4: 1995 Immunity to electrical fast transients</li> <li>• EN61000-4-5: 1995 Surge immunity</li> <li>• EN61000-4-6: 1996 [including AMD1] RF conducted immunity</li> </ul>
<b>Network Equipment Building Systems (NEBS) – Level 3</b>	<ul style="list-style-type: none"> <li>• Designed and tested to meet requirements of GR-1089-CORE - Issue 2, December 1997</li> <li>• Revision 1, February 1999</li> </ul>
<b>Mechanical</b>	<ul style="list-style-type: none"> <li>• IEC 68-2-1, IEC 68-2-2, IEC 68-2-56: Operational Temperature and Humidity</li> <li>• IEC 68-2-41: Operational Altitude</li> <li>• IEC 68-2-27: Operational Shock</li> <li>• IEC 68-2-64, IEC 68-2-6, IEC 68-2-47: Operational and Nonoperational Vibration</li> <li>• IEC 68-2-40: Nonoperational Altitude</li> <li>• IEC 68-2-27, IEC 68-2-32: Nonoperational Shock</li> <li>• IEC 68-2-3: Nonoperational Humidity</li> <li>• IEC 68-2-1, IEC 68-2-2: Nonoperational Temperature</li> <li>• IEC 68-2-14, IEC 68-2-33: Nonoperational Temperature Shock</li> </ul>
<b>LEDs</b>	<ul style="list-style-type: none"> <li>• One power LED (green)</li> <li>• One upstream-enabled LED on each upstream port (green): upstream path is configured and able to pass traffic</li> <li>• One downstream-enabled LED on each downstream port (green): downstream path is configured and able to pass traffic through the upconverter at the radio frequencies</li> </ul>
<b>Minimum Cisco IOS® Software Release</b>	<ul style="list-style-type: none"> <li>• Cisco IOS Software Release 12.2SC minimum to support PCMM, admission control, Advanced Mode DSG, and SII Cisco IOS Software</li> </ul>
<b>Compatible Cisco Network Processing Engines (NPEs)</b>	<ul style="list-style-type: none"> <li>• To operate Cisco uBR7200 Series uBR-MC88V BPE, the Cisco uBR7200VXR must contain a uBR7200-NPE-G2 processor. The uBR7200-NPE-G2 must have at least 1 GB of DRAM.</li> </ul>
<b>Standard Management Information Bases (MIBs)</b>	<ul style="list-style-type: none"> <li>• IF-MIB (RFC-2233)</li> <li>• ENTITY-MIB (RFC-2737)</li> <li>• MIBII (RFC1213)</li> <li>• EtherLike-MIB (RFC-2665)</li> <li>• IGMP-MIB (RFC-2993)</li> <li>• RMON-MIB (RFC-1757)</li> <li>• IP-MIB</li> <li>• IP-FORWARD-MIB(RFC-4292)</li> <li>• ENTITY-SENSOR-MIB</li> </ul>
<b>Expression MIBs</b>	<ul style="list-style-type: none"> <li>• SNMPv2-SMI</li> <li>• SNMPv2-TC</li> <li>• SNMPv2-MIB</li> <li>• IANAifType-MIB</li> </ul>

