GigaCenter Installation Guide

February, 2017

#220-00829, Rev 14

Contents

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About this Guide

This document provides general installation practices for the following Calix devices:

- 844GE GigaCenter
- 844G GigaCenter
- 854G GigaCenter
- 844E GigaCenter
- 844F/844FB GigaCenter

This document also provides a general description of the products, and guidance for planning, site preparation, power installation, splicing to the outside plant (if appropriate), 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 (844GE/844G/854G only).

Chapter 1

GigaCenter Overview

844G/854G GigaCenter

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.

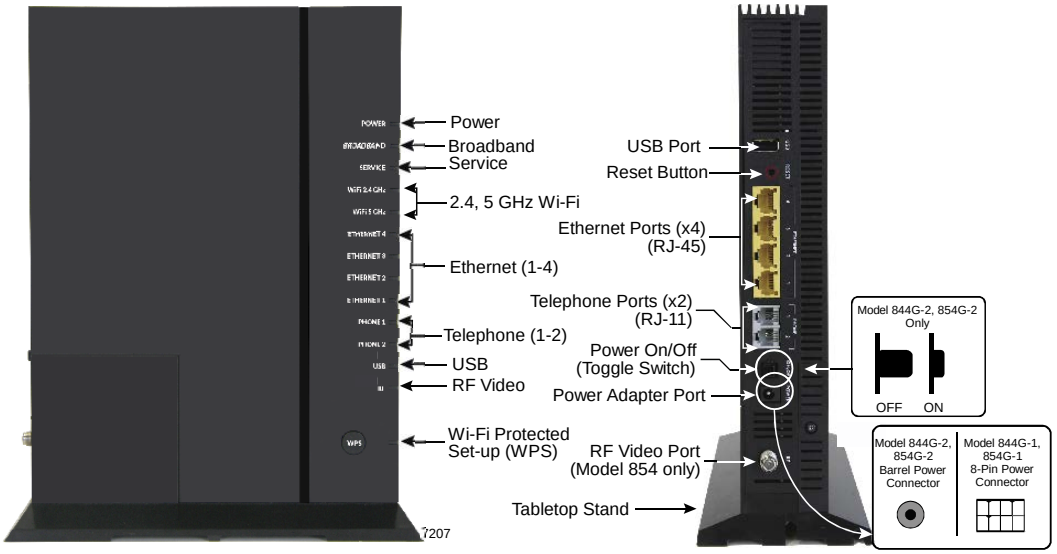
These GigaCenters are next generation residential premises service delivery platforms that extend the access network into the home and act as a strategic location for control of the gigabit experience. Supporting broadband connectivity within the home and managing subscriber voice, data and video services, this intelligent, high-performance service platform integrates a 2.5 GPON optical interface (844G, or 854G) with auto-sense switching and routing functions that manage premises network traffic. 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.

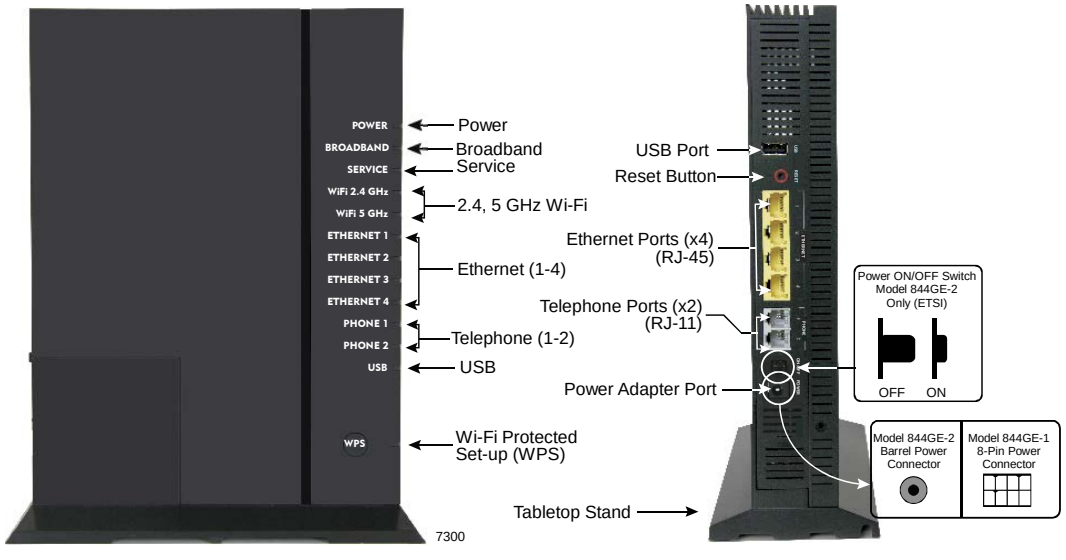
844GE GigaCenter

The Calix 844GE GigaCenter is a next generation residential premises service delivery platform that extends the access network into the home and acts as a strategic location for control of the gigabit experience. This intelligent, high-performance service platform integrates a 2.5 GPON or 1 Gbps Active Ethernet (AE) optical interface with switching and routing functions that manage premises voice, data and video traffic at speeds up to 1 Gbps symmetrically. 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, and a USB port for home networking services.

854G GigaCenter



844GE GigaCenter



844E GigaCenters

The 844E GigaCenter supports the same Home Gateway functionality as the 844G and 854G GigaCenters. It supports dual-band concurrent 2.4 GHz and 5 GHz Wi-Fi, allowing continued usage of the 2.4 GHz band for data and legacy consumer devices while supporting IPTV and high-speed data at 5 GHz. When connected to a Calix GPON ONT providing Layer-2 access and security along with carrier-grade voice, the 844E helps meet service providers' and end-users' requirements for ubiquitous broadband access throughout the residence driven by the growth of smart mobile devices and media rich content. These Wi-Fi devices range from low bandwidth IP cameras, security sensors, smart phones, tablets, and printers, as well as support for bandwidth intensive Quality of Service (QoS) sensitive Wi-Fi capable Set Top Boxes (STBs) and TVs.

The complete family of 800 GigaCenter products includes the following features:

- The 844E operates independently of the access link, whether it is a Calix GPON or AE ONT. It does not require OLT software support and therefore can be used for E7, C7, B6 and BLM-1500 deployments. As noted above, an 844E is flexible and can support many deployment scenarios.

  Note: With the initial release of the 844E, the supported deployment model is to subtend it behind a Calix GPON or AE ONT. All other deployment scenarios will be evaluated on a case by case basis. The 844E does not provide any Layer-2 access features such as downstream or upstream bandwidth management, MACFF, L2 Source Verify, and L2 security features such as broadcast limiters.

- The 844E is designed to operate and be configured, provisioned and managed by Calix Compass software. Compass has enhanced tools to support provisioning, maintaining, and troubleshooting the 844E and Wi-Fi home network. Compass's ability to store large amounts of performance management data and perform analytics on that data allows service providers to troubleshoot issues that are time of day based along with the ability to generate trend analysis to predict potential congestion issues.
- Support of the latest 802.11ac standard for the 5 GHz radio. Some basic 802.11ac enhancements include:
  - Dynamic beamforming for high performance and longer reaches
  - 80 MHz channels for greater speeds
  - QoS support allowing prioritization of Video SSID over lower priority best effort High Speed Internet (HSI) data SSIDs
- Dual band concurrent radios allow the subscriber to use legacy 2.4 GHz clients while accessing seven times the spectrum of 2.4 GHz using the 5 GHz band.
- The 844E-1 ANSI versions, both 2.4 GHz and 5 GHz Wi-Fi radios operate at the maximum conductive emissions allowed by the FCC. The 844E high power 2.4 GHz radio is combined with a higher power 5 GHz radio with beamforming gain from the 4x4 antennas for an effective power increase.

- GigaCenter 5 GHz radio was designed for critical IPTV services and supports channel hoping during operation, thereby avoiding service disruption due to interference.
- GigaCenters 5 GHz radio is FCC certified to use the Dynamic Frequency Selection (DFS) channels which comprise 60% of the 5 GHz channels. These are largely unused frequencies as commercial routers sold over retail counters generally are not certified to operate with these channels.

  Note: Not all Wi-Fi capable clients and devices support the DFS channels. Service providers will need to enable DFS support if they do not expect to encounter DFS interoperability issues with subscribers.

- GigaCenters 5 GHz radio has a Wi-Fi QoS feature that can be assigned to different SSIDs. For the current release, IPTV services are assigned to a pre-defined video SSID called "5 GHz_IPTV_SSID" with usage and QOS pre-configured. This allows this pre-defined IPTV SSID to be prioritized over best effort data services assigned to other 5 GHz SSIDs.
- The GigaCenters Carrier Class 5 GHz radio covers 95% of standard U.S. homes supporting 8 STB clients using 4x4 Quantenna radios. In other words, the use case is defined as supporting 8 simultaneous HD video channels to 8 STBs located throughout a home with additional bandwidth reserved for HSI data applications using the 5 GHz band (the industry definition of carrier class).
- GigaCenters are designed to help service providers generate new revenue streams such as smart home applications through the continued release of software features. To support these features, GigaCenters supports a high-performance CPU and larger memory than other products on the market.

The 844E has a 10/100/1000BaseT Ethernet WAN interface that connects downstream from a Calix ONT or third-party access device. In absence of any bandwidth management, it is capable of switching and routing functions that manage premises network traffic at 1 Gbps. The 844E LAN side interfaces include:

- (4) Gigabit Ethernet (GE) ports for IPTV and data services
- (2) integrated voice lines supporting SIP based VoIP
- Wireless networking support for 802.11b/g/n/ac
- A USB port for future emerging smart home services
- 2-pin barrel connector and power switch (similar to 844G-2 and 854G-2 GigaCenters).

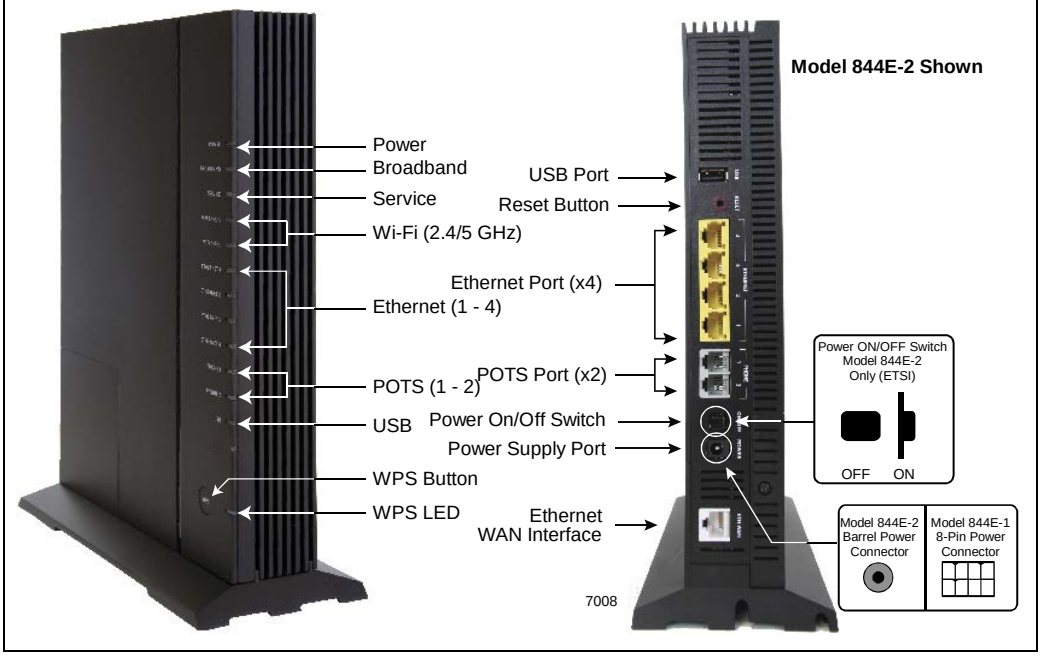
  Note: The 844E does not include the UPS connector available on 844G-1 and 854G-1 ANSI units.

Local management is accomplished using the Home Gateway locally hosted Embedded Web Interface (EWI). For remote management using Calix' cloud based Compass and Command Center, the 844E GigaCenters supports TR-98 and TR-104 data models via TR-069 management standards.

The 844E allows service providers to maintain their current GPON service model and infrastructure while allowing deployments of carrier-grade wireless HSI and IPTV services.

Note: All GigaCenter products are intended for use in residential whole home Wi-Fi deployments supporting HSI and IPTV delivery over the 2.4 GHz or 5 GHz wireless network.

844E GigaCenter



The Calix 844E GigaCenter represents an important addition to the family of Premises delivery platforms optimized to extend the network demarcation inside the subscriber's home. The 844E GigaCenter is the first Calix Premises product to support service applications when subtended from an access device such as an ONT. The 844E continues support of carrier class Wi-Fi using 802.11ac technology, allowing all services to be delivered over a wireless network including IPTV. With integrated Carrier Class Wi-Fi, the 844E GigaCenter incorporates:

- 4x4 Multiple-Input-Multiple-Output (MIMO) at 5 GHz
- Support of the entire 5 GHz band including Dynamic Frequency Selection (DFS) channels
- Implicit and explicit beamforming
- Use of 80 MHz combined channels at 5 GHz
- Software management tools and quality of service capabilities

Note: The initial release of the 844E is targeted for Calix fiber deployments with the 844E subtended from a Calix ONT.

