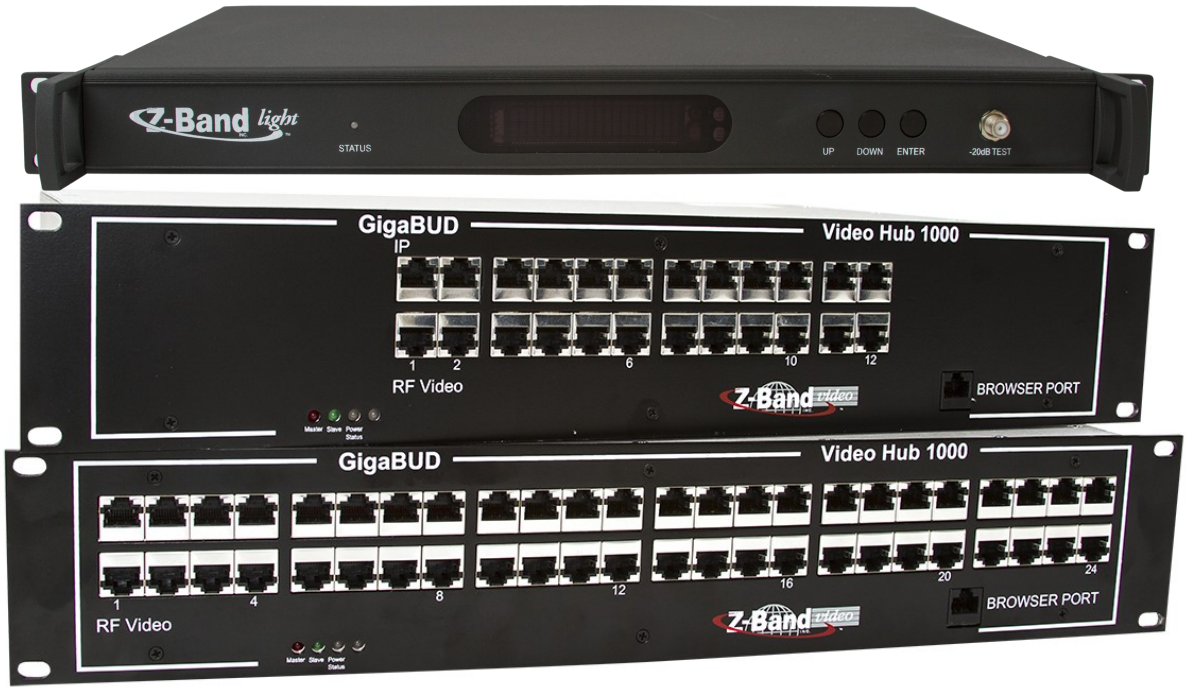
RF TELEVISION DISTRIBUTION OVER CAT 5/6

Gen 4 “GigaBUD 1000” Video Distribution System Installation Guide



Version 5.2

848-B North Hanover St. Carlisle, PA 17013 - 866-902-2606

IMPORTANT SAFETY INSTRUCTIONS:

WARNING: Failure to follow this guide can lead to malfunction of the system and invalidation of the warranty

SHOCK HAZARD

The "GigaBUD 1000", along with all of the components, are designed for indoor use ONLY. Direct exposure to moisture must be avoided. Connect the modular power cable to the rear of the "GigaBUD 1000" BEFORE plugging the other end into the wall.

Must be grounded to earth ground. Do not defeat the safety purpose of a ground-type or polarized plug. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Do not use extension cords to lengthen the power cord provided. Power cord must be accessible for the removal of power from the unit.

OPERATING AND ENVIRONMENTAL WARNINGS

Do not mount this unit with front panel facing upwards.

Each "GigaBUD 1000" is 2U and must be mounted in a 19" rack.

Airflow around the rack must be sufficient to maintain proper cooling of the "GigaBUD 1000"

LASER RADIATION

A laser transmitter emits invisible radiation that can cause permanent eye damage. This product is used with a combination of fiber optic components a cables. ***AVOID DIRECT EXPOSURE TO LASER BEAM.*** Operate all components with proper fiber cabling. Disconnect power when making any cabling changes to avoid accidental exposure.

The video hub and remotely powered balun System meet UL/CSA Listed compliance criteria as well as being FCC Part 15, Subpart B Compliant.

General System Overview

The **Z-Band Video Distribution System** is designed to distribute the full spectrum (54 to 860 MHz) of high quality, Analog and/or Digital Radio Frequency (RF) Video from a CATV direct feed or a Headend (Sources) to Televisions and/or Set-top-boxes (Receivers) in a building, campus or metropolitan area.

The Z-Band System utilizes Single-mode Fiber and/or Coaxial Cable for distribution in the Backbone and TIA 568 Certified Category 5e or better Twisted Pair Cable for distribution in the Horizontal.

Quality Video begins with the Quality of the Video Signal and Noise Levels from the Sources . The Z-Band System employs Intelligent Automatic Gain Control (AGC) technology in the Backbone with the Z-Band Light Fiber Transmitter and/or the GigaBUD Video Hub 1000 (GigaBUD 1000). In the Horizontal, the AGC is maintained by the Z-Band Intelligent GigaBOB at each Receiver.

The AGC, in a coax based Backbone, is designed to maintain Video Signal Integrity on a RG6 cable length of 400' or less or a RG11 cable length of 600' or less; therefore, the RG6 or RG11 coax Backbone cannot exceed these limits.

If the Source Signal and Noise Levels are correct, the Z-Band AGC technology will maintain Signal Integrity to each Receiver.

The Z-Band GigaBUD 1000 uses pins 7 & 8 of the twisted pair cable for the RF Video and pins 4 & 5 for a return path in interactive system applications. Pins 1, 2, 3, & 6 are available for 10/100 Ethernet or other Auxiliary signals, such as RS232 control, over the same cable (Shared Sheath) to the same destination GigaBOB where they a broken out to separate the RF Video and Ethernet/Aux signals

The Z-Band System does not Switch, Route, Repeat, or in anyway interact with the IP signal; we simply allow it to be sent over the same cable, to the same destination..

