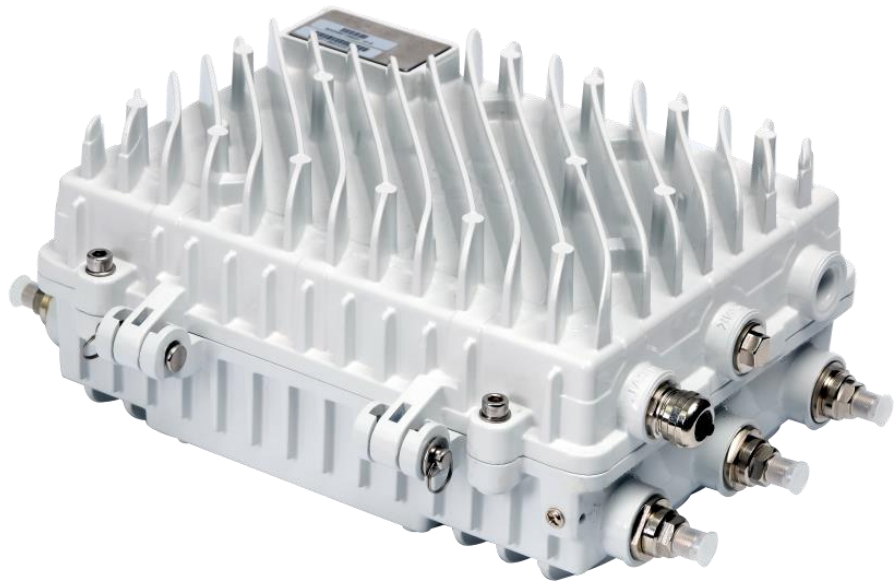


## Distributed CCAP DOCSIS 3.0 Outdoor Mini Node



### Product

**DEV 6860**

Distributed CCAP DOCSIS 3.0 Outdoor Mini Node

### Features

- /// Compatible with DOCSIS 3.0 / 2.0 / EuroDOCSIS / C-DOCSIS
- /// Support of PacketCable / PacketCable Multimedia (PCMM)
- /// Up to 960 Mbps and more per Node
- /// Up to 250 Cable Modems per Node
- /// Outdoor Chassis (IP67)
- /// Various Remote Operation and Management Capabilities

## Technical Data

<b>DEV 6860</b>	<b>Distributed CCAP DOCSIS 3.0 Outdoor Mini Node</b>	
<b>Power Supply</b>		
Supply Voltage	100...240 V AC	(with Option vPS220V, local power supply)
	36...110 V AC	(with Option vPS90V, cable based power supply)
Output Power	max. 60 W	
Power Consumption	~50 W	
Lighting Protection Classification	Level 4	
Overcurrent Protection	≥15 A	(continuous overcurrent)
	≥25 A	(burst overcurrent)
<b>General Specifications</b>		
Size	10.43" (265 mm) Width, 5.08" (129 mm) Height, 7.68" (195 mm) Depth	
Weight	~5.0 kg	
Operating Temperature	-40...+55 °C (-40...+131 °F), startup on -25 °C (-13 °F)	
Operating Humidity	5...95 % (non-condensing)	
Ingress Protection Rating	IP67	
<b>General RF Specifications</b>		
RF Output Ports	2	
Impedance, Connectors	75 Ohm, precision F (f)	
Channel Frequency Range	1002 MHz	
Frequency Division	42/54 MHz, 55/70 MHz, 65/87 MHz	
<b>DOCSIS Module</b>		
Standards	DOCSIS / EuroDOCSIS 3.0 DOCSIS / EuroDOCSIS 2.0 C-DOCSIS	
SNI (Service Node Interface)	1 * SFP (GE/EPON/GPON ONU) <sup>1</sup> 1 * RJ-45	
UNI	1 * RJ-45	
Management Interface	1 * GE RJ-45 management interface 1 * RJ-45 console interface	
Number of Cable Modems	≤100 (DOCSIS 3.0 cable modems) ≤250 (DOCSIS 2.0 cable modems)	
Modulation Method	SCDMA / ATDMA	
<b>Working Channels</b>		
Channel Frequency Range	<b>Downstream (DS)</b> 52...1002 MHz	<b>Upstream (US)</b> 5...65 MHz
Working Channels	16	4
Quantity of Service Flow	1024	2048
Channel Width	6/8 MHz	1.6/3.2/6.4 MHz
Channel Selection	Optional in 192 MHz	Random in US frequency segment
Modulation Mode	64/256 QAM	QPSK, 16/32/64 QAM
Reception Level Range (US)	N/A	-7...+23 dBmV @ 6.4 MHz -10...+20 dBmV @ 3.2 MHz -13...+17 dBmV @ 1.6 MHz
<b>PON Features</b>		
Supported Standards	IEEE 802.3ah, CTC 3.0; Standard OAM, CTC 3.0 extended OAM	
Safety Support	CTC triple churning and AES-128 encryption	
DBA Support	Fixed-bandwidth / guaranteed-bandwidth / maximum-bandwidth DBA	
Authentication Method Support	MAC/LLID/password authentication; Silence mechanism; Laser-always-on detection	