844F/844FB GigaCenter

The Calix 844F and 844FB GigaCenter are a next generation residential premises service delivery platform that extends the access network into the home. This service platform integrates a G.fast interface with switching and routing functions that manage premises voice, data and video traffic at aggregate speeds up to 1 Gbps (844F) and with 844FB G.fast bonding traffic speed up to 2 Gbps. The GigaCenter service interfaces include:

- Carrier-class wireless networking with 802.11ac and 802.11n dual Wi-Fi radios
- 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
- Single USB port for home networking

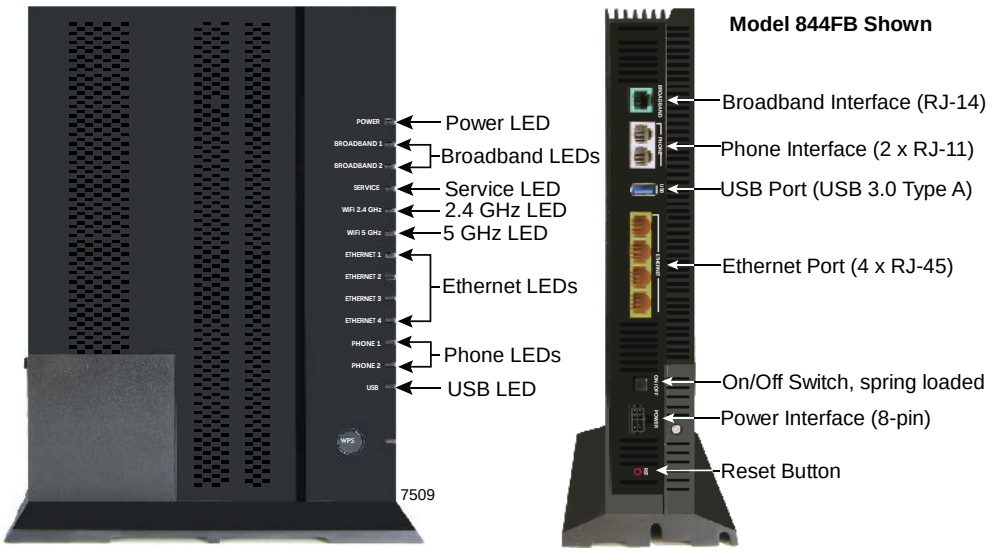
The 844F and 844FB GigaCenter are an integrated access and gateway solution that delivers network management and software features to implement the gigabit experience throughout a subscriber's home. The GigaCenter service delivery platform terminates a G.fast link at the subscriber's premises and provides dual carrier-class Wi-Fi and Gigabit Ethernet interfaces for customer multi-media devices. The 844F and 844FB GigaCenter enable residential subscribers to receive gigabit broadband data, IP video, and VoIP or TDM based voice on a G.fast interface. Using the latest 802.11n and 802.11ac technology incorporating 4x4 multi-user multiple-input and multiple-output (MU-MIMO), beamforming and band steering technology, the 844F and 844FB GigaCenter allow service providers to extend the access network inside the home and establish a strategic location for the delivery and control of broadband services. Calix engineered the 844F and 844FB GigaCenter for optimal whole-home coverage with simultaneous dual-band 2.4 GHz and 5 GHz operation and dynamic beamforming at 5 GHz. For maximum performance, the GigaCenter supports high-power 4x4 MIMO spatial diversity at 2.4 GHz and 5 GHz. The 844F and 844FB GigaCenter support the entire 5 GHz band including zero wait DFS channels, Band Steering, Wave-II MU-MIMO and supports wide channel HT160 at 5 GHz. The GigaCenter solution delivers HD video and data throughout a subscriber's home with control and management of an increasingly video-rich and mobile broadband environment.

The Calix 844F and 844FB GigaCenter integrate with the Calix G.fast solution, utilizing the Calix Persistent Management Agent (PMA) for provisioning via a NETCONF/YANG northbound interface on the Calix E3-16F DPU and E5-216F MDU. Calix also provides the Compass software portfolio with management via TR-069, enabling the service provider to auto discover, configure, activate and upgrade the GigaCenter using in-band management. Extensive troubleshooting capabilities, remote software downloads, and service activation ensures that services are delivered and maintained without truck rolls and hardware upgrades.

With the 844F and 844FB GigaCenter, Calix have redefined how to install and activate residential services at a subscriber's premises. Using the Calix Smart Activate feature and a phone or laptop, a field technician can install and apply the subscriber's service profile without additional equipment or assistance from the central office. Calix also provides the Compass software portfolio, including Consumer Connect, which allows the service provider to configure, activate and upgrade the GigaCenter from a remote location using in-band management or TR-069. Deploying GigaCenters allows service providers to reduce their operational expenses while delivering the gigabit experience to their subscribers.

The 844F and 844FB GigaCenter deliver an agile and responsive service platform with lifeline voice in the event of local AC power loss. A carrier-grade 120-240 VAC, 50-60 Hz AC to 12 VDC Uninterruptible Power Supply (UPS) provides battery backup of voice services compliant with Telcordia GR-909.

844F/844FB GigaCenter



Introduction

This document describes the installation of the following:

- 844GE-1 GigaCenter, 2 POTS, 4 Gigabit Ethernet ports, Dual Wi-Fi, 1 USB, UPS Power Interface
- 844GE-2 GigaCenter, 2 POTS, 4 Gigabit Ethernet ports, Dual Wi-Fi, 1 USB, 12 VDC Power Interface with On/Off switch
- 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
- 844E-1 GigaCenter, 2 POTS, 4 Gigabit Ethernet ports, Dual Wi-Fi, 1 USB, 1 Ethernet WAN interface, 2-pin barrel connector power supply with On/Off switch (ANSI)
- 844E-2 GigaCenter, 2 POTS, 4 Gigabit Ethernet ports, Dual Wi-Fi, 1 USB, 1 Ethernet WAN interface, 2-pin barrel connector power supply with On/Off switch (ETSI)
- 844F-1 GigaCenter, 2 POTS, 4 GigaBit Ethernet ports, Dual Wi-Fi, 1 USB, -UPS Power Interface
- 844FB-1 GigaCenter, 2 POTS, 4 GigaBit Ethernet ports, Dual Wi-Fi, 1 USB, -UPS Power Interface

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/wall mount 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/wall mount tray. Incoming and outgoing connections remain plug-and-play.

Note (844GE/844G/854G Only): 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 (844GE/844G/854G Only): 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

All GigaCenters can be powered by attaching to any 110 or 220 VAC power outlet using the supplied 12 VDC wall transformer.

In addition, the 844GE, 844G, 854G, and 844F/FB GigaCenter also includes the following powering option:

- 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: The 844GE GigaCenter uses a different UPS due to its inherently higher power requirements. See Pre-Installation Options for additional information.

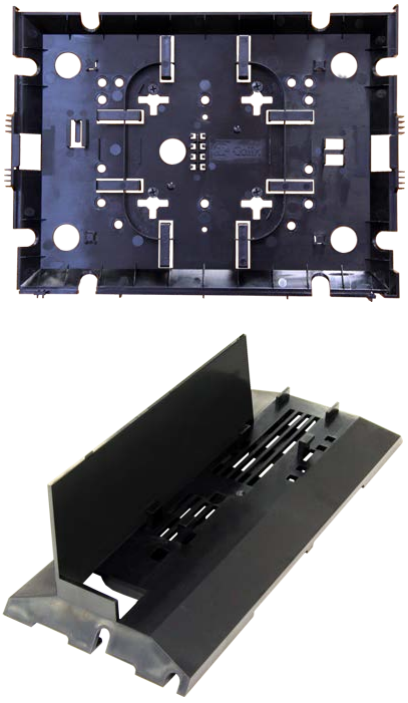
Note: For all models, the power cord configurations must be appropriate for use in the country where the GigaCenter is being deployed.

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

Mounting Options

GigaCenters 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 (854G shown)	Wall Mount Horizontal
	
Table Top Mount	**Splice/Mounting 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

For the 844GE/844G/854G/844F-FB GigaCenter, 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 recommendation.

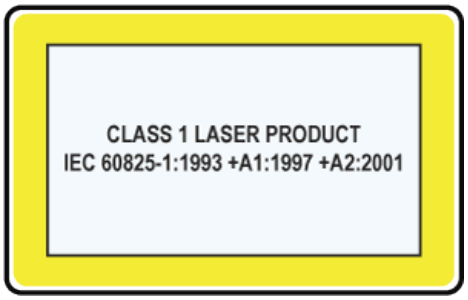
Application Standards

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

844GE/844G/854G Product Labeling

The following required labeling shows the laser class and IEC standard that defines the laser used in the G-Series and GE-Series GigaCenter:



844GE/844G/854G 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

844GE/844G/854G 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 Cables

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.

844GE/844G/854G/844F 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).

844GE/844G/854G/844F 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).

Power Supply

Note: For non-UPS applications when using standard power adapters, units will be inoperable after loss of main power and will not support voice services with emergency dialing. To support voice services with emergency service dialing, Calix recommends installing a UPS as the main power source.

Depending on the model being deployed, an external power supply may or may not be included. If the power supply is not included, use only Calix approved power adapters rated for 100-240 VAC input power and the following output power to the GigaCenter:

- Input voltage: 12 VDC (nominal)
- 10 VDC (min.), 15 VDC (max)
- External Power Adapter: 12 VDC, 2.5 A

DANGER! Using non-approved or incorrect power adapters can result in injury.

Pre-Installation Options

When planning for GigaCenter placement, keep the following in mind:

- The GigaCenter exclusively uses a standard power adapter designed for use in the region of the world where it is being deployed. Make sure there is a power source near where the GigaCenter will be installed.
- 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.

When planning for fiber attachment to the 844GE/844G/854G 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.
- You can pre-install a 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 an Ethernet cable (844E), or G.fast copper interface (844F-844FB), or a fiber pigtail (844GE/844G/854G) near the installation site.
- 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.

Note: This document includes installation instructions for the UPS (844GE/844G/854G/844F-FB only) in addition to instructions for installing the unit itself.

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.

Wall Mount Installation Options

When mounting the GigaCenter onto a wall or inside a Structured Wiring Enclosure, the unit can be installed horizontally or vertically. In addition, the 844GE/844G/854G/844F-FB GigaCenter 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 the 844GE/844G/854G /844F-FB GigaCenter, power cord lengths of 3 foot (1 meters), 10 foot (3 meters), and 20 foot (6 meters) are available.

Mounting Options

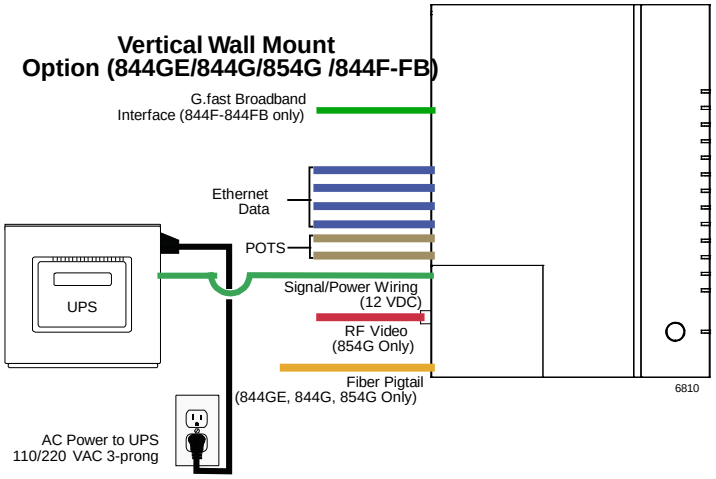
Refer to the following page for illustrations of the various mounting options.

- **Vertical Wall Mount Option A** - The 844GE/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 left-hand side.
- **Horizontal Wall Mount Option B** - Similar to Option A, the 844GE/844G/854G 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.

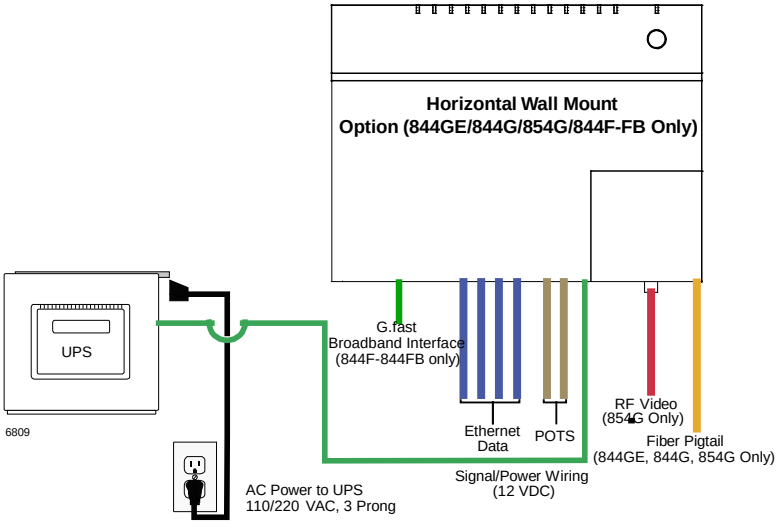
Note: The power and signal cable is terminated only at the GigaCenter end (2 x 4) 8-pin connector while the connection at the UPS is manually wired (screw-down) to the 7-pin terminal block connector provided with the UPS. Since the power/signal cable is 25 feet (7.6 meters) in length, the two devices 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 110/220 VAC to 12 VDC power converter is plugged directly into the wall socket or power receptacle. The fiber pigtail and subscriber services exit out of the bottom of the unit. All models of GigaCenters are compatible with this mounting type. 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. All models of GigaCenters are compatible with this mounting type. This option is also suitable for use in SWE environments.

