![Calix logo]

844G/854G GigaCenter Installation Guide

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Contents

About This Guide

This document provides general installation practices for the Calix 844G or 854G GigaCenter. This document also provides a general description of the products, and guidance for planning, site preparation, power installation, splicing to the outside plant, and basic troubleshooting.

Intended Audiences

This document is intended for use by network planning engineers, outside plant engineers, field support personnel, and craft personnel responsible for installation and maintenance of Calix premises equipment.

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. Operation of this equipment in a residential area may cause harmful interference; the user will be required to correct the interference at his expense.

Safety Notices

This document uses the following safety notice conventions.

DANGER! Danger indicates the presence of a hazard that will cause severe personal injury or death if not avoided.

WARNING! Warning indicates the presence of a hazard that can cause severe personal injury if not avoided.

CAUTION! Caution indicates the presence of a hazard that can cause minor to moderate personal injury if not avoided.

ALERT! Alert indicates the presence of a hazard that can cause damage to equipment or software, loss of data, or service interruption if not avoided.

DANGER! CLASS 1 LASER PRODUCT. INVISIBLE LASER RADIATION MAY BE PRESENT. Fiber optic radiation can cause severe eye damage or blindness. Do not look into the open end of an optical fiber.

IMPORTANT SAFETY INSTRUCTIONS

When using your telephone equipment, basic safety precautions must always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- Do not use this product near water. For example, near a bathtub, washbowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.
- Avoid using a telephone (other than a cordless phone) during an electrical storm. There may be a remote risk of electric shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.
- Use only the power cord and batteries indicated in this manual. Do not dispose of batteries in a fire as they may explode.
- Check with local code for possible special disposal instructions for batteries.
- For external power supplies, the external power supply used in this device is to be Class II or a Limited Power Source (LPS) power supply.
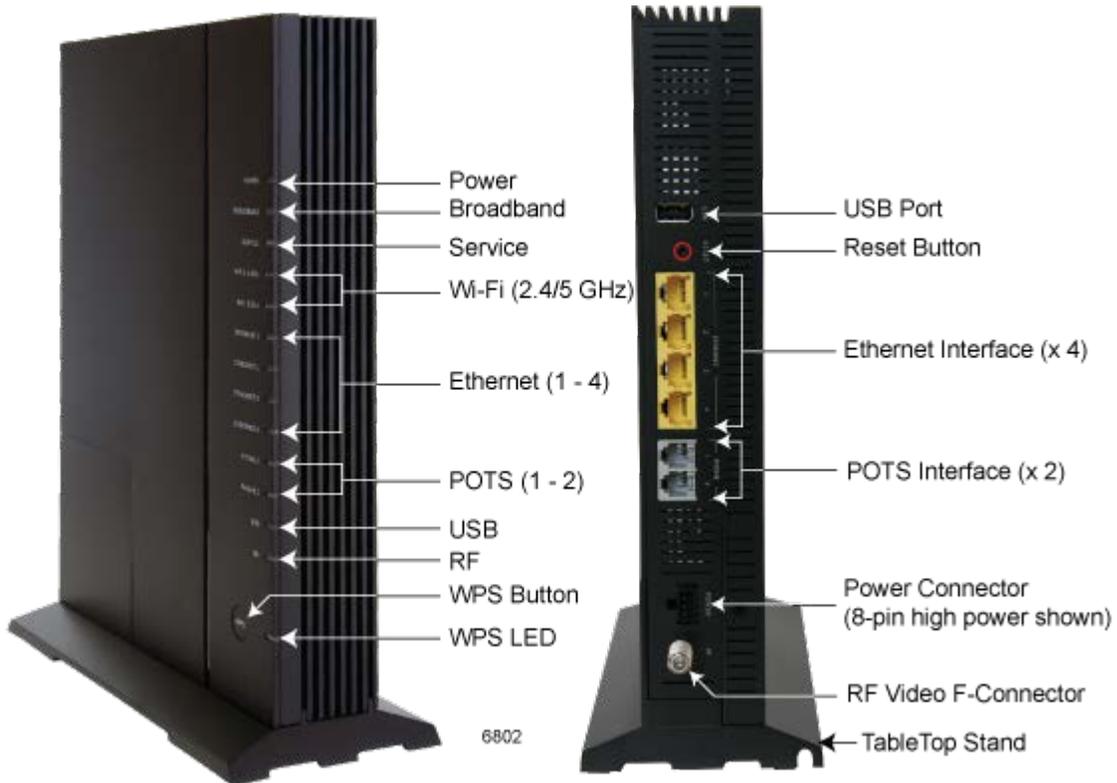
Overview

The Calix 844G or 854G GigaCenter terminates passive optical network (PON) fiber at the subscriber's premises and provides industry standard interfaces for the subscriber's information, communication, and entertainment equipment. From single family residential units or multi-dwelling units, to small business applications, Calix GigaCenters enable subscriber to receive broadband data, voice over Internet protocol (VoIP) telephone service, digital RF video, and Internet protocol television (IPTV) over a single fiber.

The Calix 844G and 854G GigaCenters are next generation residential premises service delivery platforms that extend the access network into the home and act as a strategic location for control of the gigabit experience. Supporting broadband connectivity within the home and managing subscriber voice, data and video services, this intelligent, high-performance service platform integrates a 2.5 GPON optical interface with switching and routing functions that manage premises network traffic at speeds up to 1 Gbps. The GigaCenter service interfaces include: carrier class wireless networking with 802.11ac Wi-Fi and four Gigabit Ethernet (GE) ports for IPTV video and data services, two integrated voice lines supporting carrier grade VoIP and network-based TDM voice circuits, a USB port for home networking services, and an option for RF video.

Note: For additional information on achieving carrier class wireless networking, refer to RG Wi-Fi Best Practices Guide available on the Calix Resource Center.

854G-1 GigaCenter

Power
Broadband
Service
Wi-Fi (2.4/5 GHz)
Ethernet (1 - 4)
POTS (1 - 2)
USB
RF
WPS Button
WPS LED
6802

USB Port
Reset Button
Ethernet Interface (x 4)
POTS Interface (x 2)
Power Connector
(8-pin high power shown)
RF Video F-Connector
TableTop Stand

Introduction

This document describes the installation of the following:

- 844G-1 GigaCenter, 2 POTS, 4 Gigabit Ethernet ports, Dual Wi-Fi, 1 USB, UPS Power Interface

- 844G-2 GigaCenter, 2 POTS, 4 Gigabit Ethernet ports, Dual Wi-Fi, 1 USB, 12 VDC Power Interface with On/Off switch

- 854G-1 GigaCenter, 2 POTS, 4 Gigabit Ethernet ports, Dual Wi-Fi, 1 USB, 1 RF Video, UPS Power Interface

- 854G-2 GigaCenter, 2 POTS, 4 Gigabit Ethernet ports, Dual Wi-Fi, 1 USB, 1 RF Video, 12 VDC Power Interface with On/Off switch

There are three types of installation configurations:

1. Vertical Table-top Configuration - A base stand is attached to the GigaCenter and placed on any available flat surface. Incoming and outgoing connections are plug-and-play.

2. Wall Mount Configuration - This enclosure-less configuration mounts the GigaCenter to any available vertical surface using the mounting slots molded into the provided splice tray. Incoming and outgoing connections are plug-and-play.

3. Structured Wiring Enclosure (SWE) Configuration - Similar to the wall mount configuration, the SWE Configuration mounts the unit to a SWE Enclosure using the wall mount slots molded into the splice tray. Incoming and outgoing connections remain plug-and-play.

Note: In configuration #1 above, it is assumed that the incoming fiber connection has been spliced into a Network Interface Device (NID) or a Local Convergence Point (LCP) enclosure and terminated with an SC/APC fiber pigtail for attachment to the GigaCenter.

Note: In configuration #2 and #3 above, it is assumed that the incoming fiber drop has been routed near the wall mount for SWE mount location and can be routed into the splice tray as appropriate.

Powering Options

The 844G and 854G GigaCenter is available in any of two different powering options:

*   Attached to any 110 or 220 VAC power outlet using the supplied 12 VDC wall transformer.
*   Attached to an indoor grounded or ungrounded Universal Power Supply (UPS) providing life-line service in the event of a power failure. The UPS is connected to local power using the provided molded power cord.

    Note: Power cord configurations must be appropriate for use in the country where the GigaCenter is being deployed.

    Note: Only Calix provided and approved power cords or voltage adapters should be used to connect the 854G/855G GigaCenter.

Mounting Options

700GE or 800GE devices can be mounted in a variety of different environments:

*   Vertical Wall Mount
*   Horizontal Wall Mount
*   Vertical Tabletop Mount
*   Structured Wiring Enclosure (SWE) - Not Shown

Wall Mount Vertical	Wall Mount Horizontal
Table Top Mount	Splice Tray and Base Stand (included)
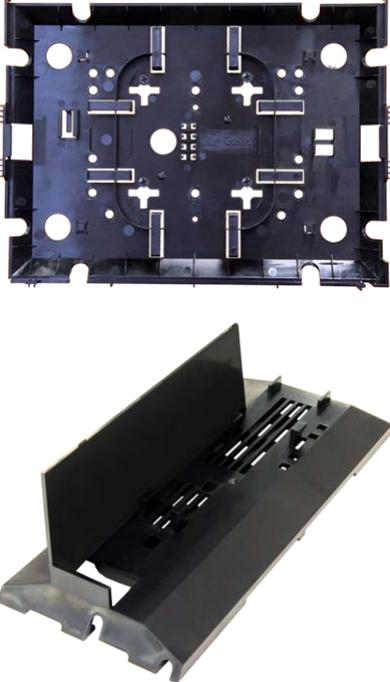
Note: Do not mount the GigaCenter flat on a tabletop or ceiling.

Agency Listing

FCC WARNING: These devices comply with Part 15 of the FCC Rules and Regulations. Operation is subject to the following conditions:

This device may not cause harmful interference, and, this device must withstand any interference received, including interference that may cause undesired operation.

The ONT has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules and Regulations. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this guide, may cause harmful interference to radio and television communications.

Hazardous materials

The externally mounted power supply includes a battery for back-up purposes. This battery is classified as hazardous material and should be disposed of according to the manufacturer's recommendations.

Applicable standards

Following is a list of standards that apply to GigaCenter products:

GigaCenter Standards		
Telcordia GR-303	Telcordia GR-909	Telcordia GR-63
Telcordia GR-950	Telcordia GR-1089	Telcordia GR-49
Telcordia GR-2890	Telcordia GR-499	Telcordia GR-1244
ITU G983.1	TR-TSY-000077	TR-TSY-000083
TA-NWT-000406	ANSI T1.231	ANSI T1.403
ANSI T1.410	IETF RFC 2495	IETF RFC 1757
IETF RFC 2131	IETF RFC 951	IETF RFC 1514
FSAN (Issue 3)	UL 1950	UL 1697
FCC Part 15	NEC (National Electrical Code)	REA (Rural Electric Association)
Canadian ICES-003	IEC-61000 4-5 Surge	EN55022 Class A
ETSI 300-386	EN 60950-1	EN 60825-1
ACMA A-Tick	ACMA C-Tick	European Conformity
WiFi a b g n a c	SUPERSPEED CERTIFIED USB	

Product labeling

The following required labeling shows the laser class and IEC standard that defines the laser used in this product.

CLASS 1 LASER PRODUCT
IEC 60825-1:1993 +A1:1997 +A2:2001
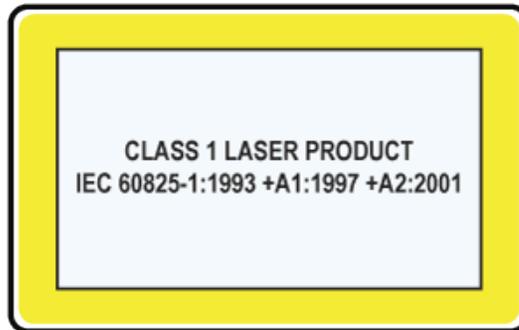
Laser specifications

- Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.
- Nominal laser wavelength: 1310 nm
- Laser Radiation Maximum Output: 3.2 mW
- Pulse Duration: 6.45 x 10-11 s to 6.45 x 10-10 s

Laser standards

- GigaCenter: Class 1 Laser product.
- 1310nm or 1490nm Laser Transmitter: Class 1 Laser product with a Class 3a internal hazard.

Radiated emissions

- This Class-B digital device complies with radiated emissions requirements as defined in Canadian ICES-003.

Power cable

- The unit must be powered by an external power source as follows: CE marked (EU), FCC (US), UL listed power source marked Class II, Limited Power Source (LPS) and rated output between 10-15 VDC (12 VDC nominal), 2.5 Amp minimum.

Note: Calix recommends a 7 wire, #16 AWG (2 wires @ 16AWG, 5 wires @ 24AWG), UL approved cable be used between the unit and the UPS at a drop length not to exceed 70 feet (21.3 meters).

Note: Calix connectorized (2 x 4) 8-pin to 7-pin power cables are recommended for use with the unit. This cord configuration is available in 4 foot (1.2 meters) and 10 foot (3 meters) lengths. For deployments where greater than 10 feet (3 meters) is required, a 25 foot (7.6 meters) cable is available that can be cut to length (9-pin connectorized on ONT end and no connector on UPS end).

Pre-Installation Options

When planning for fiber attachment to the GigaCenter, two options are most often considered:

- The incoming fiber connection has been spliced into a Local Convergence Point (LCP) or similar demarcation point and fitted with an SC/APC fiber pigtail for attachment to the unit.
- A 5mm drop fiber has been routed to the wall mounted splice tray and fusion spliced to an SC/APC fiber pigtail for attachment to the unit.
- Determine the optimal spot to locate the GigaCenter for Wi-Fi best performance.