## Technical Data (cont.)

### System Functions

IP Version Support	IPv4 and IPv6 dual-stack
DHCP Support	DHCP relay / snooping; DHCP bundle; DHCP lease query
DHCPv6 Support	DHCPv6 relay / snooping; DHCPv6 bundle; DHCPv6 lease query; DHCPv6-PD; According to vendor class string to identify equipment type; Insert Remote-ID, Interface-ID, CMTS capabilities, and CM MAC
VLAN & L2VPN Support	802.1ad / 802.1q subnet VLAN; Service flow-based VLAN addition or deletion; VLAN addition according to device type; L2VPN; VLAN conversion
QoS Support	Static / dynamic service flow; Service class; DOCSIS 3.0 USCB scheduling; PowerBoost
MAC Domain Management Support	MDD & MDF enable and disable; MTC & MRC enable and disable; UDC enable and disable; Piggyback, shared-secret, channel bonding
Multicast Support	Multicast authentication; IGMP V2 / V3 snooping
Load Balance Support	RLBG / GLBG
Spectrum Monitor Support	Reverse spectrum monitoring (0...81 MHz)
Automatic Opening Support	Automatic opening and upgrade based on DHCP and TFTP; PN8600 series OLT unified opening and upgrade

### Management & Monitoring

Cable Modem (CM) Management Support	CM status review; CM steer; CM blacklist; CM discrete degree; Remote query; Flap list; Frequency hopping
CPE Management Support	CPE query and clear
Network Management Support	SSH/Telnet; SNMP V1/V2c/V3; SYSLOG; Graphical standalone WEB management; NM3000 (graphical EMS); NMS integration
System Diagnostic and Monitoring Support	System information acquisition and monitoring; Optical receiver information monitoring; Debug mode; Show tech-support; Ping, DOCSIS ping, tracer
IPDR Support	IPDR/SP over TCP; DOCSIS IPDR; IPDR/XDR encoding based on the data; Time interval/event-based/ad hoc data acquisition method
Security Guarantee Support	AAA (TACACS+, RADIUS); RA guard; ACL; BPI+; EAE; Source verify; Message speed; DoS attack prevention; Blacklist, whitelist, firewall
Software Upgrade Support	CLI / WEB GUI / EMS (NM3000); Remote upgrade, version reversion when upgrade failure

### EQAM Functions

Channel Frequency Range	87...1002 MHz
Channel Width	8/6 MHz
Symbol Rate	6.875/6.900/6.952 MBaud, 5.057/5.361 MBaud
Modulation Mode	64/256 QAM
Working Channel	≤8 channels
Phase Noise	<-75 dBc/Hz @ 1 kHz <-85 dBc/Hz @ 10 kHz <-100 dBc/Hz @ >100 kHz
Network Delay Jitter Tolerance	1000 ms
PCR Jitter Tolerance	≤500 ns
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	<ol style="list-style-type: none"> <li>1) VOD service, single frequency supports 32 programs, with each program supporting 16 PIDs simultaneously by default</li> <li>2) A single program can configure to transmit 50 PIDs</li> <li>3) The whole device supports 256 UDP ports, and 4096 PIDs</li> <li>4) Support DATA stream of a single frequency multiplexing with other frequency</li> </ol>

## Technical Data (cont.)

### EQAM Functions (cont.)

#### 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 supports 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

#### Regular ARP

#### Network Management Support

Real-time traffic statistics; Concurrent traffic statistics

Report EQAM business IP ARP packet every 2 seconds

- 1) Web-based graphic management interface, HTTP/ HTTPS
- 2) SSH, Telnet and RS232 serial port management

