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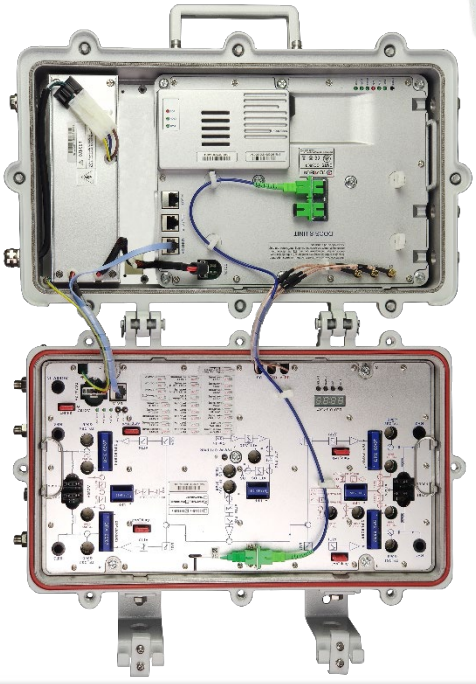
DOCSIS CMTS 3.1
OUTDOOR CMTS U2
Art.Nr.: #A-101701

Datasheet



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IT-SOLUTIONS & TELECOM

CC8800-D-U2 R-CCAP(RMD)

Product Specifications

TOPVISION TECHNOLOGIES CO., LTD.

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CC8800-D-U2 Introduction

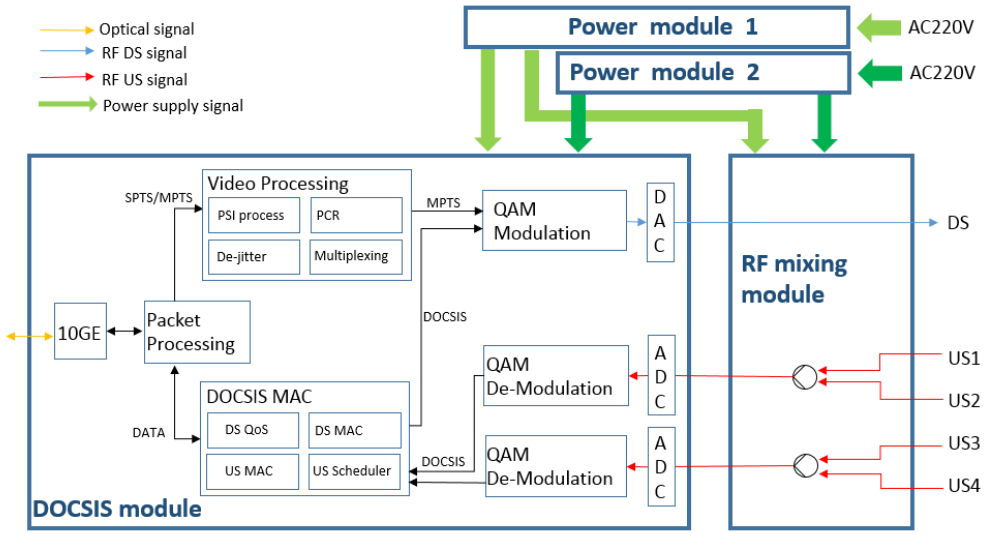
Topvision CC8800-D-U2 production is based on DOCSIS3.1/DOCSIS 3.0/ Euro-DOCSIS 3.0/ C-DOCSIS. CC8800 is a high-performance and cost-effective cable network edge device.

CC8800-D-U2: 1U equipment cabinet type, support 10GE uplink, support end-to-end QoS and unified network management.

Product Features

- Allows service providers to rapidly and cost effectively deliver broadband services over the existing coax plant
- Fully compatible with standard DOCSIS provisioning system, fully compatible with existing DOCSIS 2.0/3.0/3.1 cable modems, thus the existing investment is protected
- Support RMD Controller centralized management
- Smooth evolution: compatible with existing headend provision platform, CM terminal and support network evolution smoothly
- High bandwidth: 10 Gigabit level access device, higher bandwidth on next generation product, can satisfy the future network requirements
- Better cost-effective: the unit price of bandwidth has greatly reduced compared with traditional CMTS
- Support PacketCable/ PCMM, and multi-service applications including internet, video and interactive VOD application

Function Module Introduction



Module	Function
DOCSIS module	The main function of DOCSIS module is to converts data between the upper-layer network and the HFC network. 1.In the downstream direction, the DOCSIS module modulates data signals to RF signals and sends the signals to the RF module. 2. In the upstream direction, the DOCSIS module demodulates the RF signals sent by the RF module to data signals for data conversion.
RF module	RF module provides the functions of DOCSIS signal's combination, separation, amplification and detection.