Note: For additional information on optimizing Wi-Fi reception, refer to RG Wi-Fi Best Practices Guide available on the Calix Resource Center.

You can pre-install a 844-1/854-1 GigaCenter at the customer premises prior to turning up services. Pre-installation includes the following steps:

- Physically mounting the unit to a wall or Structured Wiring Enclosure inside the customer's home.
- Installing and securing a composite or drop cable (includes the fiber optic cable).
- Splicing or connecting the composite cable to a Fiber Management Tray (splice tray) located behind the wall-mounted unit.

Once the pre-installation is complete, cap the end of the fiber pigtail to avoid any potential danger from laser emissions. When ready, the unit and the optional Uninterruptible Power Supply (UPS) are installed inside the customer premises.

Note: This document includes installation instructions for the UPS in addition to instructions for installing the unit itself.

Wall Mount Installation Options

When mounting the GigaCenter onto a wall or inside a Structured Wiring Enclosure, the unit can be installed with or without a UPS.

Note: All hardware mounting is designed such that cable lengths are minimized and cables/cords can be routed as directly as possible.

Note: For all configurations, power cord lengths of 3 foot (1 meters), 10 foot (3 meters), and 20 foot (6 meters) are available.
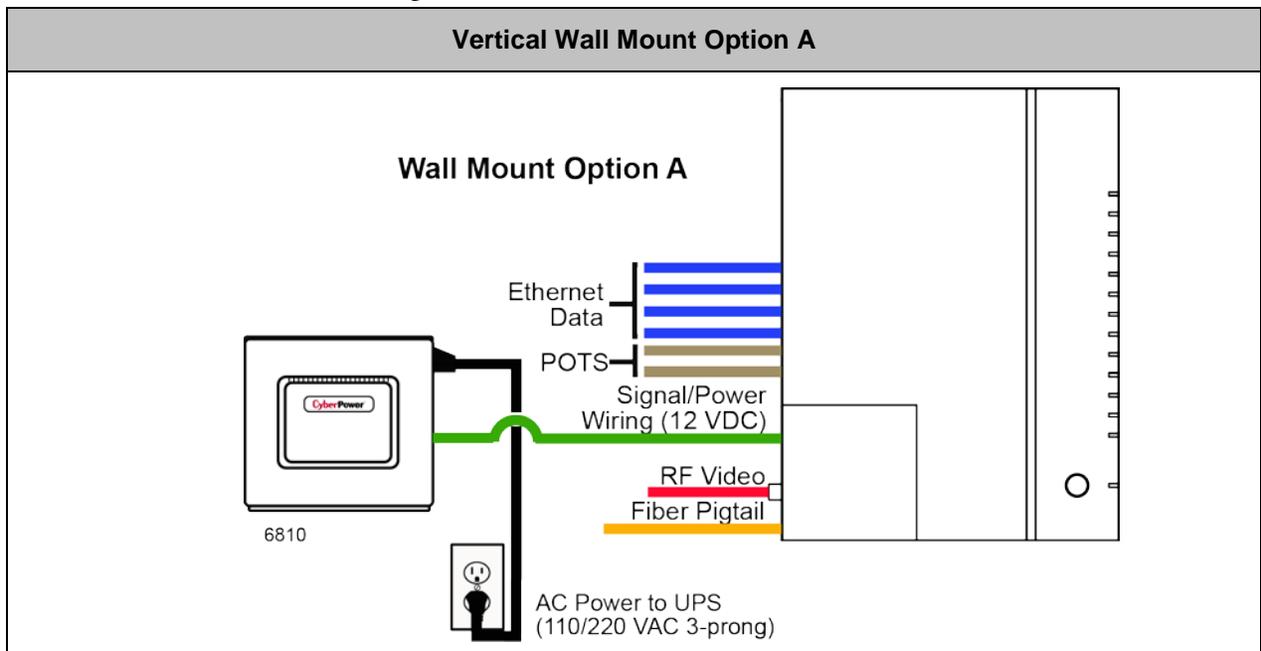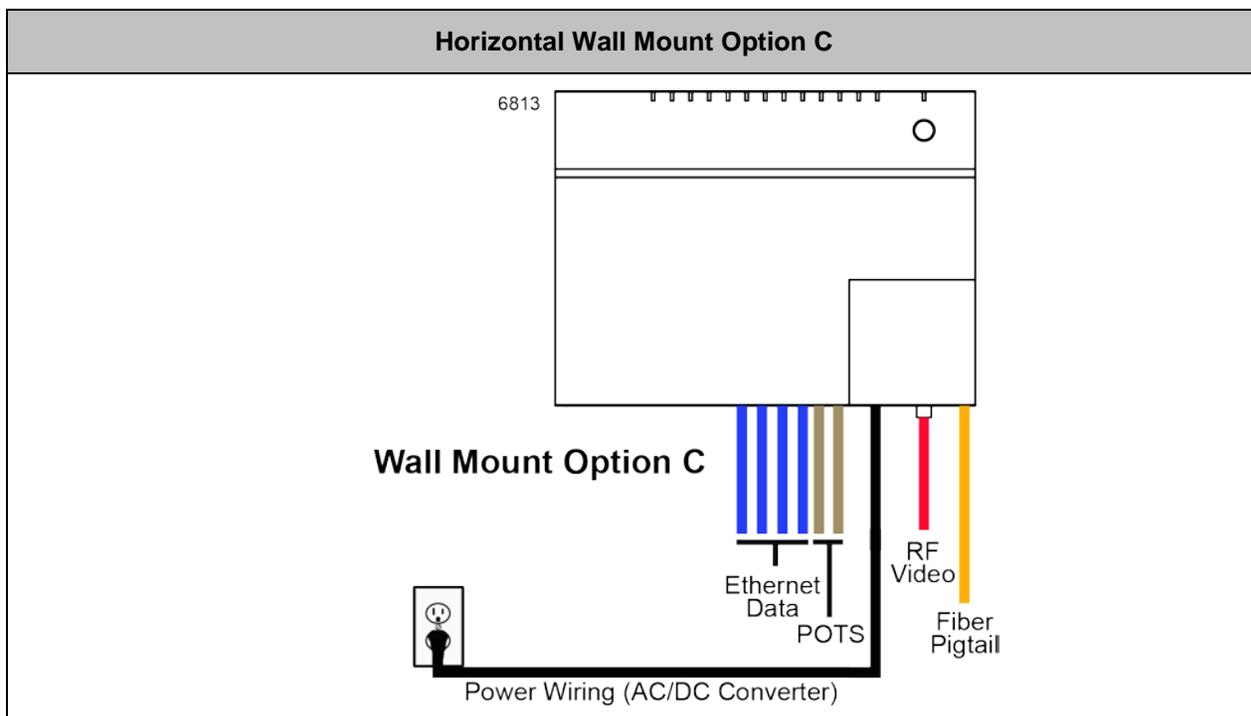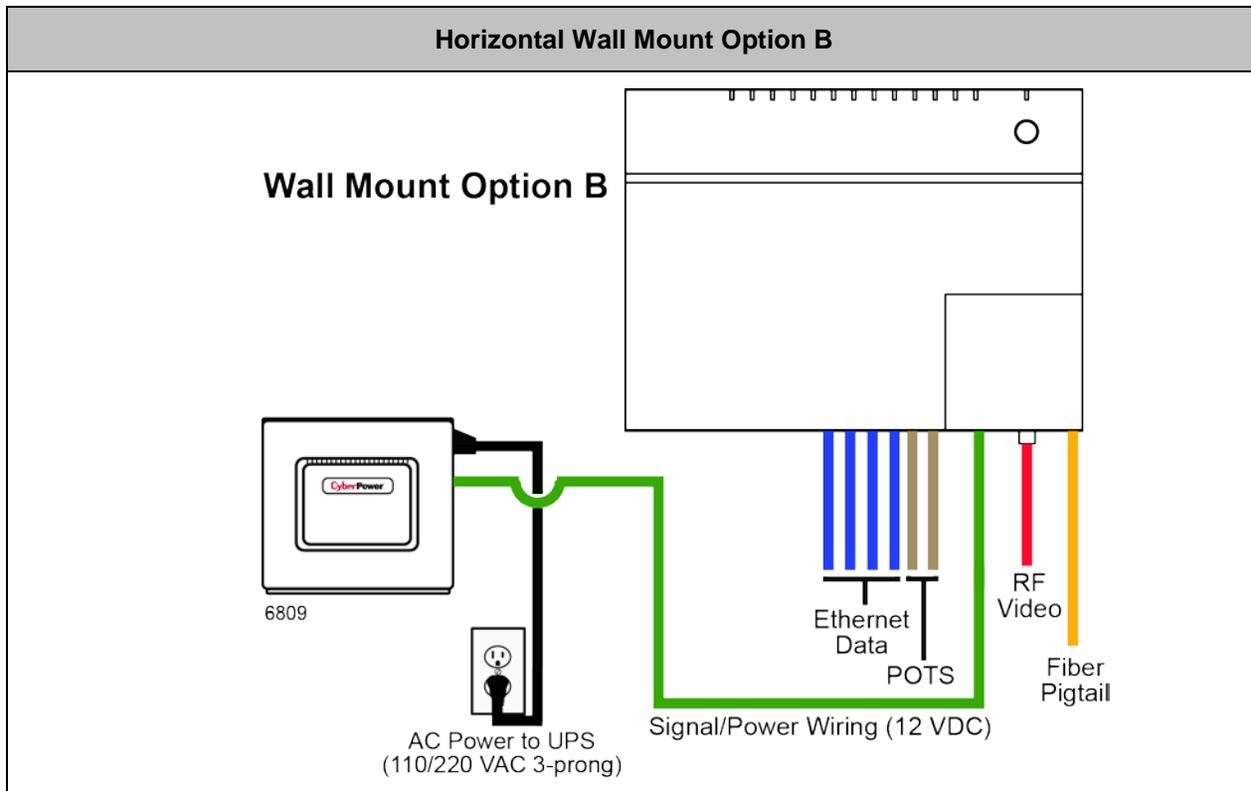
Mounting Options

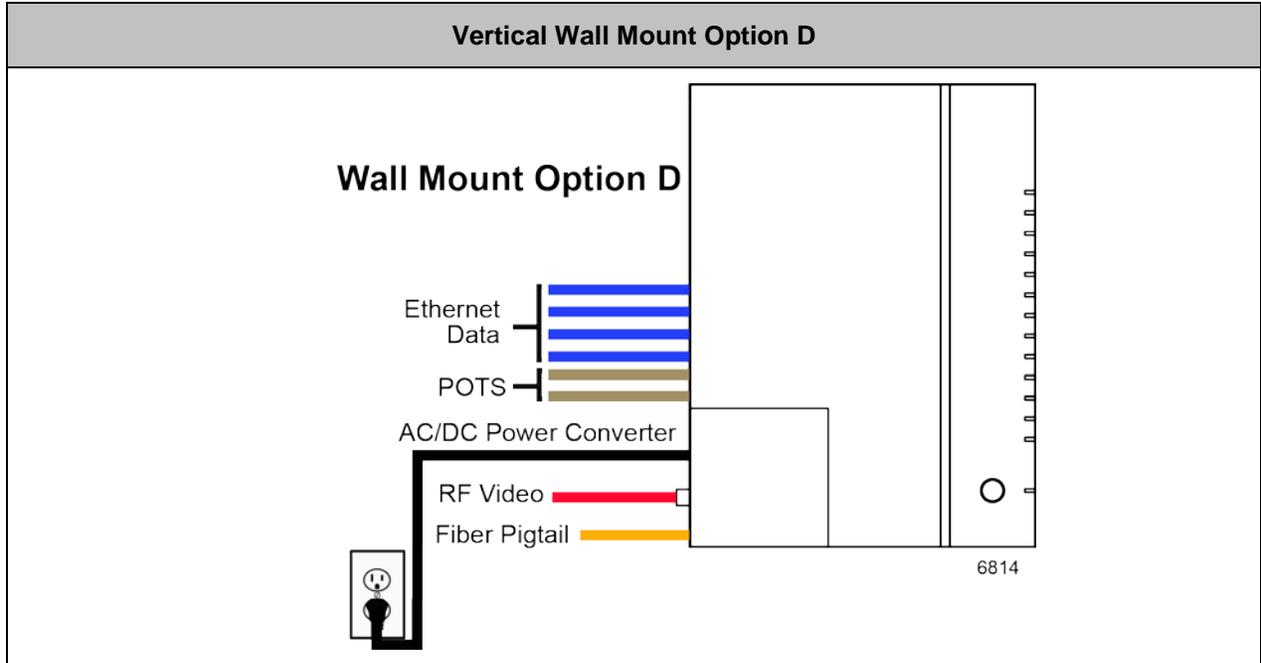Refer to the following page for illustrations of the various mounting options.

- **Vertical Wall Mount Option A** - The 844G/854G is mounted to any rigid surface with the UPS installed within 4 to 10 feet (1.2 to 3 meters). Power for the UPS is provided via an appropriate 2 or 3-prong 110/220 VAC receptacle. The (2 x 4) 8-pin (ONT/RSG end) to 7-pin terminal block connector (UPS end) cable provides 12 VDC power and signaling to the GigaCenter. The fiber pigtail is either routed out the left-hand side and connected to a LCP or NID or is stored in the splice tray directly behind the GigaCenter. Subscriber services exit the unit out the the left hand side.

