



310 5G CPE Indoor Installation Manual

Describes the product installation and requirement procedure.

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Radio Access Network

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Preface

This manual describes how to install the ICL Indoor CPE (Model: SFG-D0100) on a window frame bracket including how to connect cables.

Conventions in this Document

Samsung Networks product documentation uses the following conventions.

Symbols

Symbol	Description
	Indicates a task.
	Indicates a shortcut or an alternative method.
	Provides additional information.
	Provides information or instructions that you should follow to avoid service failure or damage to equipment.
	Provides information or instructions that you should follow to avoid personal injury or fatality.
	Provides antistatic precautions that you should observe.

Menu Commands

menu | command

This indicates that you must select a command on a menu, where **menu** is the name of the menu, and **command** is the name of the command on that menu.

File Names and Paths

These are indicated by a bold typeface. For example:

Copy **filename.txt** into the **/home/folder1/folder2/bin/** folder.

User Input and Console Screen Output Text

Input and output text is presented in the Courier font. For example,

context <designated epc-context-name>

CLI commands are presented in bold small caps. For example,

Type the **RTRV-NE-ST**s command in the input field.

New and Changed Information

This section describes information that has been added/ changed since the previous publication of this manual.

Revision History

The following table lists all versions of this document.

Document Number	Product/Software Version	Document Version	Publication Date	Remarks
N/A	Indoor ICL 5G CPE	1.0	April 2018	First version
N/A	Indoor ICL 5G CPE	2.0	June 2018	2nd version

Organization of This Document

Section	Title	Description
Chapter 1	Before Installation	This chapter introduces Indoor 5G CPE description that items should be understood before installation.
Chapter 2	Connecting Cables	This chapter describes the procedures to connect the cables to the Indoor 5G CPE
Chapter 3	Installing System	This chapter describes the procedures to install the Indoor CPE
Chapter 4	Inspect the Installation	This chapter describes the procedures of inspecting installation status after Indoor 5G CPE installation and cabling is completed.
Appendix A	Acronyms	Describes the acronyms used in this manual.
Appendix B	Standard Torque	This annex describes the standard torque when tightening the bolt.

Related Documentation

5G Indoor ICL CPE System Description

Personal and Product Safety

This product safety information includes European directives, which you must follow. If these do not apply in your country, please follow similar directives that do apply in your country.

Proposition 65 (US Only)

State of California Proposition 65 Warning (US only)

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Electrical

All structural parts are grounded and all input and outputs have built-in isolation from the network. All input and output ports that connect to external power sources are designed to meet relevant national safety requirements.

The product contains hazardous energy levels as defined by UL 60950. Care must be taken when maintaining this equipment as injury to personnel or damage to the equipment could result from mistakes. Maintenance should only be carried out by trained and competent engineers who are familiar with the relevant procedures and instructions.

Manual Handling

Care should be taken when handling equipment. Give due consideration to the weight of the equipment, the physical capability of the individual(s) handling the equipment, and movements such as twisting, bending and stooping, which could lead to skeletal and muscular injuries.

Installation

Installation is recommended to be carried out by trained personnel. All relevant safety measures should be taken to ensure equipment is not connected to live power and transmission sources during installation. Equipment must be correctly installed in order to meet the relevant safety standards and approval conditions.

Maintenance

Maintenance must only be carried out by a suitably trained and competent technician. All safety instructions must be carefully observed at all times. Equipment covers should not be removed while live power and transmission is connected unless in a controlled environment by trained technicians.

Fire

The product is powered from an AC supply. To protect against fire, the equipment is fused.

Environment

The product must be operated in an environment with the specified relative humidity and ambient temperature ranges.

Keep all liquids away from the equipment as accidental spillage can cause severe damage.

Anti-Static Precautions

The circuit boards and other modules in the product are sensitive to and easily damaged by static electricity. If any card or sub-assembly is removed from the unit, the following anti-static precautions must be observed at all times:

- Service personnel must wear anti-static wrist straps.
- Circuit boards and sub-assemblies must be placed on ground conductive mats or in conductive bags.
- All tools must be discharged to ground before use.
- The anti-static wrist strap and cord must be checked at regular intervals for their suitability for use.

Equipment Markings



Correct disposal of batteries in this product (Applicable in countries with separate collection systems.)

The marking on the battery, manual or packaging indicates that the battery in this product should not be disposed of with other household waste. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66.