## Optical Receiver

### Forward Receiver (Rx) Module

#### Wavelength

1290...1600 nm

#### Optical Connector Type

SC/APC

#### Number of optical Rx Modules

1

#### Optical AGC Options

-7...+2 dBm

#### Passband

47...1002 MHz (different standard optional)

#### Flatness

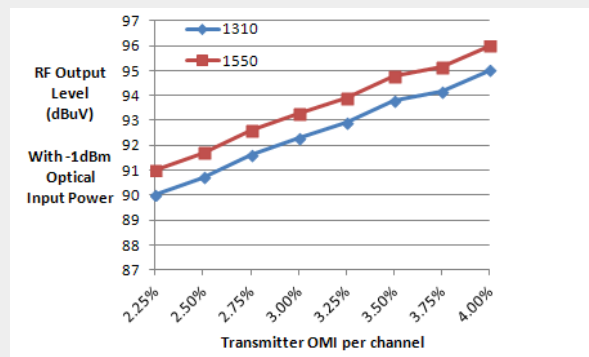
±0.75 dB

#### Optical Input Test Point

1 V/mW (± 20 %)

#### Receiver RF Output Level vs.

#### Transmitter OMI



### RF Specifications <sup>2</sup>

#### Passband

#### Amplifier Type

#### Return Loss

#### Internal RF Test Points

#### Port to Port Isolation

#### Maximum Output Level

#### Default output tilt

#### Tilt Range

#### Operational Gain <sup>3</sup>

#### Flatness <sup>4</sup>

#### Level Stability <sup>4</sup>

#### MER <sup>5</sup>

#### Forward

87...1002 MHz

PHD

≥16 dB (87...550 MHz)

≥14 dB (550...1002 MHz)

-20 dB (±1 dB)

20 dB

108 dBμV

8 dB (87...1002 MHz)

20 ±1.0 dB

16 dB

±0.75 dB

±1.5 dB (-40...+55 °C)

≥35 dB (equalizer off)

≥43 dB (equalizer on)

#### Reverse

5...65 MHz

N/A

≥16 dB

-20 dB (±1 dB)

20 dB

-13 dB

±0.75 dB

±1.5 dB (-40...+55 °C)

## Technical Data (cont.)

### RF Specifications <sup>2</sup> (cont.)

61 PAL channels (CW) w/ Digital <sup>6 7</sup>

CSO	>60 dBc
CTB	>65 dBc
C/N	>51 dBc

99 PAL channels <sup>7</sup>

CSO	>60 dBc
CTB	>65 dBc
C/N	>51 dBc

### Station Delay Characteristics

#### Forward

#### (Chrominance to Luminance Delay)

2 ns	112.25...116.72 MHz
1 ns	120.25...124.72 MHz
1 ns	128.25...132.72 MHz

#### Reverse

#### (Group Delay in 1.5 MHz BW)

45 ns	5...6.5 MHz
32 ns	6.5...8 MHz
26 ns	8...9.5 MHz
41 ns	60.5...62 MHz
46 ns	62...63.5 MHz
54 ns	63.5...65 MHz

Note 1: Industrial-grade SFP module has to be used in SFP optical interface of DOCSIS module

Note 2: All RF specifications are tested under default configuration conditions

Note 3: Operational gain refers to the gain or loss of RF launch amplifier with default setup of pads

Note 4: RF launch amplifier performance

Note 5: MER is only CMTS signals performance of station and does not include any CATV signals

Note 6: Loaded with 61 PAL CW carriers from 87...600 MHz

"Digital" refers to 600...1002 MHz loading with 48 QAM carriers at -10 dB relative to analog video carrier levels

Note 7: With receiver optical input power of 0 dBm, the output power of the RF port is 108 dBμV, and the EQ is set to 8dB

### Option CWDM1

### CWDM Module; 1310/1490/1550 nm, SC/APC;

### 1310/1490 nm, SC/UPC, 1550 nm, SC/APC

Optical Power	<300 mW (24.77 dBm)
COM Interface	Composite signal output port, 1310/1490/1550 nm, SC/APC
PASS Interface	CATV optical receiver port, 1550 nm, SC/APC
REF Interface	Data optical port, 1310/1490 nm, SC/UPC
Insertion Loss	
PASS Interface	<0.8 dB
REF Interface	<0.6 dB
Isolation	
PASS Interface	>30 dB
REF Interface	>15 dB
Reflection Loss	>50 dB
Polarization Dependent Loss (PDL)	<0.1 dB
Polarization Mode Dispersion (PMD)	<0.1 dB