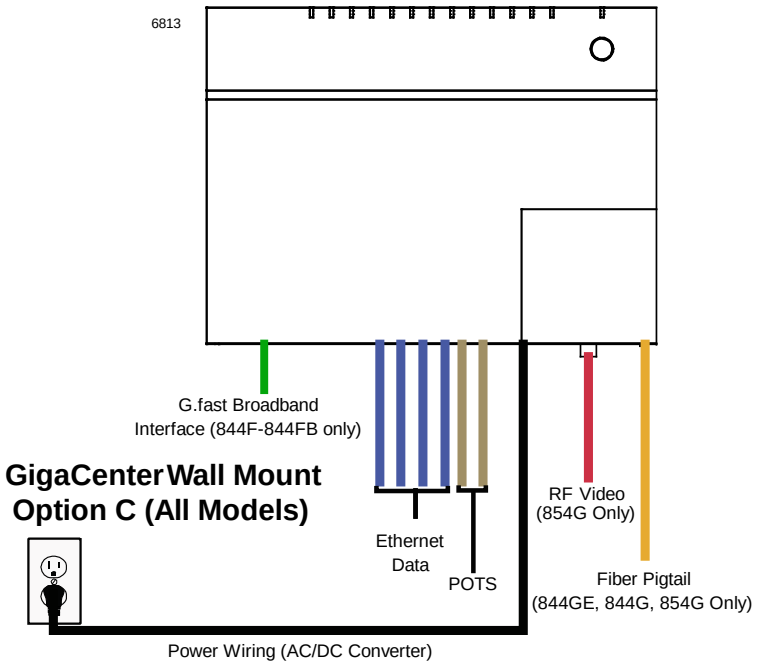
Vertical Wall Mount Option A



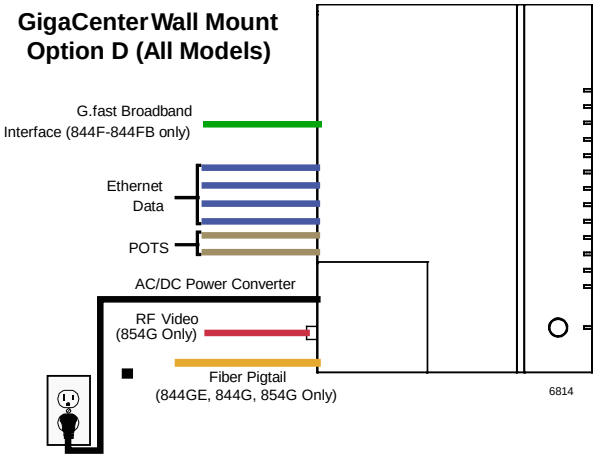
Horizontal Wall Mount Option B



Horizontal Wall Mount Option C



Vertical Wall Mount Option D



Additional Installation Options

The following components may be required to complete your installation:

UPS (844GE/844G/854G/844F-FB Only)

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. For the 844G/854G/844F-FB GigaCenter, a 24 Watt UPS is available. For the 844GE GigaCenter, a 36 Watt UPS is necessary.

UPS Power Cord (844GE/844G/854G/844F-FB Only)

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

Signal Cable (844GE/844G/854G/844F-FB Only)

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 (All Models)

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 (All Models)

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

Wall Mount (All Models)

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

Integrated Fiber Management Tray (Wall Mount Bracket)

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. For the 844E and 844F-FB GigaCenter, this tray doubles as a wall mount bracket.

Site Preparation

Before you install a GigaCenter, 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 - 844GE/844G/854G/844F-FB

In order to complete the installation 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.

Power Cords - All Models

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, Wi-Fi capable devices 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 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 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 GigaCenter:

844GE/844G/854G

- Keep fiber optic cables and splicing equipment clean at all times. Use manufacturer approved solvents and cleaning applicators.
- 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.

All Models

- Installations which utilize off-premises telephone extensions must also incorporate a primary ground protection device for each off premises instance.
- For subscribers using data services, all data wiring inside the home must be CAT5 or better 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 to complete your installation:

- **844GE/844G/854G/844F-FB:** Indoor UPS, 12 VDC with power cord. Available in US, UK, European Union, Australia/New Zealand, and Brazil power plug configurations.
- **844GE/844G/854G/844F-FB:** 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.
- **All Models:** 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 (844GE/844G/854G)
- Fusion splicer for fiber optic cable (844GE/844G/854G)
- Carpenter's level
- Optical Time Domain Reflectometer calibrated for 1310nm (Transmit) and 1490nm (Receive) - (844GE/844G/854G)

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) (844GE/844G/854G)
- Texwipe™ cloth for fiber cleaning (TX304) (844GE/844G/854G)
- SC-APC patch cord (pigtail) connector to connect fiber from the NID or LCP to the GigaCenter (844GE/844G/854G)
- 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 ten different models)

(1) Power Adapter interface cord (wall wart)

(1) Integrated Fiber Management Tray (splice tray or wall mount bracket)

(1) Tabletop Mounting Stand

(1) Consumer Guide and/or Quick Start Guide specific to the model you are installing

(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

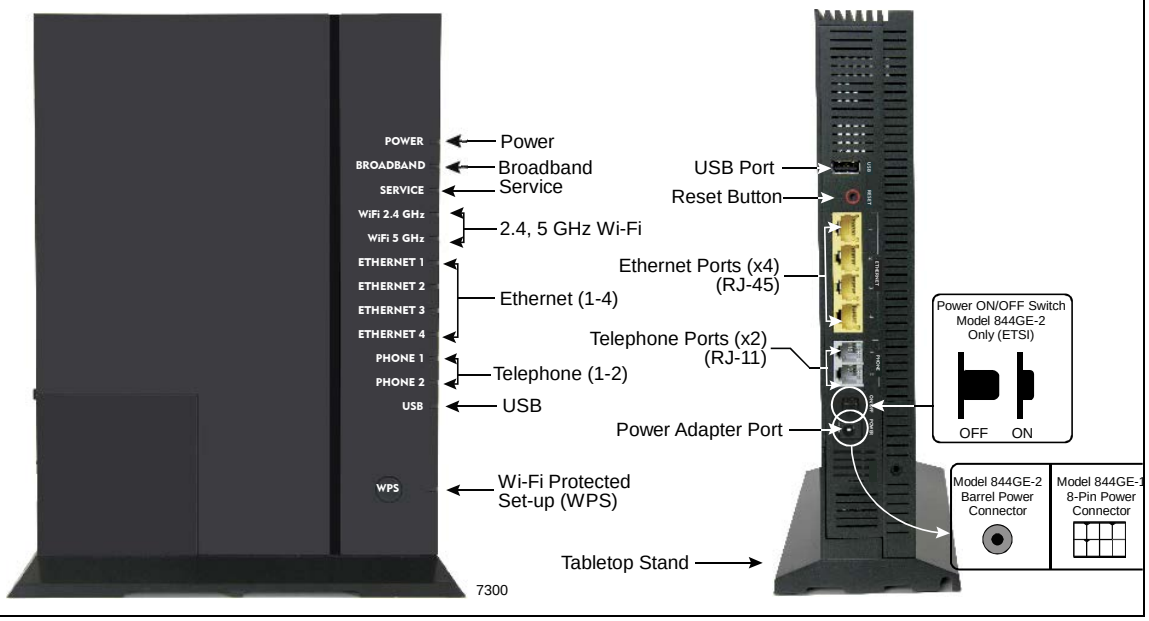
Before installing the GigaCenter, consider what additional services may be implemented. Various access points are available on the back of the unit which may or may not be used. Prior to determining the unit's final location, you need to account for the following variables:

Where will the telephone lines be routed?

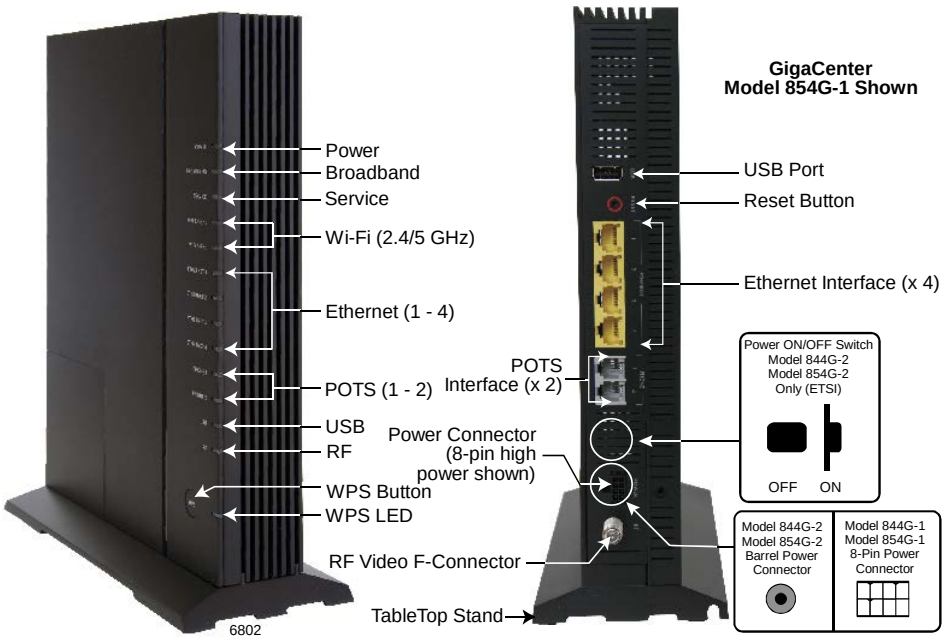
Where will the Ethernet cables be routed?

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.