Depicts a Basic Layout of a System with a Singlemode Fiber Backbone

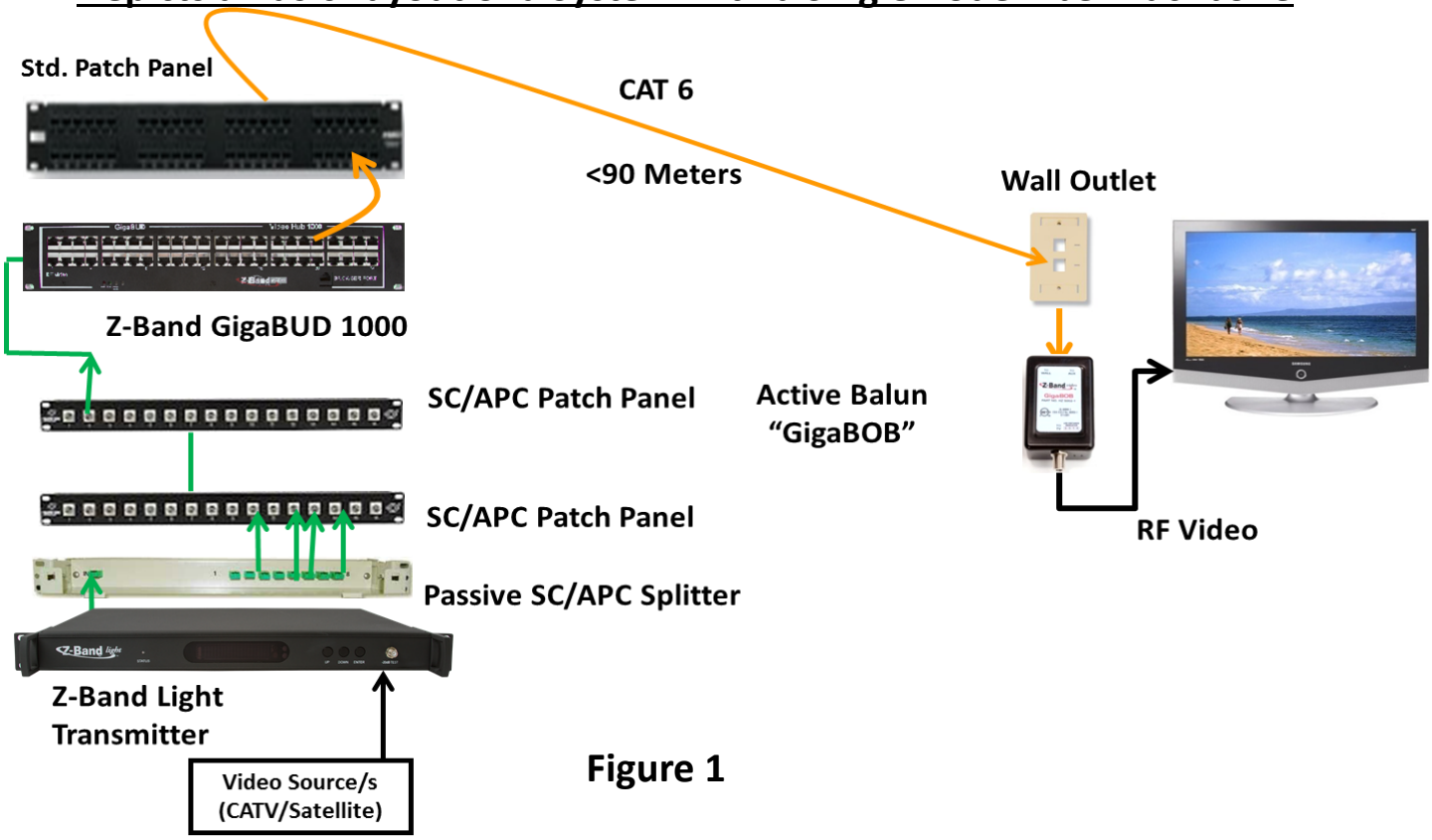
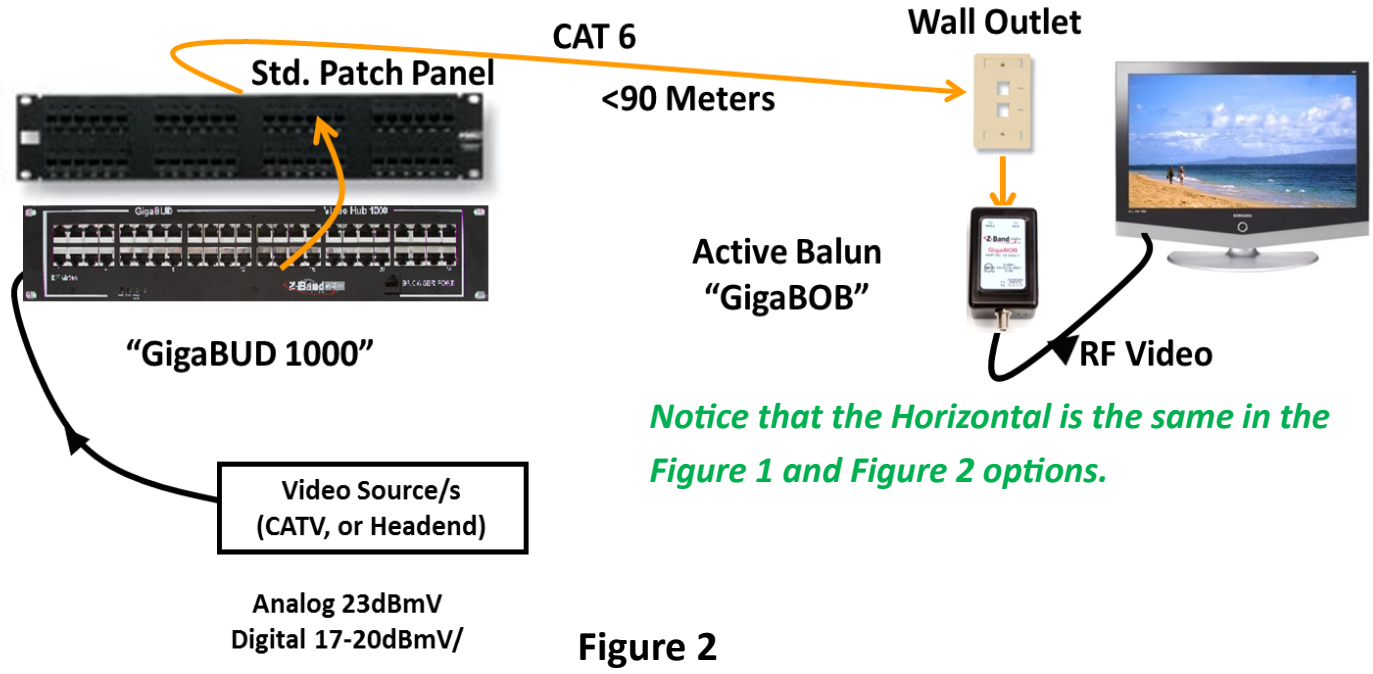


Figure 1

Depicts a Basic Layout of a System with a Coaxial Backbone



Notice that the Horizontal is the same in the Figure 1 and Figure 2 options.

Figure 2

Layout of Basic System with Shared Sheath for Video and IP

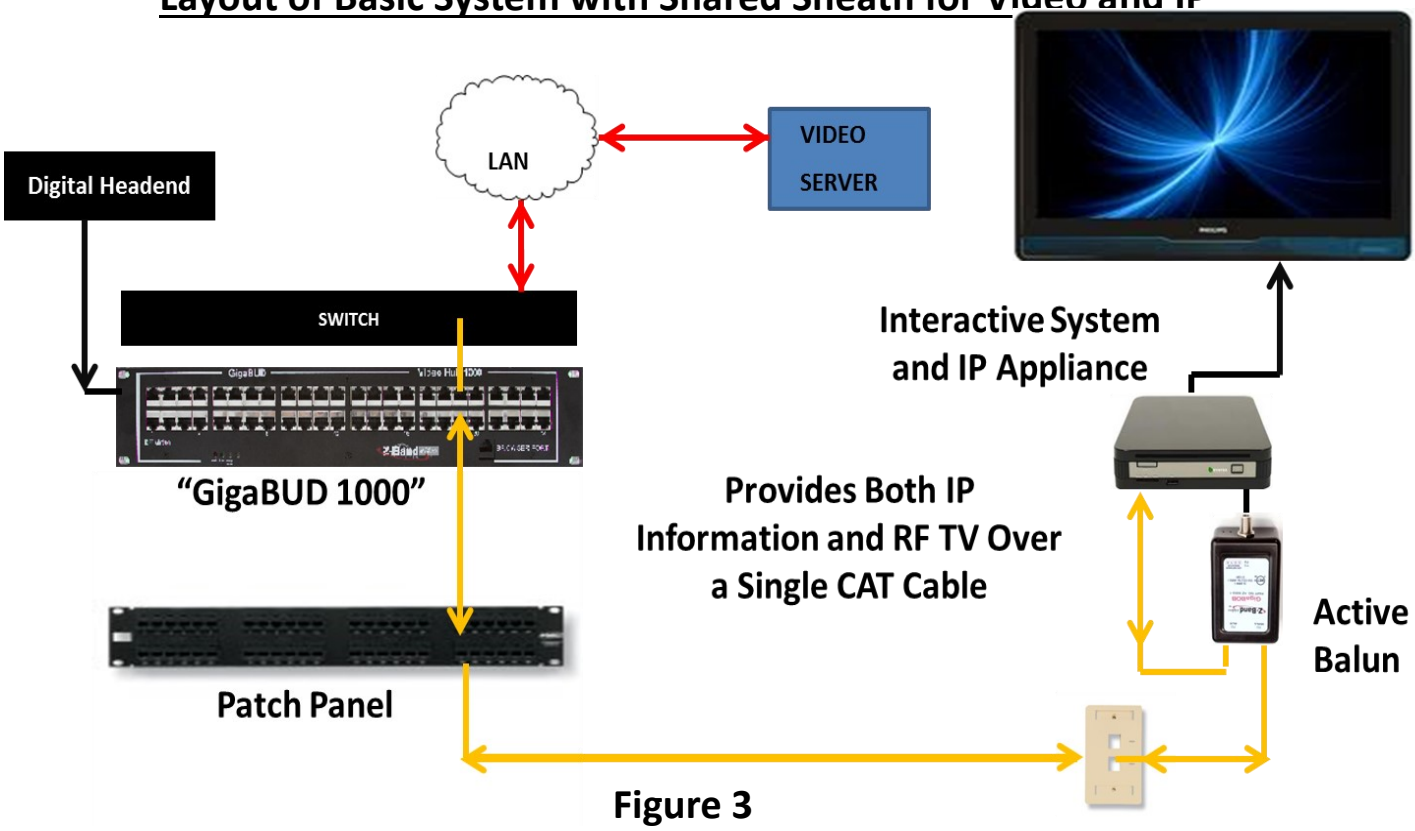


Figure 3

Allows the RF Video (on Pins 7 & 8) and the IP (on Pins 1, 2, 3, 6) to be combined at the GigaBUD 1000 and Separated at the GigaBOB. A port from the Ethernet Switch is plugged into the top row (Aux) of the GigaBUD and is combine with the RF Video that is on the bottom row. At the GigaBOB the RF Video is now available at the "F" connector output and the IP is available at the Aux output.