Module	Function
Power module	Converts the input 220 V AC voltage to the DC voltage to provide the voltage required for each module.

Packet Processing Module

All data packets entering from the aggregation network will be differentiated as MPEG video streams or IP Data packets according to their IP/UDP header.

The IP packets are forwarded to the DOCSIS 3.1/3.0 MAC module for QoS scheduling and framing. The MPEG video transport streams are forwarded to video processing module.

For Upstream, the Packet Processing Module has implemented a mapping protocol between the DOCSIS service flows and VLAN tags, to support QoS requirements and seamless connection with different types of connection networks. The CC8800-D-U2 R-CCAP also supports subnet VLAN and supports adding VLAN based on device types in DHCP Snooping, L2 Relay, and L3 Relay modes.

DOCSIS MAC Module

The data packets are forwarded to the DOCSIS MAC module for QoS scheduling and framing.

DOCSIS3.0 downstream channel bonding and upstream channel bonding is also supported by this module. The bonding feature enables high-speed broadband access and helps cable operators to offer more bandwidth-intensive services.

Data link encryption between CMTS and CM, such as BPI+, is supported by this module.

Bonded multicast is supported by this module. It enables cable operators to offer various IP Multicast-based multimedia services, such as Internet Protocol Television (IPTV) over the DOCSIS network.

DOCSIS MAC Module is also responsible for handling QoS function between CM and CMTS. QoS function characterizes the service flows by a set of parameters such as latency, jitter, and throughput assurances. If a packet matches the specified packet matching criteria of a QoS Classifier, it is then delivered to the specific service flow. The downstream packets are classified by CC8800-D-U2 R-CCAP, and the upstream packets are classified by CM. CC8800-D-U2 R-CCAP supports L2-L4 classifiers.

Video Processing Module

The Video processing module receives IP-encapsulated AVS / H.265/ HEVC/ H.264 /MPEG-4 /MPEG-2 transport data streams (unicast/multicast) from the Packet Processing Module, support all mainstream video streams such as SD, HD, 4K, etc., and upgrade to support higher bit rates in the future.

The Video processing module provides the functions as PSI processing, PCR processing, de-jittering and multiplexing, then sends MPTS bitstream to QAM modulation module.

QAM Modulation and Demodulation Module

The modulation and demodulation module modulates and multiplexes DOCSIS MAC MPEG data and MPTS MPEG packets to RF signals in downstream direction, and demodulates DOCSIS RF signals back to DOCSIS MPEG data packets in upstream direction.

10GE Uplink Module

The 10GE uplink module implements data transmission from the CC8800-D-U2 R-CCAP to the access network/aggregation network. When 10GE optical signals are connected, the 10GE SFP+ optical module can be directly connected to the SFP+ uplink interface of the CC8800-D-U2.

Useful Management Features

Spectrum Management

- Spectrum Monitoring

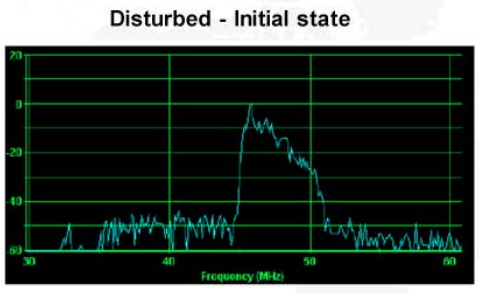
The upstream noise has an adverse impact on upstream signal transmission from CM to CC8800-D-U2 R-CCAP. The function of upstream spectrum monitoring can be used to measure the background noise level of the entire upstream spectrum. In this way, the operator can analyses and locate the possible problems caused by the noise, and find some better spectrum band to use. It is useful for fault management and troubleshooting the cable network.

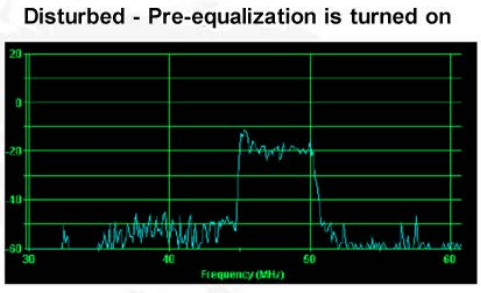
- Signal Quality Monitoring

Besides monitoring the noise level of the entire spectrum, it's also important to monitor the signal quality of the upstream channel(s) being used, which can ensure periodic detection of upstream problems and minimize the disruption of services.