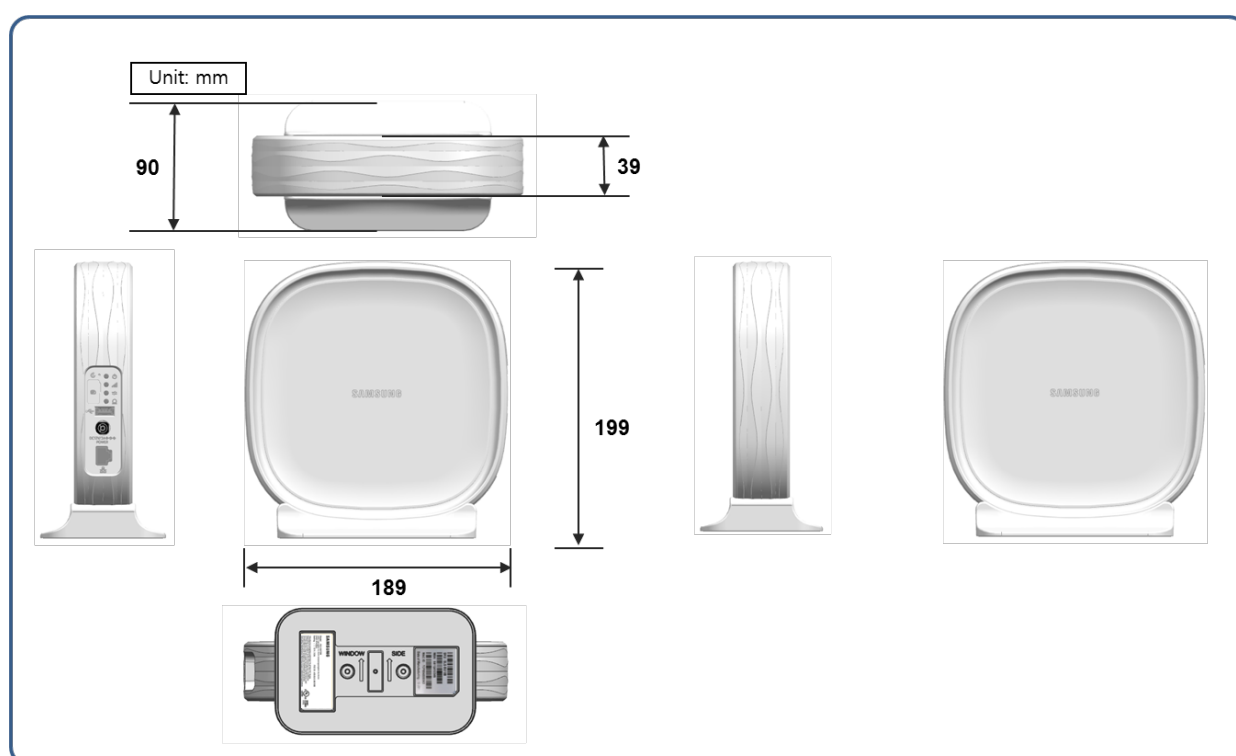
The battery incorporated in this product is not user replaceable. For information on its replacement, please contact your service provider. Do not attempt to remove the battery or dispose it in a fire. Do not disassemble, crush, or puncture the battery. If you intend to discard the product, the waste collection site will take the appropriate measures for the recycling and treatment of the product, including the battery.

Chapter 1 Before Installation

System View and Interface

Indoor CPE View

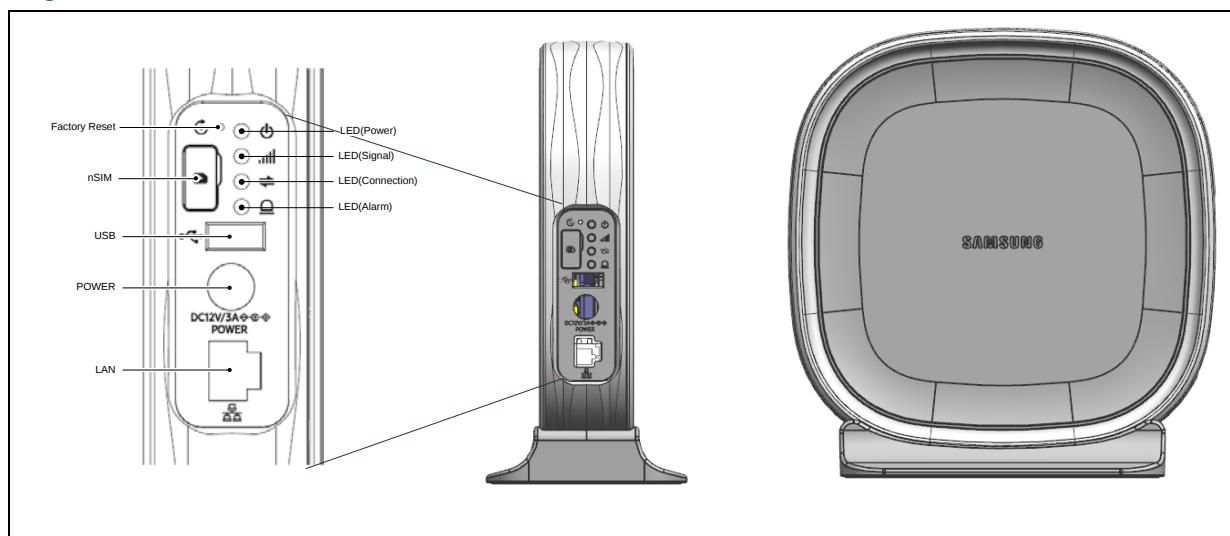
The view of the Indoor CPE is as follows.



Indoor CPE External Interface

The external interface structure of the Indoor CPE is as follows.

Figure 1. CPE DU External Interface



Indoor CPE Power Cord and Power Supply

The following figure shows the connectivity of the power cord and power supply.