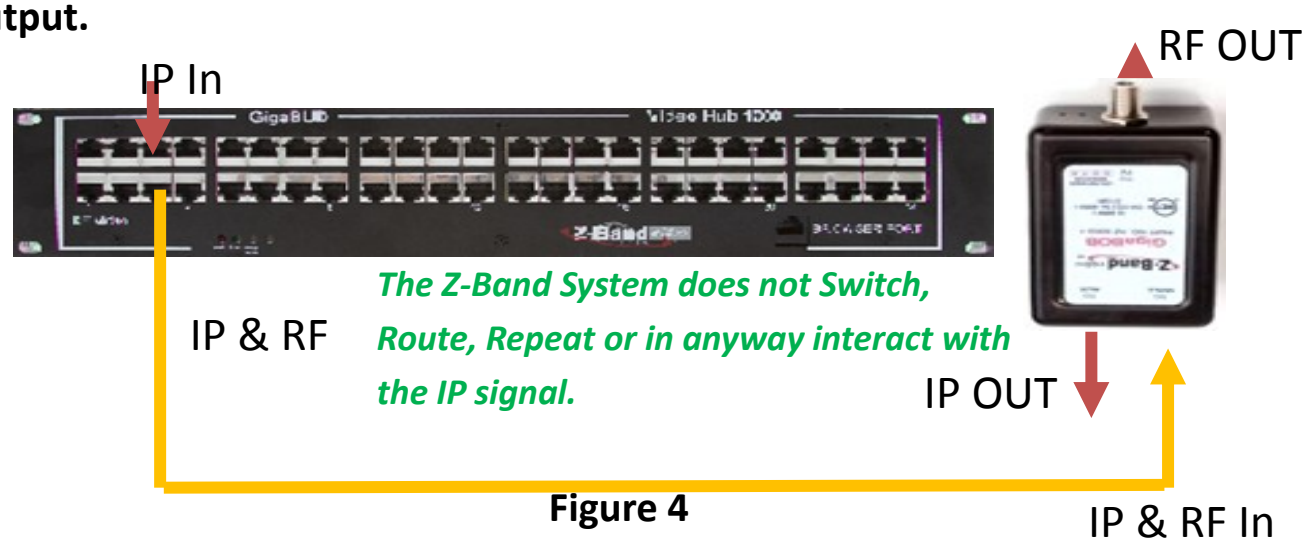


Figure 4

Front & Rear View of Z-Band Light TX

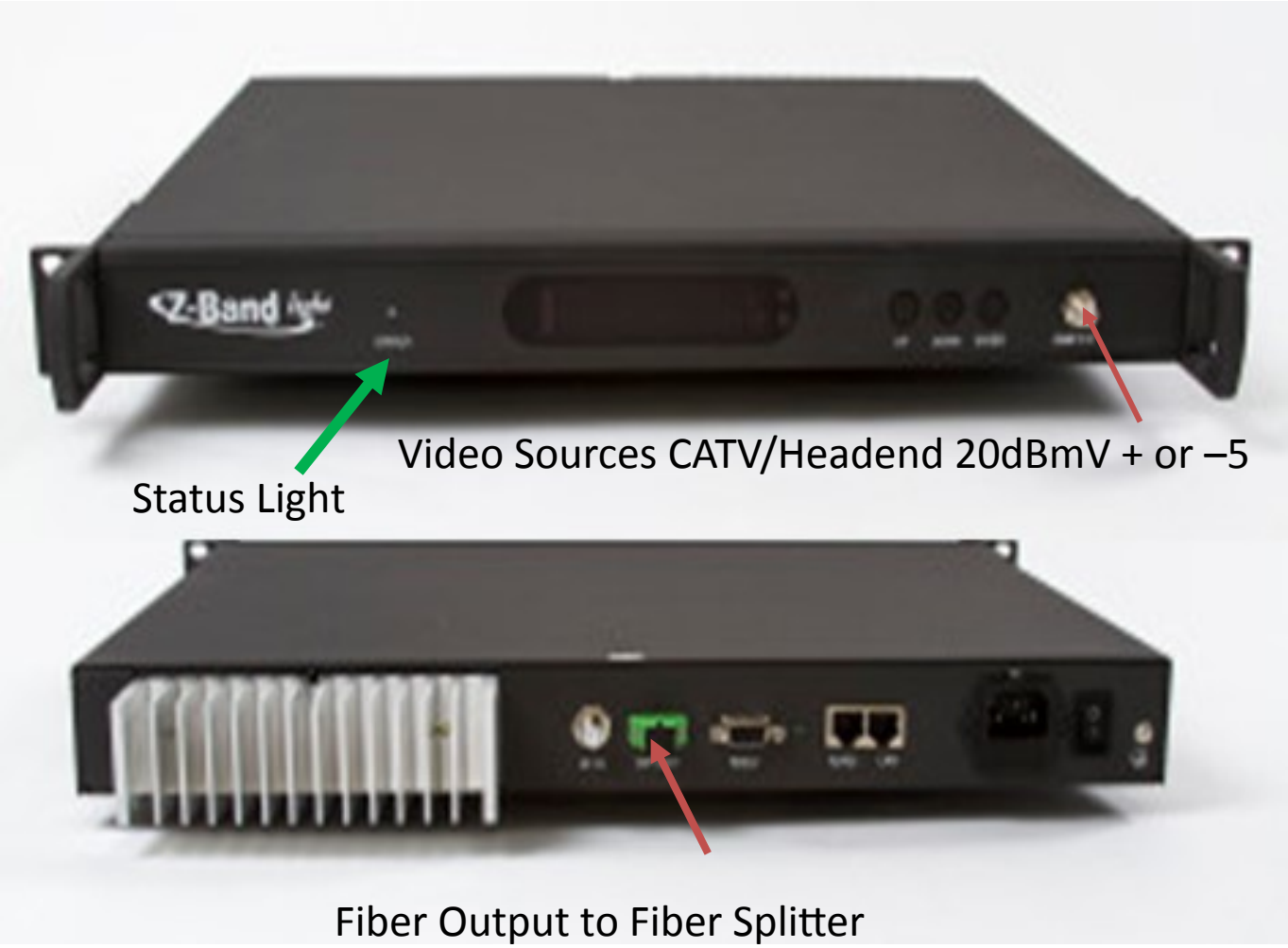
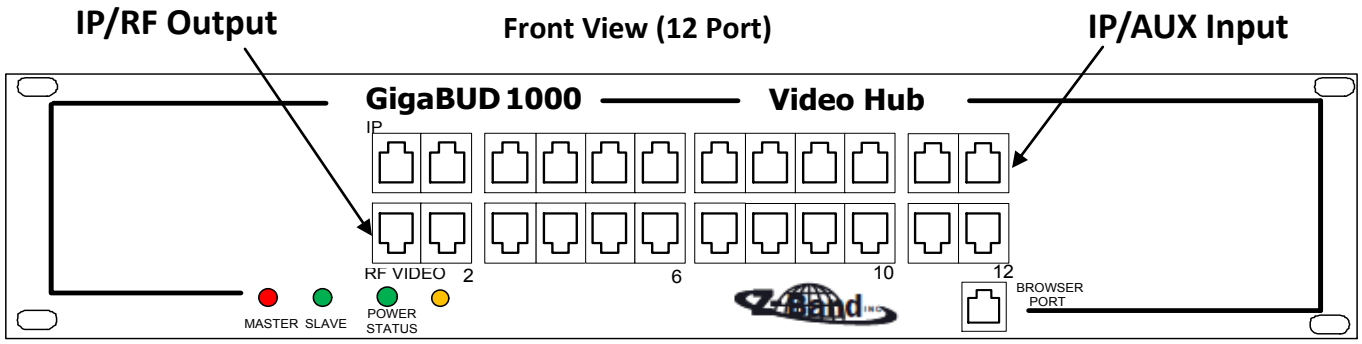


Figure 5

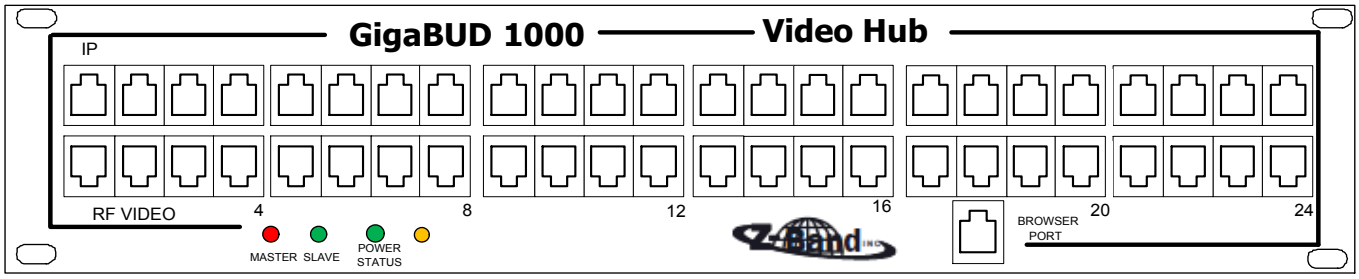
The Z-Band Light Transmitter accepts the coax Source signals at the "F" connector input. The Status Light will be **Green** when the proper input levels are received. The input level can be 20dBmV + or – 5, **but it is best to get them as close to 20dBmV as possible so that variations in input levels over time can automatically be compensated for by the + or—5 tolerance.**

The Transmitter will ***maintain the Flat Signal levels*** from the SC/APC Singlemode Fiber output to each destination GigaBUD 1000 Fiber receiver .

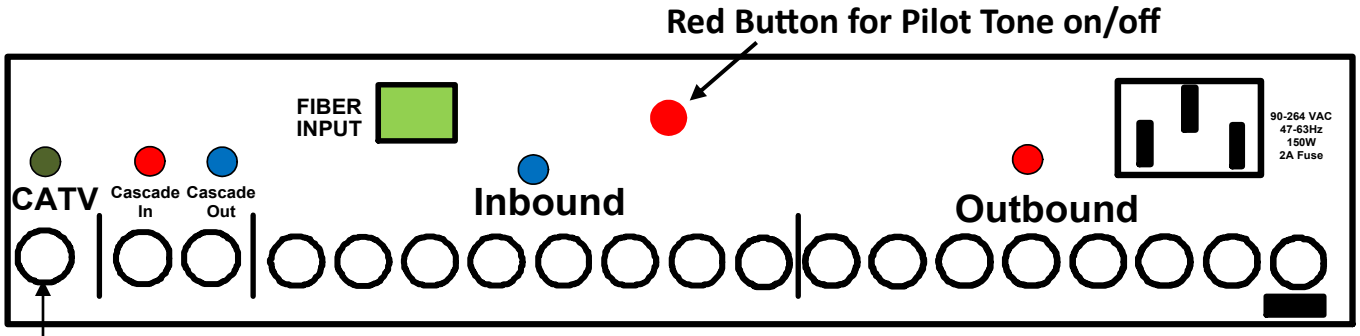
"GigaBUD 1000" Views



Front View (24 Port)



