

CHP Max5000

Converged Headend Platform



- **Accelerate deployment of new, revenue generating advanced services**
- **Innovative technology creating converged high-density platform**
- **Investment protection through 2RU footprint**
- **Simplified installation and management**
- **Universal management through Craft interface, SNMP with HMS, or remote IP access**

The CHP Max5000 Converged Headend Platform uses innovative technology to create a converged, high-density platform. The CHP Max5000 converges headend, hub, and digital transport onto one 2RU scalable system allowing service providers to accelerate deployment of advanced services such as video on demand, high speed data, and telephony.

The CHP Max5000 platform comprises a 2RU chassis offering 13 module slots. The chassis provides 10 module slots for application modules, 2 for isolated redundant power supplies, and 1 for a management module.

CHP Max5000 isolated, load-sharing, redundant power supplies are available with either auto-sensing (110 to 220V) AC or DC (-72 to -36Vdc) input. One power supply supports a completely loaded chassis, while two offer power redundancy eliminating service interruption if one power supply or line-in feed service fails.

The CHP Max5000 management module is available in two models. The Craft Management Module (CMM) offers local monitoring and configuration along with a PC compatible graphical user interface (GUI). The System Management Module (SMM) offers all the functionality of the CMM plus remote management using SNMP with HMS-compliant MIBs for use with an external element manager or remote access to the CMM interface using an IP connection through the Ethernet interface from the remote GUI software. Both management modules offer an RS-485 interface for interconnecting multiple chassis at one site for single point control from an SMM.

A standard 40RU rack holds up to 200 CHP Max5000 transmitters or 400 return receivers providing exceptional space efficiency to help MSOs relieve the pressure on precious headend space while reducing cooling and power costs.

Features

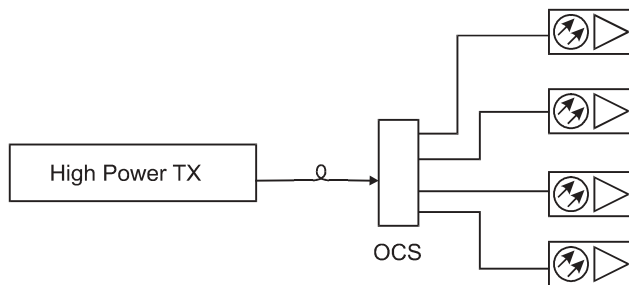
- Rapid deployment of advanced services
- Simple installation and maintenance
- Universal element management
- Space-efficient 2RU footprint

Applications

Unlocking Narrowcast Bandwidth

- Enables MSOs to increase the base of customers for advanced services
- Accelerates scaled deployment of video-on-demand, high-speed internet access, and voice-over-IP
- Lowers cost of bandwidth per subscriber

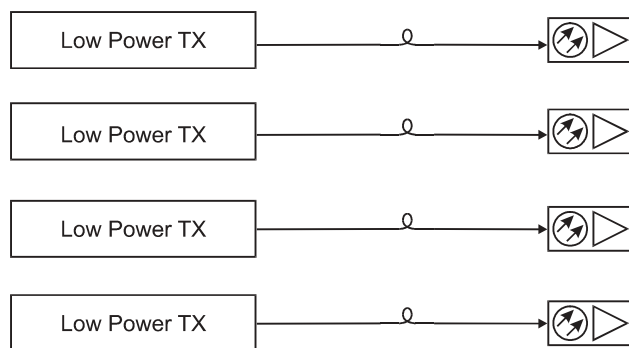
Baseline HFC Configuration



In a typical hybrid fiber coaxial network, one high power narrowcast transmitter may feed as many as four nodes, which together can serve nearly 2,000 subscribers.

Total Homes Passed: 20,000
Homes Passed/Node: 500
Nodes Required: 40
Narrowcast Group Size: 2,000 (4 nodes)
Number of Narrowcast Groups: 10
Broadcast Bandwidth: 293 Mbps
Narrowcast Bandwidth: $1254 \times 10 = 12,540$ Mbps
Total Bandwidth: 12,833 Mbps

Segmented Forward Path



You can segment the forward path to provide more narrowcast bandwidth for advanced services by using one CHP Max5000 low power forward transmitter for each node, reducing the number of subscribers served by each transmitter to one quarter of those served before segmentation. This reduction increases bandwidth per subscriber by nearly 400%.