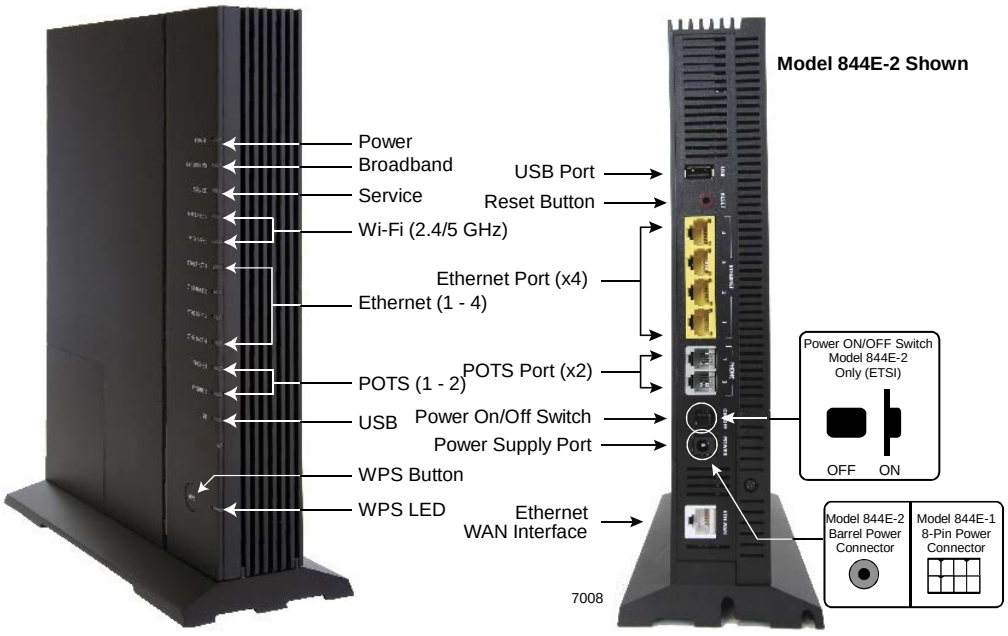
844GE GigaCenter Details



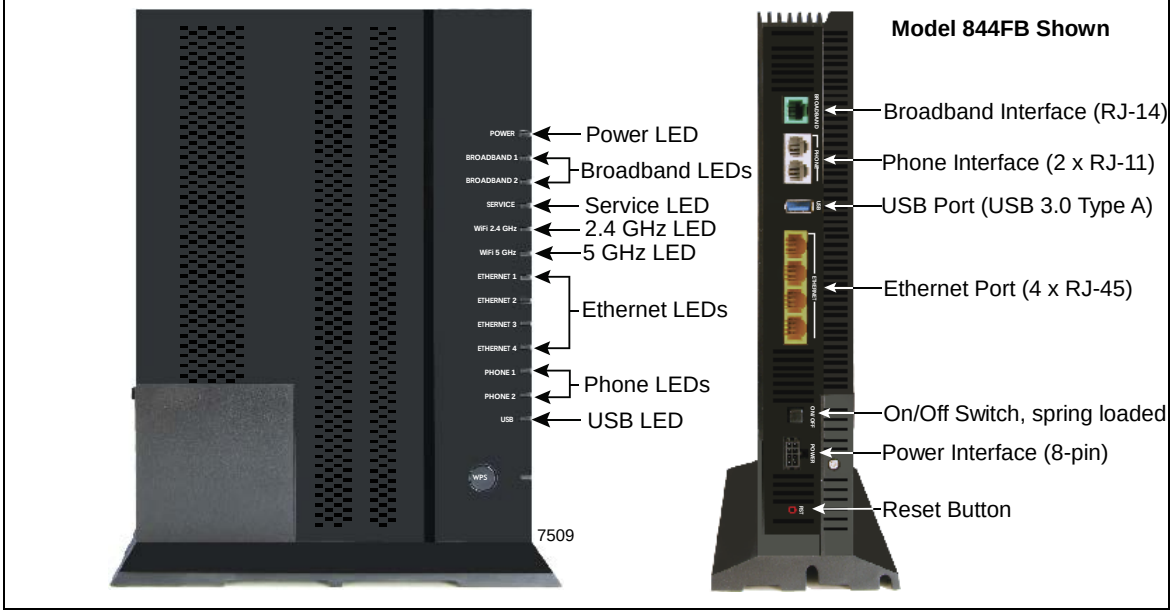
844G/854G GigaCenter Details



844E GigaCenter Details



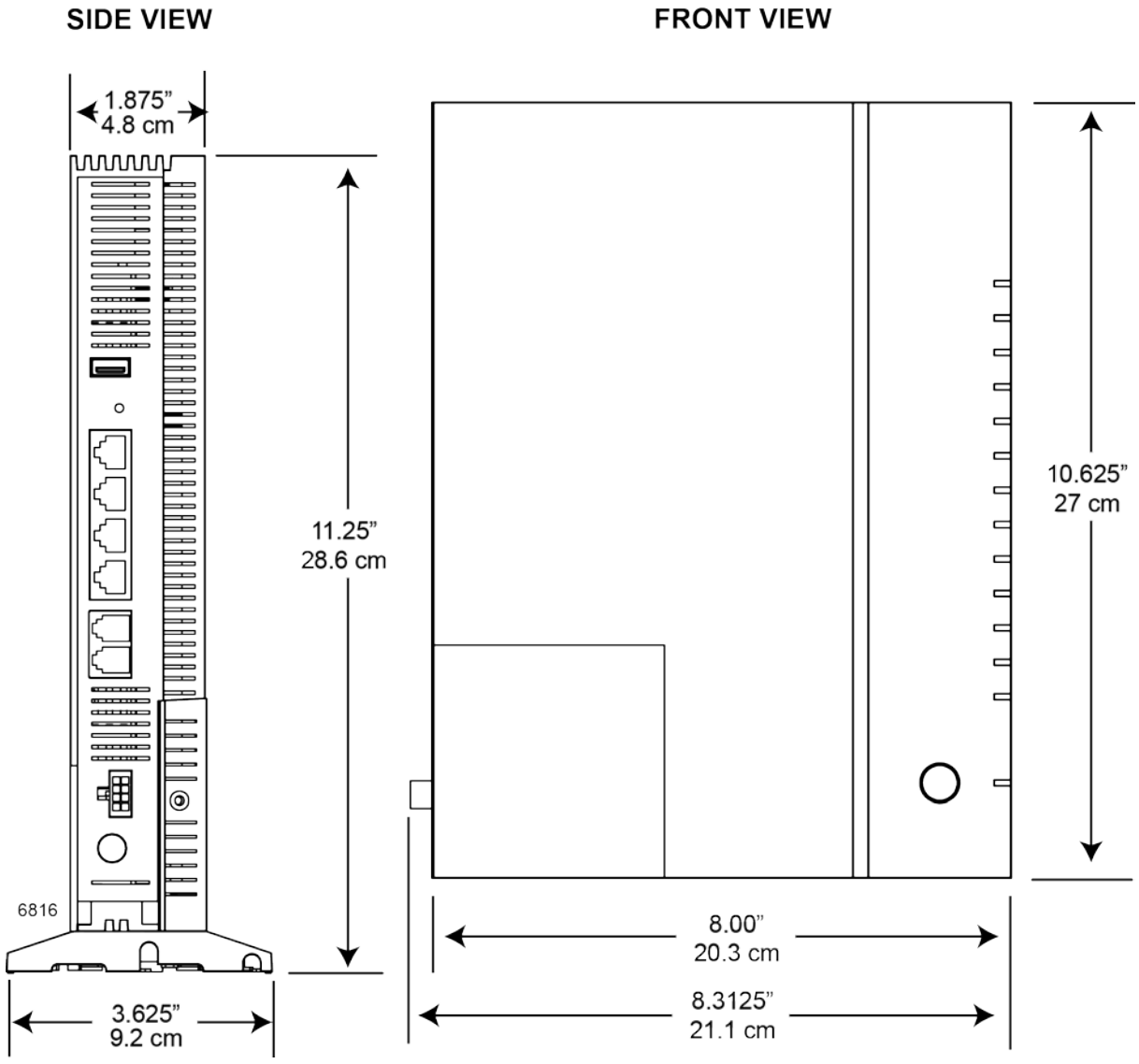
844F-844FB GigaCenter Details



At this point, you need to decide whether the GigaCenter will be installed on a *table-top* (on page 35) or on the *wall* (on page 39).

Tabletop Mounting Dimensions

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

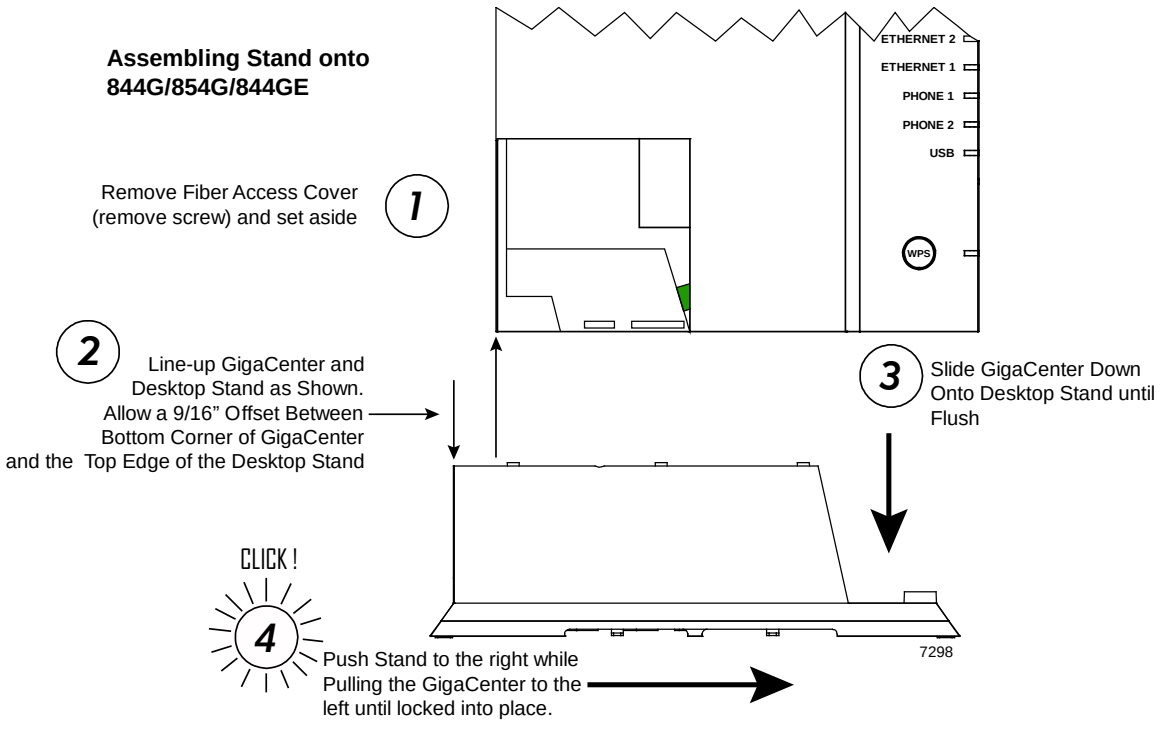


Tabletop Mounting the GigaCenter

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:

- **Model 844GE, 844G, 854G Only:** 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 (854G-1, 854G-2), 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



To mount the tabletop stand to the GigaCenter

1. Remove the tabletop stand from the bottom of the carton.
2. **844G/854G Only:** 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.
   a. If installing an 844GE/844G/854G, proceed to *Installing the Composite Cable - Tabletop Mount* (on page 37)
   b. If installing an 844E or 844F-FB, proceed to *Final Set-up and Testing* (on page 53).

Installing the Composite Cable - Tabletop Mount

Note: This topic applies to the 844GE/844G/854G GigaCenter only. If installing an 844E or 844F-FB GigaCenter, proceed to *Final Set-up and Testing* (on page 53).

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 43) 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.

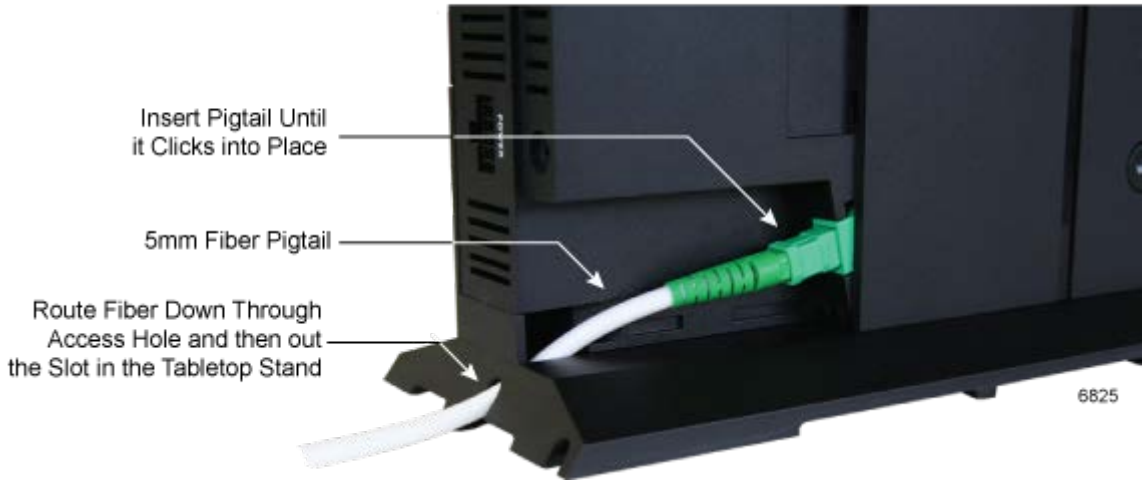
DANGER! A Class 1 laser product with an internal Class IIIb hazard is used in this equipment. Use an optical power meter to identify active fibers. Never assume laser power is turned off or that the fiber is disconnected at the other end.

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.

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

Connecting the Fiber - Tabletop Configuration

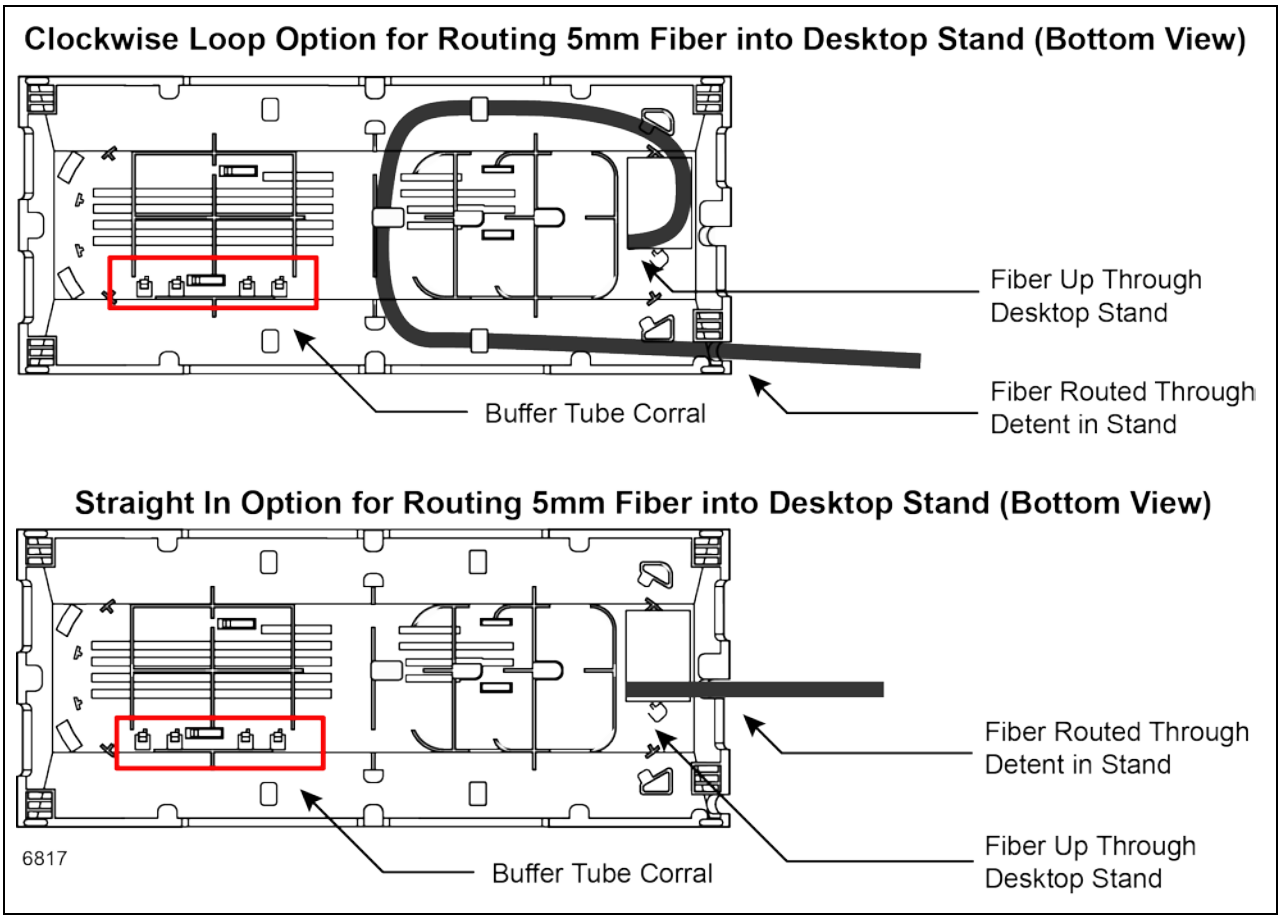


To install the composite cable

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.

