Smart-700MHz SOHO LTE Repeater

Technician's Operational & Installation Guide Manual

Version 1.0

SMR700

GS Teletech Inc.

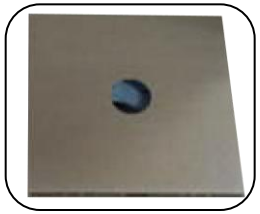
Verizon Wireless

MPE 5K

(Multi-Partitioned Enterprise Area of Less Than 5k sq. ft.)

Contents of Box (1/2)

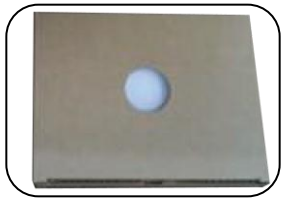
DAU



Link Cable
AC Cord
Stand Bracket
Jumper cable

DAU Bracket Set

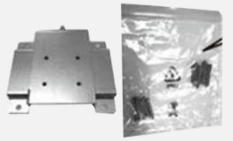
AC/DC Adaptor



SAU
SAU Bracket Set

Contents of Box (2/2)

NO	Items	Q'ty	Picture
1	SMR (DAU)	1	
2	SMR (SAU)	1	
3	Link cable (1.5D) 60m	1	
4	AC/DC ADAPTOR	1	
5	AC Power Cord	1	
6	SAU Stand Bracket	1	

NO	Items	Q'ty	Picture
8	Jumper Cable	1	
9	DAU BRACKET SET	1	
	• Tapping screw (PH(+) Φ5X25) • Anchor	4 4	
10	SAU BRACKET SET	1	
	• FH(+)M3X6 for SAU • Tapping screw (PH(+) Φ5X25) • Anchor • Tapping screw for Stand Bracket (PH(+) Φ3X16)	4 4 4 1	

7	CD	1	Technician's Operational & Installation, Quick Installation Guide, GUI Program, USB Driver, SMR700 User Manual, Registration Form

This publication provides instruction for installing Verizon Smart-700MHz SOHO LTE Repeater.

The images for the User Interface in this publication may vary from the repeater's depending on its S/W version.

Copyright

Version Revision History:

Date	Version	Changes
05/2011	Draft	

Certification
UL/FCC: This equipment complies with UL and FCC

Warnings and Hazards

WARNING! ELECTRIC SHOCK
Opening the BDA (bi-directional amplifier) could result in electric shock and may cause severe injury.

WARNING! EXPOSURE TO RF
Working with the repeater while in operation, may expose the technician to RF electromagnetic fields that exceed FCC rules for human exposure. Visit the FCC website at http://www.fcc.gov/oet/rfsafety to learn more about the effects of exposure to RF electromagnetic fields.

WARNING! DAMAGE TO EQUIPMENT
Operating the BDA with antennas in very close proximity facing each other could lead to severe damage to the repeater.

RF EXPOSURE & ANTENNA PLACEMENT
Actual separation distance is determined upon gain of antenna used.
Please maintain a minimum safe distance of at least 8inch while operating near the donor and the server antennas. Also, the donor antenna needs to be mounted outdoors on a permanent structure.

WARRANTY
Opening or tampering the BDA will void all warranties.

- **CAUTION: REPEATER SHOULD BE INSTALLED AS CLOSE AS POSSIBLE TO POWER SOURCE.**
- **CAUTION: THIS REPEATER IS FOR INDOOR USE ONLY AND SHOULD BE LOCATED INSIDE OF BUILDING.**
- **CAUTION: RISK OF EXPLOSION IF BATTERY ON CONTROLLER BOARD IS REPLACED WITH AN INCORRECT TYPE.**
- **CAUTION: DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS**

RF EXPOSURE & ANTENNA PLACEMENT

Warning! For your safety, beware of power lines and ensure appropriate safety measures are maintained at all times during the installation of the SMR700 equipment.

If equipment not shipped with the SMR700 system is to be used during installation or mounting, follow all equipment manufacturer's instructions in proper use to ensure injury is avoided.

The DAU and SAU of the SMR700 are low power transmitters. As with a cell phone antenna, avoid unnecessary contact with the front of the units when the units are operating.

Mount the units in a location where people will not approach within 3.3 ft of the front of the DAU and 8 inches in front of the SAU.

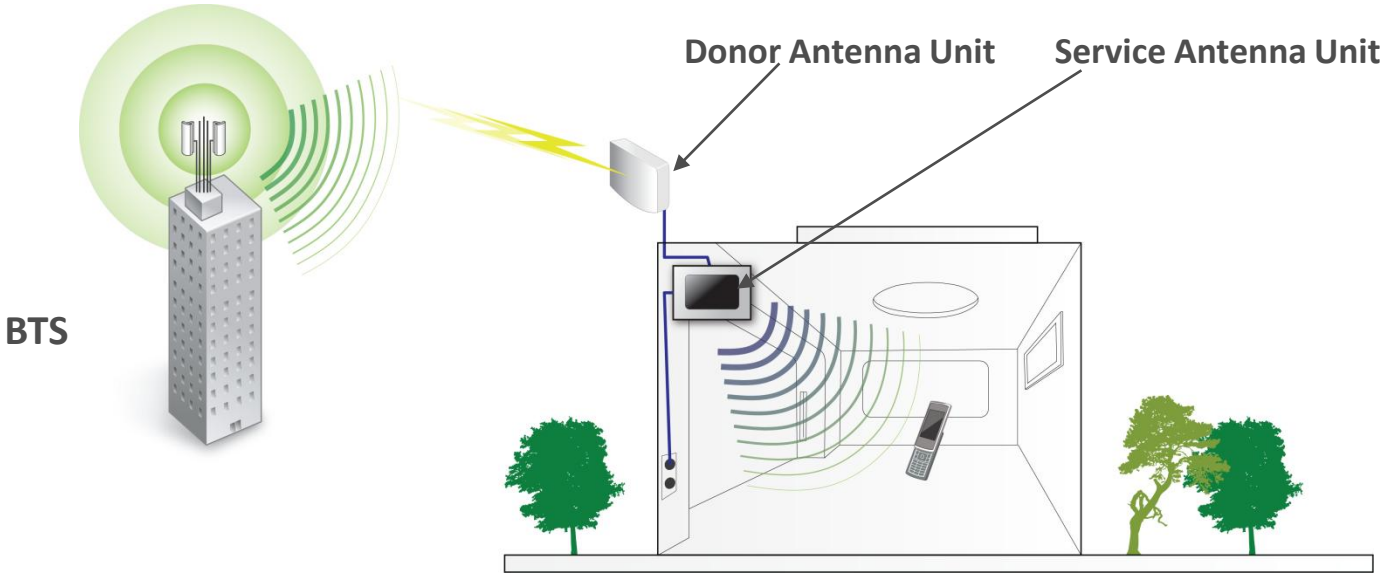
When deploying the extended coverage antenna, there must be a minimum separation of 4 inches between the main SAU and the extended coverage antenna with the antennas facing in opposite directions.

The extended coverage antenna should be mounted in locations where people will not approach within 8 inches in front of the antenna.

This manual outlines installation instructions and the appendix offers practical safety tips (see Appendix entitled 'Safety Hints').