Figure 2. Power Cord and Power Supply

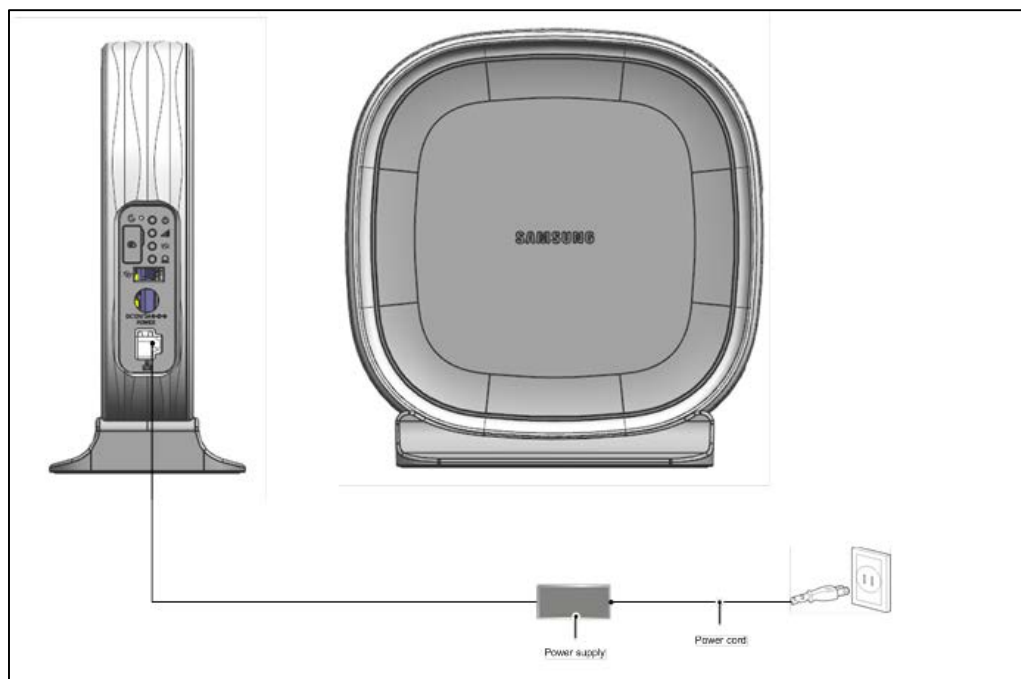


Table 1. 5G Indoor CPE Power Cord and Power Supply Specifications

Item		Specification
Power Cord	Length	1.8 meters
	Color	Black
Power Supply	Input Voltage	AC100~240 VAC @ 50/60 Hz
	Output Voltage	12 VDC ($\pm 5\%$)
	Operating Temperature	0~50°C
	Operating Humidity	5~90 %

Specifications

Key Specifications

The following table shows the key specifications of the Indoor CPE.

Table 2. 5G Indoor CPE Key Specifications

Item	Specifications
Technology	5G (Follows Verizon 5GTF's latest version)
Operating Frequency	27.5 GHz ~ 28.35 GHz
Channel Bandwidth	100 MHz
Operating Bandwidth	100 MHz x 8 Carrier
Antenna Configuration	Integrated Antenna • Data Channel: 2Tx/2Rx • RF chain per Data Channel: 32
RF Output Power	36dBm/Path (EIRP, Antenna Gain: 19dBi)
Ethernet	Indoor : RJ45 1 Port(100Base-TX or 1000Base-T)
USB	USB 2.0 1 Port
USIM	Nano-SIM 1 Port Replaceable regular SIM
LED	• Total: 4EA • Power: Green LED • Signal: 3 Colors (Green/Yellow/Red) • Connection: 3 Colors (Green/Yellow/Red) • Alarm: 3 Colors (Green/Yellow/Red)
Factory Reset	• 1EA (Push Button Switch)
Operational Temperature	5 ~ 45°C
Humidity	5% ~ 90%, non-condensing, not to exceed 30g/m ³ absolute humidity
IP rating	IP20
EMC	FCC Part 15 Subpart B
FCC	FCC Part 30 (5G RF)
Installation	Indoor: CPE Stand
Warranty	Warranty: 1 Year
Volume	Indoor: < 1.5L (main Frame, exclude stand)
Weight	Indoor: < 1.2 kg (main frame)
Power Supply (selective)	AC 100~240 VAC @ 50/60 Hz with External Adapter
Power Consumption	Indoor: < 20W (Typical)

Cautions for Installation

Observe the following safety instructions when installing the system.

Before Installing



The system must be installed close to a window or wall to face a guided direction to a 5G signal.



The location of the CPE allows at least 20 cm (about 8 inches) between the unit and persons to be compliance with FCC RF exposure guidelines.



The location of the CPE is 10 feet away from the products that generate electromagnetic radiation (e.g. microwave oven).



It is recommended that the product installation to be performed by a competent and trained professional.

While Installing

- The system power must be cut off before installing.
- Be careful not to damage or scratch the system and the cables among the boards when the system is transported or installed.



Make sure the power switch for the power supply is off when installing the system. Installing the system with the power switch on may cause system damage or fatal human injury when cables are not correctly connected.



Do not wear accessories such as watches and rings in order to prevent electrical shock.

After Installing

Remove any debris produced during the work and clean up the installation site.



Make sure the worker does not damage the installed cables while cleaning the system.



While cleaning the power supply device, take caution that the device does not come in contact with foreign objects that may cause power failure.

Installation Tools

The basic tools for installation are listed in the table below. The additional tools required for each site need to be identified and prepared during a site survey before starting installation.

Table 3. Basic Installation Tools

No.	Name	Specification	Remarks
1		Basic tool	Electric Screwdriver
2		Window Bracket	Bracket attached to window frame on which CPE is firmly placed

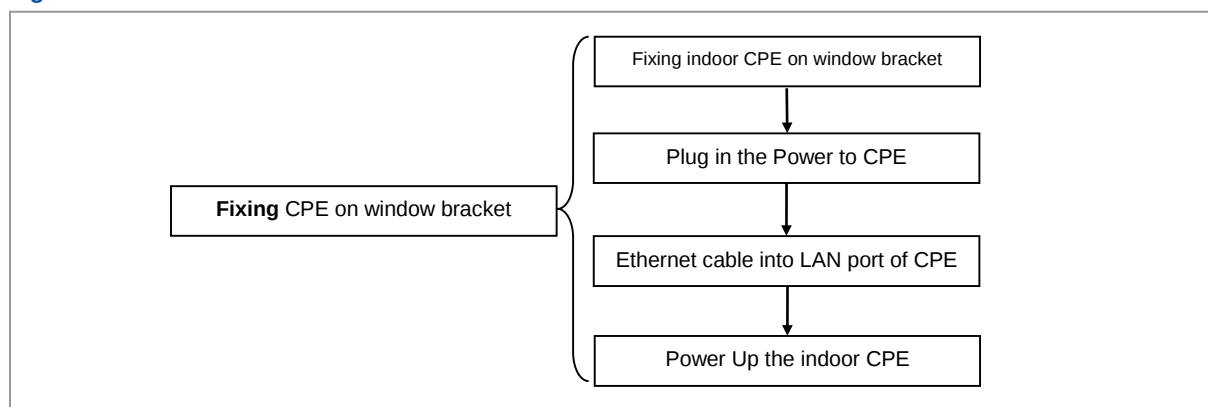
Chapter 2 Installing System

This chapter describes the procedures to install the system.