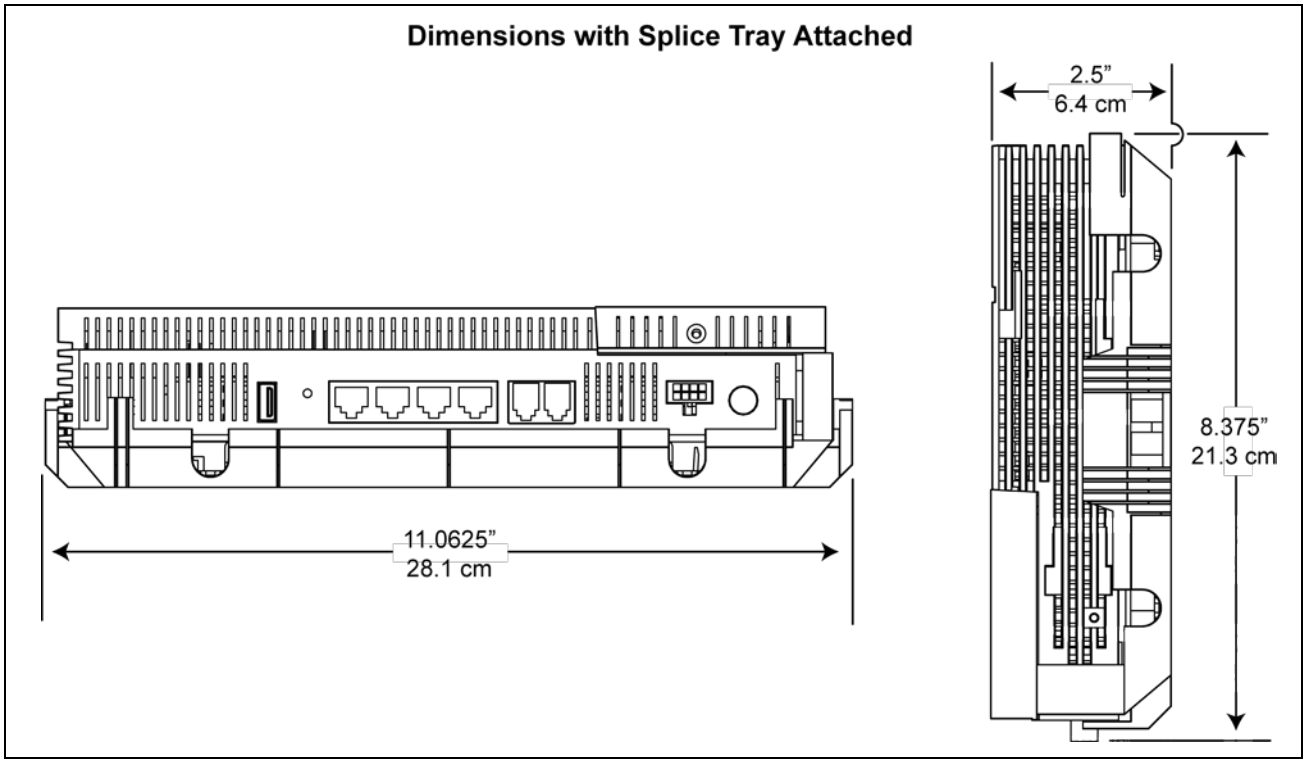


Wall Mounting the GigaCenter

Wall Mounting Dimensions

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

Note: For the 844E or 844F-FB GigaCenter, the Fiber Management Tray acts as a wall mounting bracket only.

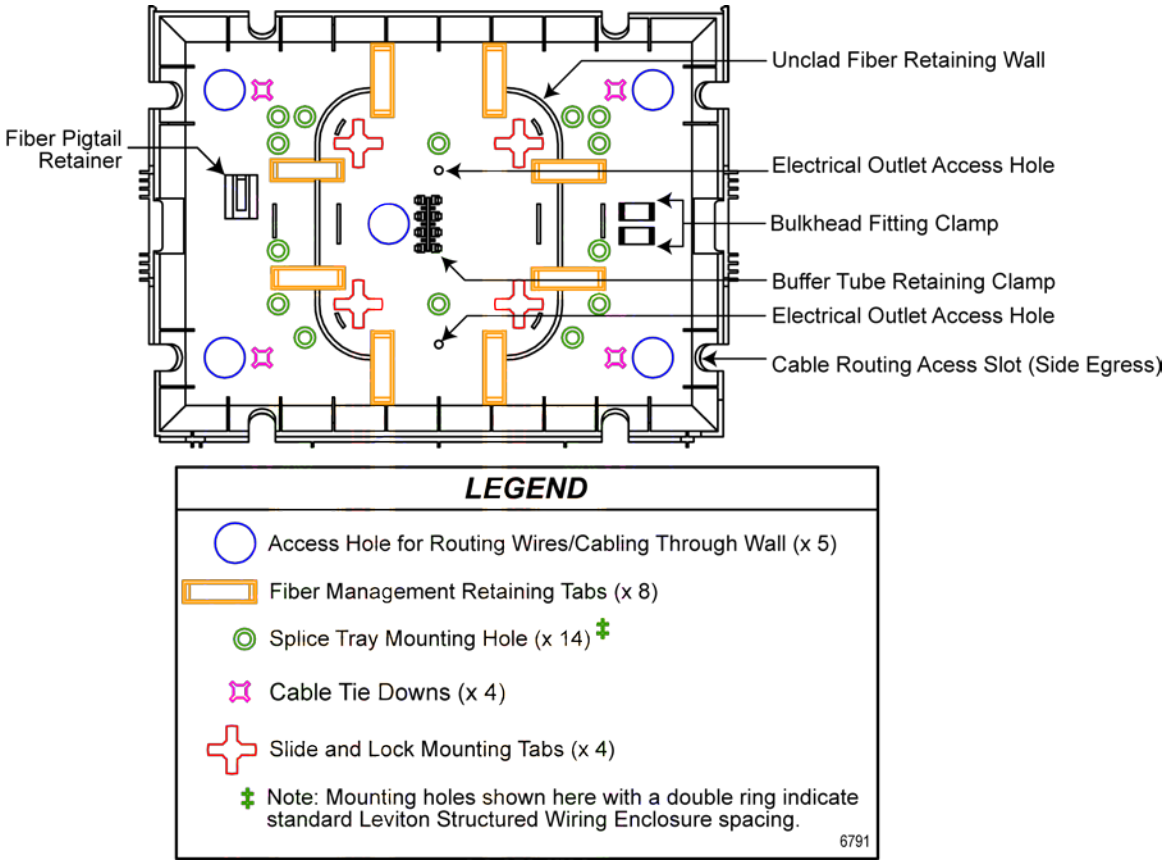


To mount the fiber management tray (wall mount bracket)

1. Test mount the GigaCenter to the tray/bracket to determine final desired orientation for incoming and outgoing wiring.
2. Disconnect the GigaCenter from the tray/bracket and set the GigaCenter aside.
3. Mount the tray/bracket 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 tray/bracket, taking care not to damage the unit.

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

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



Wall Mounting the Fiber Management Tray

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

Note: For the 844GE/844G/854G GigaCenter, Calix recommends using the wall mount method whenever possible to ensure ongoing integrity of the fiber connection.

Note: For the 844E or 844F-FB GigaCenter, Calix recommends using the table-top method whenever possible since there are no fiber connections to this unit.

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.

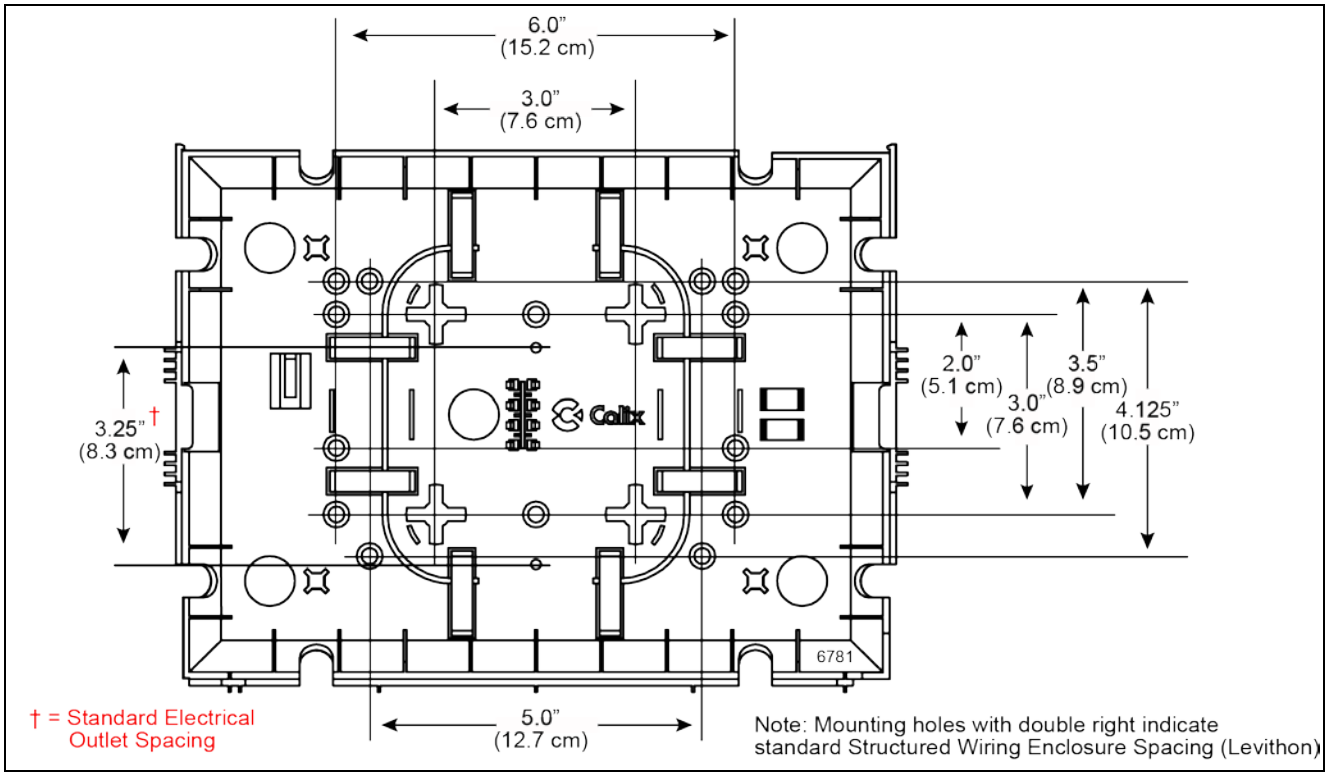
1. Determine the location of the GigaCenter on any suitable vertical surface.

   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 tray/bracket are shown below for reference:



4. If installing an 844GE/844G/854G, proceed to *Installing the Composite Cable - Wall Mount* (on page 43)
5. If installing an 844E or 844F-FB, proceed to *Final Set-up and Testing* (on page 53).

Installing the Composite Cable - Wall Mount

Note: This topic applies to the 844GE/844G/854G GigaCenter only. If installing an 844E or 844F-FB GigaCenter, proceed to *Final Set-up and Testing* (on page 53).

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.

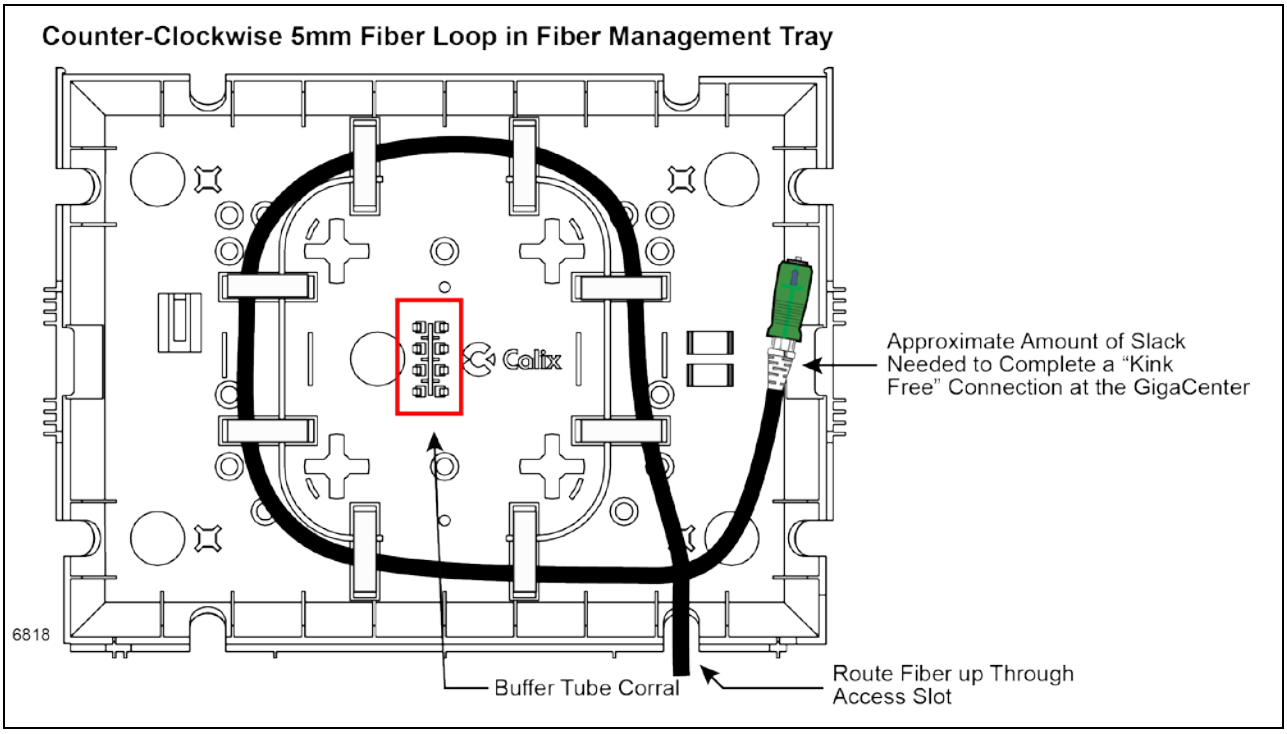
Overview of procedure

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.



Installing the GigaCenter onto the Fiber Management Tray

Note: This topic applies to the 844GE/844G/854G GigaCenter only. If installing an 844E or 844F-FB GigaCenter, proceed to *Final Set-up and Testing* (on page 53).

