



## Multicom High Power CATV Mini-Node

MUL-MN-HFC-1000  
User Manual v1.2

### Overview

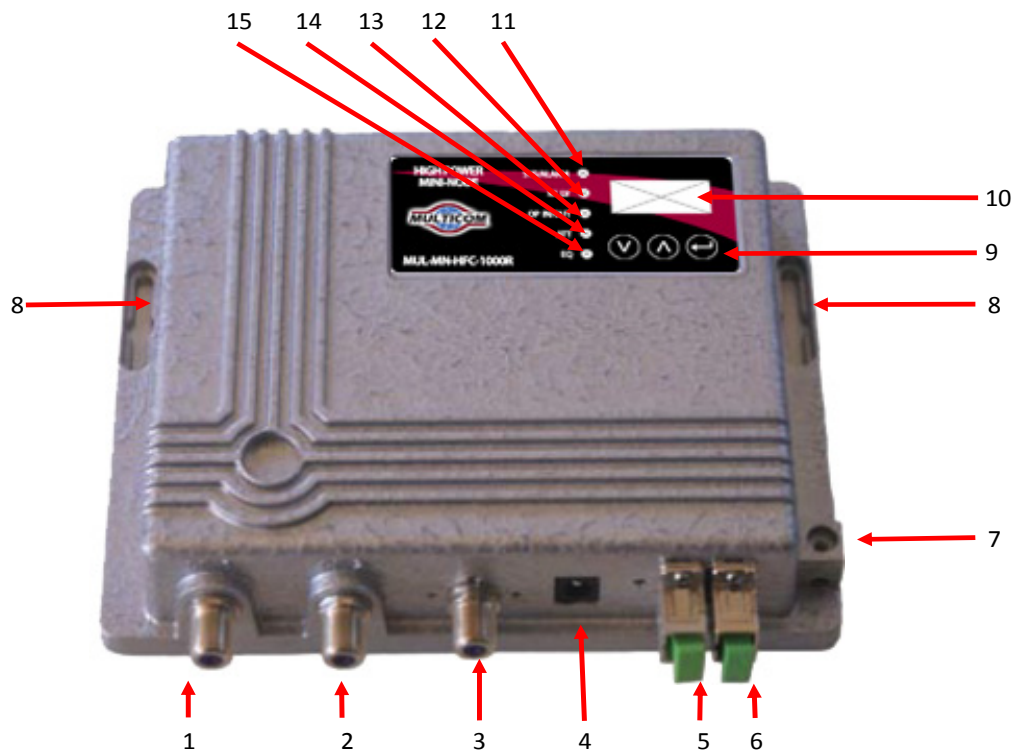


Figure 1 – Multicom High Power CATV Mini-Node

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|--|---|
| 1. Down-stream RF output level test port (-20dB) | 9. Control buttons                        |
| 2. Down-stream RF output / up-stream RF input    | 10. 3-digit Status display                |
| 3. Up-stream RF test port (-20dB)                | 11. Power ON /alarm LED                   |
| 4. Power input +5~+8VDC                          | 12. Mode LED Output power                 |
| 5. Up-stream fiber output                        | 13. Mode LED Optical in/out power         |
| 6. Down-stream fiber input                       | 14. Mode LED Attenuation settings         |
| 7. Grounding lug and screw                       | 15. Mode LED Equalization settings (tilt) |
| 8. Mounting screw slot                           |   |



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### READ FIRST – IMPORTANT SAFEGUARDS

Multicom strongly advises you to read the following safety instructions prior to installing and operating this equipment.

- **Read These Instructions First** – All safety and operating instructions should be read before installing or operating this equipment.
  - **Retain This User Manual** – Safety and operating instructions must be retained for future reference.
  - **Ventilation** – The Optical Micro-Node should be kept at a distance from other objects to keep from overheating. **Maximum operating ambient temperature is 131°F (55°C).**
  - **Power Sources** – The mains circuit should be a dedicated, unswitched supply. Keeps the unit away from high voltage or other interference creating devices such as motors, compressors, etc.
- ⚠ **CAUTION: For continued protection against risk of fire, replace circuit breakers/fuses (if necessary) with one of only the same type and rating.**
- ⚠ **Optical Output Safety: Optical Mini-Node units may emit harmful invisible laser radiation if powered on and the case is opened or the beam path is exposed.**



The Multicom MUL-MN-HFC-1000 CATV Mini-Node is classified as Class 1M per IEC/EN 60825-1/A2:2001. This product complies with FDA/CDRH, 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 dated 26 July, 2001.

Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers and microscopes) within a distance of 100 mm may pose an eye hazard.

Laser power up to 26 mW at 1310 nm could be accessible if optical connector is open or fiber is broken. Lasers are Powered ON whenever the unit is powered.