Installation Procedure

The procedure to install the RFA is as follows.

Figure 3. Procedure to Install the Indoor CPE



Transporting and Unpacking

This section describes the work to unpack cabinets and other components and transport them to the location to be installed.

Bringing in Items

Bring in items, taking care of the following:

- When carrying the system, tighten the system firmly: do not exceed the proper vibration level from 1 to 500 Hz.
- While moving the system, the system should not be shocked physically or damaged caused by dust, moisture, and static electricity.

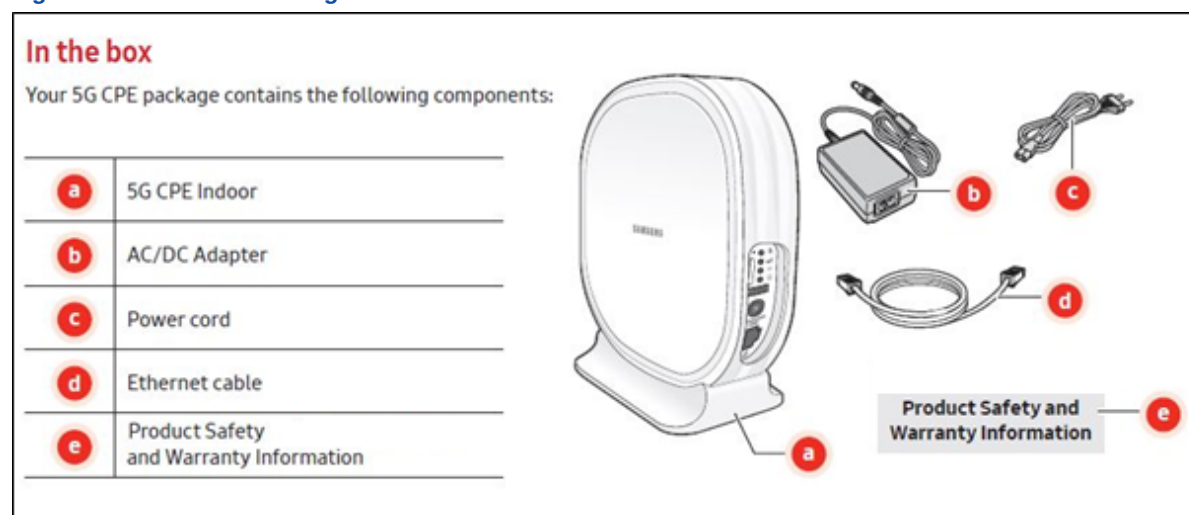
Unpacking Items

The procedure to unpack items is as follows:

- The packing items must be packed until they reach the installation place.
- The items are classified in accordance with each job specification and stored on a place that does not interfere with working.
- Unpack only external packing, leaving the internal packing in unpacked status.
- Unpack the inner packaging after each system is placed on its installation location.
- Scrap by-products (packaging waste) in accordance with the rule. Do not recycle the by-products.

In the Box

Figure 4. Indoor CPE Package Contents



Indoor CPE Installation

This section describes the procedures to fix the indoor CPE on the window frame bracket.



The Indoor CPE bottom shows the proper orientation of the CPE side facing outside the window. Make sure to check the correct orientation while installing.



The Indoor CPE must be fixed vertically as depicted in the following guidelines.

Fixing CPE on Window Frame



For the installation directions and fixing method, see the following process.

The indoor CPE installation on a window frame bracket is to install the CPE with good RSRP measurement conducted as a pre-qualification with Spectrum analyzer.

▶ To install the CPE on a window frame:

- 1 Locate the CPE fixing point on the window frame and make sure the surface is free of dust and debris.
- 2 Attach the CPE window bracket on the window frame as depicted in the figures below.
- 3 Make sure to check the direction mark at the bottom of the CPE stand as shown in the figure below.
- 4 Make sure the CPE is firmly positioned on the window frame bracket.

Indoor CPE Installation Material

Indoor CPE installation material requires the following items in order to fix the indoor CPE on the window frame.

Category	Description	
Parts	Indoor CPE Stand Holder	1 EA
Parts	Indoor CPE Window mounting bracket	1 EA
Parts	M4 screws	4 EA