## Order Information

### Product

DEV 6860 Distributed CCAP DOCSIS 3.0 Outdoor Mini Node

### Options

Option vPS220V	Power Supply 110/220 V AC
Option vPS90V	Power Supply 60/90 V AC
Option vDPX1	Diplexer 5...65 MHz, 87...1218 MHz
Option vHPF1	High Pass Filter 87...1218 MHz
Option vLPF1	Low Pass Filter 5...65 MHz
Option vDPX2	Diplexer 5...85 MHz, 108...1218 MHz
Option vHPF2	High Pass Filter 108...1218 MHz
Option vLPF2	Low Pass Filter 5...85 MHz
Option vDPX3	Diplexer 5...204 MHz, 258...1218 MHz
Option vHPF3	High Pass Filter 258...1218 MHz
Option vLPF3	Low Pass Filter 5...204 MHz
Option SFP_PON1	SFP optical Module GPON/EPON ONU; 1.25/2.5 Gbps; 1310/1490 nm
Option CWDM1	CWDM Module; 1310/1490/1550 nm, SC/APC; 1310/1490 nm, SC/UPC, 1550 nm, SC/APC
Option OFF1	Optical Fiber Flange; 2 * SC/APC-SC/APC
Option OFF2	Optical Fiber Flange; 2 * FC/APC-SC/APC
Option OFF3	Optical Fiber Flange; 1 * FC/APC-SC/APC, 1 * SC/APC-SC/APC
Option OF1	Optical Fiber; 0.57 m; SC/APC-SC/UPC
Option OF2	Optical Fiber; 0.57 m; SC/APC-LC/UPC
Option OF3	Optical Fiber; 2.0 m; SC/APC-SC/APC
Option OF4	Optical Fiber; 5.0 m; LC/UPC-LC/UPC
Option PDE	European Power Cable
Option PGB	UK Power Cable
Option HPF	Upstream High Pass Filter; 20...100 MHz
Option Acc1	Line Hanging Board
Option ETH	Gigabit Ethernet Cable; 3.0 m

### SFP Module Options

Option SFP_GE1	SFP electrical Module GE; 1000M; 100 m
Option SFP_GE2	SFP optical Module GE; 1.25 Gbps; 850 nm; 550 m
Option SFP_GE3	SFP optical Module GE; 1.25 Gbps; Commercial Grade; 1310 nm; 20 km
Option SFP_10GE1	SFP+ optical Module 10GE; 10.3125 Gbps; 850 nm; 300 m
Option SFP_10GE2	SFP+ optical Module 10GE; 10.3125 Gbps; Commercial Grade; 1310 nm; 20 km
Option SFP_GE4	SFP optical Module GE; 1.25 Gbps; Industrial Grade; 1310 nm; 20 km
Option SFP_GEB1	SFP optical Module GE BIDI; 1.25 Gbps; Tx 1310 nm, Rx 1550 nm; 20 km
Option SFP_GEB2	SFP optical Module GE BIDI; 1.25 Gbps; Tx 1550 nm, Rx 1310 nm; 20 km
Option SFP_10GE3	SFP+ optical Module 10GE; 10.3125 Gbps; Industrial Grade; 1310 nm; 20 km
Option SFP_10GEB1	SFP+ optical Module 10GE BIDI; 10.3125 Gbps; Tx 1270 nm, Rx 1330 nm; 20 km
Option SFP_10GEB2	SFP+ optical Module 10GE BIDI; 10.3125 Gbps; Tx 1330 nm, Rx 1270 nm; 20 km

### Configuration Example

1 *	DEV 6860	Distributed CCAP DOCSIS 3.0 Outdoor Mini Node
1 *	Option vPS220V	Power Supply 110/220 V AC
1 *	Option OFF1	Optical Fiber Flange; 2 * SC/APC-SC/APC
1 *	Option OF2	Optical Fiber; 0.57 m; SC/APC-LC/UPC
1 *	Option PDE	European Power Cable
1 *	Option HPF	Upstream High Pass Filter; 20...100 MHz
1 *	Option Acc1	Line Hanging Board
1 *	Option ETH	Gigabit Ethernet Cable; 3.0 m

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