- ⚠ **CAUTION: Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure.**

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### Installation

The Multicom CATV Mini-Node is designed to operate in a utility room or closet. It must be placed in a location where it will not be directly exposed to liquid or to extreme temperatures.

### Mounting

The CATV Mini-Node is designed to be mounted directly on a wall or other indoor surface. It should be placed so an operator can view the status display for installation or troubleshooting. Attach the CATV Mini-Node to a wall board with the connectors facing downward. Use appropriate mounting hardware (not included) for the surface you are mounting it on. The slots on the CATV Mini-Node will accommodate screw type fasteners from sizes #8 to #12.



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### Grounding

The CATV Mini-Node should be grounded to electrical/utility ground using at least #10 solid ground wire. This will minimize the risk of electrical shock and minimize the effect of noise on the coax cable inside the building. Follow all electrical codes and standards that apply when installing this equipment.

### Connecting COAX

Connect the building video coax wire to the output of the CATV Mini-Node. For best results the building should use RG6 coax cable or better with as short of runs as possible. The CATV Mini-Node is designed to output 40dBmV of RF power, and includes the ability to compensate for long distance coax runs if long runs cannot be avoided. Be sure that all electrical couplers are of the 2-way type, or poor performance will result with cable modems and some set-top boxes. When attaching the coax cable to the CATV Mini-Node, use appropriate tools – do not over tighten or you may damage the node. A loose or damaged coax connection may also result in poor signal stability as temperature changes over time.

### Connecting optical fibers

**Caution: NEVER Look into the ends of a fiber optic cable that is connected to the network!! Communications systems use lasers that emit invisible infrared light, which can do permanent damage to your eyes.**

#### Other general recommendations:

- Use only Single Mode Fiber (SMF) optic cable (9/125µM). Multi-Mode Fiber (MMF) is incompatible with the equipment and will result in unacceptable performance and possible damage to the equipment.
- All fiber splices should be fusion-type splices. Avoid mechanical or compression type connections.
- Insure that you follow local practices when working with fiber optic cable as tight bends or excessive pulling on the fiber jumpers may damage the cable.
- For optimum performance, fiber runs should be made directly from the transmitter to the receiver. Minimize the use of adapters, patch panels and additional points of failure and signal loss.
- In order to ensure return loss is maximized, use only SC/APC connectors. Clean and inspect connectors and fiber end-faces prior to installation, and every plug in/out cycle.
- Use only industry approved methods, materials, and solutions for cleaning.
- Do not turn on the transmitter alone or without a protector cover at the unit connector end, otherwise the laser can do harm, especially to eyes. This is especially critical because the laser is invisible.
- Always turn off the laser prior to making connections to the transmitter. Failure to do so may cause irreparable damage to the laser and transmitter.

#### Attaching the fibers to the CATV Mini-Node

- Before connecting the optical fiber to the CATV Mini-Node, inspect and clean the optical connector before connecting the optical network jumper.
- Insert the forward path fiber into the correct connector and confirm that the cable “snaps” into place.
- Clean and inspect the upstream return path connector on the CATV Mini-Node and connect the return path fiber jumper. Confirm that the return path connector “snaps” into place.

### Power up and test

The CATV Mini-Node is now ready for power up.



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### Connect the power adapter

Insert the 5mm power plug from the power converter into the power port of the CATV Mini-Node and plug the adapter into the 120VAC wall outlet.

The CATV Mini-Node will conduct a self test and the power LED will be flashing. As the test proceeds each of the mode LEDs are lit in sequence. When the self test is complete, the output power LED is lit, and the display shows the current RF output power level.

A green power LED indicates that the unit is operating correctly and the RF output is within acceptable limits. (See alarm indicator section if the SYS/ALARM LED is not showing green).

Secure the low voltage cable from the Mini-Node such that it does not become easily tangled or dislodged.

### Verify signal levels

**The CATV Mini-Node is equipped with a built in power meter for the RF output and the Optical input/outputs. Use the arrow control keys to select the values you want to view as follows:**

#### Check RF power output level

Use the arrow control buttons to select the RF LEV mode. (When the CATV Mini-Node completes its initial diagnostics, it will automatically be selected). The display indicates the RF output power, measured in dBmV/Ch. Note that the attenuation setting will directly affect the output power value for the Mini-Node.

- Using an RF Signal Meter, confirm the RF Downstream Power Level Output. The output level should be approximately +40dBmV per channel with an optical input of from -8 to +1dBmV.
  - The RF level can also be measured from the RF Output test port. The level at the test port will be approximately 20 dB below the actual RF output level.