Rear View (12 & 24 Port) Fiber



Rear View (12 & 24 Port) Non-Fiber

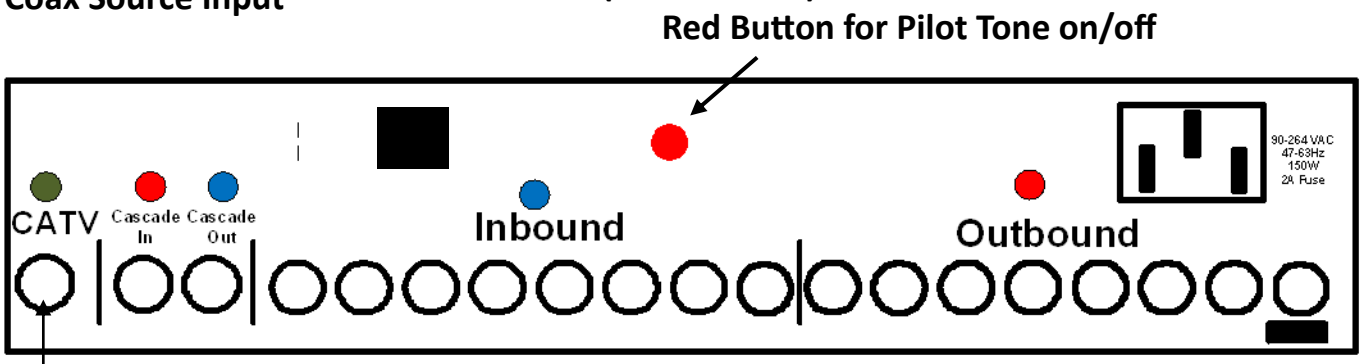


Figure 6

GigaBOB Views

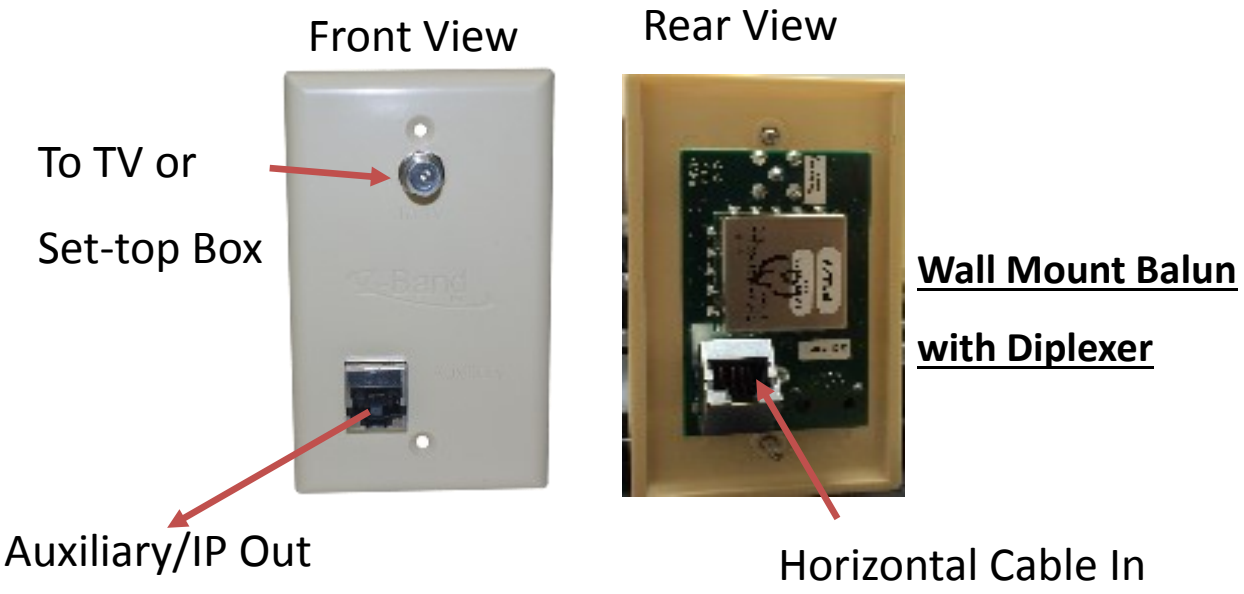


Figure 7

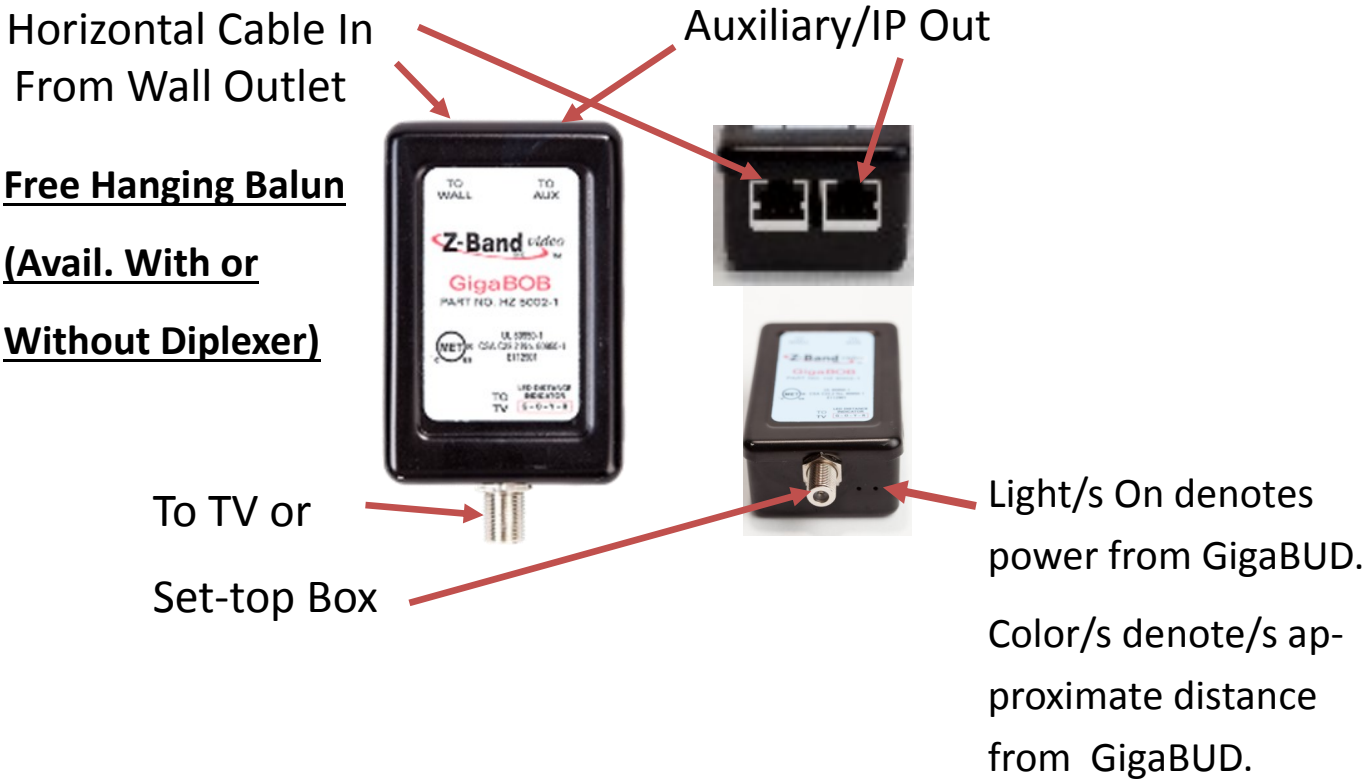


Figure 8

Installation Requirements:

Category Cable:

- Category 5E or better cable for horizontal wiring plant per ANSI/TIA-568-C Series Standard
- Category patch cables

  Category cable ***must*** be matched throughout a Z-Band System. Do ***not*** use a mixture of different cables

Coax Cable:

- Coaxial cable backbone cannot exceed **400' if using RG-6, or 600' if using RG-11** (Use single-mode fiber for distances greater than 600')
- Use RG-6 coaxial cables to cascade the "GigaBUD 1000's" in the same closet

Other Requirements:

- 35 dB amplifier with gain and tilt for Direct Cable Feed or to increase and flatten Headend signals to the proper levels
- RF meter capable of measuring analog and digital signals levels plus C/N for analog, and MER for digital channels across the CATV spectrum
- One GigaBOB for each TV or video-enabled PC in the System
- Two-Way Splitter

Fiber Cable:

- Use single-mode cable with SC/APC connectors
- Optical wavelength: 1300
- RF input power range to "Z-Band Light TX": 20 dBmV + or - 5dBmV
- Optical Meter capable of reading Single-mode SC/APC Terminated Fiber at 1300nm wavelength
- Optical input power range to "GigaBUD 1000": –1dBm to –4dBm

RF Input Levels:

Make sure that the input coming into the System is as follows (assume a 35 dB amplifier with gain and tilt is used prior to input, if required in order to obtain proper signal levels):

	Analog Only	Digital Only	Analog & Digital Combined
Level	23 dBmV *flat*	20 dBmV *flat*	23 (A) dBmV/ 17 (D) dBmV
C/N	43dB or greater		43 dB or greater
MER		36 dB or greater into GigaBUD	36 dB or greater into GigaBUD

Figure 9

Installation Recommendations:

Category Cable:

- Category 6 or better cable for horizontal wiring plant per ANSI/TIA-568-C

Coax Cable:

- Terminate with Compression Connectors

RF Signal and Fiber Test Meters:

RF Signal Meter

Televes

H30 SERIES

Meter/Analyzer

Fiber Optic Power Meter

Advanced Fiber Solutions

Model OM120A

Fiber Cable:

- RF input power range to "Z-Band Light TX": Set as close to 20dBmV Flat as possible
- **Video Source Signal Levels and Noise Levels should be recorded for all Channels prior to connection to the Z-Band Light Transmitter or to the Master GigaBUD 1000/s**
- If Singlemode Fiber Patch Panels are Terminated with Connectors other than SC/APC, special Patch cords must be acquired to address the Incompatibility .