If you are not sure about a safe installation, do not attempt to install it yourself. Call a professional installer for help.

Network Application

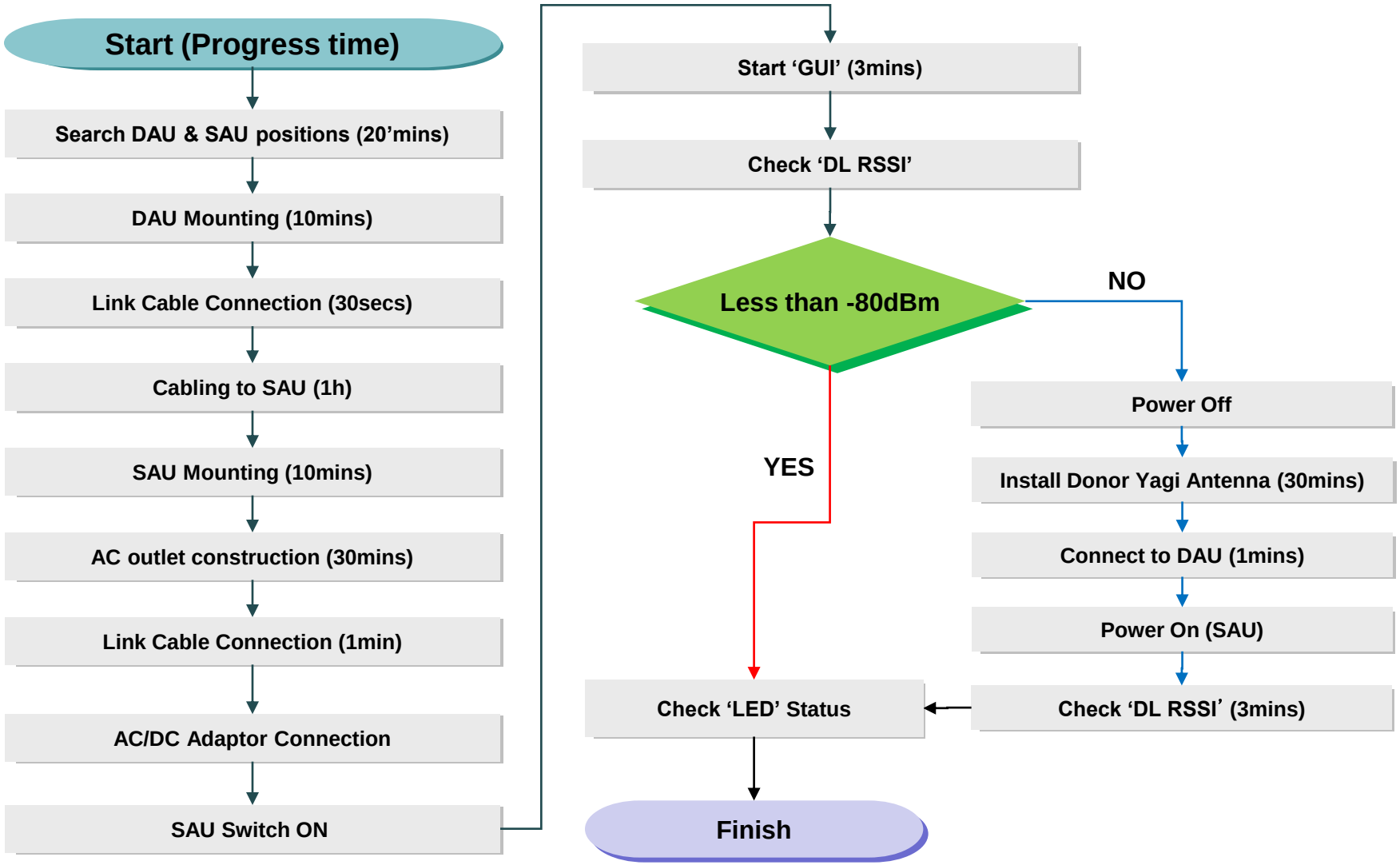


Long distance transmission (197ft) from Donor Antenna Unit to Service Antenna Unit. It enables customer to flexibly extend mobile network coverage into a building site.

Specifications

Specifications			
ITEM		Specification	REMARKS
Frequency Rang	Down Link	746 – 756 MHz	
	Up Link	777 – 787 MHz	
Brand Width		10MHz	
Gain	Down Link	50~80dB ± 1dB	AGC dynamic Range:30dB
	Up Link	50~80dB ± 1dB	
Composite Output Power	Down Link	+13dBm/Total	
	Up Link	+13dBm/Total	
Shutdown Level		+15dBm±2dB	Over 5sec standing
Group Delay		<6usec	
EVM(Error Vector Magnitude)		DL 8% @CPL15dB,UL:12.5% @CPL15dB	
ITEM		Specification	REMARKS
Size	DAU	6.22 x 5 x 1.96	H*W*D[Inch]
	SAU	5.7 x 7.67 x 1.65	H*W*D[Inch]
Weight		1.63 lbs	Each DAU,SAD
Link Cable		196.85 ft	RG174/1.5D(2.6mm)
		SMA(M)	DAU to SAU direction
Power Consumption		≤ 18W	Extemal adaptor 12V/3.5A
Operating Temperature		+14° F~+122° F	
Humidity		0% ~ 95%	