Total Homes Passed: 20,000
Homes Passed/Node: 500
Nodes Required: 40
Narrowcast Group Size: 500 (1 node)
Number of Narrowcast Groups: 40
Broadcast Bandwidth: 293 Mbps
Narrowcast Bandwidth: $1254 \times 40 = 50,160$ Mbps
Total Bandwidth: 50,453 Mbps

Summary

- Narrowcast group size decreases from 2,000 to 500, producing a fourfold improvement in bandwidth and contention.
- System capacity grows by nearly 300%.
- Cost of bandwidth decreases up to 3.7 times.

CHP Max5000 Chassis



The CHP Max5000 (2RU) chassis fits into a 19-inch or 23-inch rack with an optional bracket kit, holds 10 single-width application modules, and routes power and element management signals. Each chassis requires one power supply module and accepts a second for redundancy.

Modules slide into the chassis from the front of the rack, and all RF and optical connections are at the rear. A fiber routing aperture offers front panel access to fiber if required. Separate interfaces built into the back panel of each chassis direct power to and convey element management information to/from installed modules. Universal slots accept the plug-in application modules in virtually any combination to accommodate a variety of service delivery requirements.

Designed for thermal efficiency, the CHP Max5000 chassis provides a wide operational temperature range for maximum reliability. A plenum with eight large fans create more airflow and offer better reliability than module-based fans; in the event of a fan failure, application modules—and the services you provide—remain in operation.

Chassis Specifications

Chassis Interfaces

SNMP Interface (Note 1)	Connector: RJ-45; Electrical Interface: 10BaseT Ethernet
Shelf Interconnect Interface	Connector: RJ-14; Electrical Interface: RS-485
Local Alarm Terminal Interface	Connector: Terminal block; Electrical Interface: NO, NC, or C (Note 2)

Mechanical Specifications

Chassis Dimensions (W x H x D)	19 x 3.5 x 18 in. (48.3 x 8.9 x 45.7 cm)
Module Port Dimension, 1 wide (W x H x D)	1.25 x 3.0 x 15.7 in. (3.2 x 7.6 x 39.9 cm)
Weight, empty (Note 3)	15.5 lbs (7.0 kg)

Environmental Specifications

Operational Temperature Range	32 to 122°F (0 to 50°C)
Storage Temperature Range	-40 to 158°F (-40 to 70°C)
Humidity, noncondensing, max	85%

Notes:

1. Requires use of system management module (SMM).
2. Dry contact closures. NO = Normally Open. NC = Normally Closed. C = Common.
3. Chassis enclosure and backplane without modules.

Specifications subject to change without notice

CHP Max5000 Power Supply



The CHP Max5000 switched-mode AC power supply, model CHP-PS/AC1-Q, accepts AC input from 85 to 264VAC (47 to 63Hz) and provides DC voltages to drive application modules. While one AC power supply produces 246W to power a fully-loaded chassis of application modules, each chassis accepts a second backup AC power supply for load sharing and redundancy. These power supplies are fully isolated, which eliminates a single point of power failure.

The CHP Max5000 switched-mode DC power supply, model CHP-PS/DC1-Q, accepts DC input from -72 to -36 VDC and produces 246W to power a fully-loaded chassis of application modules. Each chassis accepts a second backup DC power supply for load sharing and redundancy. These power supplies are fully isolated, which eliminates a single point of power failure.

CHP power supplies are located on the far right side of the chassis behind the Craft Management Module (CMM) or System Management Module (SMM). Isolated outputs allow the primary and redundant supplies to operate in a power-sharing configuration. Should the primary power source fail, a second power supply provides all necessary DC power. AC and DC power supplies should not be installed in the same chassis.

CHP-PS/AC1-Q Specifications

Powering Specifications

Input Voltage, 47 to 63Hz	85 to 264VAC
Input Current Limit, continuous, RMS, max.	6.0A
Inrush Current Limit, peak, max.	30A
Input Transient, IEEE C62.41-1991 Category B 1.2, 50 μ s	4kV/0.13kA
Power Consumption, max.	402 W
Input Connector	IEC 320-C14 plug
Output Voltages and Current	12.0VDC +0.35/-0.0VDC @ 10A 5.0VDC +0.2/-0.05VDC @ 22A -5.0VDC +0.05/-0.2VDC @ 1.8A 3.5VDC \pm 0.1VDC @ 2.2A
Output Noise Ripple, RMS	25mV @ 12.0V output 25mV @ 5.0V output 20mV @ -5.0V output 20mV @ 3.5V output
Efficiency, min.	68%
Power Factor	0.9

Status Interface

Functions Monitored	All DC voltages, internal temperature, fan currents
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Mechanical Specifications