- PNM/Pre-equalization

PNMP (Proactive Network Maintenance using Pre-equalization) is a pre-equalization compensation mechanism for signals. It provides pre-equalized tap coefficients and frequency response curves to provide the health status of the coaxial network itself. Proactively discover network problems before user protection. The CC8800-D-U2 supports the standard pre-equalization mechanism of DOCSIS and is equipped with the NM3000 network management system. It can provide PNMP operation and maintenance tools for computer and mobile phone platforms to improve the operation and maintenance level and the overall maintenance level of the coaxial network.





- Frequency Hopping

To proactively avoid noise ingress, the frequency hopping is activated by using spectrum groups. The CC8800-D-U2 R-CCAP can check the signal quality parameters of upstream channel(s) periodically, including SNR and FEC. Comparing these parameters with the threshold, if the triggering condition is met, it will automatically adjust the center frequency, bandwidth and modulation mode of upstream channel to a better one.

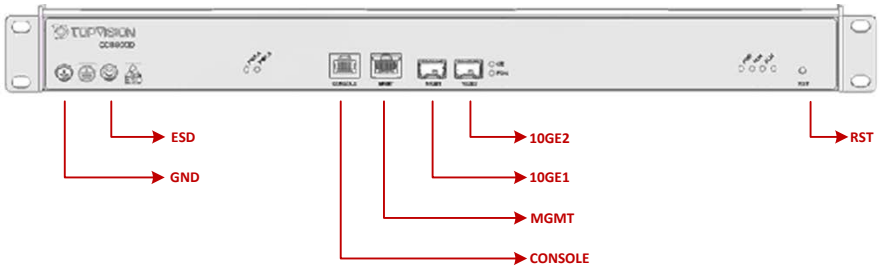
Remote Query

Remote query function allows cable operators to acquire common data of CM directly from the CC8800-D-U2 R-CCAP, which facilitates their network monitoring and maintenance. This function allows acquiring parameters of CM under the CC8800-D-U2 R-CCAP, periodically through SNMP protocol, and viewing these data in a local database.

Variety Methods of Network Management

- Support standard DOCSIS and private MIB libraries to support management and maintenance through NMS
- Supporting the management and maintenance of CMTS in the network through the NM3000
- Support mobile APP to manage and assist the device and CM
- Support management and configuration of CMTS through graphical standalone WEB
- Supporting the configuration and management of devices on the network through the CLI

Hardware Architecture



Port Description

Interface Name	Silk Screen	Description
ESD protection	ESD	ESD wrist strap connect position
GND	⏚	The function of the screw at the lower left corner is used to connect the ground
Uplink interface	10GE	10GE(optical) uplink when using a 10GE SFP+ optical module
Management interface	MGMT	GE Management interface
Serial port	CONSOLE	Console interface for local maintenance, the system is configured by command line through Hyper Terminal or other tool software, with baud rate as 115200bps
Reset interface	RST	Hardware reset button of the device. If the holding time is less than five seconds, the device is reset; if the holding time is more than five seconds, then the factory settings are restored

Port Description

Interface Name	Silk Screen	Description
RF upstream interface	US1~US4	RF-signal input interface
RF downstream interface	DS	RF-signal output interface
RF downstream test interface	TP_DS	RF-signal output (-20dB) test interface
Power interface	PWR_A/ PWR_B	AC power input interface