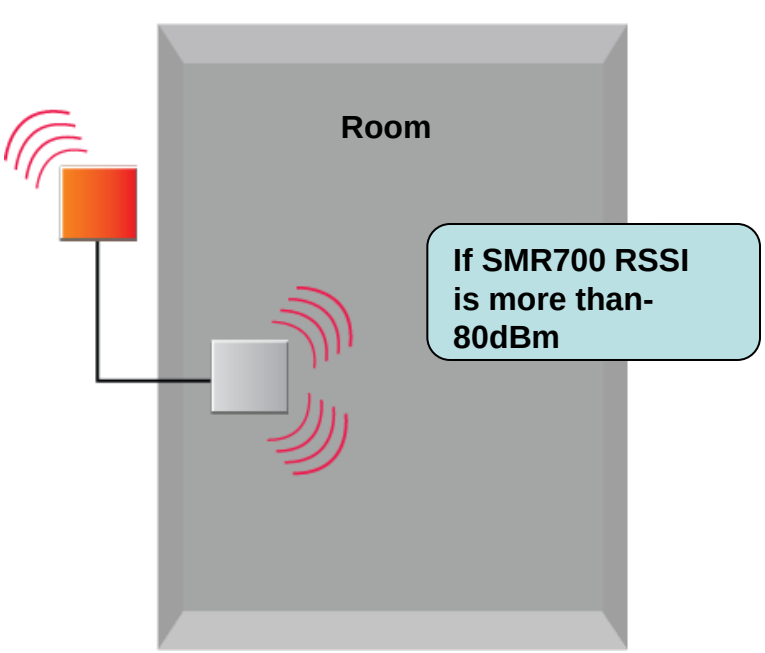
Setup Progress



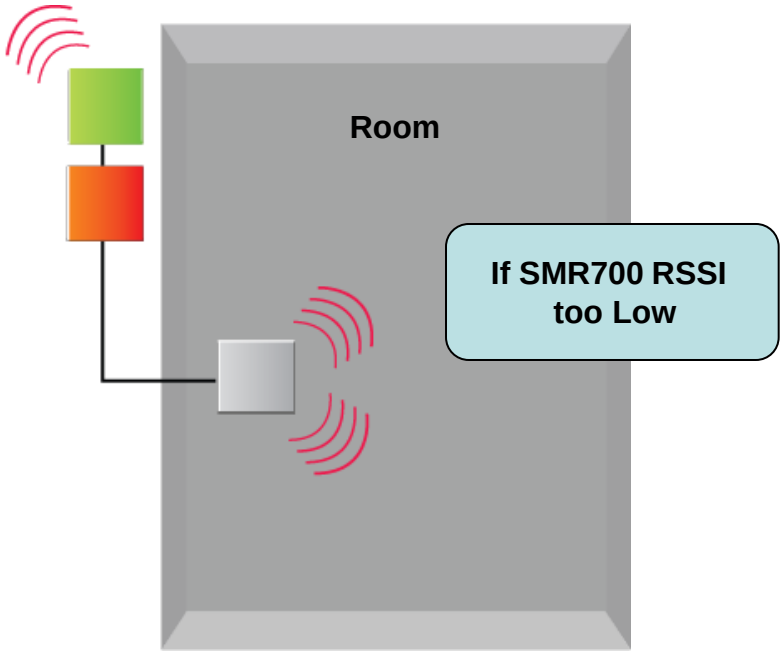
Total 5000 ft² Project One Service Area Case

HGA (high Gain Donor ANT)
DAU (Donor ANT Unit)
SAU (Service ANT Unit)
2way Divider
Service Antenna
RF Cable

Case 1 w/o HGA



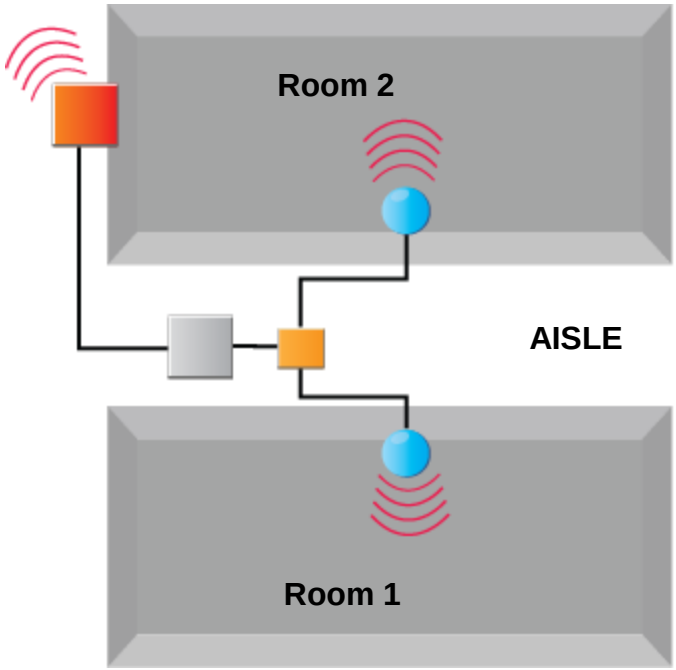
Case 2 with HGA



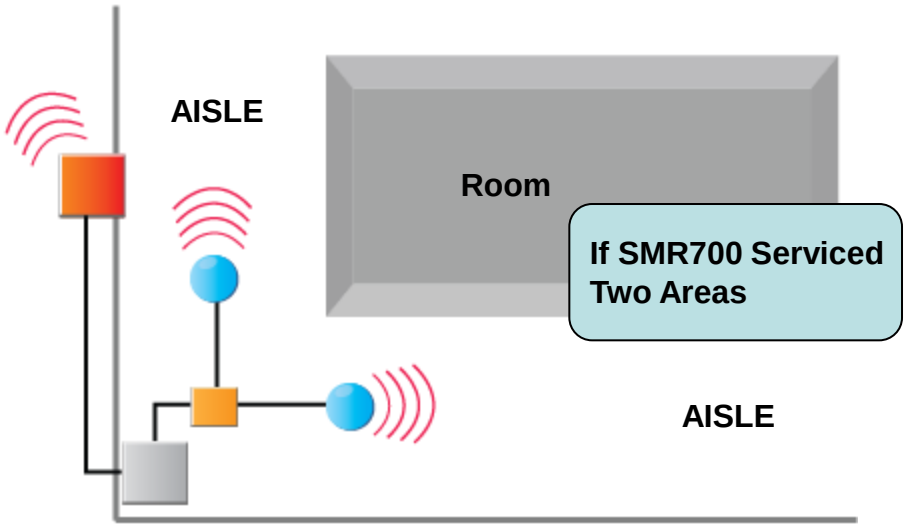
Total 5000 ft² Project Two Service Area Case

HGA (high Gain Donor ANT)
DAU (Donor ANT Unit)
SAU (Service ANT Unit)
2way Divider
Service Antenna
RF Cable

Case 1 with 2 Omni ANT



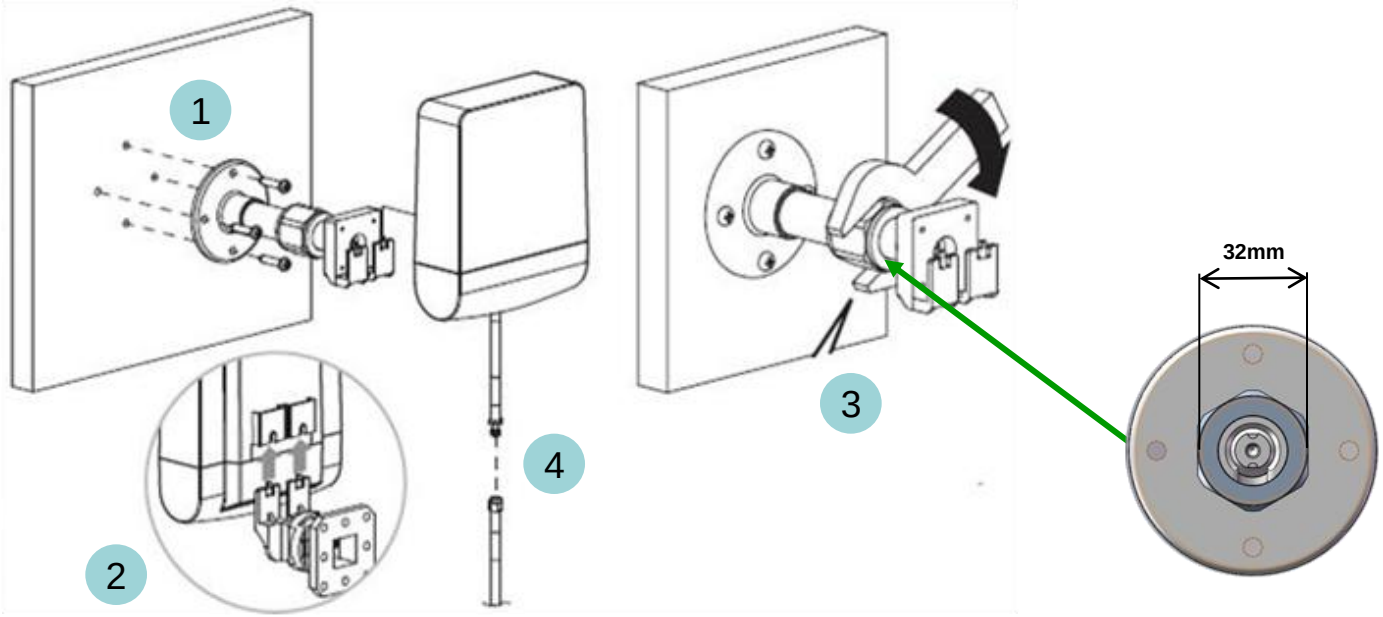
Case 2 with 2 Omni ANT



Mounting SMR700

◇ Donor Antenna Unit (DAU)

