casa systems

Casa Systems C3200 CMTS

Overview

The Casa Systems 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.

As a third generation CMTS, the C3200 has several unique capabilities beyond DOCSIS 3.0 features.

First, the C3200 supports complete separation of downstream channel capacity and upstream channel capacity in a single physical chassis and thus provides 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 ratio. Residential broadband access has more asymmetric traffic patterns. For IPTV or video-over-IP applications, significantly more downstream traffic is required than the upstream traffic which is mostly for control plane applications.

Second, the C3200 has significantly higher channel density than a second generation CMTS. The C3200 can support up to 80 downstream QAM channels in 3RU (80DS+16US) while second generation CMTS typically has 1 or 2 downstream channels in 1RU.

Feature Highlights

Full DOCSIS 3.0 qualified – Multi-channel DRFI RF for Annex A, B, & C, downstream channel bonding up to 16 channels, upstream channel bonding up to 16 channels, IPv6, AES encryption/decryption, multicast QoS, bonded channel multicast, full DOCSIS 3.0 MIBs, and IPDR

Separate downstream and upstream modules – Unlike traditional CMTS with fixed downstream to upstream ratio, Casa CMTS has separate downstream modules and upstream modules that provide flexible downstream to upstream ratio

Cost effectiveness –The lowest cost per DOCSIS channel in the industry. The only economical solution for high bandwidth multimedia IP applications

Software licensing –Ability to activate additional channels as needed up to the available physical capacity of the module

Superior density – Offers the highest channel density in the industry, ranging from 80DSx16US for IP video to 48DSx48US for typical broadband service deployment in a single chassis

Best multi-channel RF performance – Exceeds DOCSIS DRFI specification

Extended frequency range – Downstream frequency range up to 1GHz (48~1002MHz)

DOCSIS 1.1 and 2.0 features – Complete DOCSIS/**EuroDOCSIS** 1.1 and 2.0 feature sets; PacketCable and PCMM support, L2VPN, and DSG

Rich operational features – Rich operational features such as show cable modem, flap list, spectral management and IP bundling ready for deployment

High availability – Dual hot-pluggable AC power supply or DC power supply, hot-pluggable fan tray, and hot-pluggable line card modules, GigE link redundancy

The extremely high downstream channel density makes it economical to provide video-over-IP service today.

Third, the C3200 has the most extensive DOCSIS 3.0 features on the market today. It offers the highest channel bonding capability in both downstream (up to 16) and upstream (up to 16) on the market today.

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 high-bandwidth IP services such as IPTV or video-over-IP and interactive gaming in addition to traditional broadband access and VoIP services.

The integrated MPEG video capacity of the C3200 provides cable operators the flexibility to offer MPEG or DVB-based broadcast digital cable TV, video-on-demand (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.

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. The DOCSIS QAM Module (DQM) is a complete DOCSIS downstream unit that includes DOCSIS packet processing and 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.
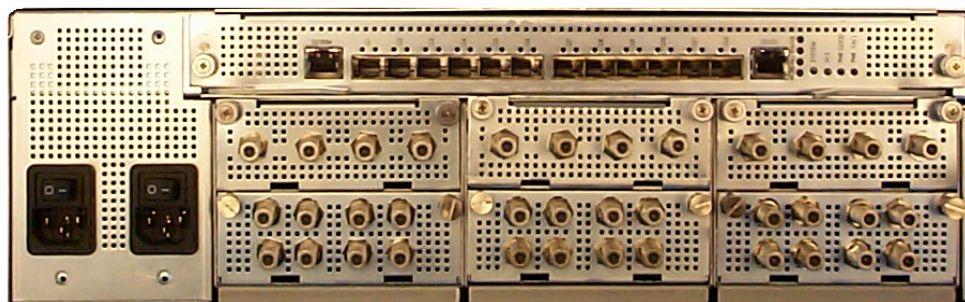
Modular and Flexible Architecture

The C3200 CMTS comes in a compact 3RU form factor. 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

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 also supports IPv6, AES encryption/decryption, and full multicast capabilities.

High Performance Video QAM

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 re-multiplexing 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 maintain 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 static and dynamic load balancing, extensive show cable modem commands, spectral management, CPU and

memory resource reporting, and user privilege management are available in the current release. Advanced features such as load balancing for bonded channels is also available in the current release.

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 currently functions as a Layer 3 routing device. It supports static as well as dynamic routing protocols. For route redundancy, multiple default routes can be configured. Layer 2 bridging, VLAN, RIP, BGP, OSPF, IS-IS, and PIM-SM are supported.

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 and video-over-IP etc. 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.

C3200 Specifications

System

24x2 Gbps switching capacity
MPEG switching from any port to any port
Six DOCSIS module slots per system
1~5 Downstream modules per system
1~5 Upstream modules per system

DOCSIS Features

Full DOCSIS 3.0 qualified (May 2008)
Full Euro-DOCSIS 3.0 compliant
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 compliant
PacketCable MultiMedia (PCMM) 1.0
DSG
L2VPN

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
BGP
RIPv2
OSPFv2
PIM-SM
L2VPN VLAN tagging
IS-IS

Management

RS232 Serial port (RJ45))
10/100BASE-T management port
Command line interface (CLI)
Telnet
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 GigE copper or fiber SFP
CWDM
Full line-rate support

DOCSIS QAM Module (DQM)

Number of ports	4 ports per module
DQM04	4 channels, 1 channel per port
DQM08	8 channels, 2 channels per port
DQM16	16 channels, 4 channels per port
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 (center)	91 to 867 MHz (standard)
	48 to 999 MHz (optional)
Frequency accuracy	+/- 5 ppm
Frequency step size	5 kHz
Channel width	6 to 8 MHz (tunable)
Maximum output power per channel	61 dBmV @ 1-ch/port
	57 dBmV @ 2-ch/port
	53 dBmV @ 4-ch/port
Output step size	0.1 dB
Return loss	50 ~ 870 MHz, 14 dB
	870 ~ 1002 MHz 10 dB
Modulation error rate	43 dB (equalized)
Wideband noise	-73 dBc

DOCSIS Control and Upstream Module (DCU)

DCU04	4 channels in 4 ports
DCU08	8 channels in 8 ports
DCU16	16 channels in 8 ports
Modulation	QPSK, 16, 32 & 64 QAM
Data rate per channel	0.32 – 30.72 Mbps
Input frequency range	5 – 42 MHz (DOCSIS)
	5 – 65 MHz (EuroDOCSIS)
	5 – 55 MHz (J-DOCSIS)
Connector	F-type, 75 Ω
Input range	-4 to 26 dBmV

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

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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