#### Check optical power receive and optical output levels

Use the arrow control buttons to select the OP IN/OUT mode. Both the input and the output optical power levels can be viewed. Enter the OP IN/Out mode by pressing the down arrow and the display shows the optical input power from the network. The value on the display is shown in dBm, and should be between -9 and +1. (The ideal setting is -3)

Pressing the down-arrow button again shows the upstream optical output power level being generated by the Mini-Node Also measured in dBm. This value should measure between 0 to +2.

- Using an Optical Power Meter, verify that the down stream (forward path) signal on the fiber cable coming from the head-end is between -9 and + 1 dBm.
- Using an Optical Power Meter, verify the upstream output of the CATV Mini-Node (return path) is between 0 and +2dBm.

#### Check the upstream RF power level

The CATV Mini-Node has no direct measurement of the upstream RF power it is receiving. You will need to confirm the received RF power from a cable modem at the head-end, or at the RF test port on the CATV Mini-Node.

- Using an RF Signal Meter, verify the RF input to the Mini-Node is between +23 dBmV and +35dBmV. The measurement at RF Upstream Input Test Port will be 20 dB below the actual input level.

#### Fine-tuning the CATV Mini-Node to the RF network

In some cases, the output of the CATV Mini-Node may need to be adjusted. The CATV Mini-Node has built-in attenuation and equalization features that allow you to optimize the system



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### Changing the RF attenuation

The attenuation feature allows you to reduce the RF output into the coax network in the case where overdriving is being experienced. Attenuation can be applied in 1dB increments up to a maximum of 16db as follows:

1. Using the arrow button, select the "ATT" mode. The current attenuation setting will be displayed.
2. Press and hold the return button until the display starts to blink.
3. Use the arrow buttons to change the value shown on the blinking display to a desired value.
4. Click the return button to set the attenuation value into memory. The display stops blinking.

**The RF output level has now been changed and set.**

### Changing the RF Equalization

The Equalization feature allows you to change the tilt on the RF output to compensate for the losses in the coax cable. High frequency channels tend to be attenuated by the cable more than the low frequency channels. Changing the tilt attenuates the lower channels but not the high channels to overcome the cable loss issues. The attenuation can be applied in 1dB increments up to a maximum of 16 as follows:

1. Using the arrow button, select the "EQ" mode. The current tilt setting will be displayed.
2. Press and hold the return button until the display starts to blink.
3. Use the arrow buttons to change the value shown on the blinking display to a desired value.
4. Click the return button to set the equalization value into memory. The display stops blinking.

**The RF tilt has now been changed and set.**

### PRODUCT SPECIFICATIONS

General		
Dimensions W x H x D	(163x40x125mm)	6.4" x 1.58" x5.5"
Weight	19 oz.	Without power adapter
Band Plan	42/54Mhz	
DC power input	+6.5VDC	
Power consumption	<6.5 Watts	
AC power adapter	120VAC 5VDC output	included
Operating temp range	-10 to +55°C	
Storage temp range	-40 to +85°C	
Humidity	5 to 95%	Non-condensing
Down Stream (forward path) Performance		
Optical wavelength	1260 to 1620nm	
Optical input power range	-9 to +1dBm	8 dB optical AGC
Optical connector	SC/APC	
RF frequency range	54-1000MHz	
RF flatness	+/- 1.5dB	54 to 1000MHz
RF output power	+40 dBmV	@-3dBm input
RF tilt adjustment	0 to 12dB	54-550MHz, 1dB steps
RF attenuation adjustment	0 to 16dB	1dB steps
RF test point	-20dB	Referenced to output
RF connectors	Female "F" type	75 Ohm
CNR	51dB	78 channel loading



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CSO	-60dBc	@0dBm input
CTB	-60 dBc	
<b>Upstream (return path) Performance</b>		
Optical wavelength	1290 to 1330nm	1310nm typical @25C
Optical output power range	0 to +2dBm	+1 dBm typical
Optical connector	SC/APC	
Return path RF frequency range	5 to 42MHz	
Return path RF input power	+22 to +35 dBmV	
Return path RF flatness	+/- 0.75dB	5 to 42MHz
Return path RF test point	-20dB	Referenced to input
RF connectors	Female "F" type	75 Ohm
<b>Management</b>		
Display	3 digit display with LED lights & control buttons	
Configuration parameters	Adjustable RF Tilt, Adjustable RF Attenuator	
Status information	Optical Input Power, Output power, RF Tilt	

## WARRANTY AND REPAIR

The Multicom MUL-MN-HFC-1000 has a one year warranty and is subject to Multicom's standard warranty terms. There are no user serviceable components inside the unit. The warranty is void if the unit is opened or is damaged due to misuse.

**For support with and more information about the Multicom MUL-MN-HFC-1000  
CATV Mini-Node, please contact your Multicom representative:**

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