1. Find a place to have good LTE signals from Base Transceiver Station
2. Using a pencil, mark the location of each of the DAU Bracket's four mounting holes on the wall
2. Drill holes in the wall at the locations marked in step 1
3. Set the anchors in the wall, and position the bracket and tighten tapping screws until secured
4. Put the DAU into mounting bracket
5. Tighten the mounting bracket with a wrench (32mm)
6. Connect the link cable to DAU



Mounting SMR700

◇ Angle and rotation of Donor Antenna Unit (DAU)

*** Make DAU a right position toward Base Transceiver Station for getting good signals with changing of DAU direction**

0 degree angle

90 degree angle

360 degree rotation

Mounting SMR700

◇ A scene of DAU installation

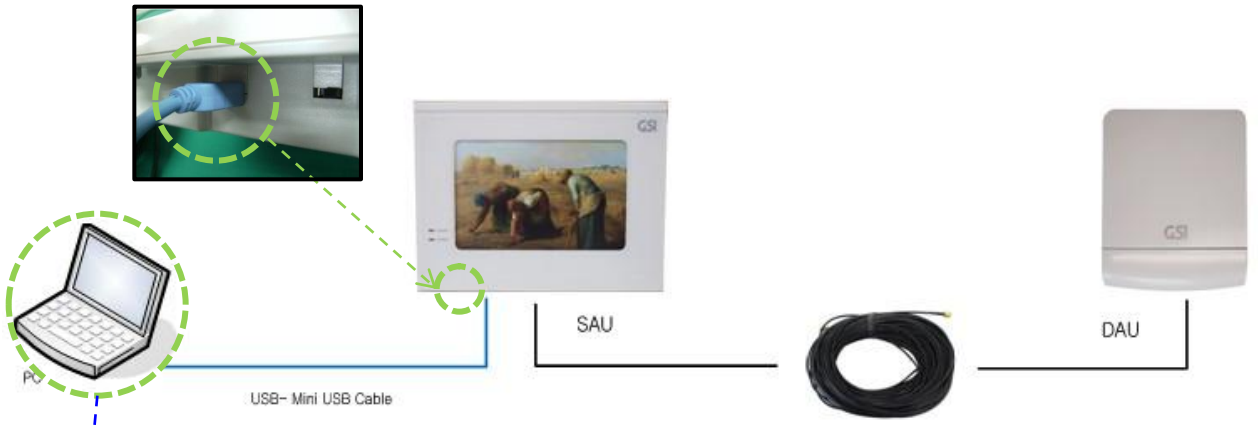
* DAU should be toward to Base Transceiver Station for receiving stable & good signals

Mounting SMR700

Recommendation

◇ Donor Yagi Antenna Installation (Optional)

* Check ‘DL RSSI’(Downlink Received Signal Strength Indicator) and Install high gain antenna if ‘DL RSSI’ is less than -80dBm.



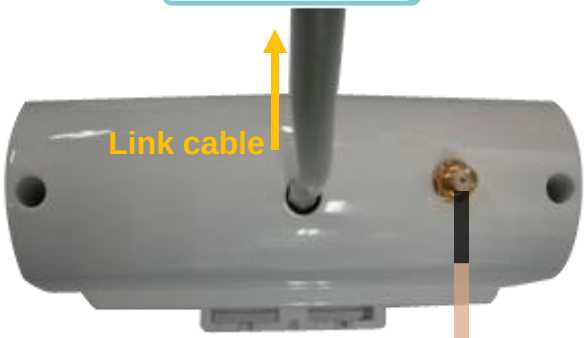
Mounting SMR700

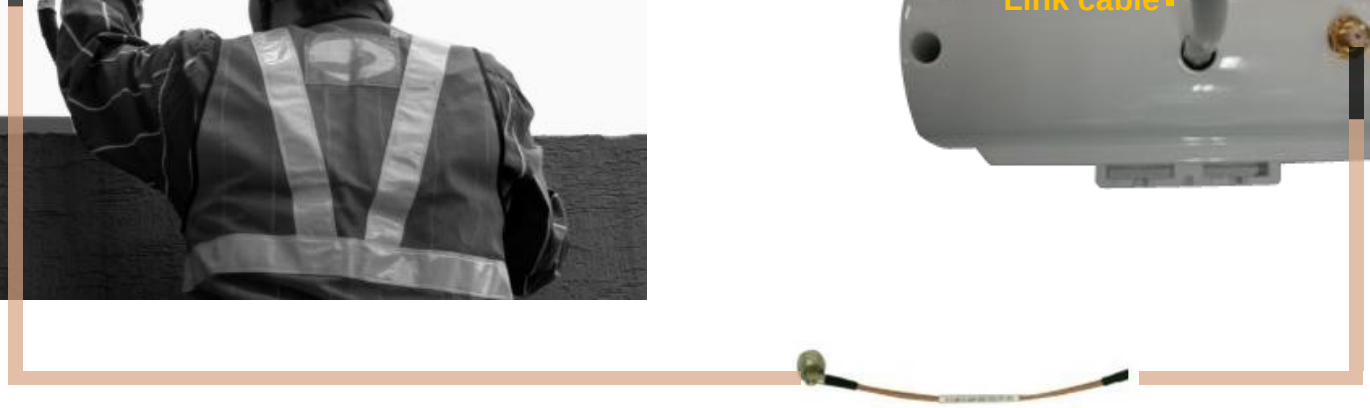
Recommendation

◇ Donor Yagi Antenna Installation

* Refer to the following page to install a proper high gain antenna for getting better signal power from Base Transceiver Station

Donor Yagi Antenna (Optional)





