# (Euro)-DOCSIS 3.0 Cable Modem Termination System C 3200

Product information


| *Applications:* |
| --- |
| • Full-DOCSIS 3.0 Features & 3.0 GOLD qualified<br>• Separate Downstream & Upstream Modules<br>• Integrated CMTS & Video QAM<br>• High Density & Cost Effectiveness<br>• Full Downstream & Upstream MAC Flexibility<br>• Best Multi-channel RF performance<br>• Extended Frequency Range |

# *(Euro)-DOCSIS 3.0 Cable Modem Termination System C 3200*

- DOCSIS 1.1 and 2.0 Features
- Rich Operational Features
- High availability

## Overview

### Full Docsis 3.0

The C3200 Cable Modem Termination System (C3200 CMTS) is a new class of cable edge device that combines a third generation DOCSIS CMTS and an MPEG video Edge-QAM in a very high density, and high availability 3RU platform. The broadband access over cable market has experienced two generations of DOCSIS CMTS. Most of the products on the market today are either first generation CMTS or second generation CMTS that can be characterized by fixed downstream to upstream ratios, instantaneous bandwidth per subscriber limited to a single RF channel, very low downstream channel density per rack unit, and high cost per unit bandwidth.
The first or second generation "Legacy" CMTS do not have any MPEG video processing capability and thus makes it necessary to implement two parallel platforms plus access networks for MPEG video and DOCSIS IP. With those limitations, the Legacy CMTS is not economically viable in the new market of high bandwidth applications such as B2B, Web2.0 , IPTV or IP video delivery anymore.
As a third generation CMTS, the C3200 has several unique capabilities beyond DOCSIS 3.0 features.

### Full flexibility

The C3200 supports complete separation of downstream channel capacity and upstream channel capacity in a single physical chassis, and thus provides a flexible downstream to upstream channel ratio. Cable operators can add downstream channels and upstream channels completely independently within the same chassis.
Business users may require more symmetric downstream to upstream traffic ratios, while residential broadband is typically more asymmetric. For IPTV or video-over-IP applications, significantly more downstream traffic is required than the upstream traffic which is mostly for control plane applications.

### Highest Density

The C3200 has significantly higher channel density than a second generation CMTS. The extremely high downstream channel density makes it economical to provide video-over-IP service today.

### MPEG/DVB - support

It can support both DOCSIS and MPEG/DVB traffic in a single platform. This unique feature is very important for cable operators to manage their HFC spectral resources in a single platform. It also allows the spectral resources to be shared dynamically between MPEG video, DOCSIS business users and DOCSIS residential users. For example, more bandwidth can be allocated to DOCSIS business traffic during the day while more bandwidth can be allocated to MPEG/DVB video traffic at night to efficiently utilize the spectral resource.

### Full DOCSIS 3.0 including Multicast- Support

The C3200 has the most extensive DOCSIS 3.0 features on the market today. It offers the highest channel bonding capability in both downstream and upstream. This bandwidth scalability from 150Mbps to 800Mbps makes it essentially equivalent to PON in bandwidth capacity. The revolutionary DOCSIS bandwidth capacity and cost per-bit of DOCSIS bandwidth of the C3200 provides an unprecedented opportunity for cable operators to cost-effectively provision highbandwidth IP services such as IPTV or video-over-IP and interactive gaming in addition to traditional broadband access and VoIP services.

### VOD / I-TV Support

The integrated MPEG video capacity of the C3200 provides cable operators the flexibility to offer MPEG or DVB-based broadcast digital cable TV, video-ondemand (VOD), and interactive services in the same platform. The flexibility, multi-functionality and economics of the platform eliminate the need to deploy multiple parallel systems for MPEG TV, IPTV bypass and DOCSIS broadband access. The following sections detail the unique capabilities of the C3200.

# *(Euro)-DOCSIS 3.0*
# *Cable Modem Termination System*
# *C 3200*

## Modular and Flexible Architecture

The C3200 CMTS comes in a compact 3RU chassis. It is based on a modular architecture that gives cable operators the maximum flexibility in tailoring their networks according to the requirements of their services. The C3200 consists of a base system with one Switch and Management Module slot and six slots for DOCSIS interface modules (downstream DQM modules or upstream DCU modules). Any combination of downstream modules and upstream modules are supported by the platform. This enables flexible downstream to upstream channel ratio.

