



Casa Systems C2150

Downstream Digital Cable Termination System

Overview

The C2150 Downstream Digital Cable Termination System (DCTS) is Casa Systems' second-generation multi-purpose Edge-QAM. It is designed to meet the DOCSIS multi-channel RF specification (Downstream RF Interface Specification) and modular CMTS EdgeQAM specification. It is the highest density and most flexible solution for cable operators to deliver both video-over-IP services and MPEG video services concurrently. The revolutionary IP bandwidth capacity and cost per IP stream of the C2150 provide an unprecedented opportunity for cable operators to cost-effectively provision high-bandwidth IP services such as video-over-IP and interactive gaming in addition to traditional broadband access and VoIP services. The integrated MPEG video processing capability of the C2150 provides cable operators the flexibility to offer MPEG or DVB-based switched digital video, video-on-demand (VOD), and interactive TV services in the same platform.



Compact and Modular Architecture

The C2150 DCTS comes in a compact 1RU form factor. It is based on a modular architecture that gives cable operators flexibility in tailoring their networks according to the requirements of their services. The C2150 consists of a base system with four slots for downstream (QAM) modules. Each downstream

Feature Highlights

Exceptional RF Performance –

Designed to meet the DOCSIS DRFI RF performance specification for multi-channel QAMs

Dual-use QAM – MPEG video traffic and DOCSIS IP traffic can share the same RF channel (optional)

Broadcast and Narrowcast – Support broadcast (MPTS pass-through) and narrowcast (SPTS to MPTS mux) mode in the same RF channel

High Density – Offers the highest channel density per 1RU space in the industry (64 channels)

MPEG Processing – Provides integrated video grooming, PID filtering, and PCR reconditioning

Conditional Access Scrambling – Integrated 3DES encryption and DVB common scrambling (optional)

Large Frequency Range – Fully tunable integrated RF upconverters can tune in the frequency range 54~999 MHz (optional)

Modular CMTS EdgeQAM – Designed to meet modular CMTS timing interface (DTI), packet interface (DEPI) and edge resource management interface (ERMI) specifications (R2, optional)

Session and Resource Management – Support multiple edge resource allocation and session management protocols for switched digital video, netPVR and VOD (R2)

Input Redundancy – Up to four GbE ports for 1+1 or n+1 input redundancy (R2)

module has four RF ports (connectors) and each port contains up to four QAM channels. In aggregation, the C2150 supports up to 64 downstream QAM channels in a 1RU form factor. C2150 can be configured for either AC or DC power to fit operation environment.

Third Generation DOCSIS Device

The broadband access over cable market has experienced two generations of DOCSIS compliant CMTSs. Both the first generation CMTS and the second generation CMTS can be characterized by fixed downstream to upstream ratio, very low downstream channel density per rack unit, and very high per channel cost. The C2150 Downstream DCTS is a third generation DOCSIS edge device that is optimized for very high downstream bandwidth applications such as video streaming. A C2150 Downstream DCTS can be combined with a C2200 Upstream DCTS to form a complete DOCSIS headend system compatible with DOCSIS1.0, 1.1, 2.0, 3.0 and EuroDOCSIS1.0, 1.1, 2.0 and 3.0. As a third generation DOCSIS device, the C2150 has several unique features not available in legacy CMTSs. First, any downstream channel in a C2150 can be associated with any upstream channel in a C2200 providing flexible downstream to upstream channel ratio. Cable operators can add and bind downstream and upstream channels completely independently. Second, the C2150 has significantly higher downstream channel density than legacy CMTSs. The C2150 can have up to 64 downstream QAM channels in a 1RU while a legacy CMTS typically has 1 or 2 downstream channels in a 1RU. The C2150's extremely high downstream channel density makes it an economical choice for providing video-over-IP service today. Third, the C2150 can support both DOCSIS and MPEG/DVB traffic in a single platform. This unique feature is very important to cable operators in managing their HFC spectral resources in a single platform. It also allows the spectral resources to be shared dynamically between video and DOCSIS. An example setup for a more optimized spectrum could have more bandwidth allocated to DOCSIS

traffic during the day and more bandwidth allocated to MPEG/DVB video traffic at night.