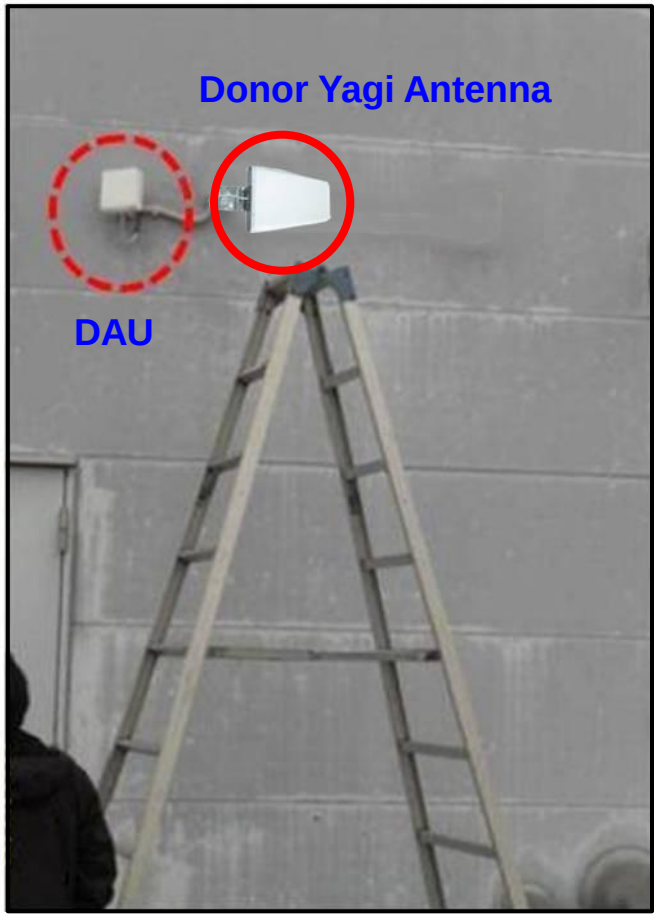
[Jumper cable]

Mounting SMR700

Recommendation

◇ A scene of Donor Yagi Antenna installation

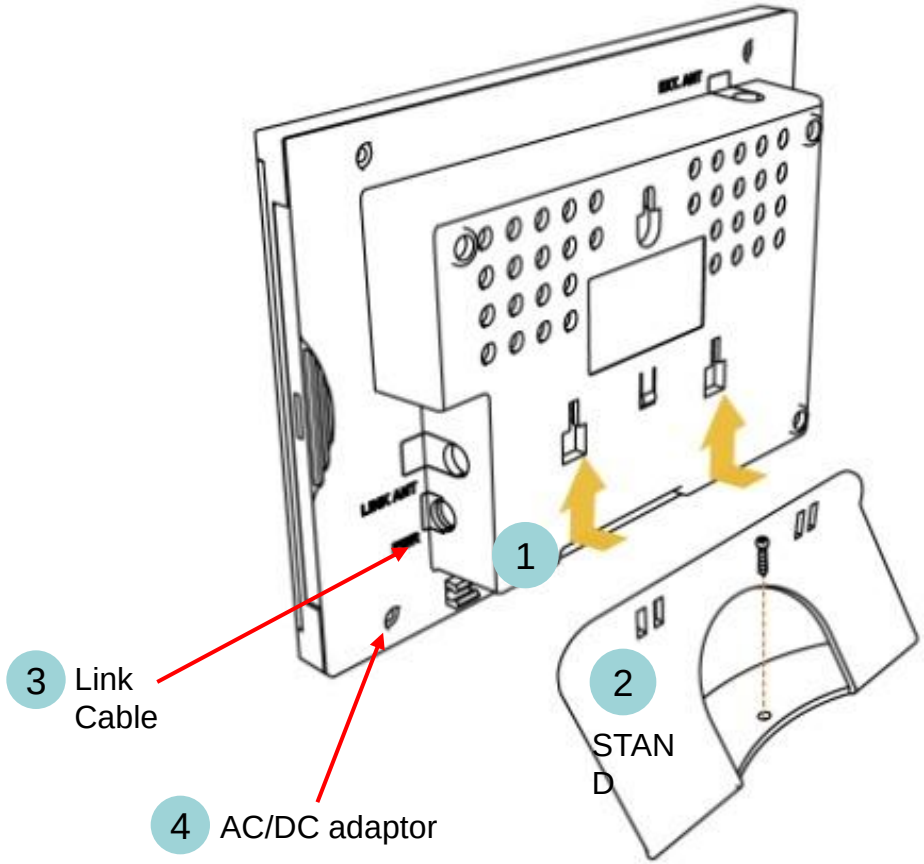
*** High gain antenna should be positioned toward Base Transceiver Station for getting high qualified input signal**



Mounting SMR700

◇ Service Antenna Unit (SAU) – Stand Bracket

1. Put the Stand Bracket into SAU
2. Fix tightly Stand Bracket with a tapping screw
3. Connect the link cable to SAU
4. Connect the AC/DC Adaptor to SAU



Mounting SMR700

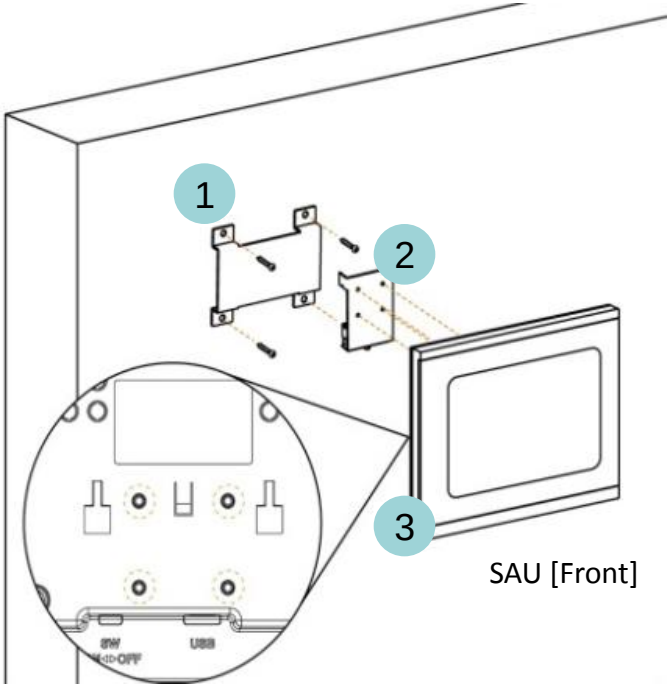
◇ A scene of SAU installation

*** SAU should be well positioned to provide good service and coverage.**

Mounting SMR700

◇ Service Antenna Unit (SAU) – Wall-Mounting

1. Using a pencil, mark the location of each of the SAU Bracket's four mounting holes on the wall
2. Drill holes in the wall at the locations marked in step 1
3. Set the anchors in the wall, and position the bracket and tighten tapping screws until secured
4. Put the DAU into the mounting bracket
5. Tighten the mounting bracket with a cross screwdriver
6. Connect the link cable to SAU



Mounting SMR700

◇ A scene of SAU installation

* SAU should be well positioned to provide good service and coverage.