Performance and Specifications

Overall characteristic

Parameter	Specification
Dimension	483mm×300mm×44mm
Product form	Indoor type/1U equipment cabinet type
Weight	<5.5kg(rough weight)
Working temperature	0~+40℃
Working humidity	10%-90%(non-condensing)
Power supply	2* plug-pull power slot
Plug-pull power supply module	AC220V/AC110V, 90V-264V, 50/60Hz
Power supply plug	
European standard plug	Type E (CEE 7/7 plug), Length 1.8m
American standard plug	Type B (NEMA 5–15 U.S. 3 pin), Length 1.8m
Power consumption	70W
Number of RF ports	
US port	4
DS port	1
Output impedance	75ohm
Default RF port type	F type
Return loss	
Forward	≥13dB
Reverse	≥13dB
Internal RF test points (± 1 dB)	-20dB
Maximum QAM output level [1]	26 dBmV@160 channels 27 dBmV@128 channels 31 dBmV@64channels 35 dBmV@32 channels 38 dBmV@16 channels 42 dBmV@8 channels 45 dBmV@4 channels 49 dBmV@2 channels 53 dBmV@1 channel
MER [2]	
DOCSIS3.1	● 87–600 MHz ≥48 dB(any single subcarrier) ≥ 50 dB(average over the complete OFDM channel) ● 600–1002 MHz ≥45 dB(any single subcarrier) ≥47 dB (average over the complete OFDM channel) ● 1002–1218 MHz

	≥43 dB (any single subcarrier) ≥45 dB (average over the complete OFDM channel)	
DOCSIS3.0	≥39dB(Equalizer off) ≥43dB(Equalizer on)	
Standard	DOCSIS3.1 DOCSIS 3.0/ Euro-DOCSIS 3.0 DOCSIS 2.0/ Euro-DOCSIS 2.0 C-DOCSIS	
SNI	2*10GE SFP+	
Management interface	1*GE RJ45 management interface 1*RJ45 console interface	
CM Qty. supported		
DOCSIS 3.1 CM	≤300	
DOCSIS 3.0 & 2.0CM	≤1000	
Communication protocol		
DOCSIS 3.1	OFDMA	
DOCSIS 3.0	ATDMA	
Working Channel	**DS**	**US**
Channel frequency range		
DOCSIS 3.1	54/ 87/ 108/ 258~1218MHz	5~42/ 65/ 85/ 204MHz
DOCSIS 3.0		
European standard	87/ 108 ~ 1006MHz	5 ~ 65/ 85MHz
American Standard	54 ~ 1002MHz	5 ~ 42MHz
Working channel		
DOCSIS 3.1	6	2*2
DOCSIS 3.0	96(DOCSIS 64 + NC 32)	2*12(DOCSIS)
Qty. of service flow	4K	4K
Channel width		
DOCSIS 3.1	24~192MHz	6.4~96MHz
DOCSIS 3.0	6/ 8MHz	1.6/ 3.2/ 6.4MHz
Modulation mode		
DOCSIS 3.1	OFDM(16/ 64/ 128/ 256/ 512/ 1024/ 2048/ 4096 QAM)	OFDMA(BPSK, QPSK, 16/ 32 /64 /128/ 256 /512/ 1024/ 2048 QAM)
DOCSIS 3.0	64/256/1024 QAM	QPSK, 16/ 32/ 64/ 256 QAM
Reception level range	/	-7-+23dBmV@6.4MHz -10-+20dBmV@3.2MHz -13-+17dBmV@1.6MHz
System function		
MTU	1532 Byte	
IP Stack	Support IPv4 and IPv6 dual-stack	
DHCP	Support DHCP relay/ snooping Support DHCP bundle Support DHCP lease query Support according to Option 60 to identify equipment type Support insert Remote-ID, Interface-ID, CMTS capabilities and CM MAC	
DHCPv6	Support DHCPv6 relay/ snooping Support DHCPv6 bundle Support DHCPv6 lease query Support DHCPv6-PD Support according to Option 60 to identify equipment type Support insert Remote-ID, Interface-ID, CMTS capabilities and CM MAC	
VLAN&L2VPN	Support 802.1ad/ 802.1q Support service flow-based VLAN addition or deletion Support VLAN addition according to device type Support the L2VPN Support VLAN conversion	
MAC domain management	Support MDD & MDF enable and disable Support MTC & MRC enable and disable Support UDC enable and disable Support upstream automatic frequency hopping Support piggyback, shared-secret, channel bonding	
Multicast	Support multicast authentication	