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 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

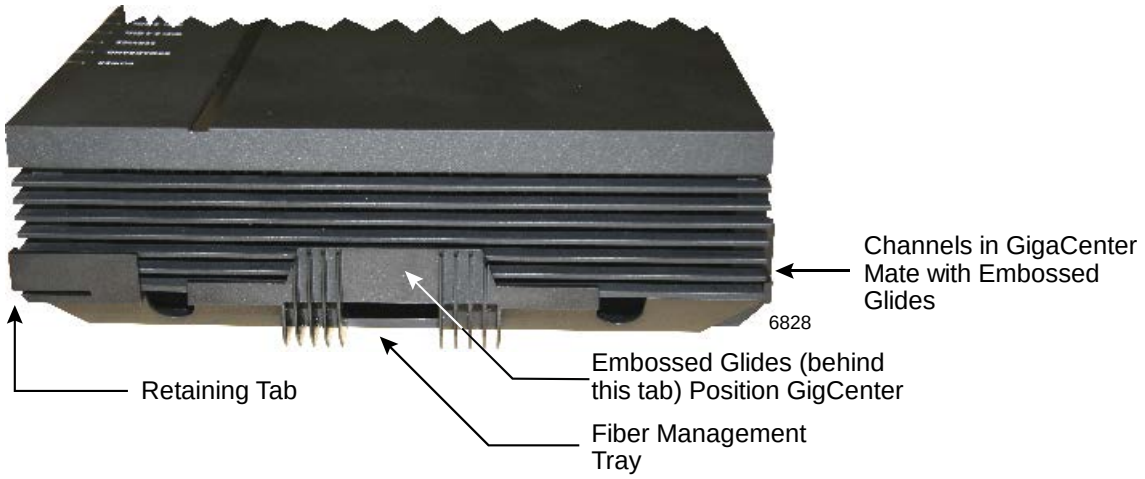


Figure 2: GigaCenter Slid partway and 5mm Pigtail Attached

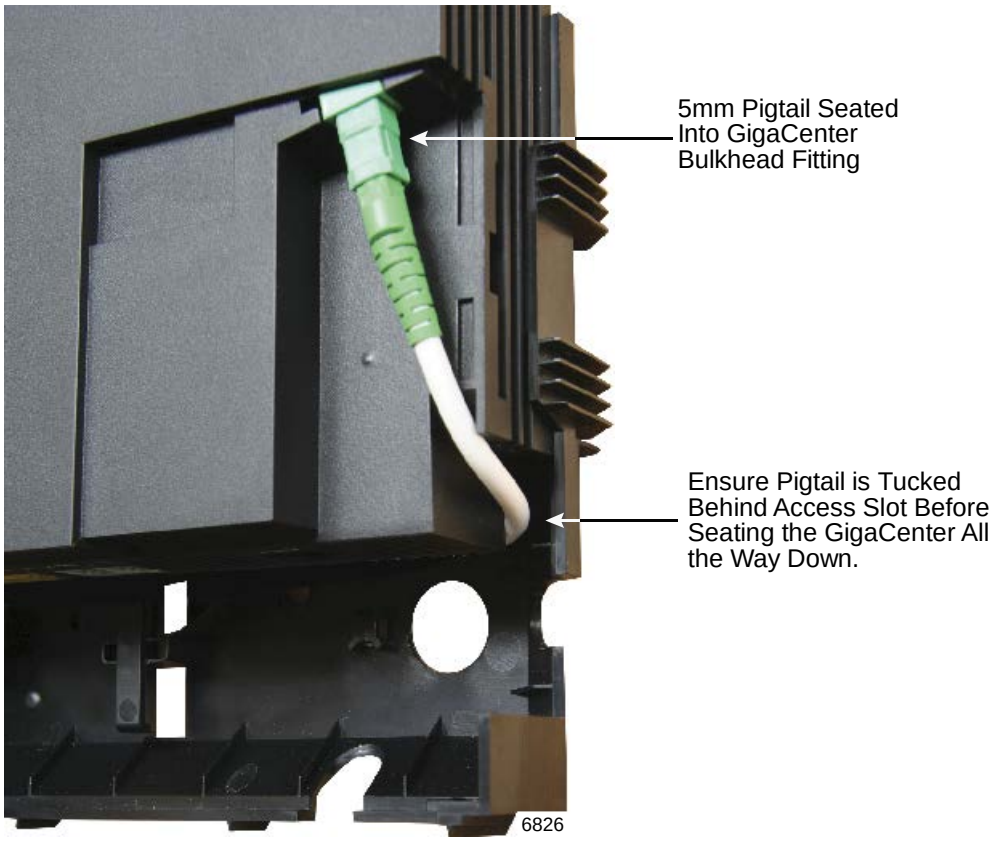
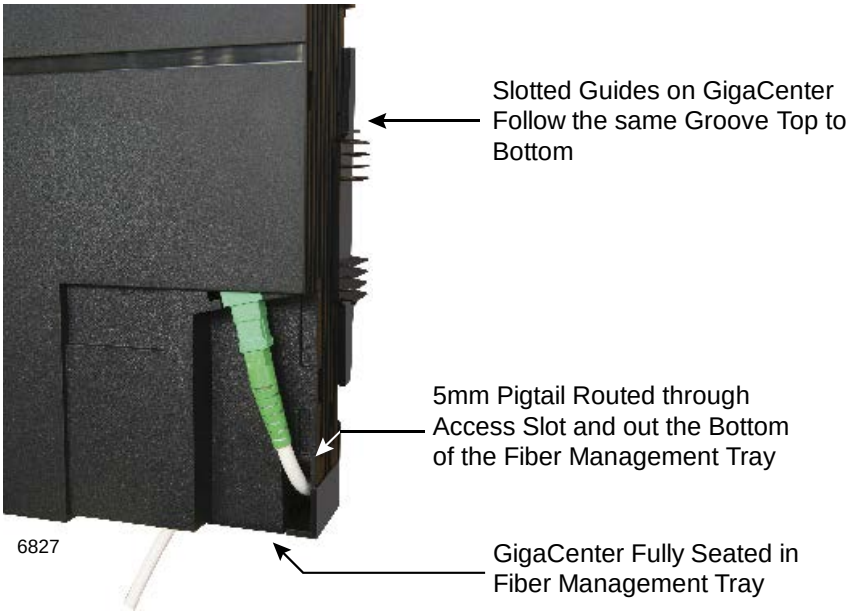


Figure 3: GigaCenter Fully Mated with Fiber Management Tray



Chapter 3

UPS Installation

Note: The Uninterrupted Power Supply configuration applies to the 844GE/844G/854G/844F-FB GigaCenter only.

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.

844GE-1/844G-1/854G-1/844F-1/844FB-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.

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.

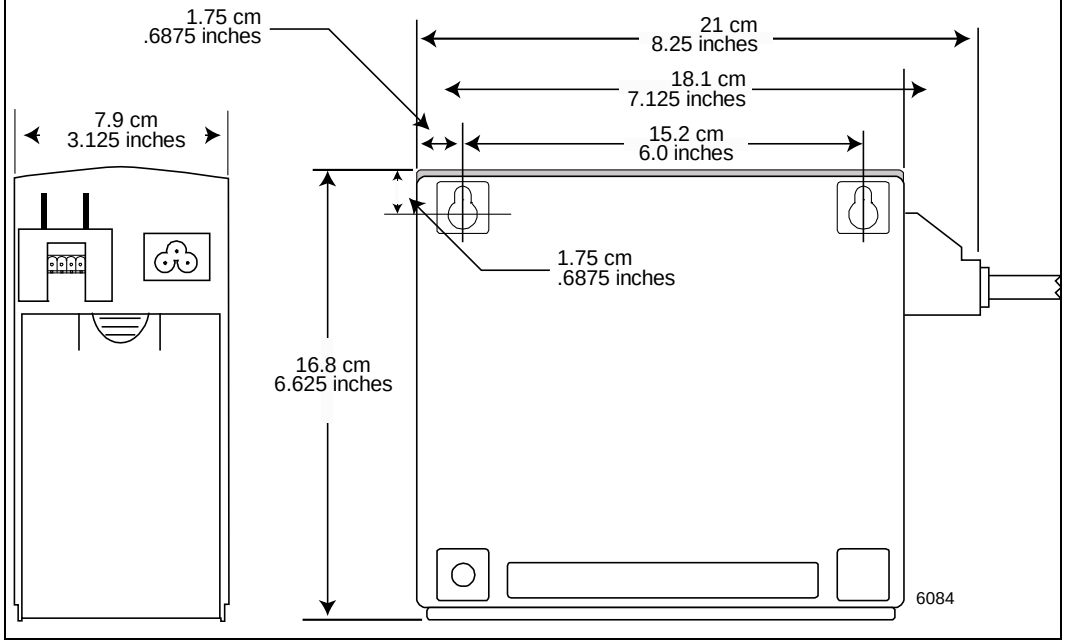
Make sure the UPS is not installed under water pipes which may leak or drip from condensation.

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.

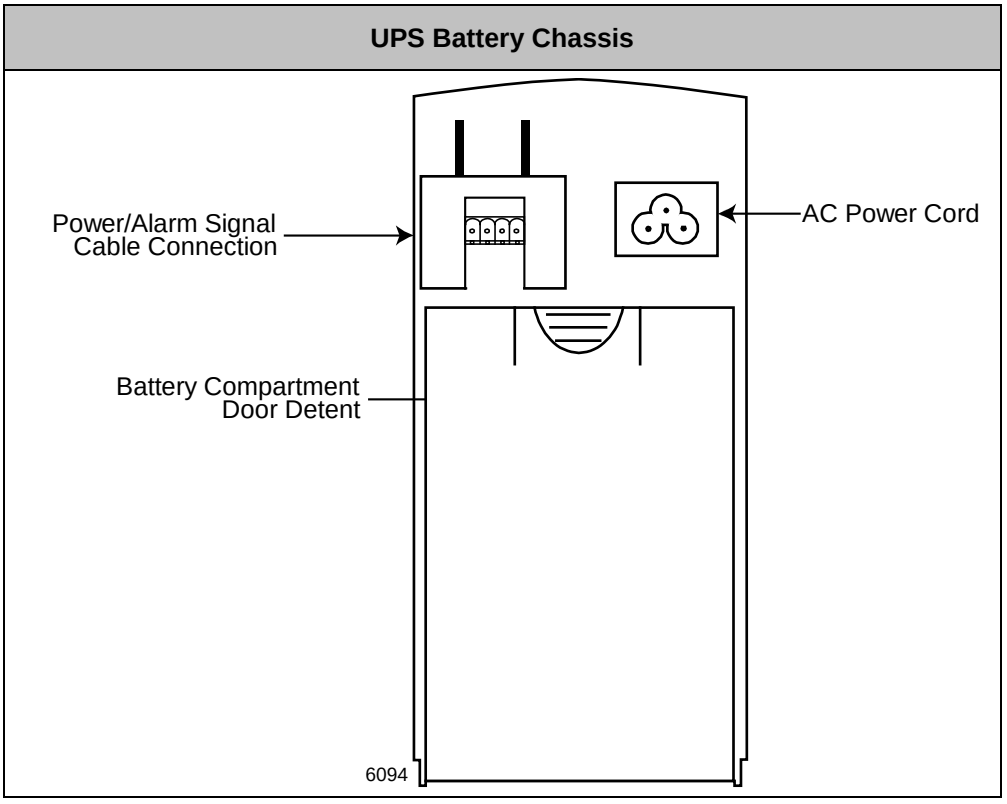
UPS Dimensions



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

Note: This topic applies to the 844G/854G/854GE/844F-FB GigaCenter only. If installing an 844E GigaCenter, proceed to Final Set-up and Testing.

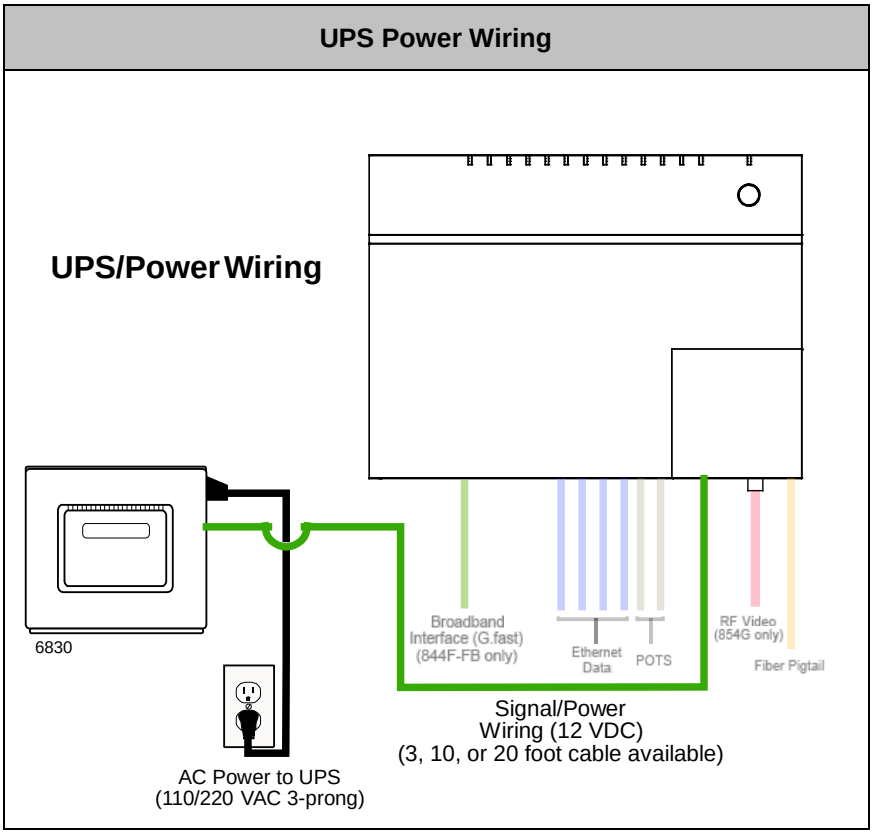
The cable providing power and alarm signaling from the UPS to the GigaCenter is pre-wired and ready for plug-and-play use. This pre-wired power/signal cable is available in 3-foot (1 meter) or 10-foot (3 meter) lengths.