Mounting SMR700

◇ Service Antenna Unit (SAU) – External Port

*** Refer to the following page for Case Studies to extend Service Antenna from External Port of Service Antenna Unit**

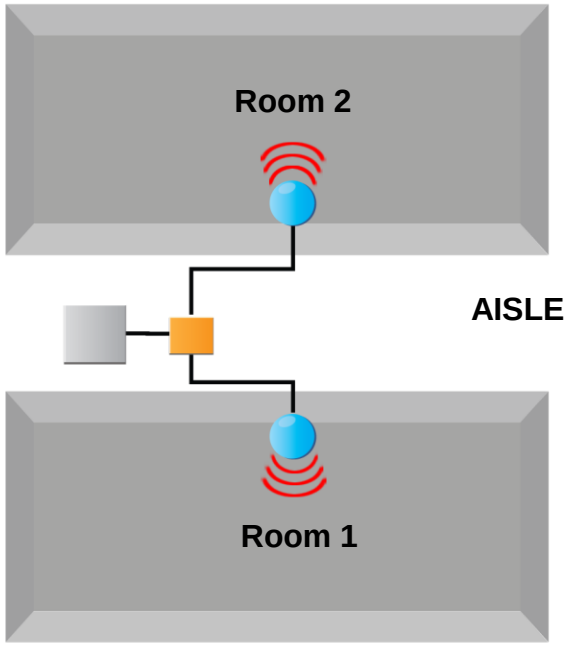
[SAU Front]

[SAU Top]

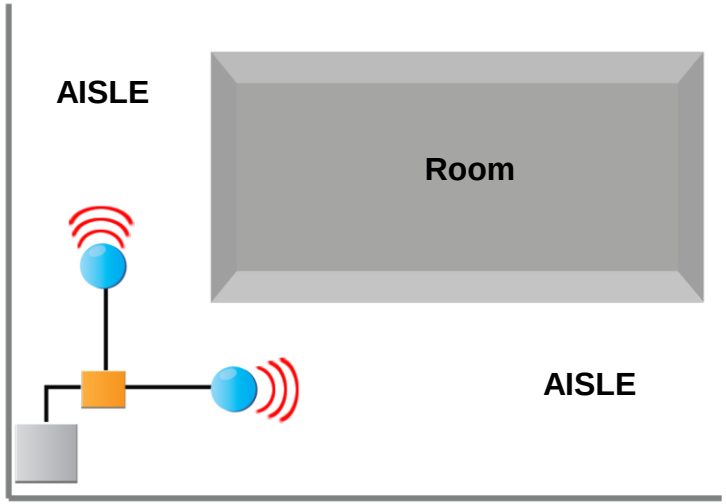
Mounting SMR700

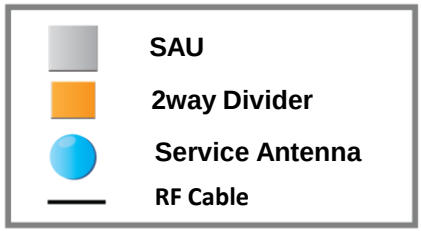
◇ Service Antenna Unit (SAU) – Case Studies

Case 1



Case 2





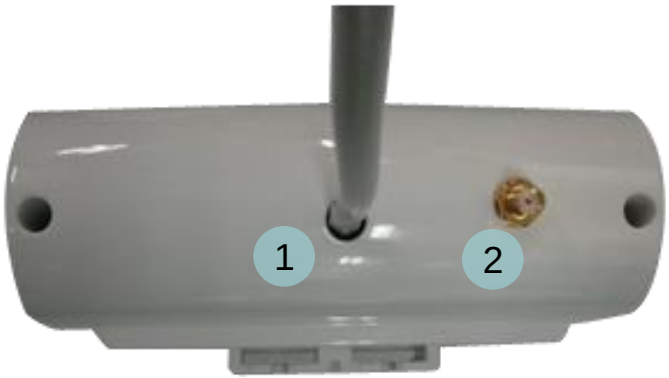
Repeater External Design

◇ Donor Antenna Unit (DAU)

◇ Service Antenna Unit (SAU)

Repeater External Port Design

◇ **Donor Antenna Unit (DAU)**



[DAU Bottom Side]

NO	PORT	Connector
1	Link Cable Port	SMA (F)
2	High Gain Antenna Port	SMA (M)

Repeater External Port Design

◇ **Service Antenna Unit (SAU)**

[SAU Bottom]

[SAU Side]

[SAU Top]

NO	PORT	Connector	NO	PORT	Connector
1	ON/OFF Switch		4	Link Cable Port	SMA(F)
2	USB Port		5	External RF Port	SMR(F)
3	AC/DC Power Port				

Cable Connections

◇ **Connect Link cable between DAU and SAU**

CAUTION
Do not connect or disconnect cable from ANT port when power is ON

[DAU Link cable connection]

[Donor Yagi Antenna connection]
(IF REQUIRED)

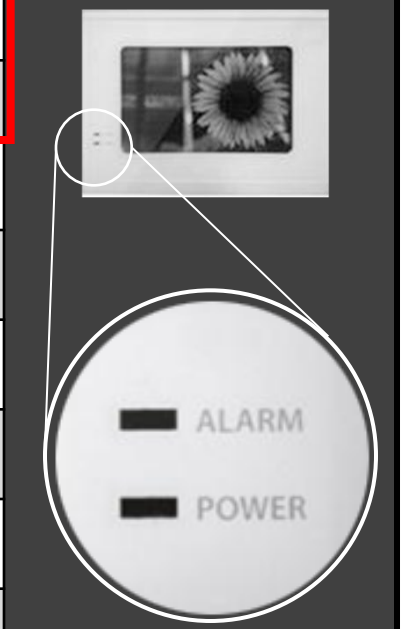
[SAU Link Cable Connection]

LED Indicator

◇ **Initial automatic setting**

LED Indicators

NO	Items	LED Indications	Explanations
1	Checking	Alarm → GREEN LED Blinking Power → GREEN LED Blinking	Auto Setup
2	Normal	Alarm → GREEN LED ON	Standard operation
3	Alarm	Alarm → GREEN LED Blinking Power → OFF	Low Input Signal from DAU
4	Alarm	Alarm → GREEN LED Blinking Repeatedly Power → GREEN LED Blinking Repeatedly	Isolation Re-Check
5	Alarm	Alarm → OFF Power → RED LED ON	Low Input Voltage (Freeding to DAU
6	Alarm	Alarm → RED LED ON Power → RED LED ON	Link Fail between DAU and SAU
7	Alarm	Alarm → RED LED Blinking Repeatedly Power → RED LED Blinking Repeatedly	Shutdown Condition
8	Alarm	Alarm → RED LED Blinking Power → RED LED Blinking	Lack of Isolation between DAU and SAU

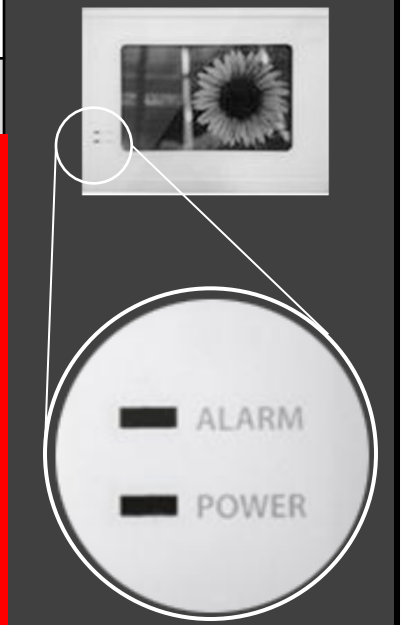


LED Indicator

◇ **Alarm LED Indication**

LED Indicators

NO	Items	LED Indications	Explanations
1	Checking	Alarm → GREEN LED Blinking Power → GREEN LED Blinking	Auto Setup
2	Normal	Alarm → GREEN LED ON	Standard operation
3	Alarm	Alarm → GREEN LED Blinking Power → OFF	Low Input Signal from DAU
4	Alarm	Alarm → GREEN LED Blinking Repeatedly Power → GREEN LED Blinking Repeatedly	Isolation Re-Check
5	Alarm	Alarm → OFF Power → RED LED ON	Low Input Voltage (Freeding to DAU
6	Alarm	Alarm → RED LED ON Power → RED LED ON	Link Fail between DAU and SAU
7	Alarm	Alarm → RED LED Blinking Repeatedly Power → RED LED Blinking Repeatedly	Shutdown Condition
8	Alarm	Alarm → RED LED Blinking Power → RED LED Blinking	Lack of Isolation between DAU and SAU