## Integrated High Perfomance Up-Converter

The DOCSIS QAM Module (DQM) is a complete DOCSIS downstream unit that includes DOCSIS packet processing, QoS, DOCSIS downstream MAC, PHY, and RF up-conversion. The DOCSIS Control and Upstream module (DCU) is a complete DOCSIS upstream unit that includes DOCSIS packet processing, DOCSIS upstream MAC and burst mode receivers. A typical configuration for channel-bonded deployment can be 48DSx48US for a 1:1 channel ratio or 32DSx64US for a 1:2 channel ratio. Each downstream QAM channel can be configured to support DOCSIS or MPEG/ DVB-C video or a combination of the two.

## Extensive DOCSIS 3.0 Features

As a Full DOCSIS 3.0 ready CMTS, the C3200 offers the highest channel bonding capability on the market today. In the downstream direction, up to 16 QAM channels (with DQM16 module) can be bonded yielding up to 800Mbps of instantaneous bandwidth per subscriber. In the upstream direction, up to 16 channels can be bonded to yield 480Mbps instantaneous bandwidth. The C3200 will also support IPv6 and BPI+/AES encryption and decryption today.

## High Performance DVB Video “EdgeQAM” included

The C3200 downstream channels can also function as a MPEG or DVB-C compliant MPEG video Edge-QAM for digital video applications such as broadcast digital cable TV, video-on-demand, interactive TV, and network DVR. The C3200 receives MPEG-2 over IP/Ethernet packets in multiple program transport streams (MPTS) or single program transport streams (SPTS) through its multiple Gigabit Ethernet ingress interfaces, it then de-multiplexes MPTS and routes the native MPEG-2 packets to its egress QAM interfaces.
At the egress interfaces, the remultiplexing function generates multiple program transport streams (MPTS) for the designated cable channels. The C3200 performs PSI/SI table processing, PID filtering and substitution, and PCR de-jittering to satisfy the most demanding needs of various video networks. The C3200 supports both CBR traffic and VBR traffic for narrowcast applications and broadcast applications.
The C3200 is the only product that can make the most efficient use of the RF bandwidth and maintains video quality at the same time through concurrent use of tools such as statistical multiplexing of all MPEG video traffic and DOCSIS traffic, and dynamical scheduling of MPEG and IP traffic.

## Rich Operational Features

The C3200 supports industry standard Command Line Interface (CLI) and SNMP for configuration and management. Operational features such as show cable modem, show ARP, flap list, spectrum management, CPU and memory resource reporting, user privilege management and LI support are available. Advanced features such as load balancing for bonded channels is also available.
Extensive IP features such as DHCP Relay and option 82, multiple DHCP servers, proxy ARP, IP subnet bundling, IGMP snooping, IGMP v2 and v3, access control list (ACL) are also available in the current release. The C3200 is functioning as a Layer 3 routing device. Static routes and default route are supported, for route redundancy, multiple default routes can be configured.
All widely required features are already realized and deployed like Layer 2 bridging, VLAN, L2VPN , RIP, OSPF or PIM-SM. Additional features have been and can be added easiliy via Software-Upgrade.

## Applications

The applications of the C3200 in a cable network can be divided into two categories. The first category the C3200 provides is DOCSIS-based IP applications, such as broadband access, VoIP, and IPTV. The second category the C3200 provides is digital video applications that include SDTV Broadcast over Cable, HDTV broadcast over Cable, VOD, Network Digital Video Recorder (nDVR), interactive gaming, and switched digital video.

Please ask us if you have some specific demands regarding additional features.

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## Specifications

**System**
- 24x2 Gbps switching capacity
- MPEG switching from any port to any port
- 6x DOCSIS module slots per system (hot plug)
- 1~5 Downstream modules per system
- 1~5 Upstream modules per system

**DOCSIS Features**
- Full DOCSIS 3.0 Qualified (since May, 2008)
- Full Euro-DOCSIS 3.0
- Full Euro-DOCSIS 1.1/2.0
- Versatile load balacing features
- DOCSIS 3.0 downstream channel bonding up to 16 channels
- DOCSIS 3.0 upstream channel bonding up to 16 channels
- DOCSIS 3.0 AES encryption/decryption
- DOCSIS 3.0 IPv6
- DOCSIS 3.0 Multicast
- Complete DOCSIS/EuroDOCSIS 1.1 features
- DOCSIS/EuroDOCSIS 2.0 A-TDMA (standard)
- DOCSIS/EuroDOCSIS 2.0 S-CDMA (optional)
- PacketCable 1.5 qualified
- PacketCable MultiMedia (PCMM) 1.0
- DSG