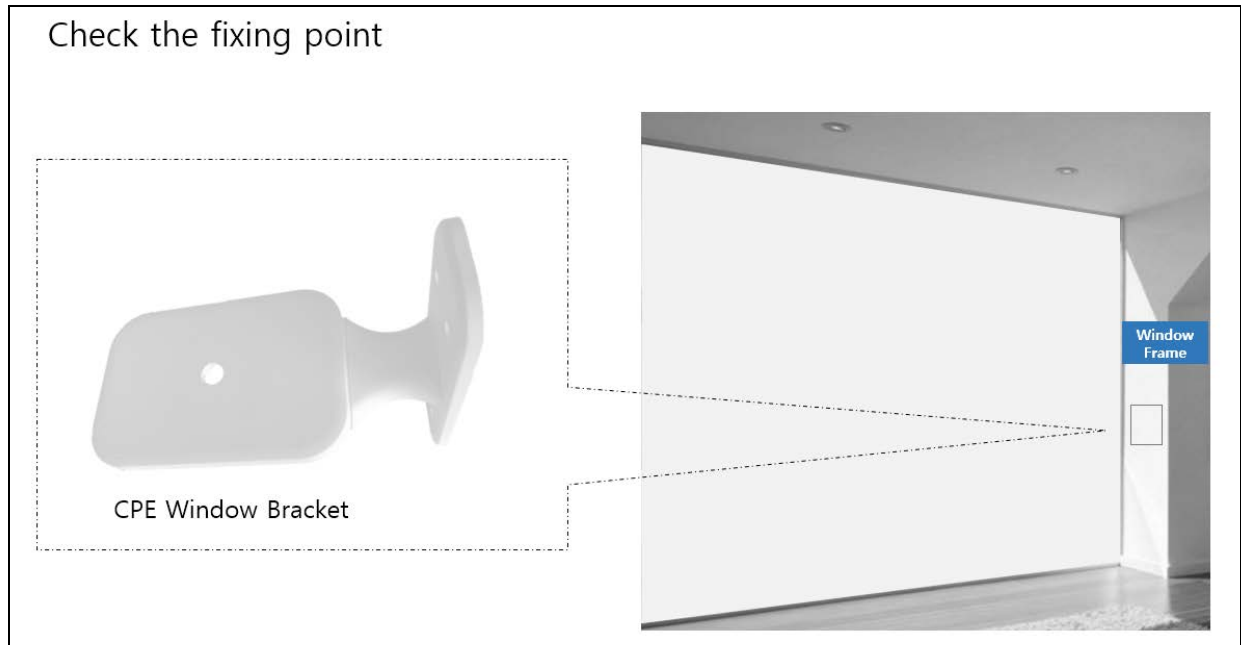
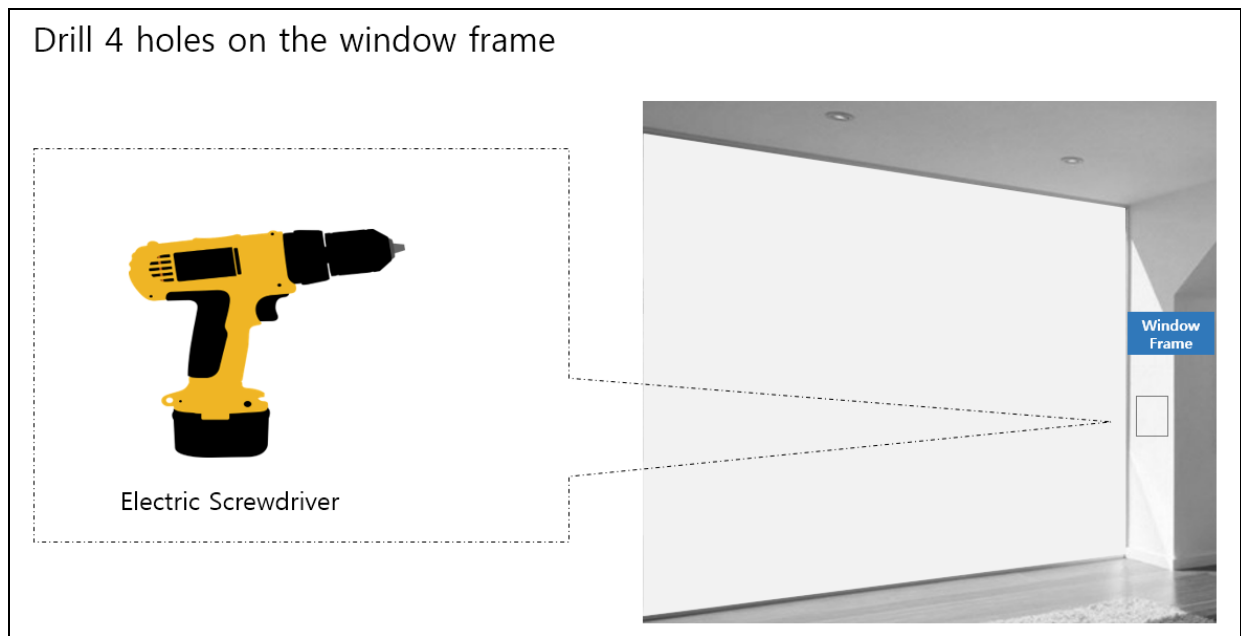
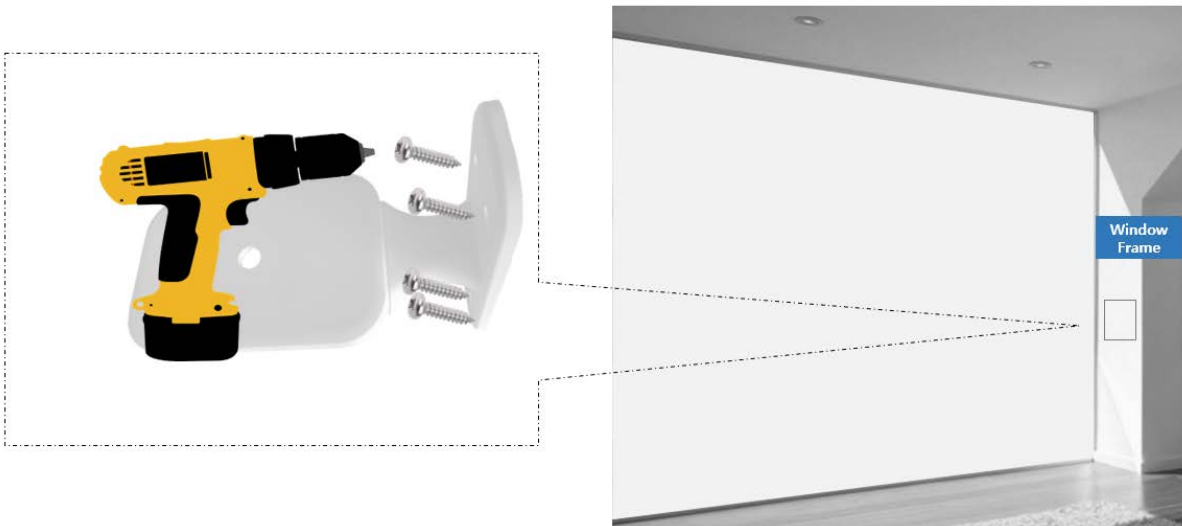
Figure 5. Indoor CPE Window Frame Installation Step 1*Figure 6. Indoor CPE Window Frame Installation Step 2*