External Dimensions (W x H x D)	3.9 x 1.57 x 14.46 in. (9.91 x 3.99 x 36.73 cm)
Weight	2.75lbs (1.24kg)

Environmental Specifications

Operational Temperature Range	32 to 122°F (0 to 50°C)
Storage Temperature Range	-40 to 158°F (-40 to 70°C)
Humidity, noncondensing	5 to 95%

Specifications subject to change without notice

CHP-PS/DC1-Q Specifications

Powering Specifications

Input Voltage	-72 to -36VDC
Input Current Limit, max.	12.0A @ 36VDC
Inrush Current Limit, max. (Note 1)	40A
Power Consumption, max.	379W
Input Connector	3-pin male conn., mates with power plug (P/N MT0401)
Output Voltages and Current	12.0VDC +0.35/-0.0VDC @ 10A 5.0VDC +0.2/-0.05VDC @ 22A -5.0VDC +0.05/-0.2VDC @ 1.8A 3.5VDC ± 0.1VDC @ 2.2A
Output Noise Ripple, RMS	25mV @ 12.0V output 25mV @ 5.0V output 20mV @ -5.0V output 20mV @ 3.5V output
Output Noise Switching Spikes, peak to peak	100mV @ 12.0V output 100mV @ 5.0V output 60mV @ -5.0V output 60mV @ 3.5V output
Efficiency, typ. (Note 2)	65%

Status Interface

Functions Monitored	Input and all DC voltages, internal temperature, fan currents
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Mechanical Specifications

External Dimensions (W x H x D)	3.9 x 1.57 x 14.46 in. (9.91 x 3.99 x 36.73 cm)
Weight	2.75 lbs (1.24 kg)

Environmental Specifications

Operational Temperature Range	32 to 122°F (0 to 50°C)
Storage Temperature Range	-40 to 158°F (-40 to 70°C)
Humidity, noncondensing	10 to 95%, not to exceed 0.024 lbs of water/lb of dry air

Regulatory Requirements (Note 3)

- UL60950 3rd Ed/CSA C22.2 number 60950 and EN60950
- EN50083-2
- EN300 386 V1.3.1
- FCC Part 15, Class A
- FCC Part 76, Subpart K
- EN55022, Class A

Notes:

1. Inrush current shall not trip a 15A mains external circuit breaker during a Hot Start condition. Hot Start occurs when a thermally stabilized power supply is removed and immediately reinserted.
2. When operating at 25°C over the input operating range with a full rated output load.
3. All emissions tests must be passed in two configurations: two power supplies operating redundantly and a single power supply installed in a chassis configured to provide maximum system load.

Specifications subject to change without notice

CHP Max5000 Management Modules



The CHP Max5000 management module is available in two models. The Craft Management Module (CMM) offers local monitoring and configuration along with a provided PC compatible graphical user interface (GUI). The CHP Max5000 GUI simplifies system installation, provides monitoring on easy to read screens and displays all critical module information to assist in operational as well as inventory management. A complete equipment manual is also included in the Craft Management Software (CMS) bundle for access on a PC with either the Windows® 98 2nd ed., NT 4.0, 2000 SP1, or XP Professional operating system.

The System Management Module (SMM) offers all the functionality of the CMM plus remote management using SNMP with HMS-compliant MIBs through the Ethernet interface for use with an external element manager. The SMM also provides remote access to the CMM interface using an IP connection through the Ethernet interface from the remote GUI software without requiring the capital expenditure of SNMP element manager. Both management modules offer an RS-485 interface for interconnecting multiple chassis at one site for single point control from an SMM. The SMM provides SNMP access for remote management and monitoring of your CHP Max5000 headend equipment via both HMS public domain and enterprise MIBs. To monitor up to 10 chassis, install 1 CMM in up to 9 chassis and 1 SMM in a tenth chassis. Then, daisy-chain the chassis together and use an Ethernet connection to program, provision, monitor, and manage your CHP Max5000 equipment via an SNMP element manager. Managing more than 10 chassis is accomplished by using a 10baseT Ethernet hub or switch between the Remote Management System and the chassis containing the SMM module.