RF Input Levels:

- Make sure that the Signal Levels and Noise Levels are checked at the proper locations (The proper locations for Signal Level readings are noted in each specific installation drawing)
- **Spend the time needed to get the Source Signal and Noise levels to the required levels . The Intelligent AGC of the Z-Band System will maintain the Source Signal Quality to all of the Displays - nothing else to adjust.**

Interconnecting GigaBUD 1000s in the Backbone

When a GigaBUD 1000 receives a video input signal from the Source it is automatically designated as a **Master**, and becomes a **Level 1** device. This is true if the Source connection is a Coax connection to the "CATV" input of a GigaBUD 1000 or a Fiber connection to the "Fiber Input" port (Note: A GigaBUD 1000 with an internal Fiber Receiver is always a Master, while all non-fiber GigaBUD 1000s may be either a Master of a Satellite Device). When a non-fiber GigaBUD 1000 receives a coax signal at the "Cascade In" port, it is automatically designated as a Satellite device (may be a Level 2, 3, or 4 device). The process for connecting GigaBUD 1000 units together is called **Cascading.** Each GigaBUD 1000 has 8 coax "Outbound " ports which can be connected to the coax "Cascade In" port of up to 8 Level 2 satellite GigaBUD 1000s. Each Level 2 device can then connect to up to 8 Level 3 devices and each Level 3 device can connect to up to 8 Level 4 devices. If all "Cascade Out" ports of all Level 1, 2, & 3 devices are used, a single Master can Cascade together 585 GigaBUD 1000s.

Cascading must be limited to 4 Levels.

Video Quality, in a Coaxial Backbone configuration, uses a "240 MHz Pilot Tone", in the guard band between channels 26 & 27 ,from each Master GigaBUD 1000 to all levels of it's Satellite GigaBuds. This may cause interference with these adjacent channels. In order to prevent the potential interference, the GigaBUD 1000 enables turning off the pilot tone after the AGC has set the signal levels to each Satellite device. However, in the event of a power outage, the Master devices will re-power to a "Tone On" state. The Pilot Tone, at each Master must then be Manually turned off.

Re-mapping channels 26 & 27 to other available channels, if possible will eliminate this potential inconvenience.

Example of Fiber Master & Coax Backbone in a closet

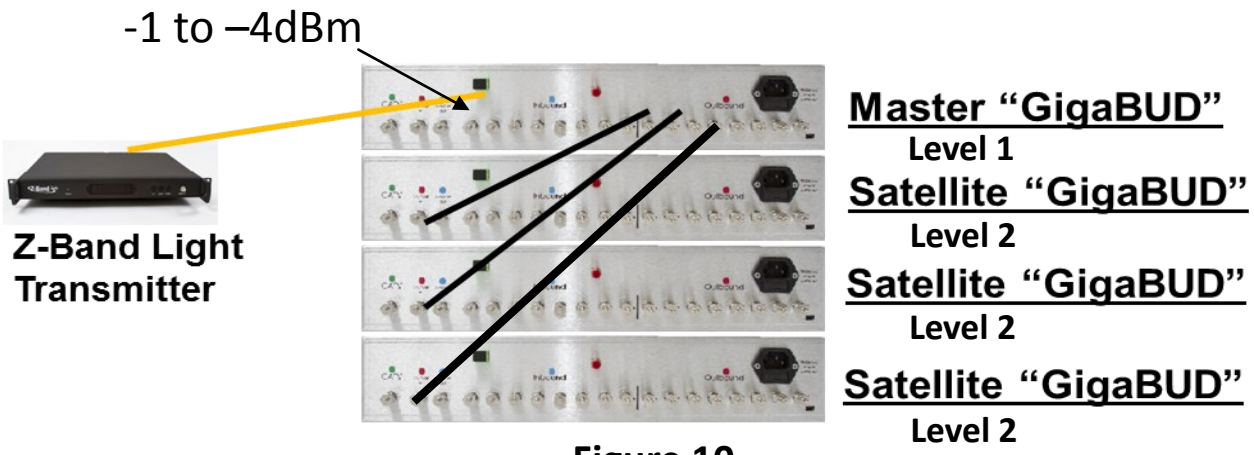
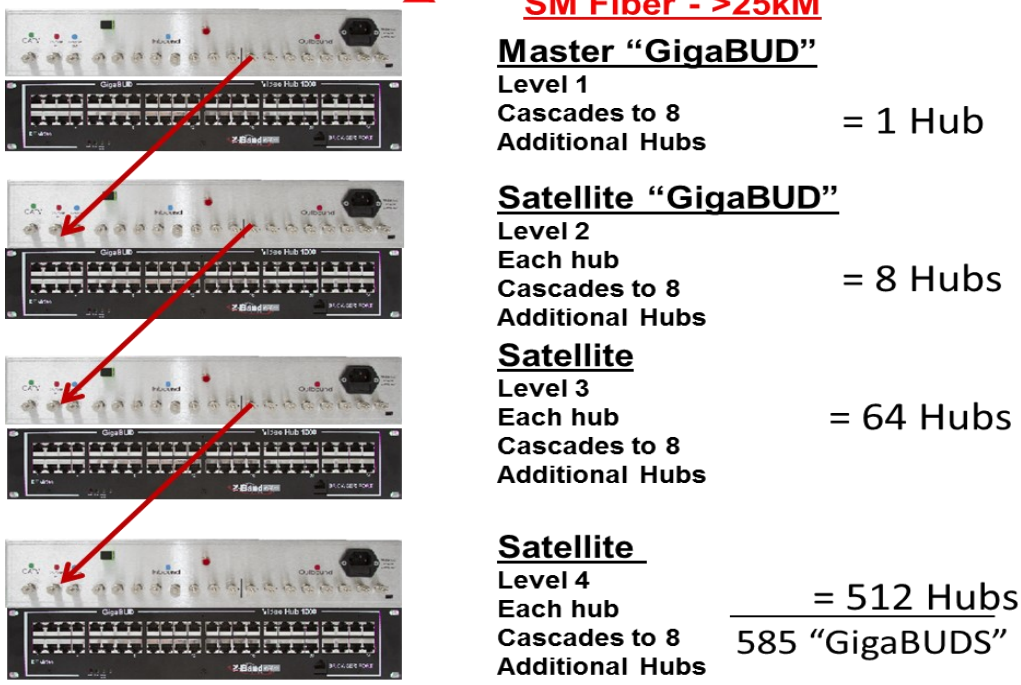


Figure 10

Figure 10 depicts the Cascade connections that are typical in a closet containing a Fiber Master. Notice that all of the Satellite devices are Level 2; direct connection from the "Outbound" ports of a Master

Example of Coax Backbone between closets

Figure 11 depicts a progressive 4 Level coax Cascade from a Master and Level 2 and Level 3 satellite devices.



Do Not Exceed 4 Levels

Figure 11

Fiber Backbone to Every Closet

Figure 12 depicts the fiber connections from a Z-Band Light Transmitter to a Fiber Master in each closet of a building.