- **Horizontal Wall Mount Option B** - Similar to Option A, the unit is mounted such that services exit the unit out the bottom and the UPS is mounted directly below. This configuration also may be appropriate for deployments inside a SWE.

  Note: The power and signal cable is terminated only at the GigaCenter end (2 x 4) 8-pin connector while the connection at the UPS is manually wired (screw-down) to the 7-pin terminal block connector provided with the UPS. Since the power/signal cable is 25 feet (7.6 meters) in length, the two devices need not be in close proximity to one another.

- **Horizontal Wall Mount Option C** - This deployment option does not include back-up power. The Calix provided 110/200 VAC to 12 VDC power converter is plugged directly into the wall socket or power receptacle. The fiber pigtail and subscriber services exit the unit out the bottom of the unit. This option is also suitable for use in SWE environments.

- **Vertical Wall Mount Option D** - Identical to Option C except the GigaCenter is rotated 90° counter-clockwise with fiber and subscriber services exiting the unit out the left-hand side. This option is also suitable for use in SWE environments.

Vertical Wall Mount Option A

Horizontal Wall Mount Option B

Wall Mount Option B

6809

Ethernet
Data

POTS

RF
Video

Fiber
Pigtail

AC Power to UPS
(110/220 VAC 3-prong)

Signal/Power Wiring (12 VDC)

Horizontal Wall Mount Option C

6813

Wall Mount Option C

Ethernet
Data

POTS

RF
Video

Fiber
Pigtail

Power Wiring (AC/DC Converter)

Vertical Wall Mount Option D

Additional Installation Options

The following components may be required to complete your installation:

UPS

A tabletop UPS is available from Calix. This UPS is available in a variety of power configurations. The tabletop UPS includes a power/signal cord that runs from the GigaCenter to the UPS.

UPS Power Cord

Power cords are available for North America (NA), European Union (EU), United Kingdom (UK), Australia/New Zealand (AU/NZ), and Brazil (BR).

Signal Cable

4 foot (1 meter) and 10 foot (3 meters) cables are available, terminated at both ends. A 20 foot (6 meters) cable is also available (terminated at the GigaCenter end with the other end capable of being "cut to length").

Power Converter

Power converters are available for North America (NA), European Union (EU), United Kingdom (UK), and Australia/New Zealand (AU/NZ) power standards.

EU	UK	AU/NZ	Argentina	North America

Structured Wiring Enclosure (SWE) Mount

Mounting holes are built into the Integrated Fiber Management Tray (splice tray) for attachment to a SWE.

Wall Mount

The GigaCenter and UPS can be mounted side-by-side, or separated (up to 20 feet [6 meters] apart).

Integrated Fiber Management Tray

The GigaCenter can be mounted on top of the Integrated Fiber Management Tray, providing a localized fiber management solution without expanding the footprint of the unit.

Site Preparation

Before you install an 844G/854G, you need to consider all incoming and outgoing cables or wires and where they can most easily be routed. In addition, the location of the GigaCenter from a Wi-Fi perspective also needs consideration.

Note: For additional information on optimizing Wi-Fi reception, refer to RG Wi-Fi Best Practices Guide available on the Calix Resource Center.

Note: It is critical that you maintain the proper airflow in and around the unit. GigaCenters are designed for surface mounting only. Do not install cabinetry or other building material around the outside of the unit.

Note: Do not install the unit in a horizontal orientation (flat on a tabletop or ceiling).

Power Cords

In order to complete the installation of an 844G/854G with a UPS, two power cords are required:

- GigaCenter Connectorized Power and Signal Cable - A (2 x 4) 8-pin (GigaCenter end) to 7-PIN terminal block (UPS end) cable available in 4 foot (1.2 meters) or 10 foot (3 meters) lengths.

Note: For deployments where the GigaCenter and the UPS are greater than 10 feet (3 meters) apart, a 20 foot (6 meters) cable is available that has the (2 x 4) 8-pin connector on the GigaCenter end and no connector on the other end. This cable can be cut to length and a 7-pin screw-down terminal block connector can be used to connect to the UPS.

- UPS Power Cable - an 8 foot (2.4 meters) long traditional power cable connecting the UPS to the local AC power receptacle. This cable is available in NA, EU, UK, AU/NZ, and BR power configurations.

For deployments not incorporating a UPS, a single 6 foot (1.8 meters) long (2 x 4) 8-pin (GigaCenter end) to local AC power receptacle is available. This cable is also available in NA, EU, UK, AU/NZ, and BR power configurations.

Wi-Fi Considerations

Certain building materials are particularly effective at blocking Wi-Fi signals (see table below) and should be considered when locating a Wi-Fi access point. Line of sight is not necessary since MIMO technology takes advantage of reflections in the over-the-air path to carry additional data. However, Calix recommends that when possible, the 836GE should be placed in a centralized location within the home to yield the best possible Wi-Fi coverage.

Building Materials and Their Effect on Wi-Fi- Signals	
Material	**Relative Wi-Fi Attenuation**
Wood, Drywall, Particle Board, Tile	Low
Glass	Low
Water	Medium
Bricks, Cinder Block	Medium
Plaster, Stucco	High
Concrete	High
Tinted or Low-E Glass (metalized)	Very High
Metal	Very High
Note: Low attenuation is considered to be best performance	

Note: For additional information on GigaCenter placement from a Wi-Fi range perspective, refer to RG Wi-Fi Best Practices Guide.

Before You Begin

Before starting the installation process, check that the following conditions are met:

- Ensure the site preparation steps are complete based on the model being installed.
- Ensure that all components are on-site or readily available in order to complete the installation.
- All required tools are readily available (including fusion splicing equipment if needed).
- The customer is aware of your planned visit and will provide access to the inside of the home.
- Ensure minimum working clearances have been honored for SWE enclosure installations.

Installation Tips

Follow these tips when installing the 844G/854G:

- Keep fiber optic cables and splicing equipment clean at all times. Use manufacturer approved solvents and cleaning applicators.
- Installations which utilize off-premises telephone extensions must also incorporate a primary ground protection device for each off premises instance.
- When routing optical fibers, be careful to avoid bending fibers beyond the manufacturer recommended 1 inch (2.54 cm) bend radius. Exceeding the bend radius can cause excess attenuation and possibly break the fiber.
- Verify all optical power levels before connections are made. If excessive loss is noted, the use of an optical time domain reflectometer (OTDR) may be required to confirm and correct this condition.
- Clean the fiber ends before making any connections.
- A Class I laser product is used in this equipment. Use an optical power meter to identify an active fiber. Never assume laser power is turned off or that the fiber is disconnected at the other end.
- A protective cap or hood must be placed over any radiating bulkhead receptacle or optical fiber connector.
- For subscribers using data services, all data wiring inside the home must be CAT5 cable.
- Make sure subscriber connections are tightened properly.
- Check the contents of each box carefully as you receive them. Components may not be located where you might expect them due to certain items being tested immediately before shipment.

Required Tools and Supplies

The following accessories, tools, grounding components, and supplies may be needed to install the 844G/854G or Indoor UPS:

Available Accessories

Calix offers the following accessories in order to complete your installation:

- Indoor UPS, 12 VDC with power cord. Available in US, UK, European Union, Australia/New Zealand, and Brazil power plug configurations.
- Signal cable (from UPS to GigaCenter). Available in connectorized 3 foot (1 meter) and 10 foot (3 meters) lengths (both ends). Available in 20 foot (6 meters) length with connector on the GigaCenter end only.
- Indoor power cord (No UPS configuration). Available in 6 foot (1.8 meters) length, adapts 110-240 VAC to 12-15 VDC. Available in US, UK, European Union, Australia/New Zealand, and Brazil power plug configuration ([2 x 4] 8-pin on GigaCenter end).

Tools required

- 3/8-inch (1 cm) drill (for drilling the mounting holes)
- Drill bits appropriate for fasteners of choice
- Wire strippers
- Utility knife, box cutter (for unpacking)
- #1 Phillips head screwdrivers
- Fiber splicing tools
- Fusion splicer for fiber optic cable
- Carpenter's level
- Optical Time Domain Reflectometer calibrated for 1310nm (Transmit) and 1490nm (Receive)

Additional Supplies Needed

- Mounting screws suitable for use with the material that you are attaching the GigaCenter to
- Electrical tape
- Assorted tie wraps (for securing cabling)
- TexWipe™ Alco pad for fiber cleaning (TX806)
- Texwipe™ cloth for fiber cleaning (TX304)
- SC-APC patch cord (pigtail) connector to connect fiber from the NID or LCP to the GigaCenter
- Plastic Structured Wiring Enclosure push-pins for attaching Fiber Management Tray to SWE.

Chapter 2

Connectorized Installation

Unpacking the GigaCenter

Each GigaCenter is shipped individually in its own carton and contains the following:

- (1) GigaCenter (any one of four different models)
- (1) Power Adapter interface cord (wall wart)
- (1) Integrated Fiber Management Tray (splice tray)
- (1) Tabletop Mounting Stand
- (1) 800G Consumer Guide
- (1) Fiber Access Cover Screw
- (2) Product Identification Labels with Login Credentials

After opening the carton, remove the protective packaging, ensure all components above are present, and prepare for mounting the unit.

Installation Variables

Before installing the GigaCenter, consider what additional services may be implemented. Various access points are available on the back of the unit which may or may not be used. Prior to determining the unit's final location, you need to account for the following variables:

- Where will the telephone lines be routed?
- Where will the Ethernet cables be routed?
- What type of building material is used on the home? Make sure you have the appropriate drills, drill bits and fasteners for routing subscriber services and/or power cables as they pass through walls and the like.
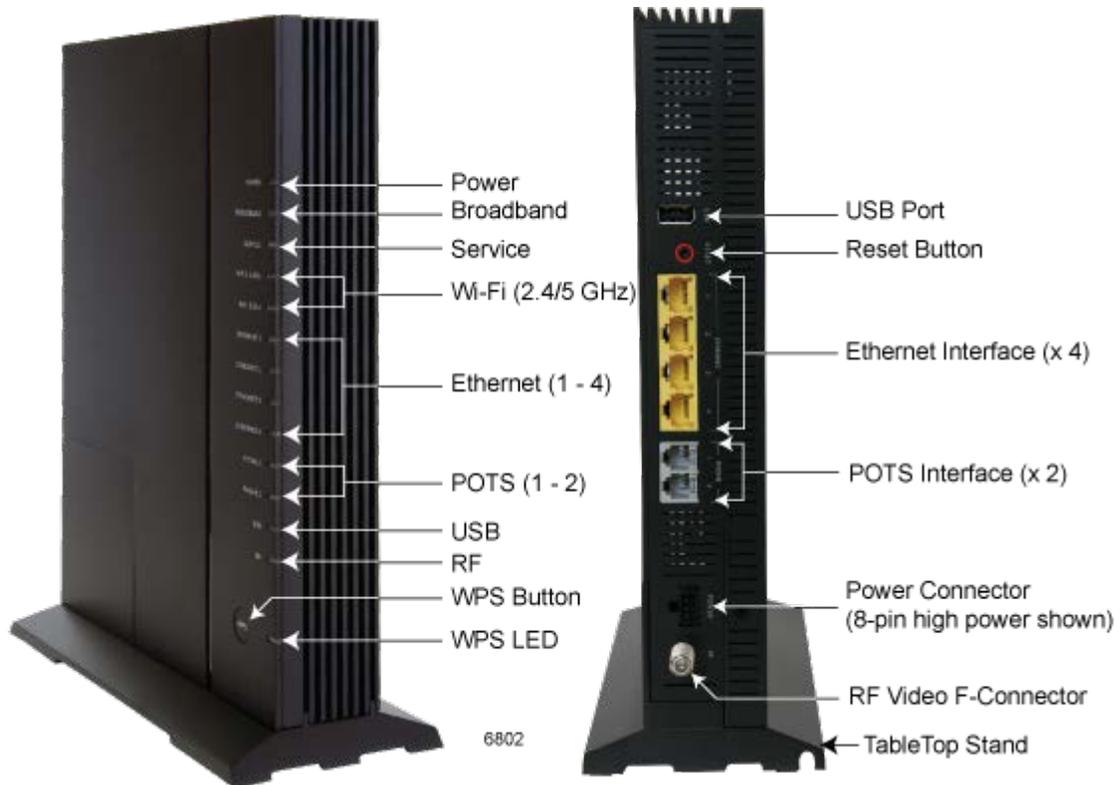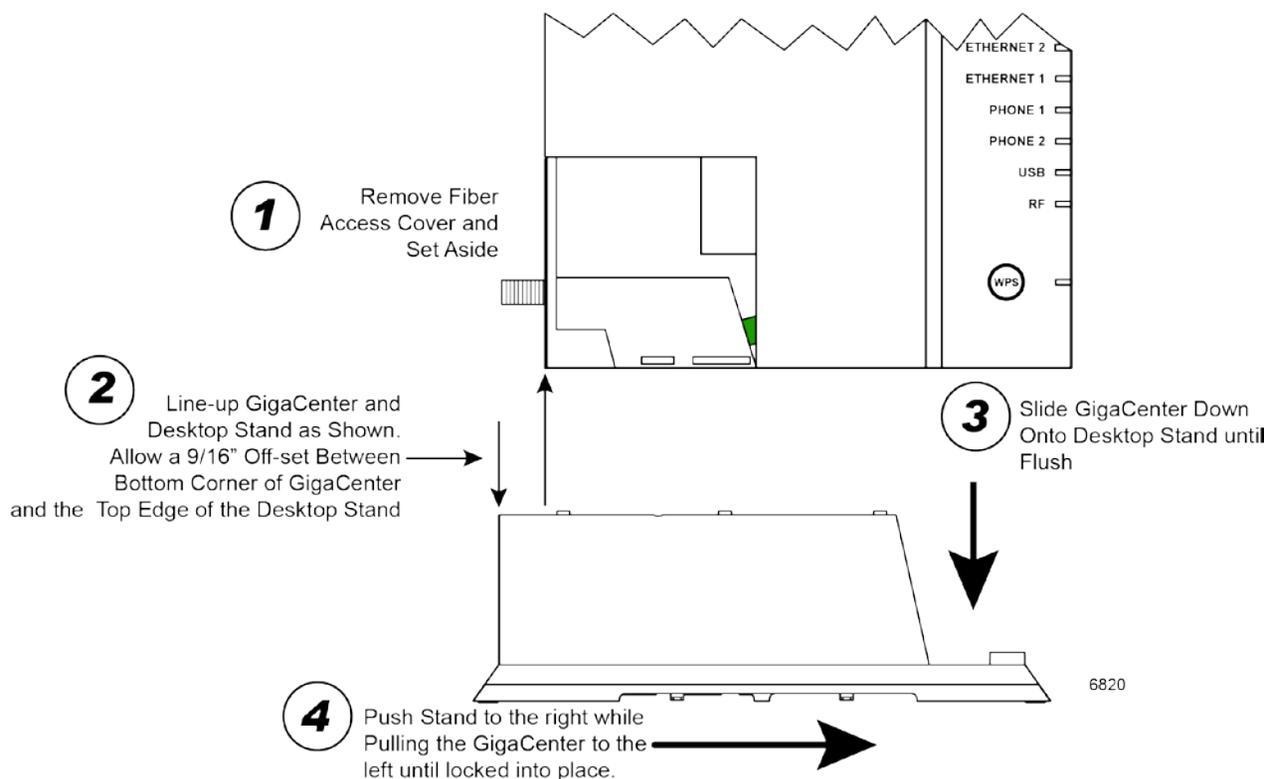
Tabletop Mounting the GigaCenter