Figure 7. Indoor CPE Window Frame Installation Step 3

Fix the CPE window bracket to window frame

*Figure 8. Indoor CPE Window Frame Installation Step 4*

Fix the CPE Stand to CPE Stand Holder



Figure 9. Indoor CPE Window Frame Installation step 5

Put CPE on Window Bracket



Put CPE Stand & Holder on Window bracket

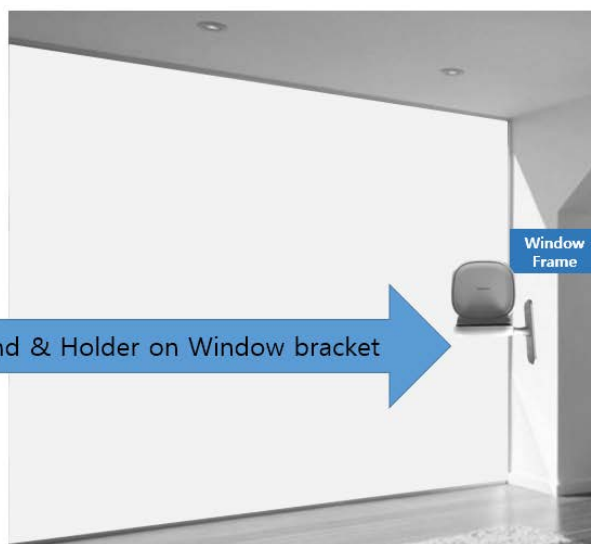


Figure 10. Indoor CPE Window Frame Installation step 6

Screw CPE Stand with Window Bracket

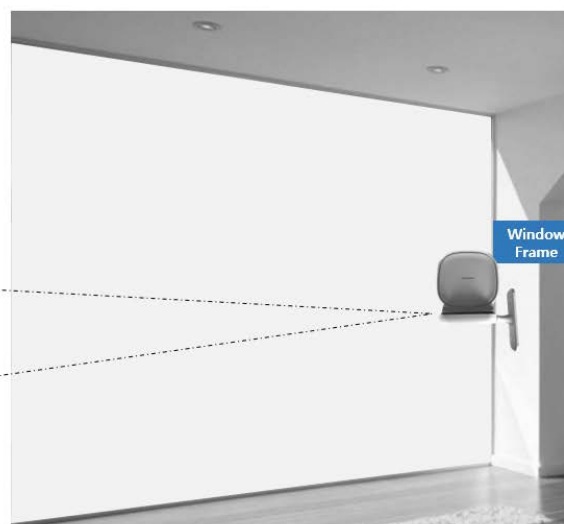
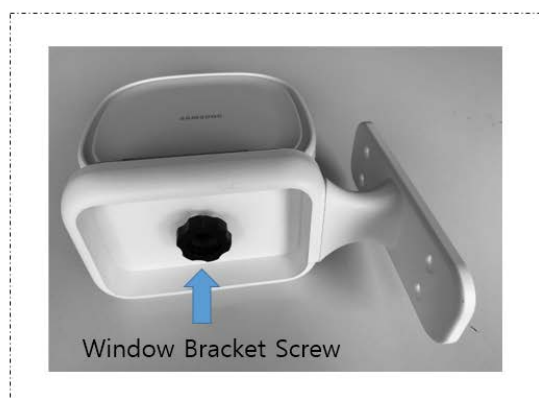


Table 4. Requirement to Fix Indoor CPE on Window Frame

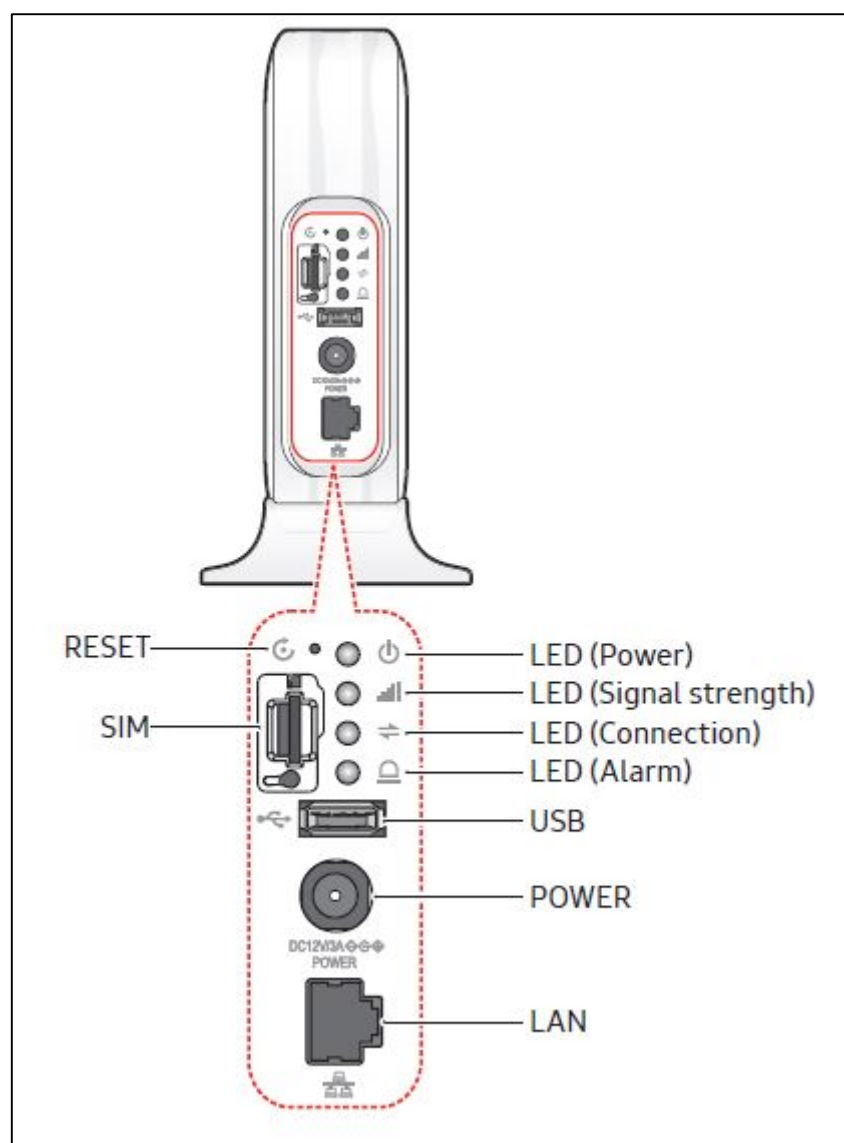
Category	Description	
Parts	Indoor CPE	1 EA
Parts	Indoor CPE Stand Holder	1 EA
Parts	Indoor CPE Window Bracket	1 EA