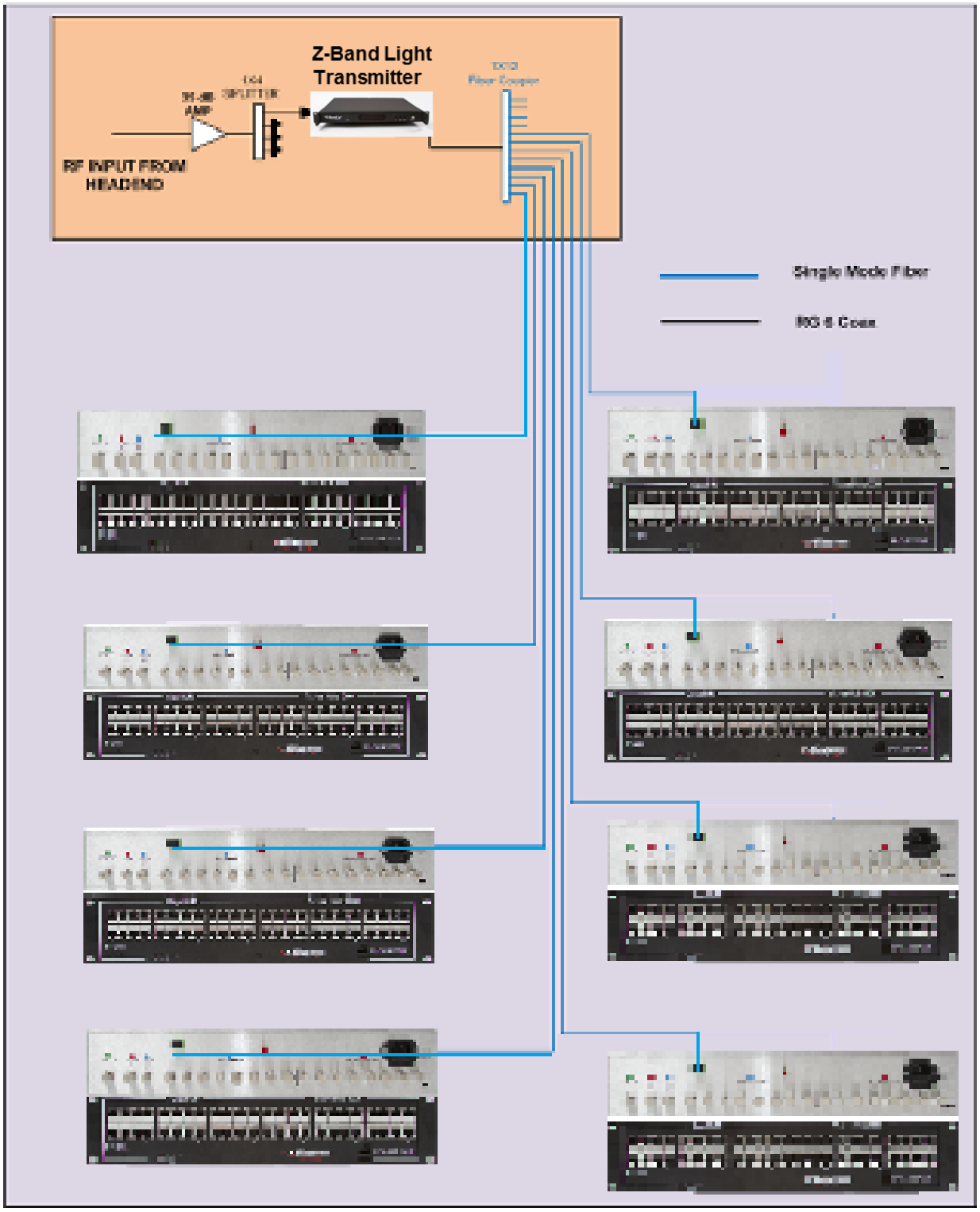


Figure 12

Coax Backbone to Every Closet

Figure 13 depicts the coax connections from a non-fiber GigaBUD 1000 Master to Level 2 Satellite devices in each closet of a Building.

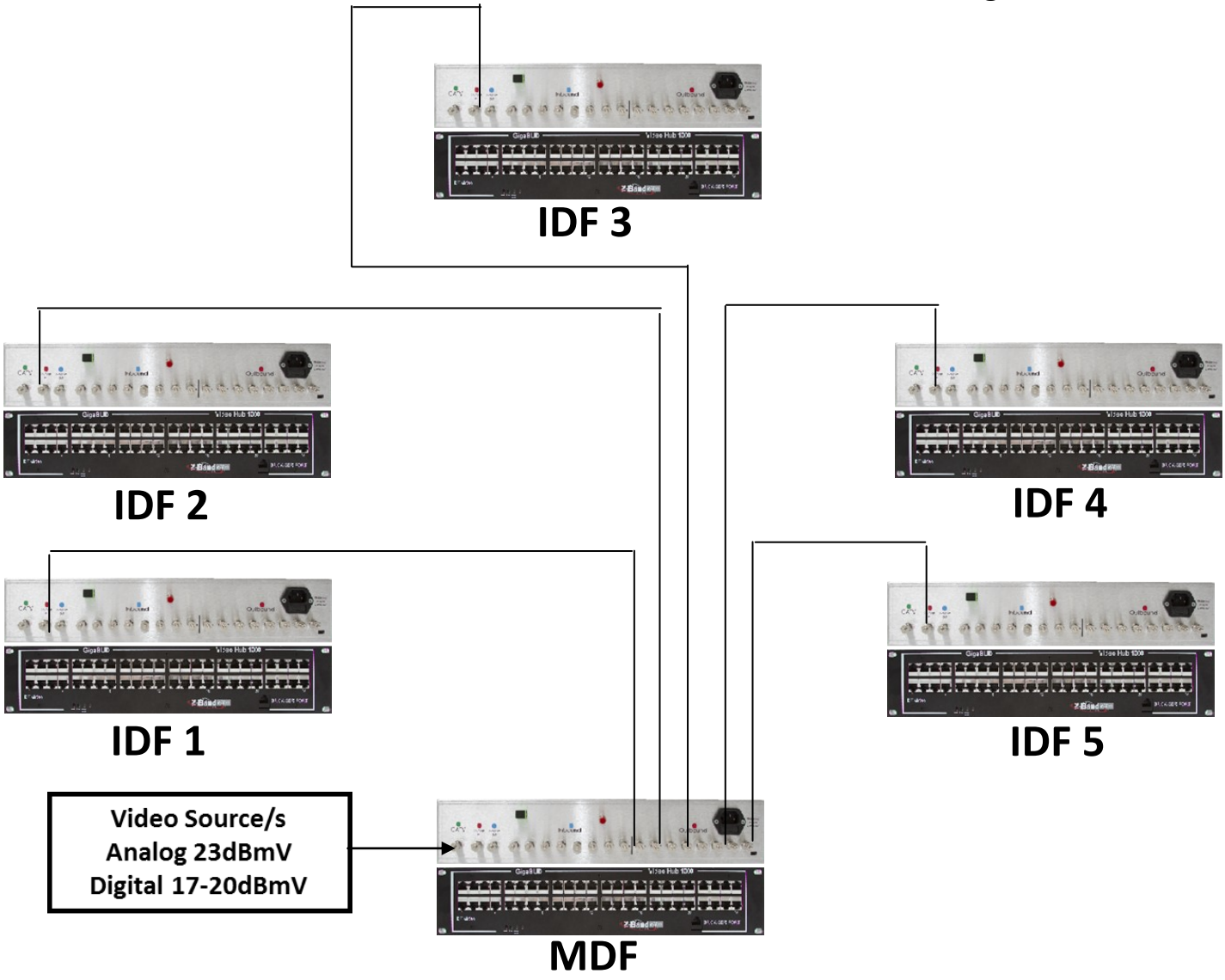


Figure 13

Fiber Backbone to Every Closet,

Coax Backbone Cascade within the Closets

Figure 14 depicts a typical Campus installation using a Fiber Backbone to each closet in multiple buildings, and Coax Cascades within each closet.

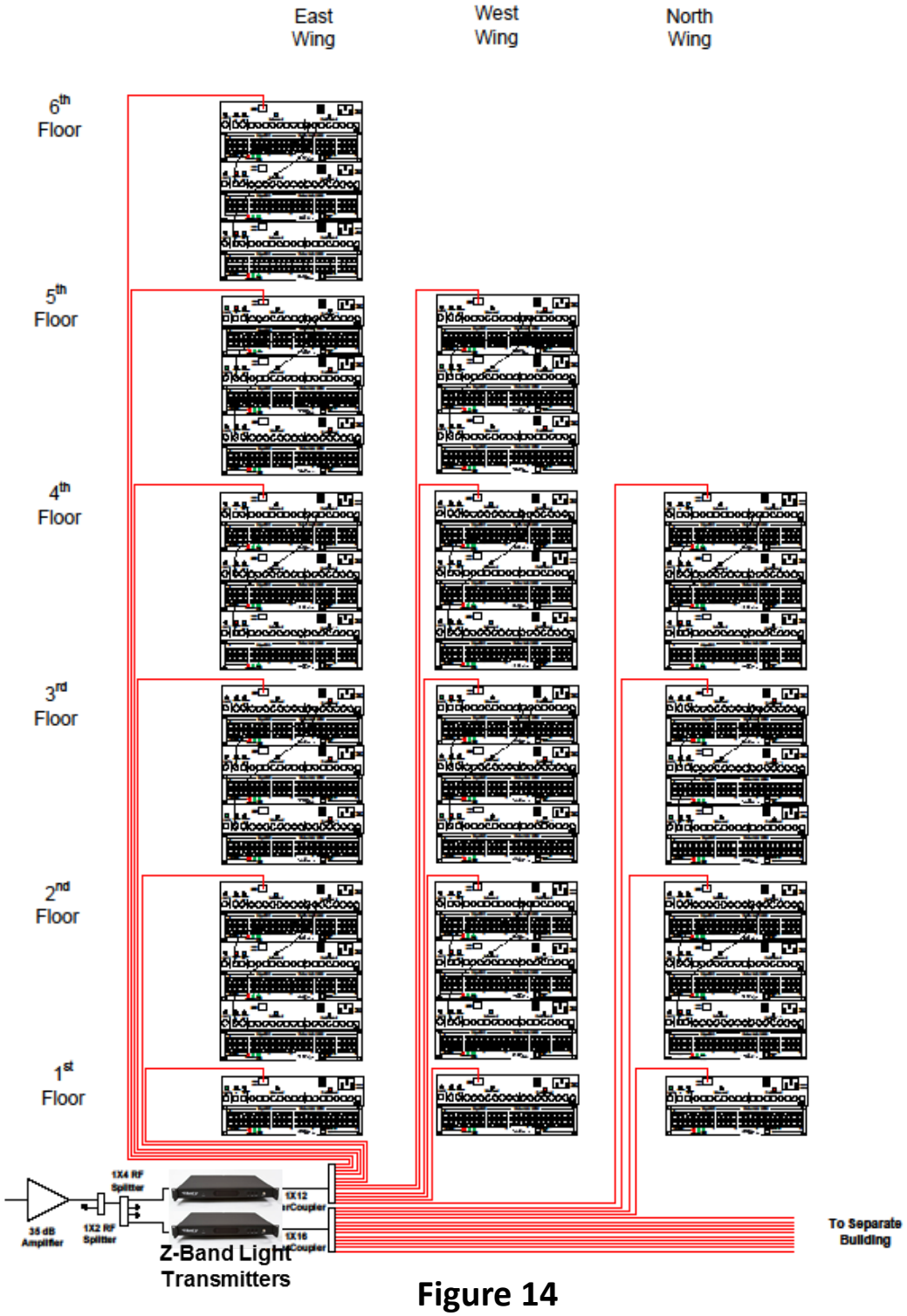
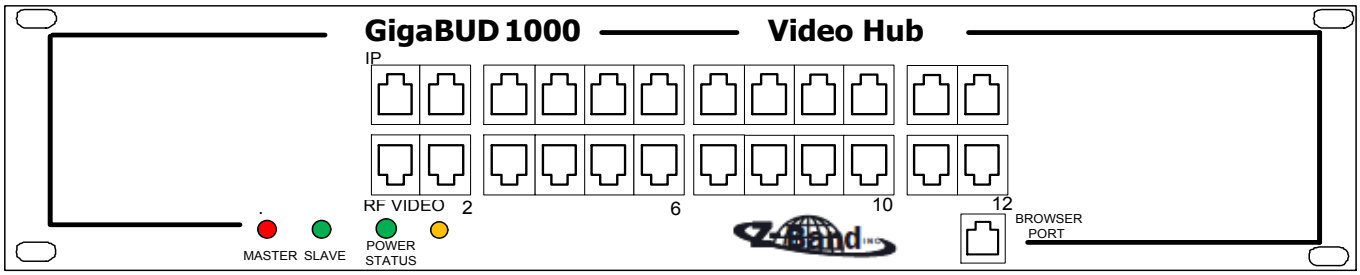