Calix GigaCenters can be mounted on a tabletop in a "tower" configuration using the tabletop stand shipped with the product. Keep the following information in mind when considering tabletop mounting:

- Due to the likelihood of having exposed fiber on the tabletop, Calix recommends connecting the unit to the GPON network using a shielded 5mm fiber pigtail with an SC-APC connector on each end.
- Due to component placement inside the chassis, do not install the GigaCenter on a tabletop surface without using the tabletop stand.
- Locate the GigaCenter on the desktop in a location that is unlikely to be bumped or jostled.
- Make sure that service wiring attached to the GigaCenter is secured properly and has minimal sharp bends.
- For RF capable units, make sure that undo stress is avoided when installing any coaxial cables to the F-Connector on the GigaCenter.

Attaching the GigaCenter to the Tabletop Stand

1 Remove Fiber Access Cover and Set Aside

2 Line-up GigaCenter and Desktop Stand as Shown. Allow a 9/16" Off-set Between Bottom Corner of GigaCenter and the Top Edge of the Desktop Stand

3 Slide GigaCenter Down Onto Desktop Stand until Flush

4 Push Stand to the right while Pulling the GigaCenter to the left until locked into place.

ETHERNET 2
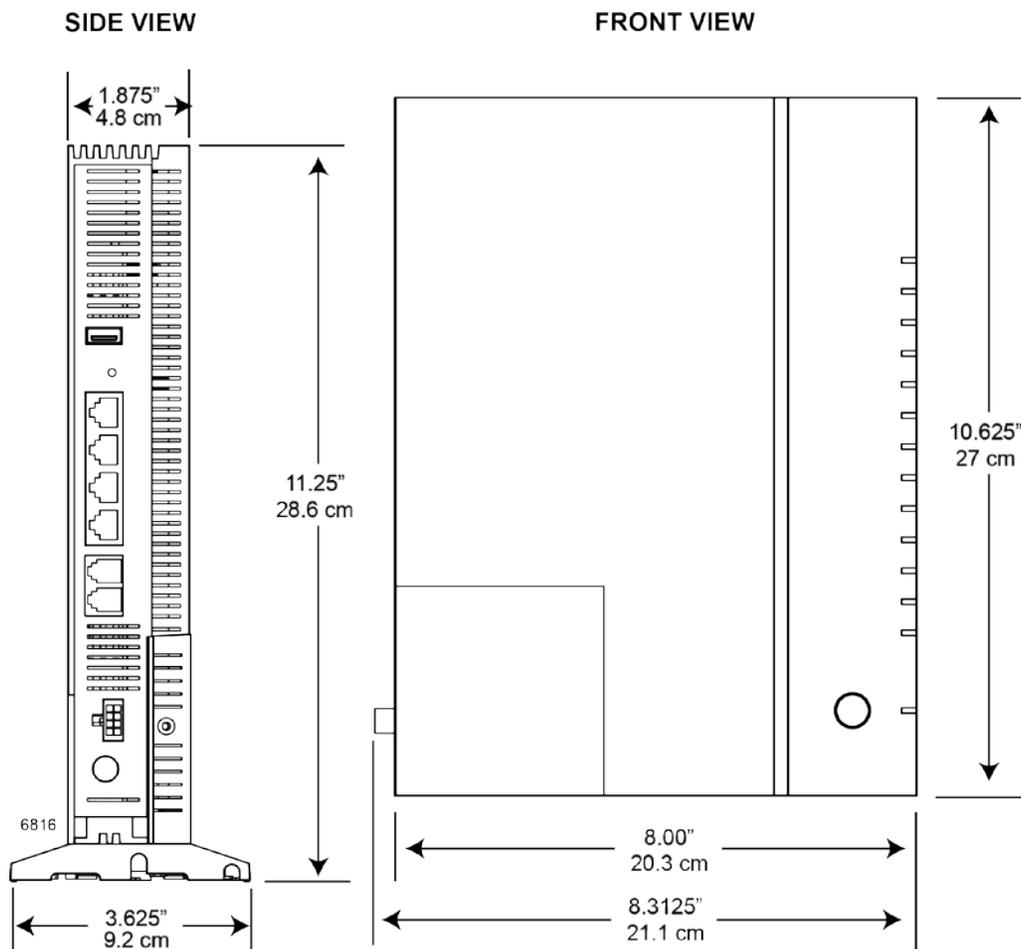ETHERNET 1
PHONE 1
PHONE 2
USB
RF
WPS
6820

To mount the tabletop stand to the GigaCenter

1. Remove the tabletop stand from the bottom of the carton.

2. Remove and temporarily set aside the fiber access cover from the 844G/854G GigaCenter.

3. Orient the stand and the GigaCenter as shown above with the LEDs on the right.

4. Lower the GigaCenter onto the tabletop stand keeping a 9/16" offset to allow proper mating of the two pieces.

5. Once seated on the stand, slide the Gigacenter back onto the stand until it stops and the back end of the GigaCenter is flush with the back edge of the stand.

6. Leave the fiber access cover off temporarily.

7. Proceed to *Installing the Composite Cable - Tabletop Mount* (on page 27)

Tabletop Mounting Dimensions

Dimensions for tabletop mounting of a GigaCenter are included here for reference.

SIDE VIEW   **FRONT VIEW**

1.875"
4.8 cm

11.25"
28.6 cm

10.625"
27 cm

6816

3.625"
9.2 cm

8.00"
20.3 cm

8.3125"
21.1 cm

Installing the Composite Cable - Tabletop Mount

With the tabletop stand mounted to the GigaCenter, the incoming composite fiber must be connected to the GigaCenter.

When deployed without the Fiber Management Tray, the incoming fiber connection enters the GigaCenter through a fiber channel molded into the unit. An access cover is included providing a protective cover ensuring the connection is not disturbed and that the fiber cannot be inadvertently disconnected. Once the fiber connection is completed, the GigaCenter fiber access cover is attached with a provided Phillips head screw.

Note: Refer to *Installing the Composite Cable - Wall Mount* (on page 33) for additional information.

ALERT! A protective cap or hood must be placed over any radiating bulkhead receptacle or optical fiber patch cord.

CAUTION! Use of controls or adjustments or performance of procedures other than those specified here may result in hazardous radiation exposure.

DANGER! A Class 1 laser product with an internal Class IIIb hazard is used in this equipment. Use an optical power meter to identify active fibers. Never assume laser power is turned off or that the fiber is disconnected at the other end.

Overview of procedure

Note: For the purposes of these instructions, it is assumed that a Local Convergence Point (LCP) has been located somewhere near the planned GigaCenter installation site and that a 5mm fiber pigtail will be used to connect the GigaCenter to the GPON network.

- Route the 5mm fiber pigtail from the GigaCenters planned location back to the Local Convergence Point (LCP)
- Attach the pigtail to the GigaCenter
- Secure the pigtail to the tabletop stand
- Route the pigtail back to the LCP and connect to the GPON network
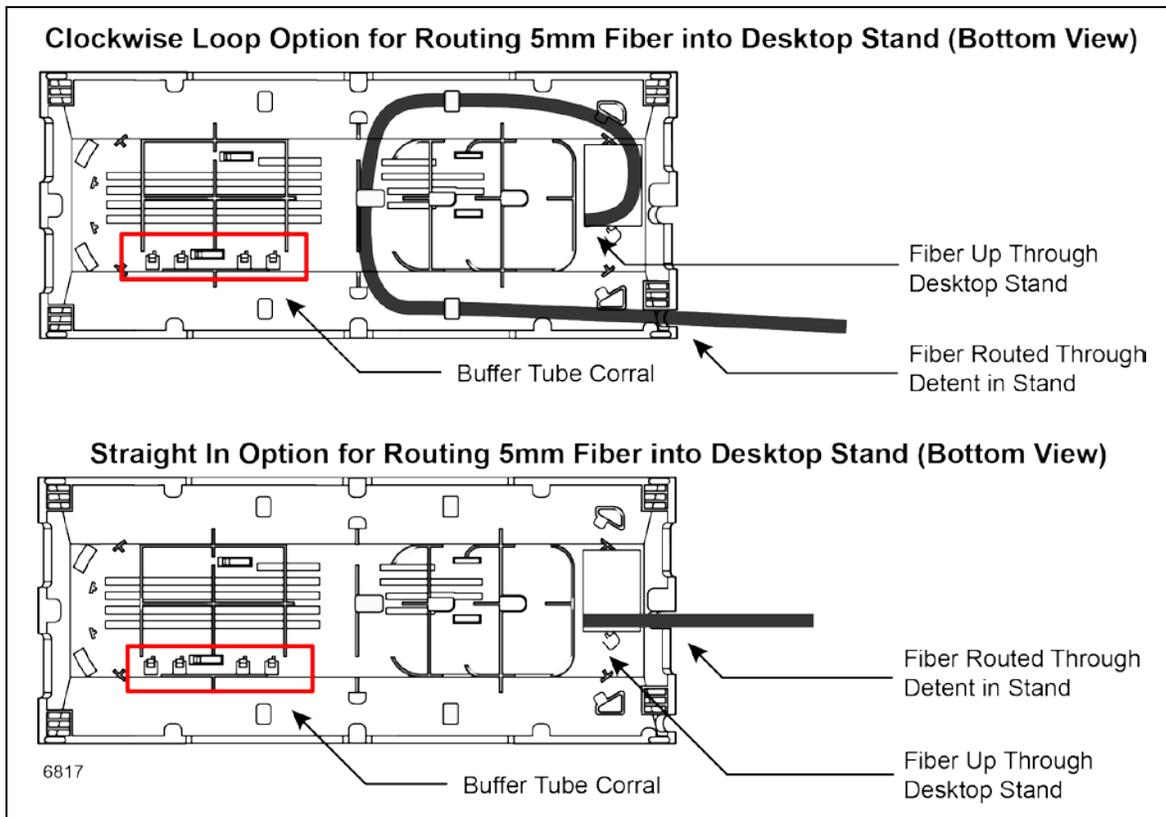- Dress up any slack fiber as appropriate

Connecting the Fiber - Tabletop Configuration
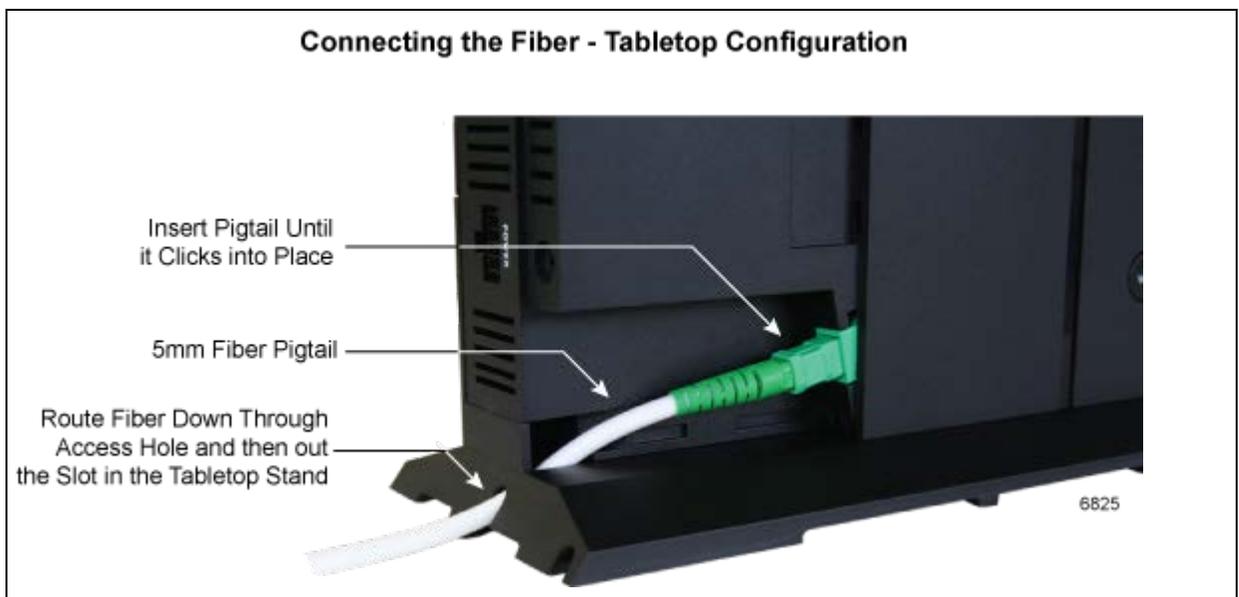
To install the composite cable

1. Route the 5mm fiber pigtail from the LCP to the tabletop.

2. Insert the pigtail end through the fiber access slot as shown above.

3. Insert the SC-APC pigtail into the bulkhead fitting inside the GigaCenter.

4. Wrap any excess fiber around the fiber management stays inside the stand assembly. Depending on the amount of slack fiber that is available, you can install the pigtail using a clockwise loop or a straight in approach can be used.