<b>DOCSIS and Euro-DOCSIS MIBs</b>	<ul style="list-style-type: none"> <li>• DOCS-IF-MIB (RFC 4546)</li> <li>• DOCS-CABLE-DEVICE-MIB (RFC-2669)</li> <li>• DOCS-BPI-PLUS-MIB (Rev 5)</li> <li>• DOCS-QOS-MIB (Rev 4)</li> <li>• DOCS-CABLE-DEVICE-TRAP-MIB</li> <li>• DOCS-SUBMGT-MIB (Rev 2)</li> <li>• DOCS-IF3-MIB</li> <li>• DOCS-QOS3-MIB</li> <li>• DOCS-DRF-MIB</li> <li>• DOCS-LOADBAL3-MIB</li> <li>• DOCS-DIAG-MIB</li> <li>• DOCS-SUBMGT3-MIB</li> <li>• CLAB-TOPO-MIB</li> <li>• DOCS-MCAST-AUTH-MIB</li> <li>• DOCS-MCAST-MIB</li> <li>• DOCS-SEC-MIB</li> <li>• DOCS-IETF-BPI2-MIB</li> <li>• DOCS-IETF-QOS-MIB</li> </ul>
<b>Cisco DOCSIS MIBs</b>	<ul style="list-style-type: none"> <li>• CISCO-DOCS-EXT-MIB</li> <li>• CISCO-DOCS-REMOTE-QUERY-MIB</li> <li>• CISCO-DOCS-QOS-EXT-MIB</li> <li>• CISCO-CABLE-SPECTRUM-MIB</li> <li>• CISCO-CABLE-AVAILABILITY-MIB</li> <li>• CISCO-CABLE-WIDEBAND-MIB</li> </ul>
<b>Cisco generic MIBs</b>	<ul style="list-style-type: none"> <li>• CISCO-SYSLOG-MIB</li> <li>• CISCO-SMI-MIB</li> <li>• CISCO-TC-MIB</li> <li>• CISCO-PRODUCTS-MIB</li> <li>• CISCO-FLASH-MIB</li> <li>• CISCO-CONFIG-MAN-MIB</li> <li>• CISCO-CONFIG-COPY-MIB</li> <li>• CISCO-MEMORY-POOL-MIB</li> <li>• CISCO-BULK-FILE-MIB</li> <li>• CISCO-SONET-MIB</li> <li>• CISCO-TCP-MIB</li> <li>• CISCO-RTTMON-MIB</li> <li>• CISCO-FTP-CLENT-MIB</li> <li>• CISCO-IPMROUTE-MIB</li> <li>• CISCO-QUEUE-MIB</li> <li>• CISCO-IMAGE-MIB</li> <li>• CISCO-ENVMON-MIB</li> <li>• CISCO-ENTITY-VENDORTYPE-OID-MIB</li> <li>• CISCO-PRODUCTS-MIB</li> </ul>

**Table 3.** System Requirements

Item	Requirement
<b>Fan Tray</b>	uBR7246VXR needs new fan tray to accommodate uBR-MC88V
<b>Power Supplies</b>	uBR7225VXR needs new power supplies to accommodate uBR-MC88V
<b>NPE Requirement</b>	uBR7200-NPE-G2 is required
<b>Hardware Compatibility</b>	uBR-MC88V will be compatible with the uBR7225VXR and uBR7246VXR chassis and will not be backward compatible with older chassis such as uBR7246 and uBR7223. In addition, the new uBR-MC88V will only be supported by uBR7200-NPE-G2 and will not be able to coexist with the existing cable line cards in both the uBR7225VXR and uBR7246VXR chassis. It does not support port adaptors or clock card and I/O controller in the same chassis with uBR-MC88V.
<b>Flash Memory</b>	At least 1 GB of Flash memory is required for Cisco IOS Software
<b>Software</b>	Cisco IOS Software Release 12.2(33)SCD is required

## Warranty Information

Find warranty information is available on Cisco.com at the [Product Warranties](#) page.

## Ordering Information

To place an order, visit the [Mega Hertz Web Site](#) . To download software, visit the [Cisco Software Center](#).

**Table 4.** Ordering Information

Product Name	Part Number
uBR-MC88V DOCSIS 3.0 Broadband Processing Engine	uBR-MC88V
uBR-MC88V DOCSIS 3.0 Broadband Processing Engine Spare	uBR-MC88V=
uBR-MC88V 4 Line Card Bundle	uBR-4MC88V
uBR-MC88V 4 Line Card Bundle Spare	uBR-4MC88V=
uBR7246VXR Upgrade Bundle with new fan tray and NPE-G2=	UPG-U7246VXR-G2
uBR7246VXR Upgrade Bundle with new fan tray and 1 UBR-MC88V=	UPG-U7246VXR-88V
uBR7225VXR Upgrade Bundle with 2 new PSUs and 1 NPE-G2=	UPG-U7225VXR-G2
uBR7225VXR Upgrade Bundle with 2 new PSUs and 1 UBR-MC88V=	UPG-U7225VXR-88V
uBR7246VXR New Fan Tray For MC88V	MAS-U7246VXR-FAN2
uBR7246VXR New Fan Tray For MC88V Spare	MAS-U7246VXR-FAN2=
uBR7225VXR New Power Supply For MC88V	PWR-UBR7225-AC-E
uBR7225VXR New Power Supply For MC88V Spare	PWR-UBR7225-AC-E=
uBR7225VXR Dual New Power Supply For MC88V	PWR-UBR7225/2-AC-E

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## For More Information

For more information about the Cisco uBR-MC88V Broadband Processing Engine,

Contact Mega Hertz 800-883-8839 [sales@go2mhz.com](mailto:sales@go2mhz.com) [www.go2mhz.com](http://www.go2mhz.com)



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San Jose, CA

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