Figure 14

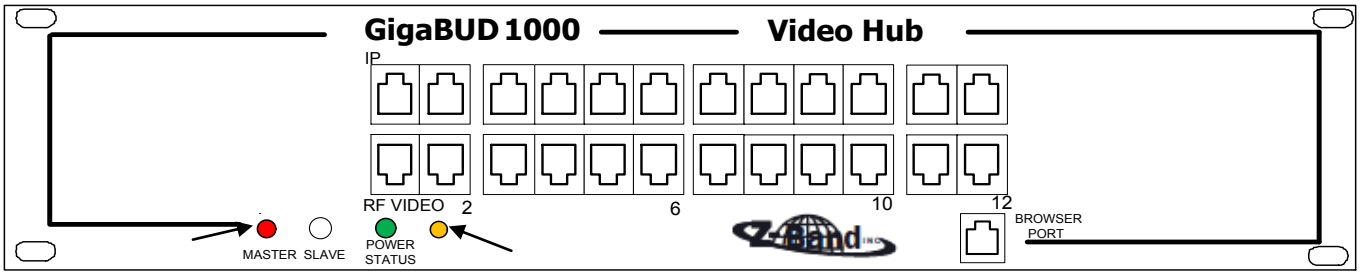
FRONT INDICATORS AND RED BUTTON ON REAR:

Initial Power-Up



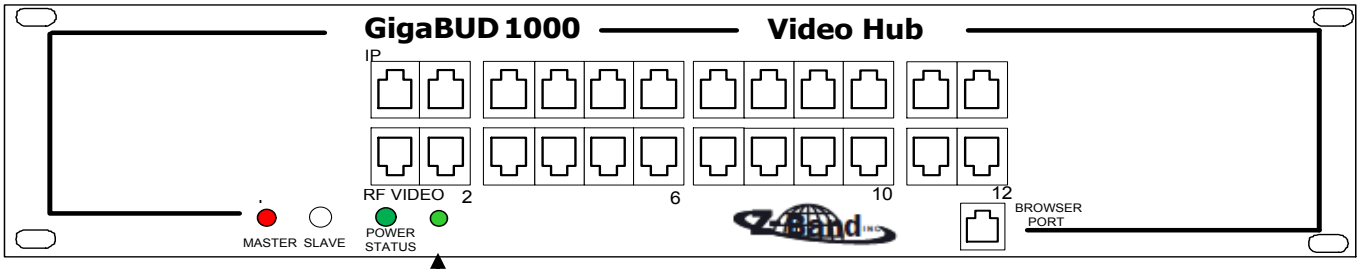
All four lights indicate the System is searching for a source and whether it will be a Master or a Satellite unit. Depending on what source is connected will provide the light sequence indicated as shown below. When this light sequence is shown, the unit will be in "Native State".

Master (CATV Wired or Fiber) Pilot



When there is a signal that goes into "CATV IN" port or the "FIBER IN" port the Red master light turns on. The pilot tone is a unique signal sent out so that the Satellite units connected can set their levels properly for signal balance. A yellow "Fourth" light indicates that the pilot tone is on and is active.

Master (CATV Wired or Fiber) Pilot

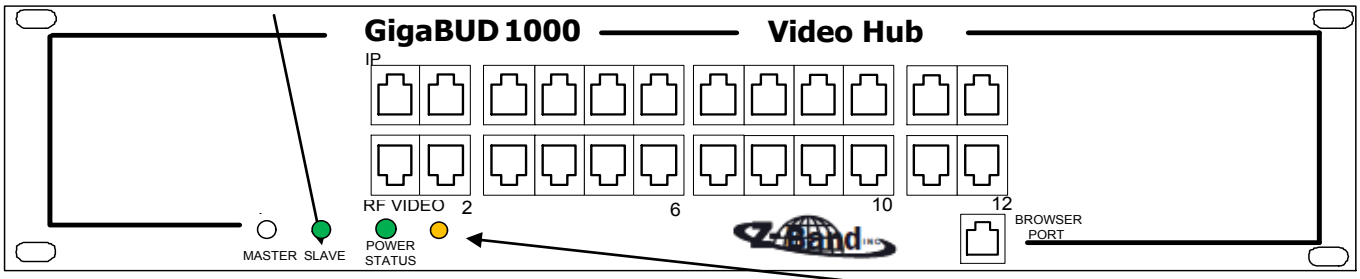


While a feed is hooked into CATV and then red button is held down the pilot tone will be switched off. A green light on the fourth position indicates that the pilot tone is turned off.

Figure 15

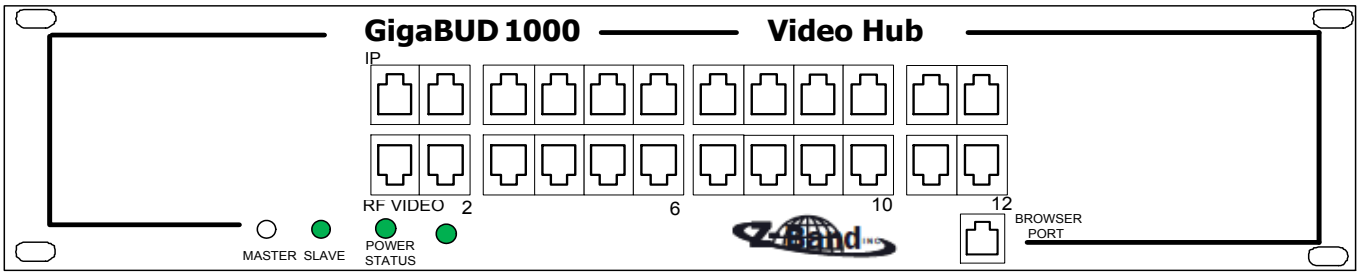
"GigaBUD 1000" FUNCTIONS:

Satellite (Unlocked)



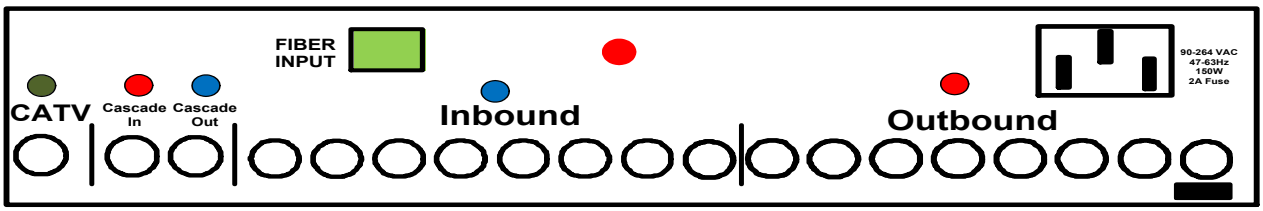
The lights for this mode indicate that the unit is a Satellite unit. A blinking amber light means there is a RF signal on the "Cascade In" port. Unlocked means the System is self-adjusting to set itself to the proper levels based on distances between itself and the Master unit. Once it has settled, it will appear as 3 green lights as shown below.

Satellite (Locked)



After about a 10 seconds, the unit will lock in the parameters it has adjusted to for a balanced System. The amber light will no longer blink and remain solid green. Note: If power is disrupted, the unit will return to native state.