Note: For deployments where the final fusion splice must be near the GigaCenter, a buffer tube corral is molded into the bottom of the tabletop stand assembly (see below).

5. Use cable ties as necessary to fully secure the excess fiber, being careful not to over-tighten the cable ties and thereby crimping the fiber.

Clockwise Loop Option for Routing 5mm Fiber into Desktop Stand (Bottom View)

Fiber Up Through Desktop Stand

Fiber Routed Through Detent in Stand

Buffer Tube Corral

Straight In Option for Routing 5mm Fiber into Desktop Stand (Bottom View)

Fiber Routed Through Detent in Stand

Buffer Tube Corral

Fiber Up Through Desktop Stand

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Wall Mounting the GigaCenter

Wall Mounting Dimensions

Dimensions for a wall or SWE mounted GigaCenter are included here for reference.

Dimensions with Splice Tray Attached
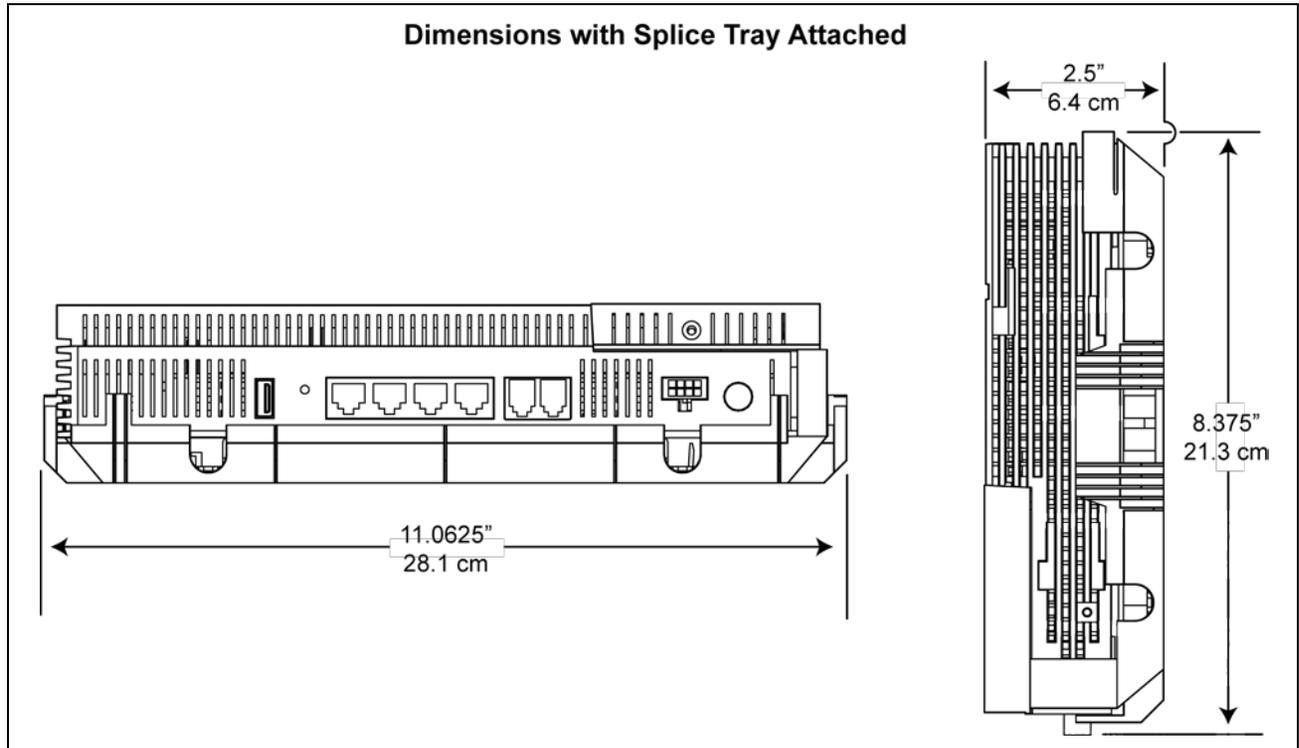
To mount the fiber management tray

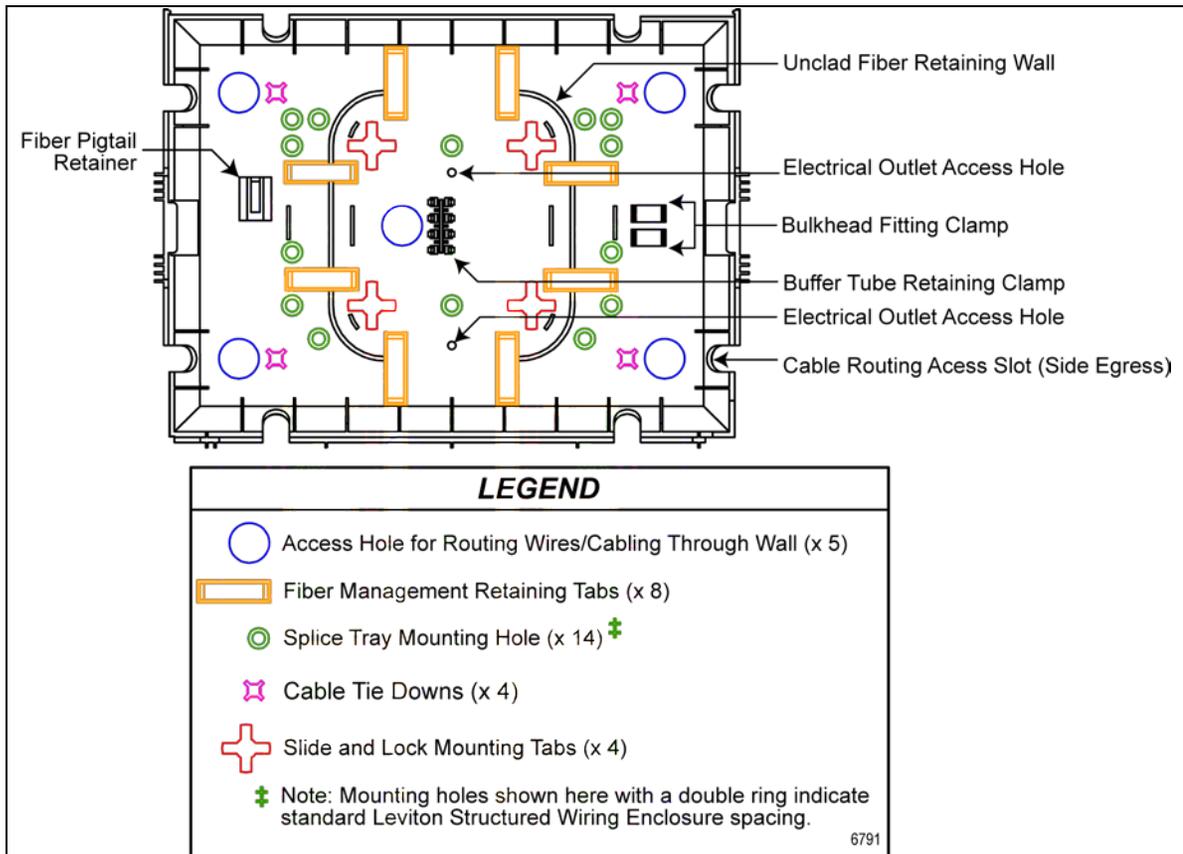1. Test mount the GigaCenter to the fiber management tray to determine final desired orientation for incoming and outgoing wiring.

2. Disconnect the GigaCenter from the fiber management tray and set the GigaCenter aside.

3. Mount the fiber management tray to the wall or SWE using appropriate fasteners based on the material you are attaching to.

4. If utility or service wiring is to be routed through the wall, drill out the appropriate access holes in the fiber management tray, taking care not to damage the unit.

Note: The round pass-through holes in the assembly are 3/4" in diameter.

Note: The fiber management tray can be attached directly to a standard electrical outlet using the provided mounting holes as shown below.

Unclad Fiber Retaining Wall

Fiber Pigtail Retainer

Electrical Outlet Access Hole

Bulkhead Fitting Clamp

Buffer Tube Retaining Clamp

Electrical Outlet Access Hole

Cable Routing Acess Slot (Side Egress)

LEGEND

Access Hole for Routing Wires/Cabling Through Wall (x 5)

Fiber Management Retaining Tabs (x 8)

Splice Tray Mounting Hole (x 14)

Cable Tie Downs (x 4)

Slide and Lock Mounting Tabs (x 4)

Note: Mounting holes shown here with a double ring indicate standard Leviton Structured Wiring Enclosure spacing.

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Wall Mounting the Fiber Management Tray

The GigaCenter can be mounted to a Fiber Management Tray or a Structured Wiring Enclosure.

Note: Calix recommends using the wall mount method whenever possible to ensure ongoing integrity of the fiber connection and outgoing subscriber services.

To wall mount the GigaCenter

DANGER! High voltage electrical and pressurized natural gas lines may be present. Make sure you fully understand the locations of these and all other utility connections before drilling through any surface.

1. Determine the location of the GigaCenter on any suitable vertical surface.

   Note: Make sure you allow for adequate bend radius on the connector side of the unit.

   Note: Make sure to allow adequate space for service cable routing.

2. Mark the mounting screw hole locations using the diagram below for reference.

3. Using a proper sized drill bit for the mounting screws required, pre-drill the mounting hole locations.

Mounting hole locations for the GigaCenter and the Integrated Fiber Management Tray are shown below for reference:
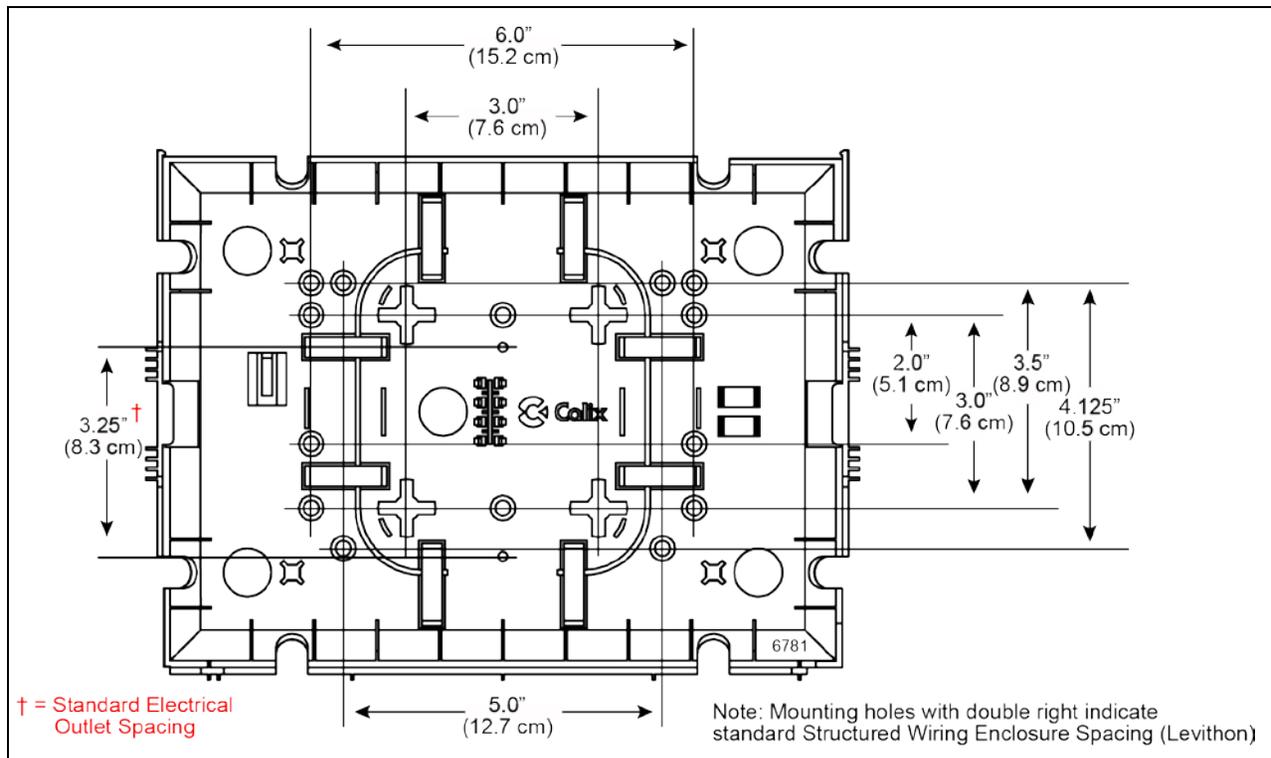
Installing the Composite Cable - Wall Mount

With the Integrated Fiber Management Tray mounted to the wall, the incoming composite fiber must be installed and spliced into the Integrated Fiber Management Tray.