CMM and SMM Specifications

RS-232	38.4kbps
RS-485 (Shelf Interconnect, RJ-14 connectors on chassis)	38.4kbps
Craft Interface Port (DB-9 female)	RS-232
RS-232 Debugging Port (SMM only)	19.2kbps
RJ-45 (Ethernet)	10Mbps
Serial Peripheral Interface Bus	480kbps
Operational Temperature	0 to 50°C (32 to 122°F)

Specifications subject to change without notice

Ordering Information

Platform Components

Component Type	Model Series	Description
Chassis	CHP-CHASSIS-19Q	Rear fiber access chassis and backplane with eight dual-speed fans for quieter operation.
	CHP-CHASSIS-R-19Q	Front fiber access chassis and backplane with eight dual-speed fans for quieter operation.
23-in External Bracket	CHP-EXTBKT-23	Bracket adapts 19-inch chassis to install in a 23-inch rack.
Power Supply	CHP-PS/AC1-Q	Isolated power supply accepting 110/220VAC input
	CHP-PS/DC1-Q	Isolated power supply accepting -48VDC input.
Craft Mgmt. Module	CHP-CMM	Allows local monitoring and management via laptop computer connected to the RS-232 connector on the front of the CMM.
Craft Mgmt. Software	CHP-CMS-1	Software that provides graphical user interface (GUI) and enables local communication for module setup and monitoring of a CHP Max5000 shelf from a portable computer.
System Mgmt. Module	CHP-SMM	Provides all CMM functionality and SNMP port for remote management. SMM also provides remote access to the CMM interface using an IP connection through the Ethernet interface on the back of the shelf from the remote GUI software.

Application Modules

Module Type	Model Series	Description
Forward Transmitters	CHP-FTX-xx-S	1310nm single-input forward TXs linearized to 550MHz. "xx" indicates optical output power. Output powers of 2 through 15 dBm. SC/APC connectors.
	CHP-FTX-D-xx-S	1310nm dual-input forward TXs linearized to 550MHz. "xx" indicates optical output power. Output powers of 2 through 15 dBm. SC/APC connectors.
	CHP-FTX-DXL-xx-S	1310nm dual-input forward TXs linearized to 870MHz, where "xx" indicates optical output power. Output powers of 2 through 15 dBm. SC/APC connectors.
	CHP-GFX-D-xx-S	1310nm dual-input, fixed output 1GHz forward TXs linearized to 550MHz. "xx" indicates optical output power. Output powers of 13, 14, and 15 dBm. SC/APC connectors.
	CHP-GFXV-D-xx-S	1310nm dual-input, variable output 1GHz forward TXs linearized to 550MHz. "xx" indicates max. optical output power of 4, 6, 8, 10, or 12 dBm.
	CHP-GFXV-1311-xx-S	1311 nm CWDM dual-input, variable output 1GHz forward TXs linearized to 550MHz. "xx" indicates max. optical output power of 4, 6, 8, or 10 dBm.
	CHP-GQTX-10-S-xx	Dual-input 10dBm output 1GHz forward QAM Tx, where "xx" indicates odd ITU channel.
	CHP-XMOD-45-xx-x	Ext. modulated forward TX at λ of 1545 nm. First x is TX reach; M=65 km, X=100 km. Second x is channel loading; blank=79 Ch, A=112 Ch, L=40 NTSC low-band, U=40 NTSC hi-band. The last x represents the optical connector; S= SC/APC, E=E2000.
	CHP-XMOD-55-xx-x	External modulated forward TX at λ of 1555 nm.
CHP-XMOD-Dxx-xx-x	External modulated forward TX at λ of odd ITU channels from 21 to 29.	
Redundant Forward RXs	CHP-RFRX-S	Forward RX accepting 1200nm to 1620nm with hardware and optical path redundancy.
Return Transmitters	CHP-RTX3-10-S	1310nm dual-input return TX. 10dBm output. SC/APC connectors.
	CHP-RTX5-10-S-xx	1550nm dual-input return TX. 10dBm output. "xx" indicates odd numbered ITU channel (21 through 49). SC/APC connectors.
Return Receivers	CHP-2RRX-S	Dual return RX accepting 1200nm to 1620nm optical input.
	CHP-R2RR-S	Redundant dual return RX accepting 1200 to 1620nm optical input.
	CHP-D1RRX-S	Redundant 1:2 TDM return RX accepting 1465 to 1615nm optical input.
EDFAs	CHP-EDFA-CG-xx-1-S	EDFA with constant gain or constant power operating modes. Available with output power of 13, 16, 19, or 22 dBm with 1 port and 13 or 16 dBm outputs with 2 ports.
	CHP-EDFA-xx-x-x	EDFA with constant power operating mode. Available with output power of 16 dBm (4 or 8 ports), 19 dBm (2, 4, or 8 ports), 20 dBm (8 or 16 ports), or 21 dBm (2 or 4 ports).

Contact your C-COR sales professional for data sheets on CHP application modules.

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