**IP Features**
- DHCP Relay and option 82
- Multiple DHCP servers
- Proxy ARP
- IP subnet bundling
- Static IP routing
- Multiple default routes
- IGMP snooping
- IGMP v2 and v3
- Access Control List
- RIPv2
- BGP
- OSPFv2
- PIM-SM
- L2VPN VLAN tagging
- IS-IS

**Management**
- RS232 Serial port (DB9)
- 10/100BaseT management port
- Command Line Interface (CLI)
- Telnet and SSH
- SNMPv1, v2, and v3
- Standard DOCSIS and IETF MIBs
- IPDR
- Casa Systems Enterprise MIBs
- Event logging through Syslog
- Electronic mail notification
- Resource usage reporting
- TACACS+ and RADIUS

**Additional Features**
- Dynamic upstream and downstream load balancing
- Spectrum Management
- Software-defined MAC domains
- Software channel licensing
- Ingress cancellation filtering

**MPEG Stream Processing**
- MPEG de-multiplexing and re-multiplexing
- Unicast to Multicast conversion
- PAT and PMT extraction and regeneration
- PID filtering and remapping
- PCR jitter removal and re-stamping
- SI table generation and insertion
- DVB Simulcrypt scrambling
- Session-based Encryption

**Switch and Management Module (SMM)**
- 10/100/1000 Mbps interfaces
- 12-port GbE copper or fiber SFP
- CWDM
- Full line-rate support

**DOCSIS Control & Upstream Module (DCU)**

| | |
|---|---|
| DCU04 | 4 channels in 4 ports |
| DCU08 | 8 channels in 8 ports |
| DCU16 | 16 channels in 8 ports |
| Channel bonding | All channels on a DCU |
| Modulation | QPSK, 16, 32 & 64 QAM |
| A-TDMA or S-CDMA | |
| Data rate per channel | 0.32 – 30.72 Mbps |
| Input frequency range | 5 – 42/65/85 MHz (DOCSIS)<br>5 – 65/85 MHz (EuroDOCSIS) |
| Connector | F-type, 75 Ω |
| Input range | -4 to 26 dBmV |

**DOCSIS QAM Module (DQM)**

| | |
|---|---|
| Number of ports | 4 ports per module |
| DQM04 | 4 channels, 1 channel per port |
| DQM08 | 8 channels, 1 channel per port |
| DQM16 | 16 channels, 2 channels per port |
| Channel bonding | All channels on a DQM |
| QAM modulation | Annex A, B or C |
| QAM constellations | 64, 128, & 256 QAM |
| Data Rates (DOCSIS) | 27 Mbps @ 64 QAM |
| | 38 Mbps @ 256 QAM |
| Data Rates (EuroDOCSIS) | 36 Mbps @ 64 QAM |
| | 51 Mbps @ 256 QAM |
| Connector | F-type, 75 Ω |
| Frequency range (edge) | 48 to 1002 MHz |
| Frequency step size | 5 kHz |
| Channel width | 6 to 8 MHz (tunable) |
| Maximum output | 61 dBmV @ 1-ch/port |
| power Per Channel | 57 dBmV @ 2-ch/port |
| | 53 dBmV @ 4-ch/port |
| Output step size | 0.1 dB |
| Output stability | ± 0.3 dB |
| Return Loss | 50 ~ 870 MHz, 14 dB<br>870 ~ 1002 MHz 10 dB |
| Modulation Error Rate | 44 dB (equalized) |
| Wideband Noise | -73 dBc |

**Mechanical**

| | |
|---|---|
| Form Factor | 3RU |
| Height | 5.25 in. /133.35 mm |
| Width | 19 in. /482.6 mm |
| Depth | 23.5 in. / 597 mm |
| Weight | 70 lbs |
| Mounting | 19 inch, 3 rack unit high |
| Front Panel | LED power, alarm, I/O status |

**Environmental**

| | |
|---|---|
| Operating temperature | 0° to 50° C |
| Storage temperature | -40° to 70° C |
| Operating humidity | 5% to 95%, non-cond. |
| Power supply | |
| AC operating range | 90 to 264 V (dual) |
| DC operating range | -36 to –60 V (dual ) |
| Power consumption | < 700 W (nominal) |

**Regulatory Compliance**
- Safety: UL/IEC/CSA 60950-1
- EMC: FCC Part 15 Class A and CISPR Class A
- Immunity: EN61000-4



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