ALERT! A protective cap or hood must be placed over any radiating bulkhead receptacle or optical fiber patch cord.

CAUTION! Use of controls or adjustments or performance of procedures other than those specified here may result in hazardous radiation exposure.

DANGER! A Class 1 laser product with an internal Class IIIb hazard is used in this equipment. Use an optical power meter to identify active fibers. Never assume laser power is turned off or that the fiber is disconnected at the other end.
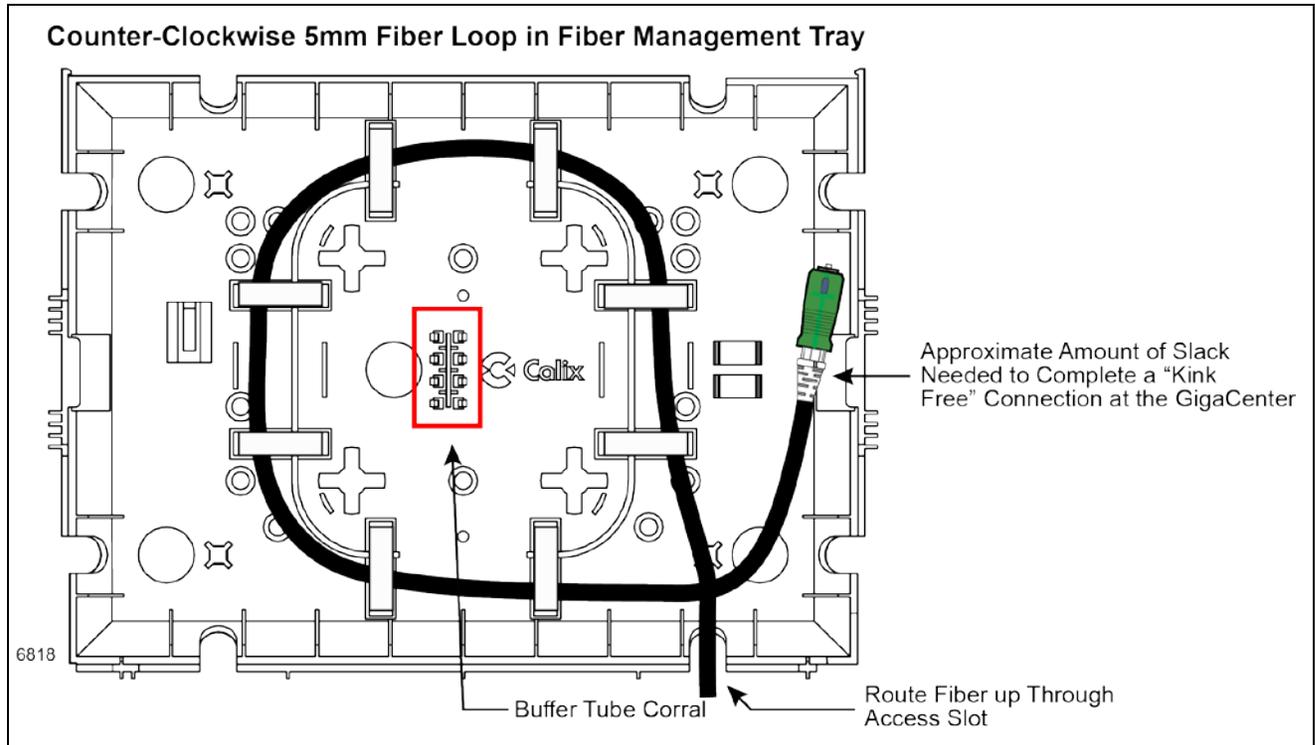
Overview of procedure

Note: For the purposes of these instructions, it is assumed that a Local Convergence Point (LCP)has been located somewhere near the planned GigaCenter installation site and that a 5mm fiber pigtail will be used to connect the GigaCenter to the GPON network.

- Prepare the pigtail for splicing onto the end of the incoming composite cable.
- Prepare the composite cable for splicing.
- Fusion splice the pigtail and composite cable together.
- Route and secure the spliced components into the Integrated Fiber Management Tray.

To install the composite cable

1. Route the 5mm fiber pigtail from the LCP

2. Locate the incoming fiber composite cable and route it through the fiber access slot as shown below.

3. Wrap any excess fiber around the fiber management stays inside the assembly. Make sure the amount of slack available closely matches the example below (the pigtail must be connected to the GigaCenter without exceeding bend radius specifications).

4. Use cable ties as necessary to fully secure the excess fiber, being careful not to over-tighten the cable ties and thereby crimping the fiber.

Counter-Clockwise 5mm Fiber Loop in Fiber Management Tray

Approximate Amount of Slack Needed to Complete a "Kink Free" Connection at the GigaCenter

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Buffer Tube Corral

Route Fiber up Through Access Slot

Installing the GigaCenter onto the Fiber Management Tray

With the 5mm fiber pigtail threaded and secured to the mounted fiber management tray, the GigaCenter can now be secured to the fiber management tray The proper mating of these two pieces is critical in ensuring the fiber pigtail is not pinched or kinked during the assembly process.

During the assembly process, the GigaCenter will slide onto the rails of the fiber management tray and as the GigaCenter slides down (or across), the 5mm fiber pigtail needs to be routed around the GigaCenter and connected to the bulkhead fitting.

To assemble the GigaCenter onto the fiber management tray

Note: Refer to the images below for guidance in assembly the GigaCenter to the fiber management tray.

1. Press and slide the fiber access cover down to remove it from the front of the GigaCenter. Set aside temporarily.

2. Center the GigaCenter over the fiber management tray and tip the GigaCenter slightly to one side or the other in order to clear one of the retainer tabs on the fiber management tray.

3. Once clear, guide the GigaCenter onto the embossed glide of the fiber management tray. The glide should be positioned between the 2nd and 3rd channel of the GigaCenter unit.

4. Rotate the trailing edge of the GigaCenter down while manually bending the remaining retaining tab out of the way.

5. With the GigaCenter partially engaged into the fiber management tray, grab the pigtail end and connect it to the bulkhead fitting on the GigaCenter (Figure 2).

6. Once clicked into place, wrap the 5mm fiber around and behind the GigaCenter making sure it does not kink or get pinched between the tray and GigaCenter.

7. Continue sliding the GigaCenter down (or across) until it is full seated on the fiber management tray (Figure 3).

8. Ensure the GigaCenter has cleared the retaining tabs on each end and that the retaining tabs are "locking" the GigaCenter in place.

9. Double-check the fiber pigtail is secured and is not pinched or kinked in any way.

10. Re-attach the fiber access cover.

11. Locate the screw for attaching the fiber access cover (shipped in a small bag) to the GigaCenter and tighten.
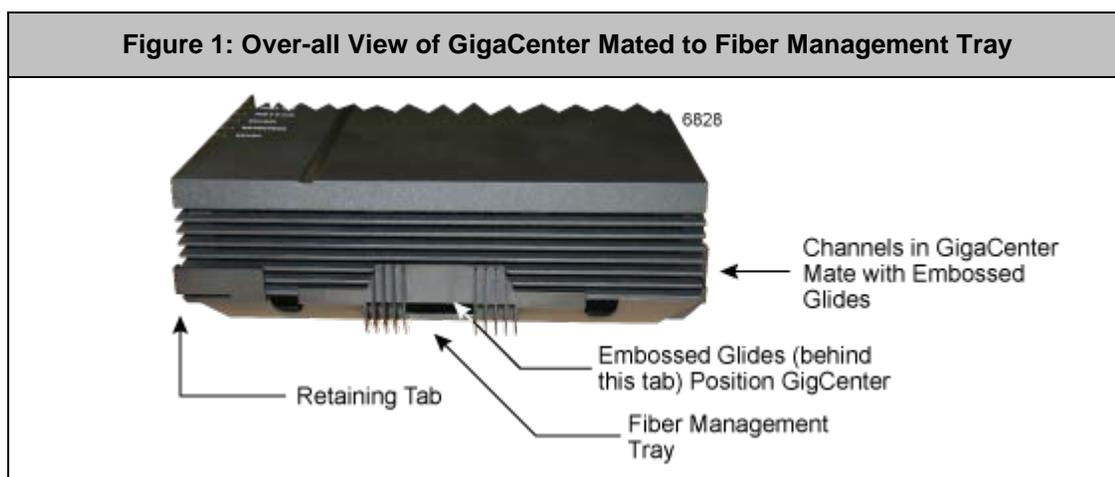

Figure 1: Over-all View of GigaCenter Mated to Fiber Management Tray

Figure 2: GigaCenter Slid partway and 5mm Pigtail Attached

5mm Pigtail Seated
Into GigaCenter
Bulkhead Fitting

Ensure Pigtail is Tucked
Behind Access Slot Before
Seating the GigaCenter All
the Way Down.

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Figure 3: GigaCenter Fully Mated with Fiber Management Tray

Slotted Guides on GigaCenter
Follow the same Groove Top
to Bottom

5mm Pigtail Routed Through
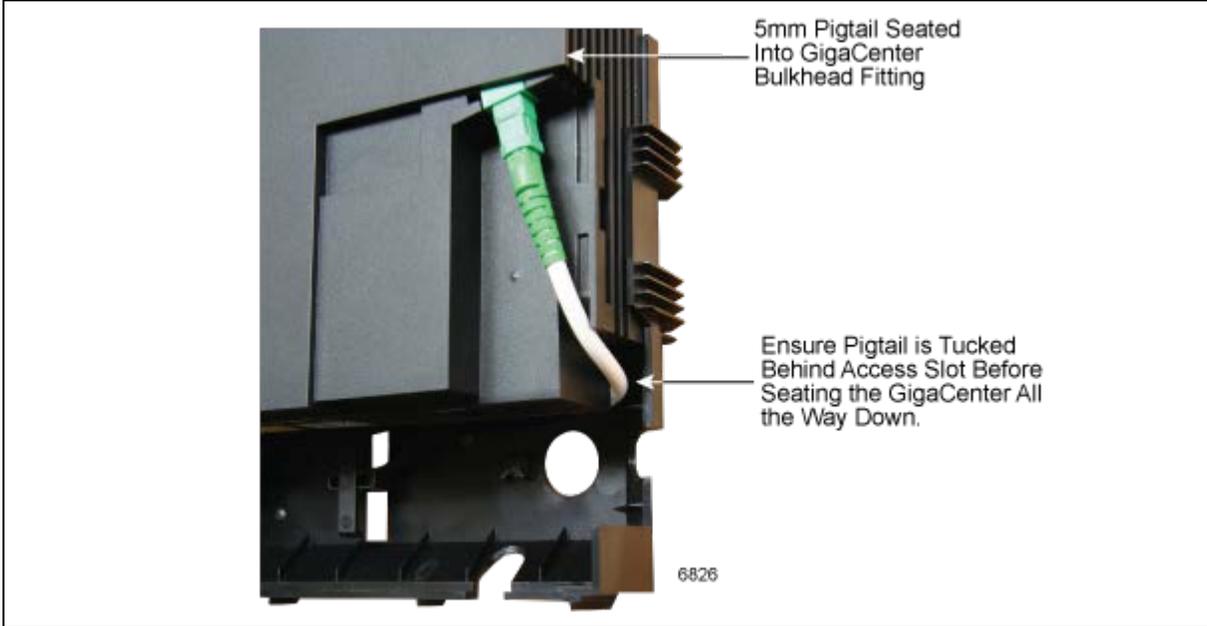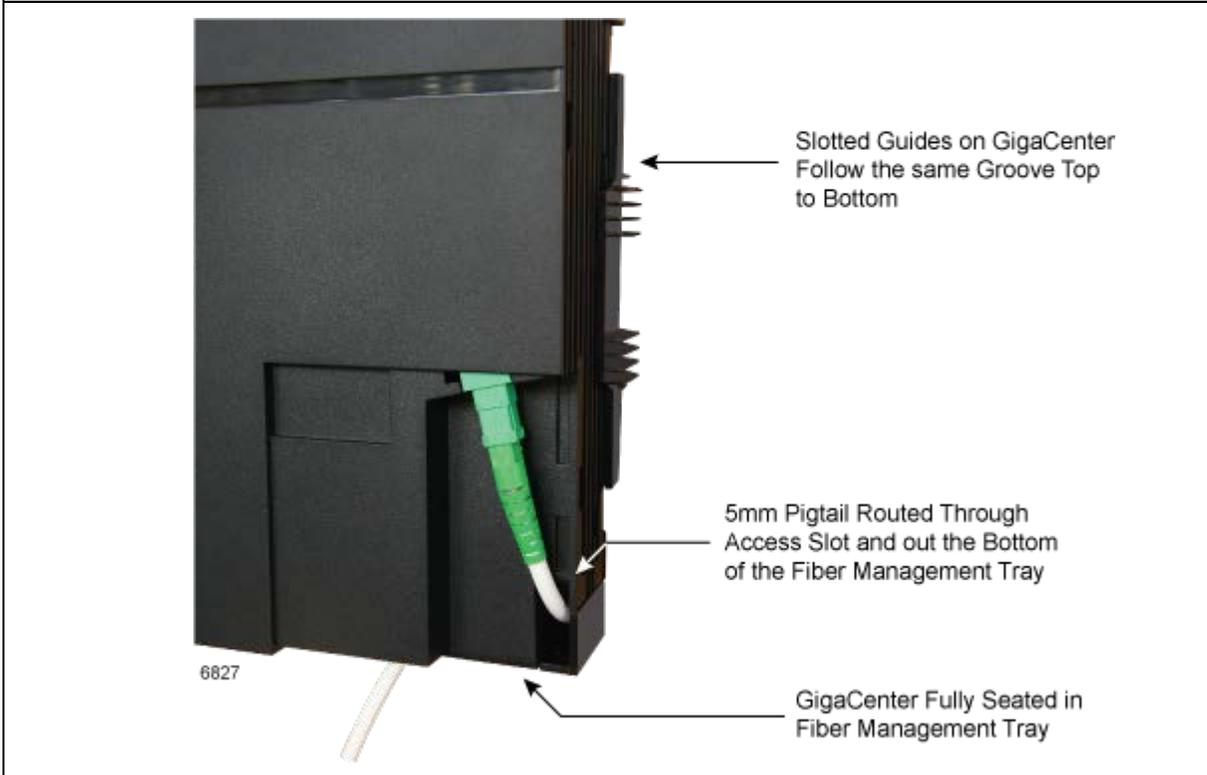Access Slot and out the Bottom
of the Fiber Management Tray

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GigaCenter Fully Seated in
Fiber Management Tray

Chapter 3

UPS Installation

Mounting the Universal Power Supply

Prior to putting the GigaCenter into service, the UPS must be mounted to ensure the low voltage power cord that is connected between the UPS and the GigaCenter is long enough to span the distance between the two devices.