CAUTION! If the 8-pin molded power connector is being used (no UPS configuration), avoid twisting or flexing the connector as you insert or remove the cable since excessive bending may damage the pins inside the molded connector. In addition, make sure you push in the locking tab on the bottom of the connector before attempting to remove the power cord.

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

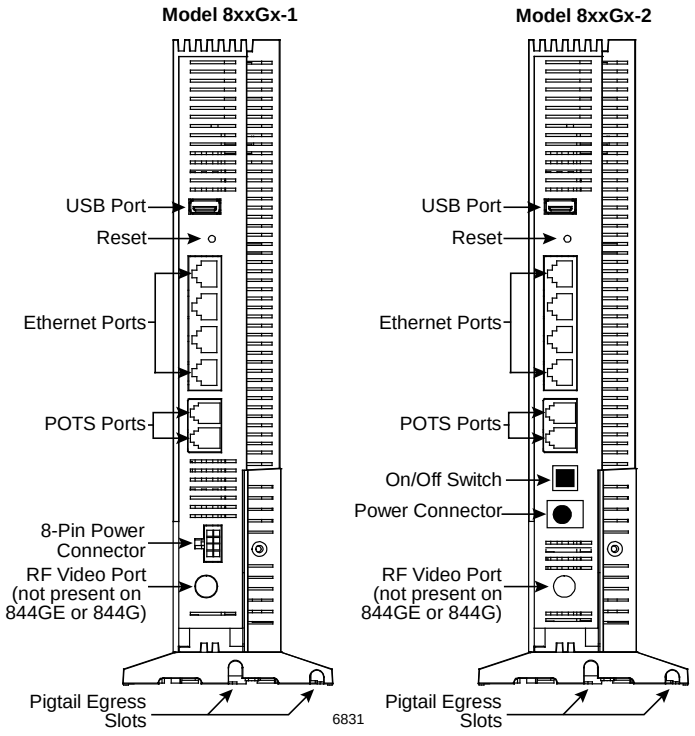
Subscriber voice, IP video and data services are attached to the rear of the GigaCenter.

To install subscriber services

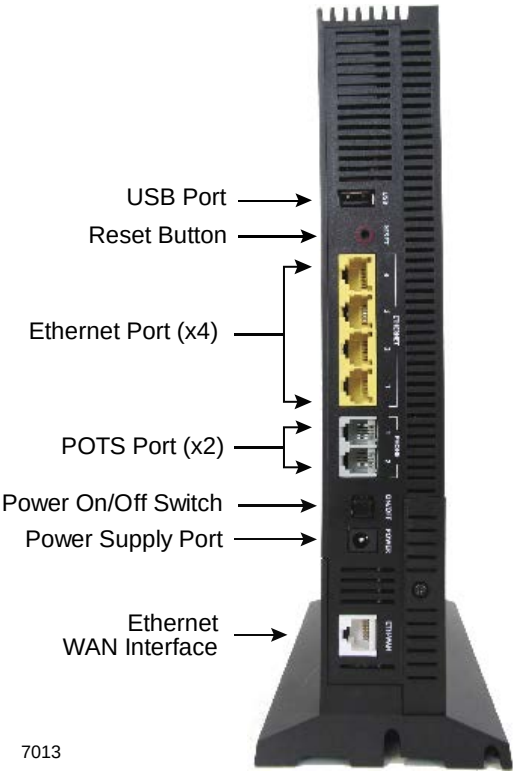
Note: Subscriber telephone lines are connected via RJ-11 connectors. IP video and data services are connected using RJ-45 connectors.

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

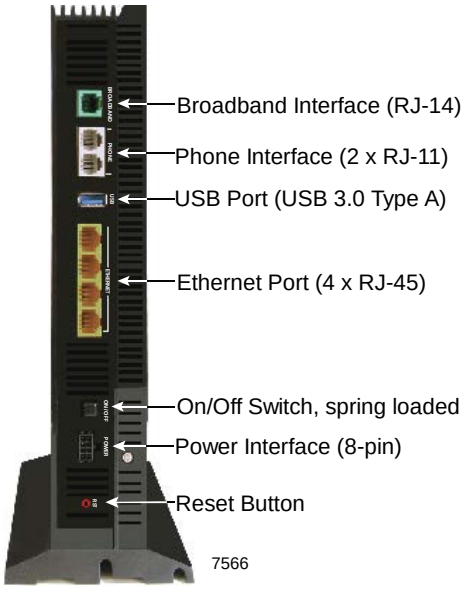
844GE/844G/854G Service Ports



844E Service Ports



844F-844FB Service Ports



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. **Optional:** Connect a copper DSL cable (RJ-14) to the Broadband Interface port.
5. Connect CAT5 Ethernet cables to the RJ-45 Ethernet ports.
6. **Optional:** Connect CAT5 Ethernet cable to the Ethernet WAN Interface (844E GigaCenter only).
7. Secure all subscriber service wiring as appropriate.

Powering up the GigaCenter

Depending on the model you are installing, do the following:

844GE/844G/854G/844F-FB with UPS

1. If a UPS is used in your configuration, attach the provided UPS power cord to the UPS.
2. Plug the other end of the power cable to any available 3-prong 110/220 VAC wall outlet.

844GE/844G/854G/844F-FB without UPS and 844E

1. Locate the power adapter shipped with the unit.
2. Attach the 2-pin barrel connector or the 8-pin molded connector to the GigaCenter's power port.
3. Plug the other end of the cable to any available 3-prong 110/220 VAC wall outlet

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.

GigaCenter LED Behavior

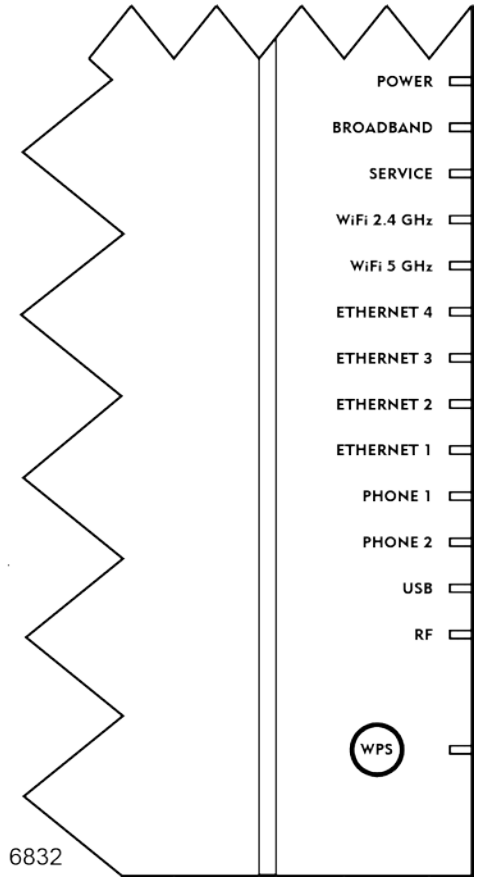
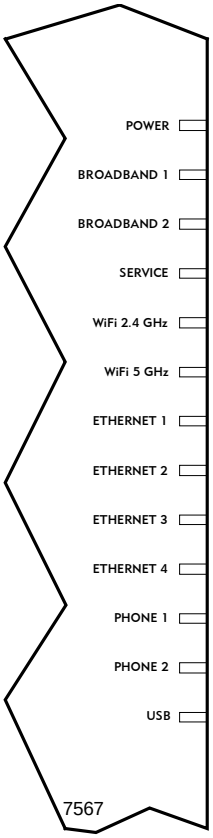
844GE/844G/854G/844F-FB LED Behavior

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.

854G LEDs	844FB LEDs
	

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).

844E/844G/854G GigaCenter

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

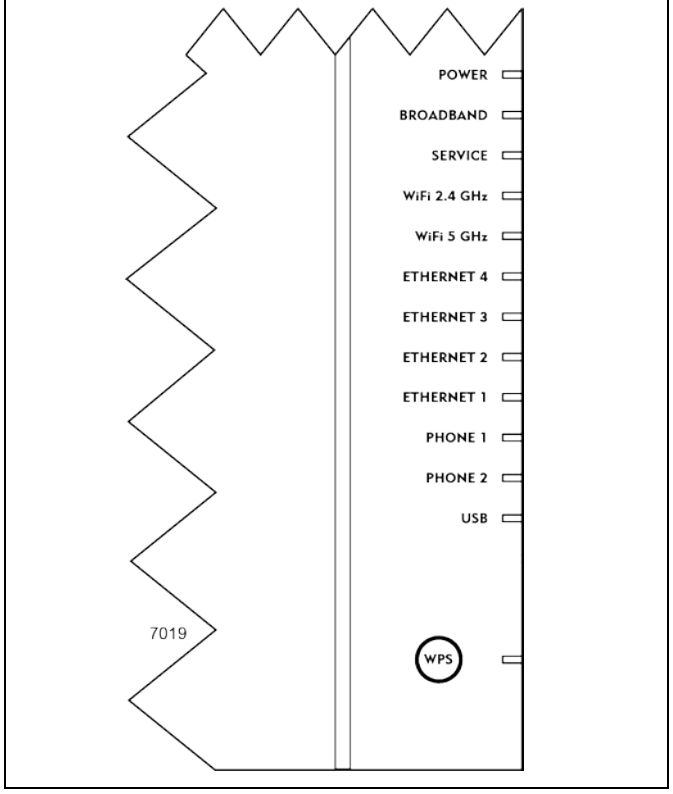
A properly installed and functional GigaCenter exhibits the following LED behavior:

- When power is initially applied, the power LED illuminates and remains lit. If LED does not light, power is off or the power cord may be defective.
- During initial power-up, Power, Broadband, Service, Phone 1, Phone 2, USB, (RF (854G only) and WPS button illuminate momentarily (lamp test).

- 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.

844E/844GE/844G/844F LEDs



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 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 - GPON/AE Products

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

Note: Check mark indicates LED state and function are in effect. "X" mark indicates the feature is not available or not applicable.

Power LED (Green/Red/Amber) Software Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	Power is off. There is no power to the unit or the UPS battery is missing or failed and cannot provide back-up power.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flashing Green - Slow	Device is booting up. All hardware and software self-tests are fully functional.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solid Green	In boot-up mode, device is powered on and boot-up is complete.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solid Red	In boot-up mode, red during hardware boot-up test. Remains red if the hardware test fails.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solid Amber	In boot-up mode, turns amber during the software image boot test. Remains amber if software test fails.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flashing Amber - Slow	Device is performing a local firmware upgrade. If successful, unit reboots. If unsuccessful, LED returns to solid green.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solid Amber after Mechanical Reset	When the reset button is held in for more than 10 seconds, the device is ready to reset to factory default values.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flashing Green/Amber	During a remote TR-069 upgrade, the Power LED blinks amber, then green in one second increments. Repeats until remote upgrade is complete.	N/A	N/A	✓	✓	✓	✓	✓	✓	✓

Broadband LED (Green/Red/Amber) Software Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	WAN link down or no optical or Ethernet link detected	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solid Green	Broadband physical connection is established. Device has ranged and synchronized	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flashing Green - Slow	WAN link has been detected, carrier signal is present. Device in process of ranging and synchronizing to network. • **Note:** Does not apply to 844E GigaCenter.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solid Red	If carrier is not detected, Broadband LED turns solid red. Optical signal present but no sync due to bit errors, out of range, or no negotiate. Turns red after 2 minutes if no success above. Flashes green during initial 2-minute sync until pass or fail.	✓	✓	✓	✓	✓	✓	✓	✓	✓

Service LED (Green/Red/Amber) Software Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	Internet service has not been established. Physical connection may not be present or service may not be enabled.	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Bridged Mode: No Ethernet port has been provisioned	✓	✓	✓	✓	✓	✓	✓	✓	✓
	RG Mode: No IP address received or PPPoE session authentication has occurred.	N/A	N/A	✓	✓	✓	✓	✓	✓	✓
Solid Green	Internet service has been established. IP address or PPPoE session has been provisioned. If operating in Bridged mode, indicates that one Ethernet port has been provisioned	✓	✓	✓	✓	✓	✓	✓	✓	✓
	OMCI Layer-2 Bridged Mode: At least one Ethernet port has been provisioned	✓	✓	✓	✓	✓	✓	✓	✓	✓
	RG Mode (IPv4 or IPv6): Receive IP address or PPPoE session authenticated with credentials. If IPv4 and/or IPv6 is connected, LED remains solid.	N/A	N/A	✓	✓	✓	✓	✓	✓	✓
	Mixed Mode: RG mode conditions apply	N/A	N/A	✓	✓	✓	✓	✓	✓	✓
Flashing Green (Slow)	**IGD Layer-2 Bridged Mode:** No ports configured for RG mode. WAP mode or all interfaces configured using EWI or TR-069 as transparent bridge.	N/A	N/A	✓	✓	✓	✓	✓	✓	✓
Flashing Green (Activity)	**RG Mode (IPv4 or IPv6)**: Internet service established, IP activity seen on connection between WAN-to-LAN or LAN-to-WAN.	N/A	N/A	✓	✓	✓	✓	✓	✓	✓

LED State	Function	801G	803G	812G	813G	818G	844GE	844G	854G	844E
Solid Red	Internet service attempted to establish connection in RG mode but failed to an IP address or provisioned PPPoE session. Not applicable in Bridged Mode.	N/A	N/A	✓	✓	✓	✓	✓	✓	✓
	OMCI or IGD Layer-2 Bridged Mode: Does not apply.	N/A	N/A	✓	✓	✓	✓	✓	✓	✓
	RG Mode: Device attempted to become IP or PPPoE session (authentication failed)	N/A	N/A	✓	✓	✓	✓	✓	✓	✓
	Mixed Mode: RG mode conditions apply	N/A	N/A	✓	✓	✓	✓	✓	✓	✓
Solid Amber	**Walled Garden**: When in the walled garden state, Internet LED supports the following: • Solid Amber • Activity blink of .2 seconds on and off during LAN to WAN and WAN to LAN Activity. Walled Garden state initiates as follows: • The modem is authenticated with the connect@calix.com PPP username in PPPoE mode. • The CPE captive portal is enabled via ACS in all protocols.	N/A	N/A	✓	✓	✓	✓	✓	✓	✓