Category	Description	
Parts	Command damage free hanging [attach Kwik Klip to wall/glass]	As needed
Parts	Kwik Klips 3/4" 19mm [Cable dressing]	As needed
Parts	M4 Screws	4 EA

5G Indoor CPE Interface Overview

The following figure shows the 5G indoor CPE interface.

Figure 11. Indoor CPE Interface Overview



5G Indoor CPE Connecting Cables

▶ To connect cables:

- 1 Plug one end of the provided Ethernet cable into the available LAN port on the indoor CPE. Once the CPE is in service, connect the other end of the Ethernet cable into the wireless router.
- 2 Plug the AC/DC adapter connector into the DC 12V power port located on the indoor CPE.
- 3 Insert one end of the power cord into the AC/DC adapter and then plug the other end into an available outlet.

5G Indoor CPE LED Information

Figure 12. LED Information

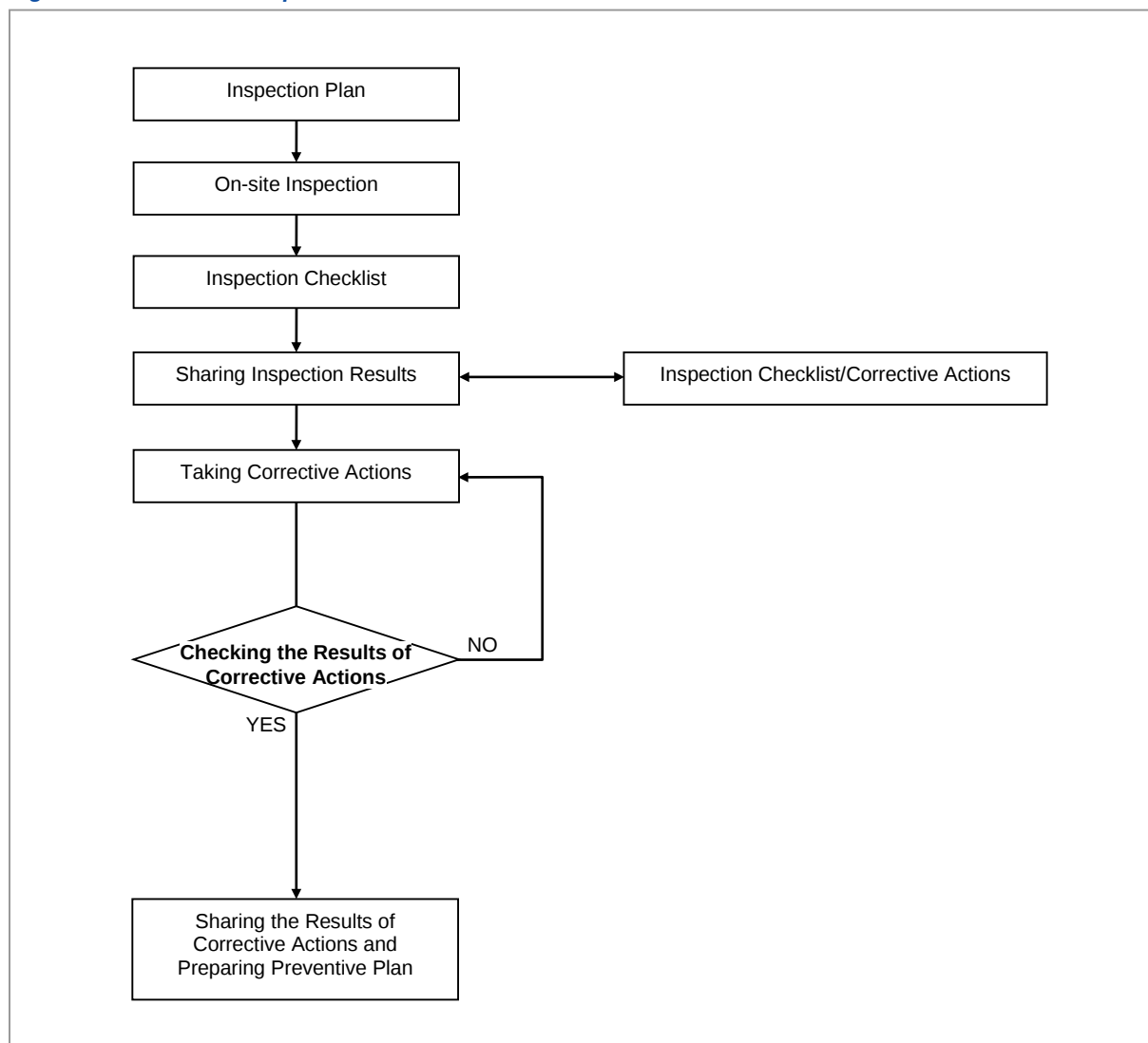
LED Information		
 Power		
LED	State	Description
	Green On	Power On
	Off	Power off
 5G Signal strength		
LED	State	Description
3 •   	Amber blinking (3 times) then off	Initialization
	Green On	Strong
	Amber On	Fair
	Red On	Weak
	Off	5G disconnected
 5G Connection		
LED	State	Description
3 •   	Amber blinking (3 times) then off	Initialization
	Green On	Connected
	Red On	Connection fail
	Off	Connection fail
 	Green blinking	5G modem ready
 Alarm		
LED	State	Description
3 •   	Amber blinking (3 times) then On	Initialization
	Red On	Initialization failure
	Green On	Normal
 	Green blinking	Upgrading firmware/software
 	Red blinking	Critical, major alarm
 	Amber blinking	Minor alarm