Depending on your configuration, power cords of varying lengths may be included:

- The AC power cord that runs from the UPS to the AC wall outlet is 8-feet long. Make sure an AC outlet is available within that distance.

- The power/signal cord that runs from the UPS to the GigaCenter is available in any of the following configurations based on model.

844G-1/854G-1 (North American Markets), Sold Separately

- Connectorized Power and Signal Cable - An 8-pin (GigaCenter end) to 7-pin terminal block (UPS end) cable available in 3 foot (1 meter) or 10 foot (3 meters) lengths.

- Connectorized Power and Signal Cable - An 8-pin (GigaCenter end) to dressed and tinned (un-terminated) cable available in 20 foot (6 meter) length.

- Power Adapter, 2-prong Type A - An 8-pin (GigaCenter end) to standard North American 2-prong electrical outlet (how long?)

844G-2/854G-2 (International Markets), Sold Separately

- Power Adapter, EU Type C
- Power Adapter, AM Type A
- Power Adapter, UK Type G
- Power Adapter, AU/NZ Type 1
- Power Adapter, AR Type 1

Mounting the UPS

WARNING! High voltage electrical and pressurized natural gas lines may be present. Make sure you fully understand the locations of these and all other utility connections before drilling through any surface.

CAUTION! The UPS is designed for indoor installation and must be installed in a location with adequate airflow.

Make sure the UPS is not installed under water pipes which may leak or drip from condensation.

Note: The UPS must be located less than 50 feet (15.2 meters) from the GigaCenter when using an 18 AWG Type I power cord or less than 70 feet (21.3 meters) from the GigaCenter when using 16 AWG Type II power cord.

1. Unpack the UPS and associated hardware from the carton.

2. Find a suitable location for the UPS and prepare mounting screws per the mounting hole pattern shown below.

   Note: Refer to the back of this guide for a UPS mounting template.
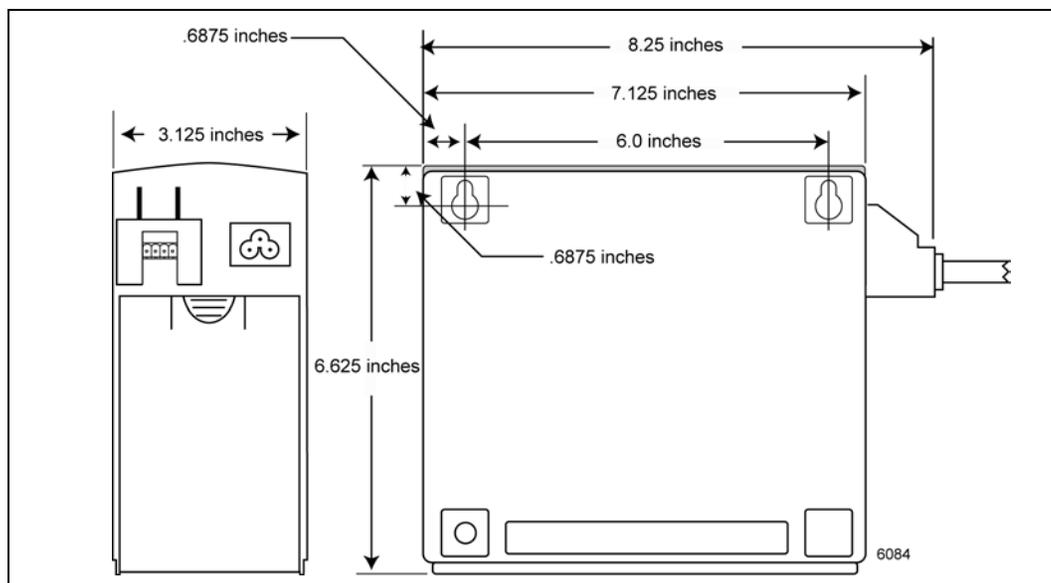
1. Pre-drill mounting holes (to accept an 8-32 pan head screw - not provided) of the appropriate size.

   Important: Make sure the material you are mounting the UPS to is of sufficient strength to support its weight of 7.16 pounds (3.25 kgs).

2. Insert a screw into each hole, leaving 3/16-inch (.48 cm) of the screw protruding from the wall.

3. Align the key slots on the top of the UPS with the screws and slide the unit down into place.

4. If the UPS is not snug after test fitting the mounting screws, remove the UPS and tighten the mounting screws slightly to allow for a tighter fit.
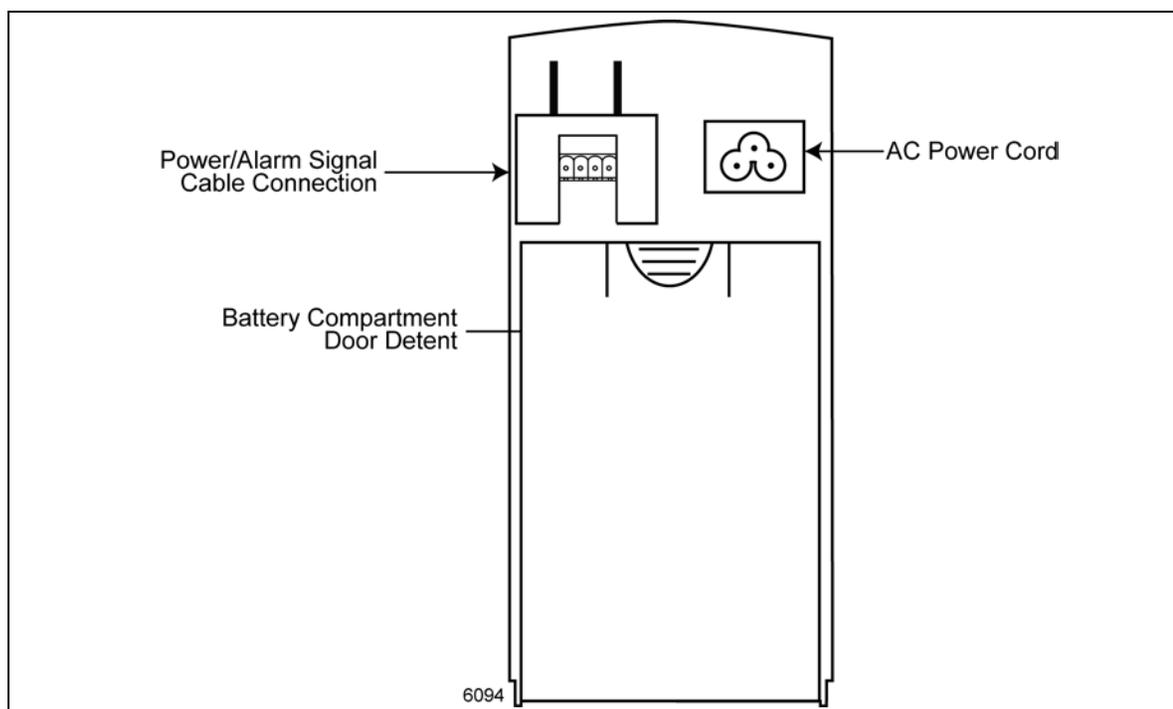
5. Unpack the battery and slide it into the UPS housing.

6. Attach the battery leads to the battery (red to red, black to black).

7. Re-install the battery cover.

Installing the Power/Signal Cable

The cable providing power and alarm signaling from the UPS to the GigaCenter is pre-wired and ready for plug-and-play use. This pre-wired power/signal cable is available in 3 foot (1 meter) or 10 foot (3 meter) lengths.

Note: A 20 foot (6 meters) cord is also available including a (2 x 4) 8-pin connector on the GigaCenter end and dressed and tinned non-terminated 7-wire on the opposite end (provides "cut to length" option).

To connect the power/signal cable

1. Locate the power and alarm cable and remove any cable ties.

2. Plug one end into the UPS and plug the other end into the GigaCenter ([2 x 4] 8-pin connector).
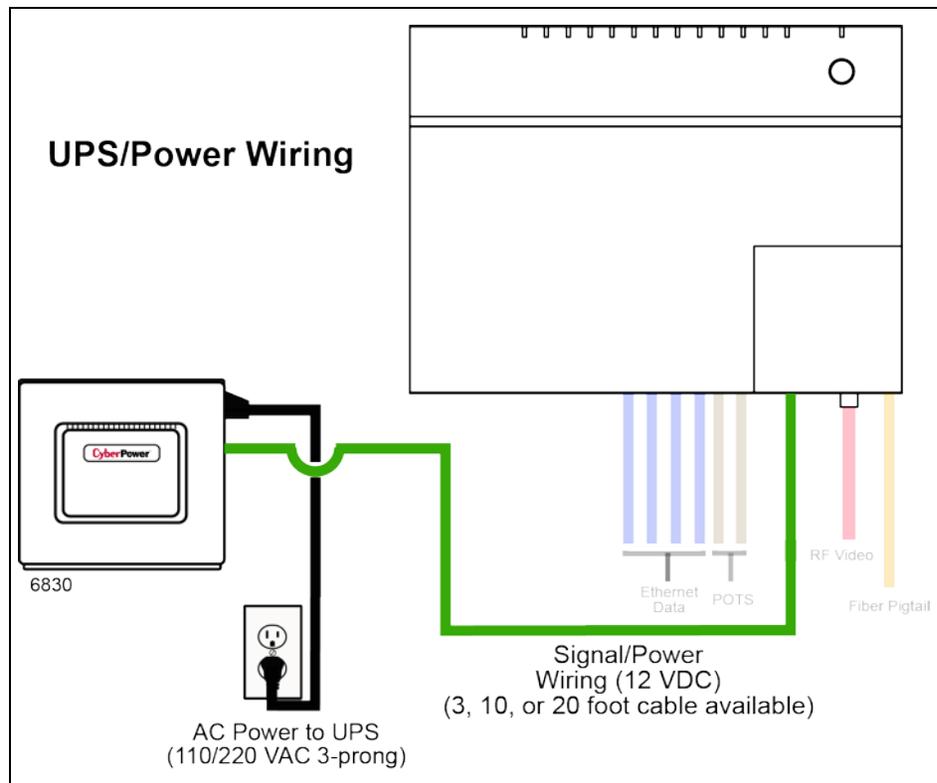
For installations where the non-terminated 20 foot (6 meters) cable is used or instances where the 3 foot (1 meter) or 10 foot (3 meters) cable needs to be trimmed to a shorter length, the pin-out information is offered here as reference.