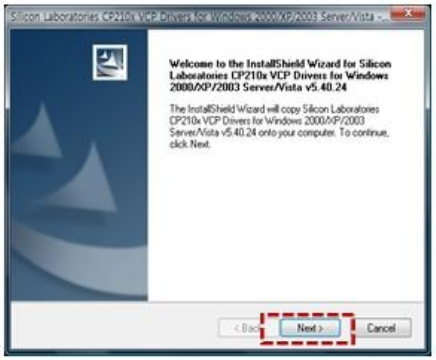
GUI Installation

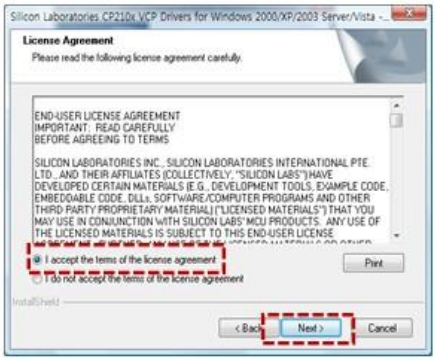
User Guide Manual

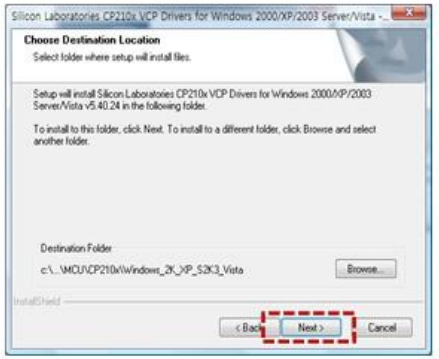
◇ **USB Driver Installation – Laptop PC**

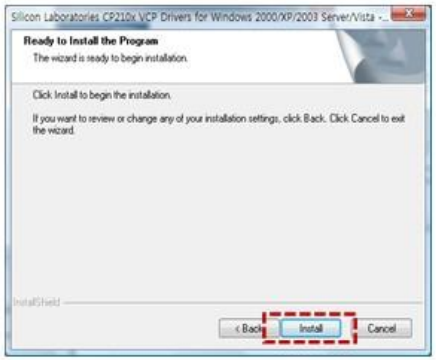
[Recommended OS: WINDOW XP, VISTAR]