Chapter 3

Inspect the Installation

The procedure to check the installation status is as follows.

Figure 13. Installation Inspection Procedure



Inspection Plan

Create an inspection sheet per system and select an inspector to set an inspection schedule per site.

On-site Inspection and Inspection Checklist

The on-site inspection is to perform inspection visually or using instruments for each specification, standard, and installation status, and others based on the inspection checklist actually at a site where the system is installed.

The inspector must record the results onto the inspection checklist during or after filed inspection.

Sharing Inspection Results and Taking Corrective Actions

The inspector must share the inspection results (inspection checklist/corrective actions) with an installation operator and, the installation operator must take the corrective actions if necessary after reviewing the requirements.

Checking the Results of Corrective Actions

The inspector must check if the corrective actions are properly taken. If they are not sufficient, the inspector must ask the installation operator to take the corrective actions again

Sharing the Results of Corrective Actions and Preparing Preventive Plan

After the corrective actions are all completed, the inspector must share the results with the installation operator and relevant departments and prepare a preventive plan to prevent the same or similar problems from re-occurring.

Construction Situation Checklist

Table 5. Construction Situation Checklist

Category	Check Items	Criteria	Result	
			Pass	Fail
Installing Equipment	Appearance of equipment and mechanical parts	Equipment damage such as Dent, scratch and crack, and so on.		
	Placement of equipment and mechanical parts	Maintenance and horizontal/vertical placement		
	Leveling condition of equipment and mechanical parts	Horizontal/vertical status		
	Validity of status and specifications of tightening bolt/nut/washer, others.	Checking fasteners omission		
		Compliance with assembly order of fasteners		
		Compliance with tightening torque value		
	Insulation status	Checking electrical contact between insulators (insulation resistance tester)		

Category	Check Items	Criteria	Result	
			Pass	Fail
Power	Installation status of power supply	Power supply capacity		
		Output voltage (tester)		
	Installation of circuit breaker	Checking circuit breaker capacity		
	Cable specification	Checking the specification		
		Checking the limit distance		
	Cabling	Cable damage		
		Proper installation route		
		Compliance with the radius of curvature		
	Cable binding status	Binding status		
		Binding interval		
		Checking binding materials		
	Cable connection	Checking cable connection (Pin Map)		
		Input voltage		
		Assembly condition of a pressure terminal and connector		
		Tightening condition of a pressure terminal and connector		
		Checking compliance with tightening torque value		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
Other data cables	Cable specification	Checking the specification		
	Cabling	Cable damage		
		Proper installation route		
		Compliance with the radius of curvature		
	Cable binding status	Binding status		
		Binding interval		
		Checking binding materials		
	Cable connection	Checking cable connection (Pin Map)		
		Assembly condition of a connector		
		Tightening condition of a connector		
		Checking compliance with tightening torque value		
	Installation status of cable tag	Position		
		Marking content		
		Checking tag installation method		
Others	Reserved ports	Checking port cap tightening status		
		- Indoor: Dust cap - Outdoor: Water proof cap		

Category	Check Items	Criteria	Result	
			Pass	Fail
	Cable inlet status/Connection of equipment I/O port	Checking tightening status (Conduit/Cable Gland)		
	Cable tray and duct	Checking installation status		
	Status of inside/outside of the equipment and system surrounding area	Checking the stocking condition (waste parts, waste materials, packing materials, others)		
Opinion				

Figure 14. Troubleshooting Steps

Troubleshooting

Power LED is off.

Check the power cable connection.

5G Signal strength LED is RED or off.

- Install the CPE to face a guided direction from your service provider (Check the direction mark at the bottom of the CPE stand).
- Turn the CPE direction to the right or left for a better signal strength.

Alarm LED keeps blinking in RED.

Change the CPE location to the place which the temperature is less than 45 degrees and the air flows well.

Alarm LED keeps in RED or blinking in GREEN more than ten minutes.

Disconnect the power cable and re-connect the power cable after 10 seconds.

For More Information

- For the latest documentation, additional troubleshooting steps, or to learn more about advanced settings and the device's web interface, find the downloadable User Guide at www.verizonwireless.com/support/
- Or call customer support toll free at 800-922-0204.

Appendix A Acronyms

AC	Admission Control
AP	Access Point
CPE	Customer Premises Equipment
DC	Direct Current
DU	Digital Unit
LTE	Long Term Evolution
MIMO	Multiple Input Multiple Output
Wi-Fi	Wireless Fidelity

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