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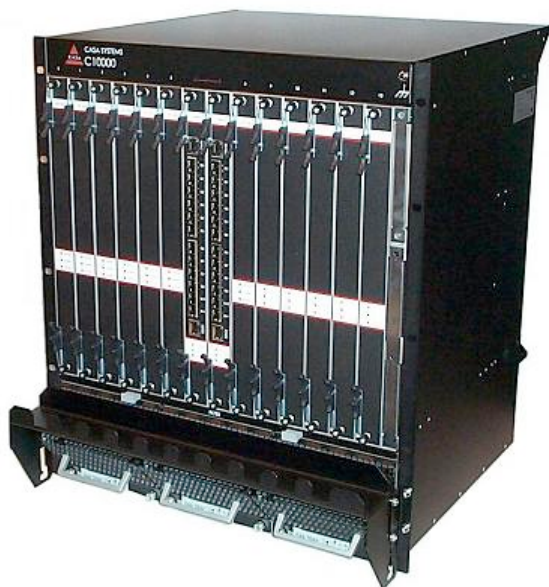
Casa Systems C10G CMTS

Overview

The Casa Systems C10G Cable Modem Termination System (C10G CMTS) is a new class of DOCSIS 3.0 cable edge device that delivers unprecedented performance and scalability in a 12RU 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 legacy CMTS does not have any MPEG video processing capability and thus makes it necessary to implement two parallel access networks for MPEG video and IP data. With those limitations, the legacy CMTS is not economically viable in the new market of high bandwidth applications such as IPTV or IP video delivery and is not competitive with other broadband access methods such as FTTX.

Feature Highlights

Full DOCSIS 3.0 compliant – Multi-channel DRFI RF for Annex A, B, & C, downstream channel bonding up to 64 channels, upstream channel bonding up to 64 channels, IPv6, AES encryption/decryption, multicast QoS, bonded channel multicast, multiple logic upstream channels, 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 704DSx64US for IP video to 384DSx384US 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)

Extensive DOCSIS Features – Complete DOCSIS/**EuroDOCSIS** 1.1, 2.0, and 3.0 feature sets; PacketCable and PCMM support, L2VPN, and DSG.

Rich Operational Features – Rich operational features such as static and dynamic load balancing, 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, dual hot-pluggable SMM, and hot-pluggable line card modules, GigE link redundancy

As a third generation CMTS, the C10G has several unique capabilities beyond DOCSIS 3.0 features. First, the C10G 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.

Second, the C10G 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.

Third, The C10G 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 3.2Gbps makes it essentially equivalent to PON in bandwidth capacity.

The revolutionary DOCSIS bandwidth capacity and cost per-bit of DOCSIS bandwidth of the C10G 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 C10G 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 C10G.

Modular and Flexible Architecture

The C10G CMTS comes in a 12RU 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 C10G consists of redundant Switch and Management Module slots, 12 slots for DOCSIS interface modules (downstream DQM modules or upstream DCU modules), and 12 slots for RF I/O modules (8-port downstream or 16-port upstream).

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, 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 384DSx384US for a 1:1 channel ratio or 256DSx512US 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.

Carrier-Class Reliability

The C10G is a robust platform designed from the ground up to be carrier-class. It is NEBS compliant and includes many redundancies:

- Power-supply redundancy: dual -48VDC power supply
- Fan-tray redundancy
- Switch and Management modules: 1+1 redundancy
- QAM/Upstream modules: 10+2 redundancy
- Link redundancy: 2-port 10GigE and 8-port GigE interfaces for link fail-over
- A passive mid-plane

All modules in the C10G are designed for "hot-swap" operation and can be inserted or removed while the system remains powered and in operation.

Rich Operational Features

The C10G 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, 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.

In the current release, the C10G is functioning as a Layer 3 routing device. Static routes and default routes are supported. 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 C10G in a cable network can be divided into two categories. The first category the C10G provides is DOCSIS-based IP applications, such as broadband access, VoIP, and IPTV and video-over-IP etc. The second category the C10G 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.

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C10G Specifications

System

240x2 Gbps switching capacity
MPEG switching from any port to any port
12 DOCSIS module slots per system
1~11 Downstream modules per system
1~11 Upstream modules per system

DOCSIS Features

Full DOCSIS compliant
Full Euro-DOCSIS 3.0
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/Euro-DOCSIS 2.0 A-TDMA (standard)

PacketCable 1.5 qualified
PacketCable MultiMedia (PCMM) 1.0
DSG
L2VPN

IP Features

IPv6
DHCP v6, 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 (RJ45)
10/100BASE-T management port
Command line interface (CLI)
Telnet
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

Switch and Management Module (SMM)

Two 10GigE interfaces
Eight GigE interfaces
GigE copper or fiber SFP
Full line-rate support

DOCSIS QAM Module (DQM)

DQM32	32 channels, 4 channels/port
DQM64	64 channels, 8 channels/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
Frequency range (center)	48 to 1000 MHz
Frequency step size	5 kHz
Channel width	6 to 8 MHz (tunable)
Maximum output power per channel	60 dBmV @ 1-ch/port
	56 dBmV @ 2-ch/port
	52 dBmV @ 4-ch/port
	49 dBmV @ 8-ch/port
Output step size	0.1 dB
Output accuracy	± 5ppm
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)

DCU32	32 channels, 2 channels per port
DCU64	64 channels, 4 channels per port
Modulation	QPSK, 8, 16, 32 & 64 QAM
Data rate/ channel	0.32 – 30.72 Mbps
Input frequency range	5 – 42 MHz (DOCSIS)
	5 – 65 MHz (EuroDOCSIS)
	5 – 55 MHz (J-DOCSIS)

Input range	-4 to 26 dBmV

RF I/O Downstream Module (RFD)

Number of ports	8 ports per module
Connector	F-type, 75 Ω

RF I/O Upstream Module (RFU)

Number of ports	16 ports per module
Connector	F-type, 75 Ω

Mechanical

Form factor	12RU
Height	21 in. / 533 mm
Width	19 in. / 482 mm
Depth	16 in. / 406 mm
Weight	120 lbs (fully loaded)
Mounting	19 inch, 12 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 requirements (DC)	-40.5 to –60 V (dual)
Power consumption	< 2700 W (nominal)

Regulatory Compliance

Designed to NEBS level 3 requirements
Safety: EN/UL/IEC/CAN/CSA/C22.2 60950-1
EMC: FCC Part 15 Class A and CISPR Class A
Immunity: EN61000-4

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