Feature-Rich Video QAM

The C2150 DCTS downstream channels can also function as a MPEG or DVB-C compliant video QAM for digital video applications such as broadcast digital cable TV, video-on-demand, interactive TV and network DVR. The C2150 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. It also support a MPTS pass through mode for broadcast streams. The C2150 performs all of the PSI/SI table processing, PID filtering/substitution, and PCR de-jittering to satisfy the most demanding needs of various video networks.

C2150 supports both CBR traffic and VBR traffic for narrowcast applications and broadcast applications. C2150 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.

Mutli-Layer Switching & Routing

The C2150 DCTS can be configured as a Layer2 bridge, multi-layer switch, or as a Layer3 router for CMTS applications. The hardware-based packet-forwarding engine can handle 24Gbps capacity at wire-speed for both Layer2 forwarding and Layer3 forwarding. The C2150 DCTS supports Layer2 services such as transparent LAN bridging, VLAN, and PPPoE traffic. When configured as a multi-layer switch, it bridges traffic within a LAN segment and routes traffic among different network segments

Applications

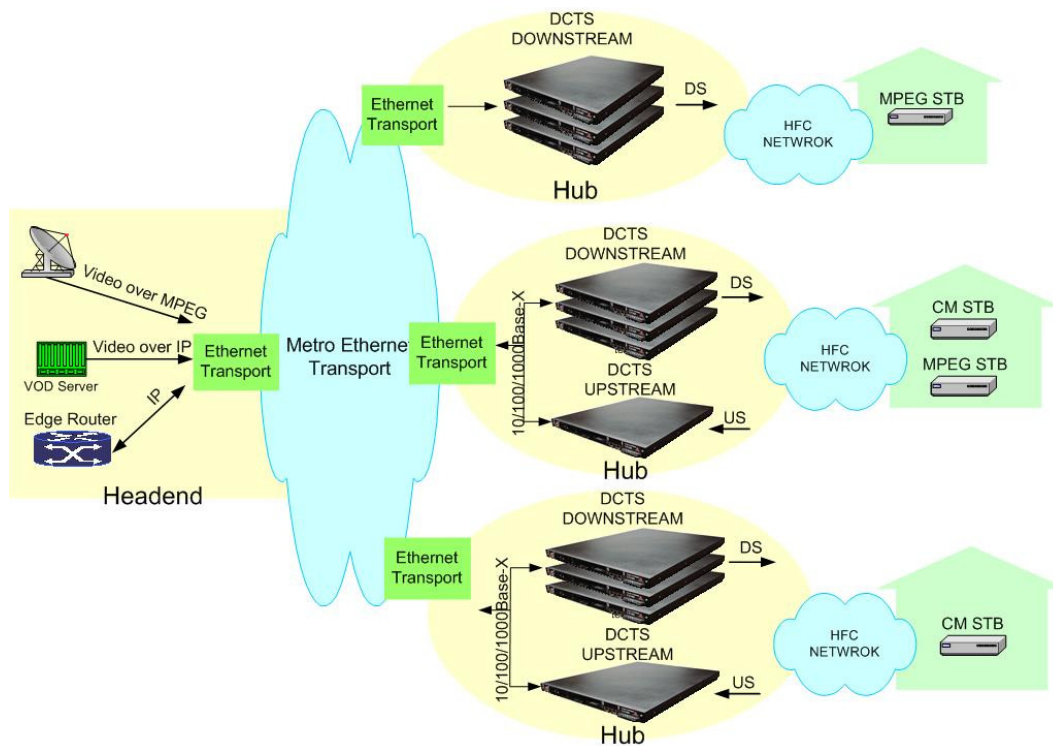
There are several scenarios in which the Casa C2150 can be deployed today to provide different types of services and migration paths:

1. Deployed as MPEG Edge-QAM and video switch today: The C2150 can be deployed as Edge-QAM today for MPEG-based unicast applications and for switched digital broadcast applications in a new deployment scenario or as added-on additional capacity without the need to remove legacy equipment. The C2150 is completely compatible with existing MPEG Edge-QAM deployed in the field today. No change to existing network architecture is needed to deploy the C2150. When the operator is ready to move to video-over-IP, the C2150 can be field-upgraded to provide IP functionality without any change of hardware. Deploying the C2150 as MPEG Edge-QAM

today provides investment protection and a migration path to an all-IP network.

2. Deployed as MPEG Edge-QAM and video-over-DOCSIS edge device: The C2150 can also be deployed as a unified platform to provide simultaneous video-over-MPEG and video-over-IP services. The RF spectrum resources are shared between MPEG and IP traffic, the ratio of MPEG traffic and IP traffic can be adjusted in real-time.
3. Deployed as video-over-IP edge only: The C2150 can be deployed from day one as a downstream DOCSIS edge device to provide video-over-IP services at a cost very competitive relative to video-over-MPEG services.

C2150 Application Diagram



C2150 Specifications

System

- 24 Gbps switching capacity
- Ethernet switching and IP routing
- MPEG switching from any port to any port
- CLI, SNMP and Web GUI management
- Four RF interface slots per system
- 1-4 Downstream modules per system

Standard Compliance

- EuroDOCSIS 1.0, 2.0, 3.0 compatible
- Spanning Tree
- SNMPv1, SNMPv3
- IGMPv3
- DHCP Relay
- Proxy ARP

MPEG Stream Processing

- MPEG 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

Management

- RS232 Serial port (DB9)
- 10/100BaseT management port
- Command Line Interface (CLI)
- Web-based GUI interface
- Telnet
- SNMP
- Standard DOCSIS and IETF MIBs
- Casa Systems Enterprise MIBs
- Event logging through Syslog
- Performance monitoring
- DVB SimulCrypt protocol

GbE Interfaces

- 4-port Copper or fiber SFP
- CWDM
- Full line-rate support

QAM Module

Number of ports	4
Number of channels	16 channels
QAM Modulation	Annex A, B, or C
QAM constellations	64, 128, & 256 QAM
Data Rates (Annex B)	27 Mbps @ 64 QAM 38 Mbps @ 256 QAM
Data Rates (Annex A)	36 Mbps @ 64 QAM 51 Mbps @ 256 QAM
Connector	F-type, 75 Ω
Frequency range	48 to 999 MHz
Frequency step size	12.5 kHz
Channel width	6 to 8 MHz (tunable)
Maximum output power Per Channel	61 dBmV @ 1-ch/port 56 dBmV @ 2-ch/port 52 dBmV @ 4-ch/port
Output step size	0.1 dB
Output stability	± 0.3 dB
Return Loss	> 15 dB
Modulation Error Rate	43 dB (equalized)
Wideband Noise	-73 dBc

Mechanical

Form Factor	1RU, 19" rack mount
Dimensions (HxWxD)	1.75 x 19 x 23.5 inch 44.4 x 482 x 597 mm
Weight (full load)	30 lbs / 13 kg
Front Panel LED	Power, alarm, I/O status

Environmental

Operating temperature	0° to 50° C
Storage temperature	-20° to 70° C
Operating humidity	5% to 95%
Power supply	100 to 240 VAC -40 to -60 VDC (option)
Power consumption	< 400 W (nominal)

Regulatory Compliance

CE, EMC	EN55022, Class A EN55024 FCC Part 15, Class A
Safety	EN60950-1 UL60950-1 CAN/CSA C2.2.2 60950-1-03

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