RED BUTTON PURPOSE:



Master

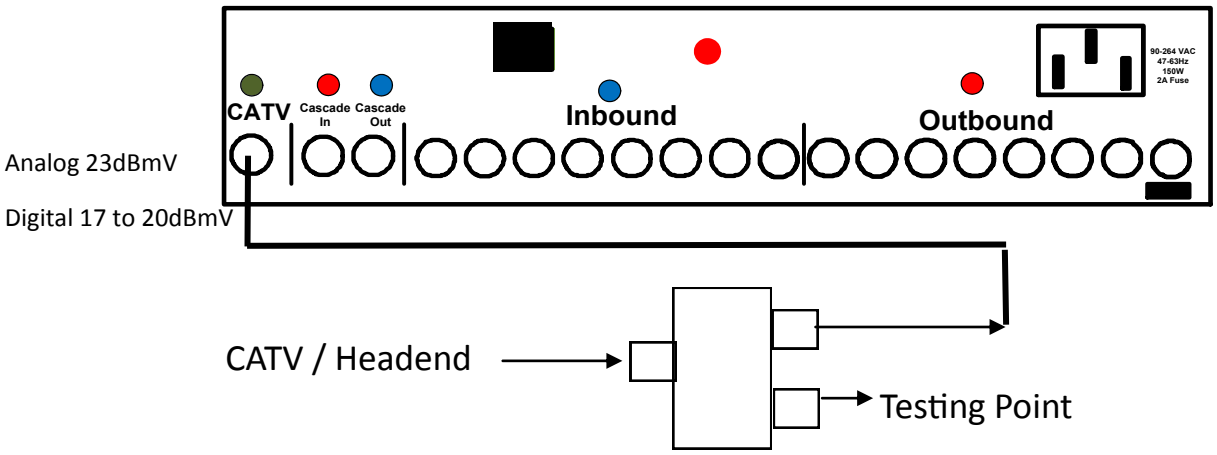
While in Master and the button is held for ~5 seconds, the unit will stop broadcasting the tone and the light will change from yellow to green. Holding the red button again will turn the tone back on. Resetting the power from this point will return the unit to master with the tone being broadcast.

Satellite

While in Satellite mode with no feed into cascade in and the button is held for ~5 seconds, the unit will switch to a native state, all four lights will be on. When a feed is present then the red button Function is disabled.

Figure 16

SERVICE PROVIDER TO Non-Fiber GigaBUD INTERFACE:



Putting the splitter in the System will allow for reading the input signal level and quality (MER or C/N) without disconnecting the System.

Figure 17

SERVICE PROVIDER TO Fiber GigaBUD INTERFACE:

Fiber Configuration - Master Only

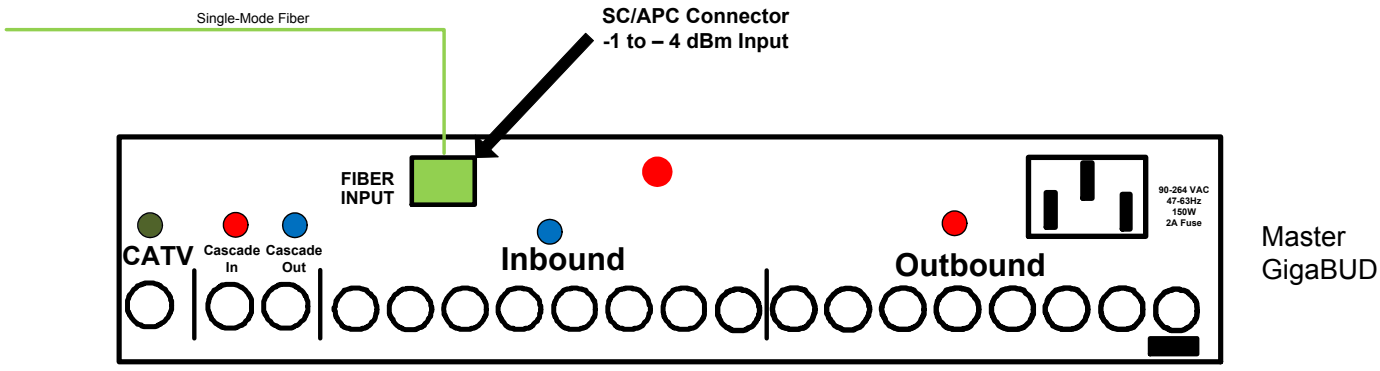
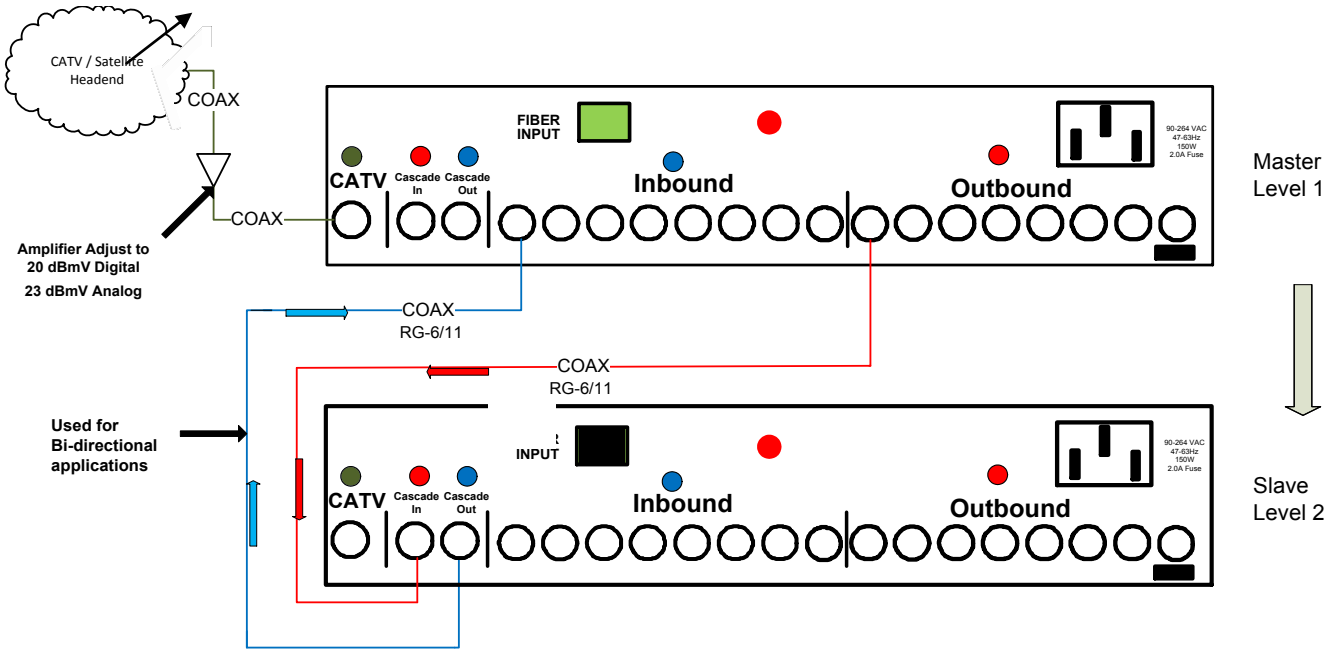


Figure 18

Bi-Directional CASCADE CONFIGURATIONS:

- **Some installs will require a return path for video on demand and other special features. In the event that the system uses a DOCSIS or FSK return, it will be necessary to provide a Bi-Directional Cascade Backbone, as shown below. In addition, Diplexer GigaBOBs will be required at all displays. If an IP based return path is used, Bi-Directional cascading is not required.**

Master / Satellite Cascade Configuration



Satellite/Satellite Cascade Configuration

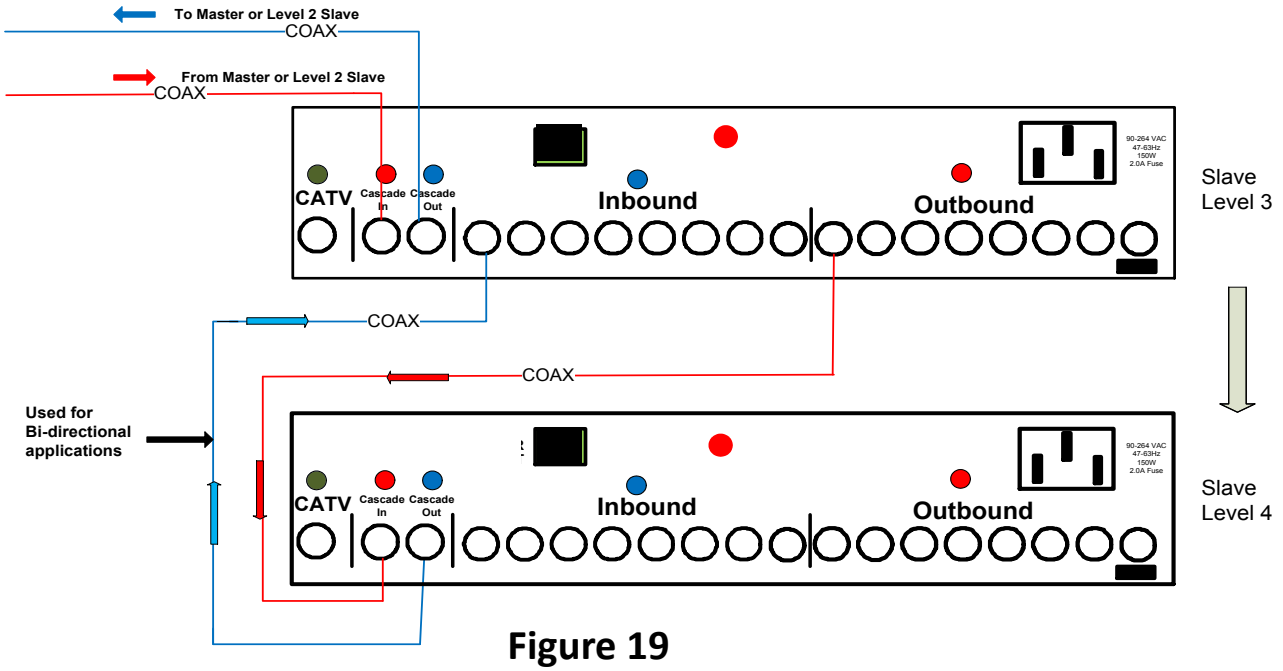


Figure 19