2.4 GHz Wi-Fi LED (Green) Hardware Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	Radio is OFF or has not been enabled.	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Solid Green	Radio is ON but there are no clients associated or no wireless activity. A client may be associated to the radio/SSID but may be idle.	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Flashing Green (slow)	• Radio is ON and has at least one client associated to it with wireless activity. • The flickering of the light is roughly synchronized to actual data traffic.	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓

5.0 GHz Wi-Fi LED (Green) Hardware Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	Radio is OFF or has not been enabled.	N/A	N/A	N/A	N/A	N/A	✓	✓	✓	✓
Solid Green	Radio is ON but there are no clients associated or no wireless activity. A client may be associated to the radio/SSID but may be idle.	N/A	N/A	N/A	N/A	N/A	✓	✓	✓	✓
Flashing Green (slow)	• Radio is ON and has at least one client associated to it with wireless activity. • The flickering of the light is roughly synchronized to actual data traffic.	N/A	N/A	N/A	N/A	N/A	✓	✓	✓	✓

Ethernet (1-4) LED (Green) Hardware Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	No Ethernet link established or device connected to port may not be powered.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Solid Green	Device is connected to the associated port, Ethernet link is up but no Ethernet traffic present.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flashing Green (slow)	• Activity seen from devices associated with the port. • Activity of the LED is roughly synchronized to actual ingress data traffic from device to port.	✓	✓	✓	✓	✓	✓	✓	✓	✓

Phone (1-2) LED (Green/Red/Amber) Software Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	Phone line is disabled, not provisioned or no phone lines off-hook.	N/A	N/A	✓	✓	N/A	✓	✓	✓	✓
Solid Green	The phone line is configured and on-hook. Line is provisioned and registered with the SIP server.	N/A	N/A	✓	✓	N/A	✓	✓	✓	✓
Green Flashing - Slow	Phone line is off-hook, call is active. Flashing indicates active call.	N/A	N/A	✓	✓	N/A	✓	✓	✓	✓
Solid Red	Voice registration with the network has failed. No calls are possible until phone line has been registered and is in service.	N/A	N/A	✓	✓	N/A	✓	✓	✓	✓

USB LED (Green) Software Controlled									
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	The USB port is disabled or device connected to port may not be powered.	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Solid Green	Powered device connected to the associated port, link is active but no Ethernet traffic present.	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Flashing Green (slow)	• Activity seen from devices associated with the port. • Activity of the LED should be synchronized to actual ingress data traffic from device to port.	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓

RF LED (Green/Red/Amber) Software Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	The received optical signal not present or is below AGC range.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	N/A
Solid Green	The received optical video signal is within the AGC range (-6.8 dBm to +2 dBm).	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	N/A
Solid Red	The received optical video signal is too high (greater than +2 dBm). Video signal may be saturated.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	N/A
Solid Amber	The received optical video signal is below the AGC range (less than -6.8 dBm). The RF port will remain in operation.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	N/A
Flashing Amber - Slow	The received optical video signal is below allowable limits (less than -8.5 dBm) or is not present. The RF port is disabled and action must be taken to restore video services.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	N/A

WPS LED (Green/Red/Amber) Software Controlled										
LED State	**Function**	**801G**	**803G**	**812G**	**813G**	**818G**	**844GE**	**844G**	**854G**	**844E**
Off	WPS LED is off when Wireless Protected Setup procedure is not active or is disabled.	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Solid Green (3 minutes or until WPS button is pressed again)	The WPS procedure has been completed successfully, a device has been associated to an SSID	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Flashing Green - Slow	The WPS procedure has been activated for Primary 2.4 and 5GHz SSID and may be in process of associating a device	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Flashing Amber - Slow	The WPS procedure has been activated for IPTV 5GHz SSID and may be in process of associating a device	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Solid Red (up to 2 minutes)	• A non-security based error, such as failed to find any client or WPS procedure stopped. • Recommended user action is to press WPS button to start procedure again.	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓
Flashing Red (Fast)	• The WPS procedure has detected a session overlap. • Recommendation is to wait 2 minutes, then select WPS to re-attempt WPS procedure	N/A	N/A	N/A	✓	N/A	✓	✓	✓	✓

LED States and Status - G.fast Products

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

Note: Check mark indicates LED state and function are in effect. "N/A" indicates the feature is not available or not applicable.

Power (Green, Red, or Amber) - Software Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• Power is off. There is no power to the unit or the UPS battery is missing or failed and cannot provide back-up power.	✓	✓	N/A	✓
Flashing Green - Slow	• Device is booting up. All hardware and software self-tests are fully functional. • Power is applied to device, a Power On Self-Test (POST) is in progress.	✓	✓	✓	✓
Solid Green	• In boot-up mode, device is powered on and boot-up is complete. • Power is applied to device, POST has completed successfully.	✓	✓	✓	✓
Solid Red	• In boot-up mode, LED is red during hardware boot-up test. Remains red if the hardware test fails. • When POST fails, LED will flash red.	✓	✓	✓	✓
Solid Amber	• In boot-up mode, device is executing software image test. If test fails, will stay amber if test fails. • When the reset button is held in for more than 5 seconds, the device is ready to reset to factory default values.	✓	✓	✓	✓
Flashing Amber - Slow	• Device is performing a local firmware upgrade. If successful, unit reboots. If unsuccessful, LED returns to solid green.	✓	✓	✓	✓
Flashing Red	• When POST fails, LED will flash red.	✓	✓	✓	✓
Flashing Green/Amber	• Upgrading remote. During a remote TR-069 upgrade, the Power LED blinks amber then green: • 1 second on Amber, 1 second on Green. Repeats until upgrade is complete.	N/A	N/A	✓	✓

Broadband 1 (Green, Red, or Amber) - Software Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• WAN link down or no G.fast or Ethernet link detected	✓	✓	✓	✓
Solid Green	• Broadband physical connection is established. • Device has ranged and synchronized	✓	✓	✓	✓
Flashing Green - Slow	• WAN link has been detected and a carrier signal is present. Device is in the process of ranging and synchronizing to the network.	✓	✓	✓	✓
Solid Red	If carrier is not detected, Broadband LED turns solid red after about 2 minutes. A G.fast signal is present but no synchronization has occurred due to any of the following: • Bit errors have been reported. • An out of range condition exists. • Negotiation has failed. • Turns red after 2 minutes if no success above. Flashes green during initial 2-minute sync until pass or fail. • **Note:** LED flashes green during the initial 2-minute synchronization cycle. After connecting 801FB to DPU with a "faulted" line, the broadband LED remains solid red.	✓	✓	✓	✓

Broadband 2 (Green, Red, or Amber) - Software Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• WAN link down or no G.fast or Ethernet link detected	N/A	✓	N/A	✓
Solid Green	• Broadband physical connection is established. • Device has ranged and synchronized	N/A	✓	N/A	✓
Flashing Green - Slow	• WAN link has been detected and a carrier signal is present. Device is in the process of ranging and synchronizing to the network.	N/A	✓	N/A	✓
Solid Red	If carrier is not detected, Broadband LED turns solid red after about 2 minutes. A G.fast signal is present but no synchronization has occurred due to any of the following: • Bit errors have been reported. • An out of range condition exists. • Negotiation has failed. • Turns red after 2 minutes if no success above. Flashes green during initial 2-minute sync until pass or fail. • Note: LED flashes green during the initial 2-minute synchronization cycle. After connecting 801FB to DPU with a "faulted" line, the broadband LED remains solid red.	N/A	✓	N/A	✓

Service LED (Green, Red, or Amber) - Software Controlled with Hardware Controlled Activity					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• Internet service has not been established. Physical connection may not be present or service may not be enabled. • In Bridged Mode, Ethernet port has not been provisioned. • In RG Mode, IP address has not been received (IPv4 or IPv6) or PPPoE session authentication has not occurred. **NOTE:** RG Mode N/A on 801F, 801FB.	✓	✓	✓	✓
Solid Green	• Internet service has been established. IP address or PPPoE session has been provisioned. • In Bridged Mode, indicates that one Ethernet port has been provisioned. • In OMCI Layer-2 Bridged Mode: At least one Ethernet port has been provisioned. • In RG Mode (IPv4 or IPv6) or Mixed Mode: Received IP address or PPPoE session authenticated with credentials is complete. Once IPv4 and/or IPv6 is connected, LED is solid green. **NOTE:** RG Mode or Mixed Mode N/A on 801F, 801FB.	✓	✓	✓	✓
Flashing Green - Slow	• IGD Layer-2 Bridged Mode: No ports configured for RG mode. WAP mode or all interfaces configured using EWI or TR-069 as transparent bridge.	N/A	N/A	✓	✓
Flashing Green - Activity	• RG Mode (IPv4 or IPv6): Internet service established, IP activity seen on connection between WAN-to-LAN or LAN-to-WAN.	N/A	N/A	✓	✓
Solid Red	• RG or Mixed Mode: Internet service attempted but failed to complete an IP address request or PPPoE session. • In RG or Mixed Mode, if achieving an IP address fails and PPPoE session cannot be authenticated on both IPv4 or IPv6, solid red will occur. • OMCI or IGD Layer-2 Bridged Mode: N/A	N/A	N/A	✓	✓
Solid Amber	Walled Garden mode: When in "walled garden", any Internet LED supports the following states: • Solid Amber • Activity - blinks every .2 seconds during LAN to WAN and WAN to LAN activity. **Note:** Walled garden initiates under the following conditions: • The modem is authenticated with the connect@calix.com PPP username in PPPoE mode. • The CPE captive portal is enabled via ACS in all protocols.	N/A	N/A	✓	✓

Wi-Fi 2.4 GHz (Green) - Hardware Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• Radio is Off or has not been enabled.	N/A	N/A	✓	✓
Flashing Green - Activity	• Radio is ON and has at least one client associated to it with wireless activity. • Changes in LED intensity (flickering) roughly correlates to actual data traffic.	N/A	N/A	✓	✓
Solid Green	• Radio is ON but there are no clients associated or no wireless activity. A client may be associated to the radio or SSID but is currently not passing traffic (idle).	N/A	N/A	✓	✓

Wi-Fi 5 GHz (Green) - Hardware Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• Radio is Off or has not been enabled.	N/A	N/A	✓	✓
Flashing Green - Activity	• Radio is ON and has at least one client associated to it with wireless activity. • Changes in LED intensity (flickering) roughly correlates to actual data traffic.	N/A	N/A	✓	✓
Solid Green	• Radio is ON but there are no clients associated or no wireless activity. A client may be associated to the radio or SSID but is currently not passing traffic (idle).	N/A	N/A	✓	✓

Ethernet (1-4) (Green) - Hardware Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• No Ethernet link established or device connected to port may not be powered.	✓	✓	✓	✓
Solid Green	• Device is connected to the associated port, Ethernet link is up but no Ethernet traffic is present.	✓	✓	✓	✓
Flashing Green - Activity	• Activity seen from devices associated with that port. • Activity of the LED should be synchronized to actual ingress data traffic from device to this port.	✓	✓	✓	✓

Phone (1-2) (Green, Red, or Amber) - Software Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• Phone line is disabled, not provisioned, or zero phone lines are currently off-hook.	N/A	N/A	✓	✓
Solid Green	• The phone line is configured and on-hook. Line is provisioned and registered with the network. • **Note:** This state is supported for SIP, H.248, MGCP and C7 TDM Gateway only.	N/A	N/A	✓	✓
Flashing Green - Slow	• Phone line is off-hook, call is active. Flashing indicates active call.	N/A	N/A	✓	✓
Solid Red	• Voice registration with the network has failed. No calls can be completed until phone line has been registered and in service.	N/A	N/A	✓	✓

USB (Green) - Software Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• The USB port is disabled or any device connected to this port may not be powered.	N/A	N/A	✓	✓
Solid Green	• Powered device connected to the associated port, link is active but no Ethernet traffic present.	N/A	N/A	✓	✓
Flashing Green - Activity	• Activity seen from devices associated with the port. • Activity of the LED should be synchronized to actual ingress traffic from devices attached to this port.	N/A	N/A	✓	✓

WPS (Green, Red, or Amber) - Software Controlled					
LED State	**Function**	**801F**	**801FB**	**844F**	**844FB**
Off	• WPS LED is off provided Wireless Protected Setup request is not active or if the WPS function is disabled.	N/A	N/A	✓	✓
Solid Green	• Note: Conditions exists for a maximum of 3 minutes or until WPS request is depressed again. • The WPS procedure has been completed successfully (a device has been associated to an SSID).	N/A	N/A	✓	✓
Flashing Green - Slow	• The WPS procedure has been activated for the Primary 2.4 GHz and 5 GHz SSID and may be in the process of associating with a device.	N/A	N/A	✓	✓
Flashing Amber - Slow	• The WPS procedure has been activated for IPTV 5 GHZ SSID and may in the process of associating with a device.	N/A	N/A	✓	✓
Solid Red	• **Note:** This condition may exist for a maximum of two minutes. An error may exist for any of these listed reasons: • An error unrelated to invalid security credentials • Device failed to find a client • WPS process has been aborted.	N/A	N/A	✓	✓
Flashing Red - Fast	The WPS procedure has detected a session overlap. **Note:** Should this occur, wait 2 minutes, then select WPS to re-attempt a connection.	N/A	N/A	✓	✓

Appendix A

Appendix

Cleaning Fiber Connectors

Note: This topic applies to the 844GE/844G/854G GigaCenter only.

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.