	Support static multicast
	Support IGMP V2/ V3 Snooping
	Support MLD V1/ V2 Snooping
Load balance	Support RLBG/ GLBG
	Support load balance priority
QoS	Support static/ dynamic service flow
	Support service class
	Support best effort, UGS, UGS-AD, RTPS, NRTPS
	Support the DOCSIS 3.0 USCB scheduling
	Support PowerBoost
Packetcable	Support Packetcable 1.5/2.0 & PCMM
	Support DQoS
Management & Monitor	
CM management	Support CM status review
	Support CM steer
	Support CM blacklist
	Support remote query
	Support flaplist
	Support admission control
CPE management	Support CPE query and clear
Network management	Support SSH/telnet
	Support SNMP V1/V2/V3
	Support SYSLOG
	Support graphical standalone WEB management
	Support RMD Controller centralized management
	Support NM3000 graphical EMS centralized management
	Support NM3000 mobile APP management
	Support integrate to NMS
System diagnostic and monitor	Support system information acquisition and monitoring
	Support optical receiver information monitoring
	Support showtech
	Support ping, DOCSIS ping, tracert
	Support spectrum monitor
IPDR	Support IPDR/SP over TCP
	Support DOCSIS IPDR
	Support based on the data IPDR/XDR encoding
	Support time interval/event-based/adhoc data acquisition method
Security guarantee	Support AAA (TACACS+, RADIUS)
	Support RA guard
	Support ACL
	Support BPI+
	Support EAE
	Support source verify
	Support prevent DoS attack
	Support blacklist, white list, the firewall
Software upgrade	Support CLI/ WEB GUI/ EMS(NM3000)/ RMDC upgrade
	Support remote upgrade, version reversion when upgrade failure
EQAM functions	
Channel frequency range	
European standard	DS: 87 / 108 ~ 1006MHz
	US: 5 ~ 65 / 85MHz
American Standard	DS: 54 ~ 1002MHz
	US: 5 ~ 42MHz
Channel width	8MHz/6MHz
Symbol rate	6.875/6.900/6.952Mband/s, 5.057/5.361Mband/s
Modulation mode	64/256QAM
Working channel	Maximum 32 NC QAM channels
Phase noise	
1KHz	<-75dBc/Hz
10KHz	<-85dBc/Hz
>100KHz	<-100dBc/Hz
Network delay jitter tolerance	1000ms

PCR jitter tolerance	≤500ns
Transmission technology	Support UDP/IP/GE transmission
Control protocol	Compatible with NGOD specification, D6/R6 standard
Multiplexing capability	Support PMT PID, and other PSI/SI multiplexing capabilities
TS multiplexing	1) VOD service, single frequency supports 32 programs, with each program supporting 16 PIDs simultaneously by default 2)a single program can configure to transmit 50 PIDs 3)the whole device supports 256 UDP ports, and 4,096 PIDs 4)Support DATA stream of a single frequency multiplexing with other frequency
Stream parameters	1)Support the stream of a variety of signal source formats such as MPEG2, MPEG4, H.264, H.265, HEVC, AVS, DATA (including VBR and CBR formats) 2) In a single frequency, support unicast stream, multicast stream and DATA stream simultaneously 3) Each frequency support 4 business UDP port 4) the service port (UDP port) can be configured with PMT PID and service flow type information according to different frequencies 5) Support stream overflow protection 6) In data broadcasting service, support PID value offset in the transport stream (remapping)
Status monitoring	Support real-time traffic statistics Support concurrent traffic statistics
Regular ARP	Report EQAM business IP ARP packet every 2s
Network management	1) Support web-based graphic management interface, HTTP/ HTTPS 2) Support SSH, telnet and R232 serial port management

Note:

1, The channel width of each channel is 6 MHz. The output level of each channel can be reduced based on the maximum output level.

2, The values are obtained on RF OUT ports. Based on Cablelabs DOCSIS 3.1 test standard.

MER test conditions:

a) The total frequency width 528 MHz, including 2*192 MHz (OFDM channel) + 24*6MHz (SC-QAM channel) .

b) 528 MHz equal to 88 DOCSIS 3.0 channels (calculated using the U.S. standard 6M channel bandwidth)

(Optional) Optical / Electrical Module Characteristic

GE Optical / Electrical Module

No.	1	2
Central Wavelength	-	1310nm
Package	SFP	SFP
Rate (Gbps)	1.25	1.25
Connector	RJ45	Dual LC/UPC
Fiber type	-	Single mode
Transmission distance	100m	20km
Launched power range (dBm)	-	-9~-3
Receive power range (dBm)	-	-24~-3

10GE Optical Module

No.	1	2
Central Wavelength	850nm	1310nm
Package	SFP+	SFP+
Rate (Gbps)	10	10
Connector	Dual LC/UPC	Dual LC/UPC
Fiber type	Multi-mode	Single mode
Transmission distance	300m	20km
Launched power range (dBm)	-6.5~-1	-3~1
Receive power range (dBm)	-11.1~-1	-14.4~0.5

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