Pin #	Color	Signal
1	Red	Power In +
2	Black	Power In -
3	Green	Status Return
4	Gray	On Battery
5	Brown	Replace Battery
6	Blue	Battery Missing
7	Orange	Low Battery

Chapter 4

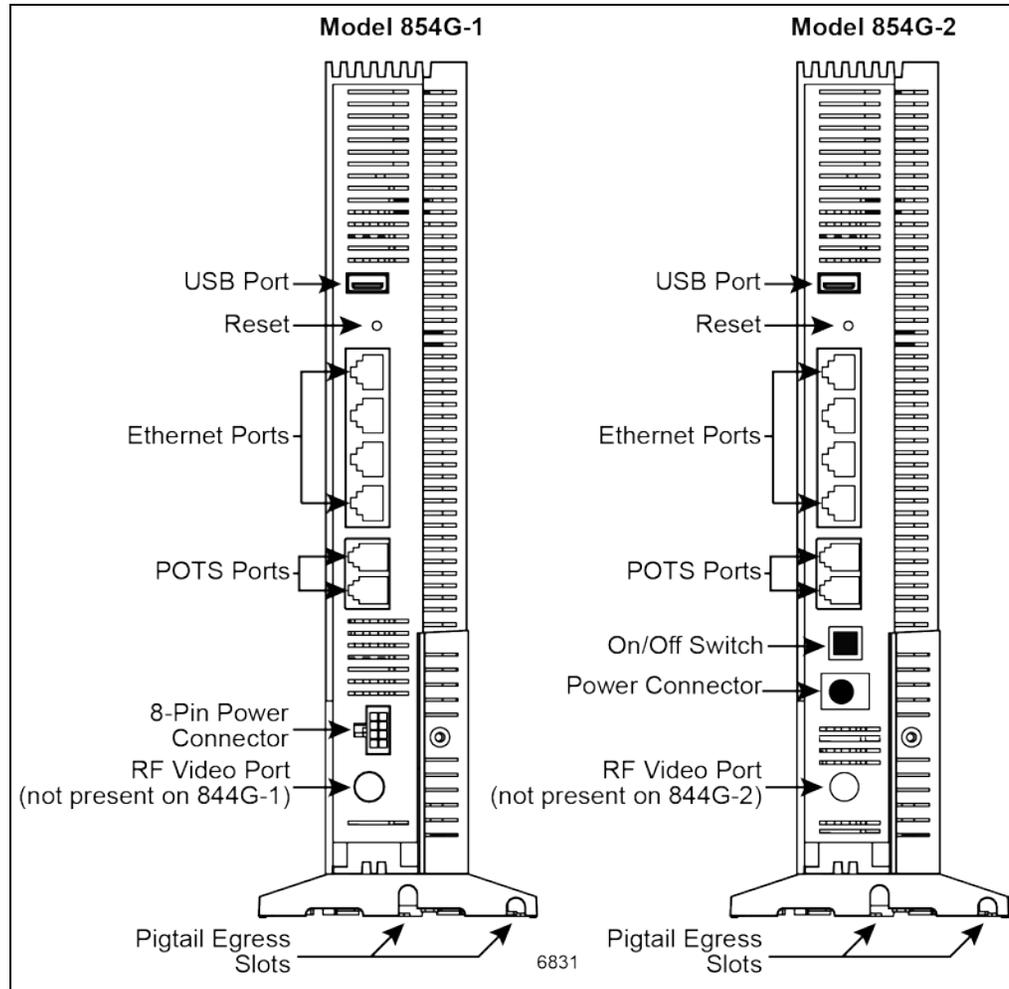# Final Set-up and Testing

Connecting Outside Services

Subscriber voice, IP video and data services are attached to the rear of the GigaCenter.

To install subscriber services

Note: Subscriber telephone lines are connected via RJ-11 connectors. IP video and data services are connected using RJ-45 connectors.

1. Locate the telephone, video, and data cables coming from the subscriber's home.

Model 854G-1 | **Model 854G-2**

USB Port

Reset

Ethernet Ports

POTS Ports

On/Off Switch

Power Connector

8-Pin Power Connector

RF Video Port (not present on 844G-1)

RF Video Port (not present on 844G-2)

Pigtail Egress Slots

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2. Connect the incoming telephone lines to the RJ-11 connectors on the rear of the GigaCenter.

3. Optional: Connect a coaxial cable to the IP video port (RG-58) on the back of the 854G-1 or 854G-2 GigaCenter.

4. Connect CAT5 Ethernet cables to the RJ-45 Ethernet ports.

5. Secure all subscriber service wiring as appropriate.

Wi-Fi Protected Set-up (WPS) LED Behavior

Depending on the services being configured, the WPS button and associated WPS LED will react differently.

For data services, WPS is enabled upon pressing the WPS a single time. The WPS LED begins to flash (green) and continues to do so for up to 180 seconds. During this time, other Wi-Fi capable devices can be paired to the GigaCenters Wi-Fi radios (either the 2.4 GHz or the 5.0 GHz band) by initializing a similar WPS function on the remote device, thereby creating an association with the primary SSID of the GigaCenter and the other device. WPS LED behavior for pairing to the primary SSID (either 2.4 GHz or 5.0 GHz) is as follows:

- Press WPS button a single time.
- WPS LED illuminates green and flashes for up to 120 seconds.
- Wi-Fi 5.0 GHz LED begins flashing after approximately 10 seconds indicating the pairing process has begun.
- If another device is found, the GigaCenter pairs with the device, the Wi-Fi 5.0 GHz LED remains on continuously, and the WPS LED goes out.
- If no device is found, the WPS LED turns red after the initial 120 second time-out and remains red for another 120 seconds.

For IPTV services, WPS is enabled upon pressing the WPS three times in approximately 1 second intervals. After a short delay, the WPS LED begins to flash (amber) and continues to do so for up to 180 seconds. During this time, other Wi-Fi capable devices can be paired to the GigaCenters 5 GHz Wi-Fi radio by initializing a similar WPS function on the remote device, thereby creating an association with the reserved IPTV SSID (5GHz_IPTV_SSID) of the GigaCenter and the other device. WPS LED behavior for pairing to the IPTV SSID (5.0 GHz) is as follows:

- Press WPS button exactly three times, at one second intervals. WPS LED turns green and begins flashing after the 3rd press.
- WPS LED illuminates amber after approximately 10 seconds and flashes for up to 120 seconds. The GigaCenter has entered IPTV SSID pairing mode.
- If another device is found, the GigaCenter pairs with the device and the WPS LED turns green and remains on for approximately 120 seconds.
- If no device is found, the LED turns red after the 120 second time-out and remains red for 120 seconds.
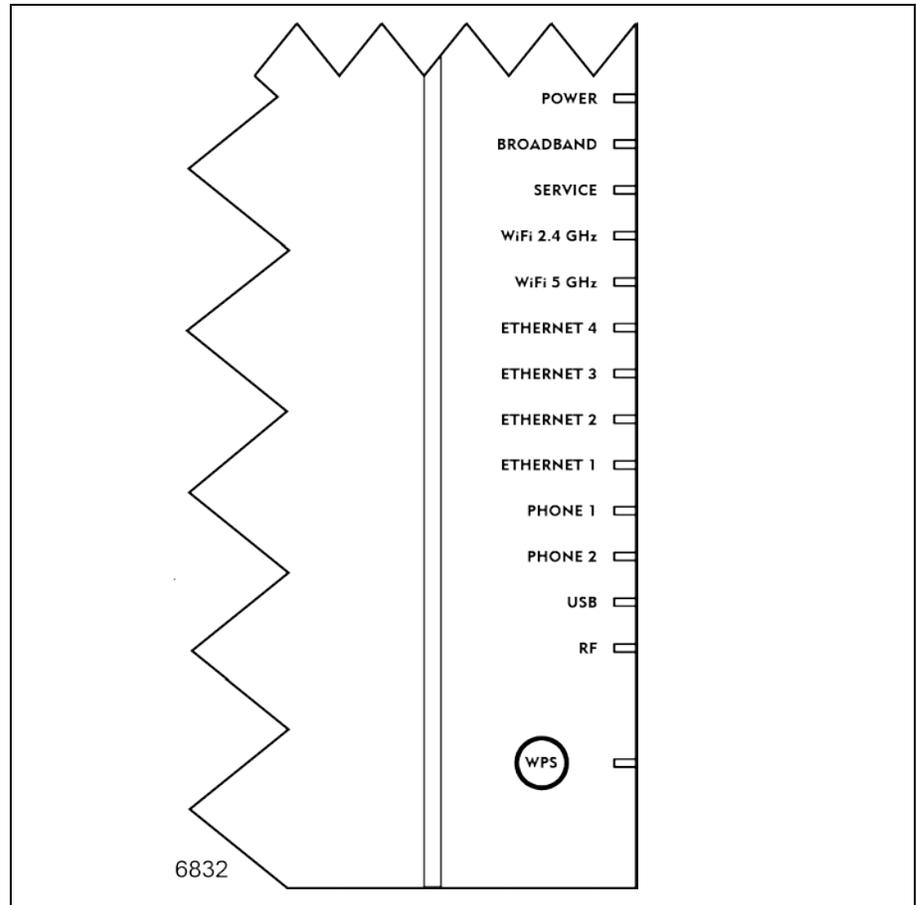
LED Behavior

Before leaving the site, verify that the GigaCenter is communicating with the GPON network. Viewing the LEDs helps the installer determine the exact state of the device.

A properly installed and functional GigaCenter exhibits the following LED behavior:

- When power is initially applied, the power LED behaves differently based on the state/status of the UPS:
    - If no UPS is present or if a UPS is present and is not currently providing primary power, the power LED illuminates and remains lit.
    - If a UPS is present and a battery alarm condition exists, the power LED blinks to indicate an alarm status.
    - If LED does not light, power is off or the UPS power supply is not functional.
- During initial power-up, all remaining LED's come on momentarily (lamp test).
- If the SC-APC pigtail is not connected, the Phone 1 LED will begin to blink when Voice Smart Activate is activated.
- If the SC-APC pigtail is connected, the Broadband LED begins flashing once downstream synchronization has been completed. The LED switches to solid green if the GigaCenter has been provisioned.
- As Ethernet ports are initialized, the corresponding LED illuminates provided an Ethernet device is connected to the port.

Note: Phone service is not available until the Broadband LED lights and remains on.

POWER
BROADBAND
SERVICE
WiFi 2.4 GHz
WiFi 5 GHz
ETHERNET 4
ETHERNET 3
ETHERNET 2
ETHERNET 1
PHONE 1
PHONE 2
USB
RF

WPS

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Note: The integrated WPS feature allows for the sync'ing of remote WIFI capable products with the GigaCenter. When in WPS mode (pressing the WPS button), the WIFI LED blinks rapidly for 120 seconds, indicating the remote device is attempting to pair with the GigaCenter.

Note: By default, the Wi-Fi radio is disabled upon start-up. Once initialized (via graphical user interface), the Wi-Fi LED assumes normal functionality).

LED States and Status

The LED's located on the face of the GigaCenter provide information on the status and current state of the device.

LED States and Status			
LED NAME	**ON**	**OFF**	**BLINK**
POWER	Main AC power (either power adapter or UPS) is present at the ONT/RSG.	No power present (AC power or battery back-up).	ONT/RSG is on battery and the battery remains in a fully functional state.
BROADBAND	Broadband physical connection has been established. GigaCenter has ranged with GPON network.	Broadband interface is not powered - no signal detected.	When WAN is active, broadband interface has detected a carrier signal. LED blinks at 50% duty cycle when optical light is detected and the GigaCenter is in ranging mode.
SERVICE	See table below for specific behaviors		
WiFi 2.4 GHZ **WiFi 5 GHz**	Wi-Fi is enabled.	Wi-Fi is disabled.	N/A
ETHERNET 4 through ETHERNET 1	A powered device is connected to the port.	The GigaCenter is not powered, cable is not attached, or no powered device is connected to the port.	Activity is present on associated device - downstream traffic present. Rate of blink loosely translates to the amount of packets being transported.
PHONE 1 **PHONE 2**	At least one POTS port is off hook.	Zero POTS ports are in service (off hook)	Smart Activate or Voice Activate in process.
USB	A device is connected, and associated with the USB port however the port is currently idle.	The device is not powered, no cable connected, or no powered devices connected to the port.	Activity is present on the USB port. Rate of blink loosely translates to the amount of packets being transported.
RF **Model 854-1 AND 854-2 only**	RF video optical level is within prescribed AGC range.	RF Video optical level is outside prescribed range (too low) or no signal is present.	N/A
WPS	GREEN: On for three minutes or until WPS button is pressed again. RED: On for two minutes. An error has occurred unrelated to security such as no partner found, protocol aborted. Press WPS button again to restart. WPS function.	The device is not currently in WPS mode and is waiting for the next authentication attempt.	GREEN: The Wi-Fi protected setup PBC procedure is in progress. RED: Session overlap detected (security risk). Wait for 2 minutes then press WPS button again to restart. If error persists, refer to PIN-based configuration method.

Service LED States and Status			
LED Appearance	**Bridged Mode**	**RG Mode**	**Mixed Mode**
OFF*	No Ethernet port has been provisioned	No IP address has been received or PPPoE session authentication has not occurred.	N/A
Solid GREEN (Indicates internet service)	At least one Ethernet port has been provisioned.	The GigaCenter has received an IP addressed or a PPPoE session authentication (with credentials) has been completed.	Same as RG Mode
Solid RED	N/A	GigaCenter attempted to connect via IP and failed (DHCP/PPPoE response or authentication failed)	Same as RG Mode
* For all modes, the Service Gateway is not powered and a physical broadband connection has not been detected.			

Appendix

Cleaning Fiber Connectors

In order to minimize optical signal loss due to "dirty" optical fiber ends, Calix recommends that all connectors be cleaned at initial installation and after any disconnect event has occurred.

DANGER! A Class 1 laser product with an internal Class IIIb hazard is used in this equipment. Use an optical power meter to identify active fibers. Never assume laser power is turned off or that the fiber is disconnected at the other end.

ALERT! A protective cap or hood must be placed over any radiating bulkhead receptacle or optical fiber patch cord (pigtail) when not connected.

CAUTION! Use of controls or adjustments or performance of procedures other than those specified here may result in hazardous radiation exposure.

What you will Need

- SC-APC Terminated Fiber Pigtail
- SC-APC Terminated Fiber Bulkhead Fitting
- Isopropyl Alcohol or any commercially available fiber cleaning solution
- Lint Free Cotton Swabs

To clean optical fiber ends

1. Remove any protective plugs or shields from the adapter.

2. Dampen (do not saturate) a lint-free cotton swab or appropriately sized cleaning stick with alcohol.

3. Insert the swab or stick into the connector end and rotate three times with light pressure up against the end-face of the connector end.

4. Use a new swab or stick for each connector to be cleaned, disposing of the old one after a single use.