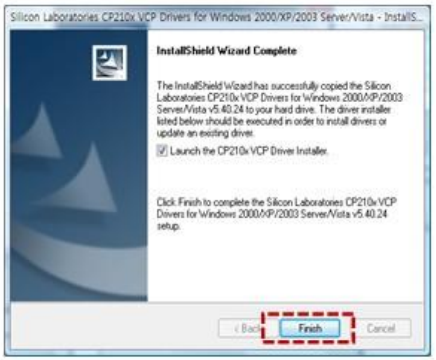
Program execution











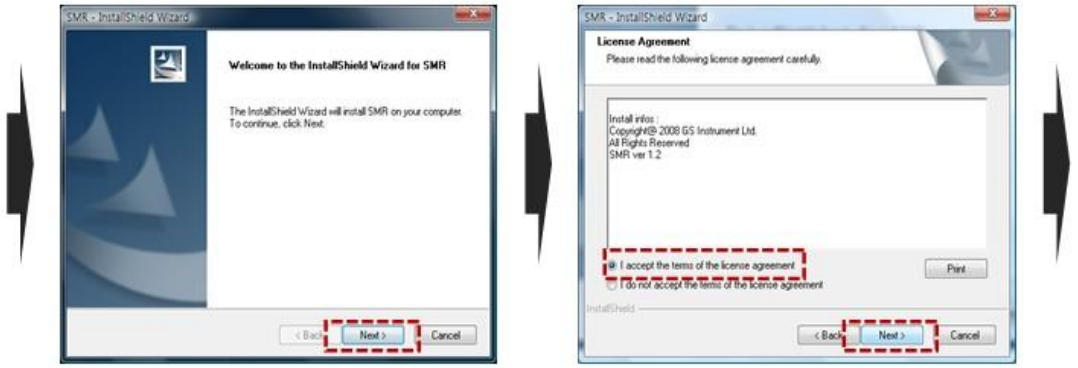
GUI Installation

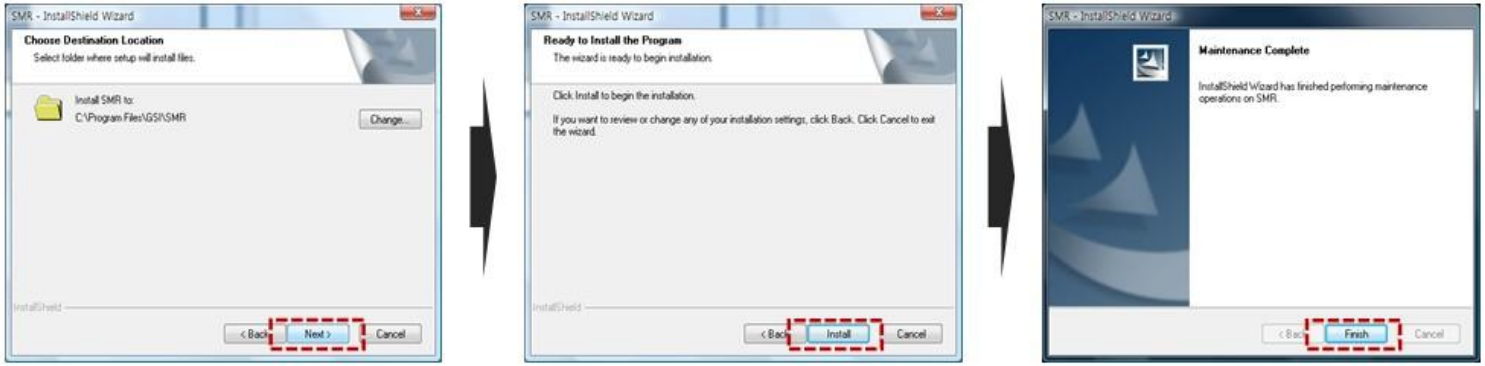
User Guide Manual

◇ **GUI program installation – Laptop PC**

Recommended OS: WINDOW XP, VISTAR

Program Execution

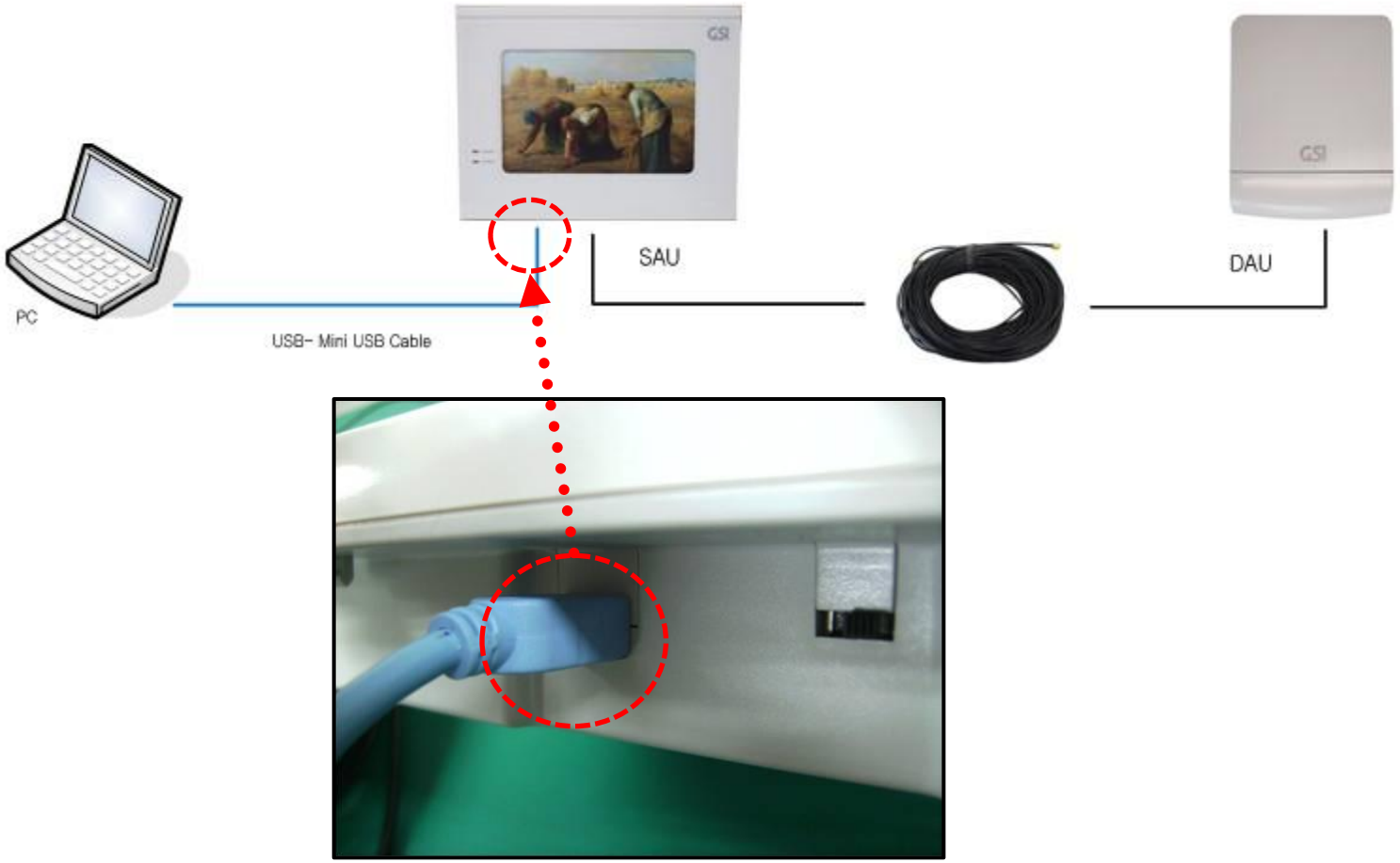




GUI Installation

User Guide Manual

◇ **USB Connection – Laptop PC**

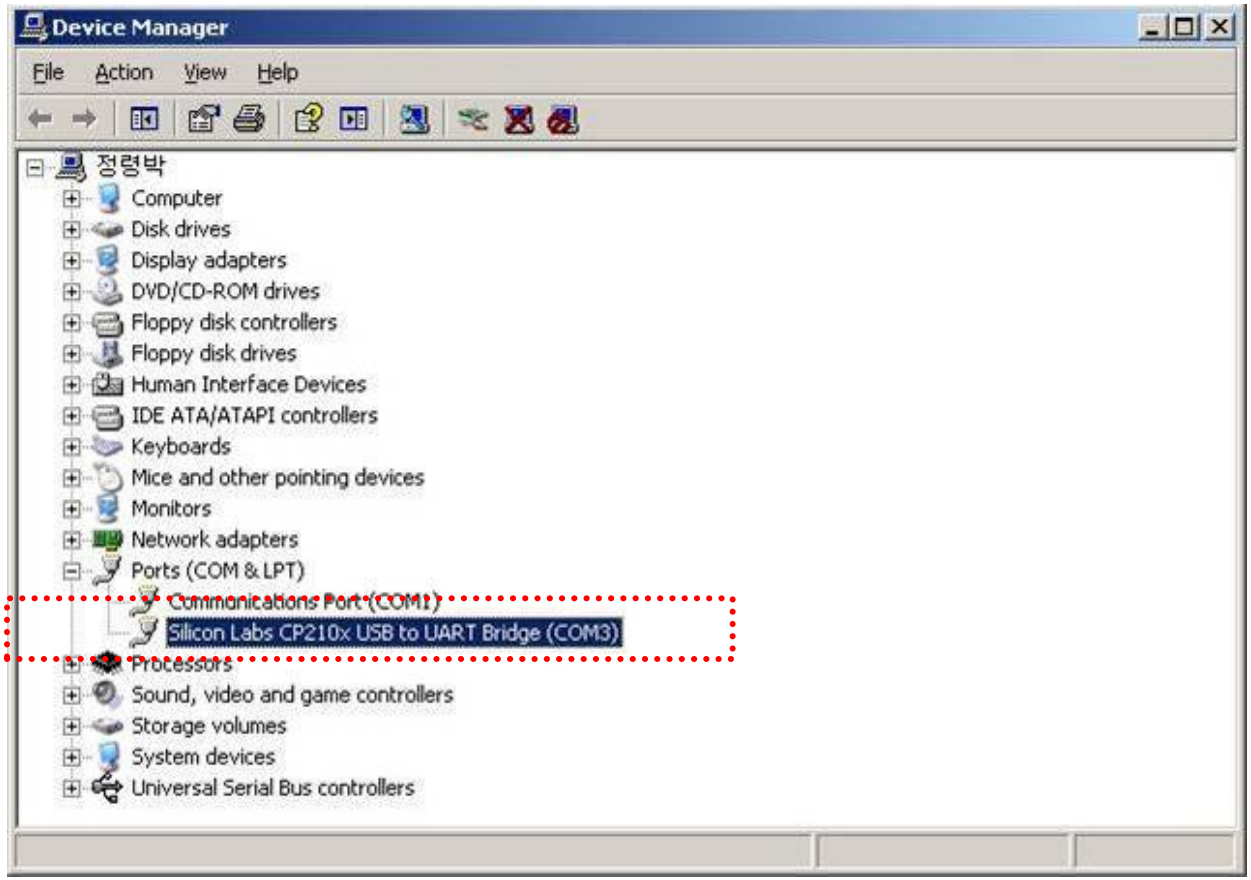


GUI Installation

User Guide Manual

◇ **Comport Check – Laptop PC**

In Device Manager of OS



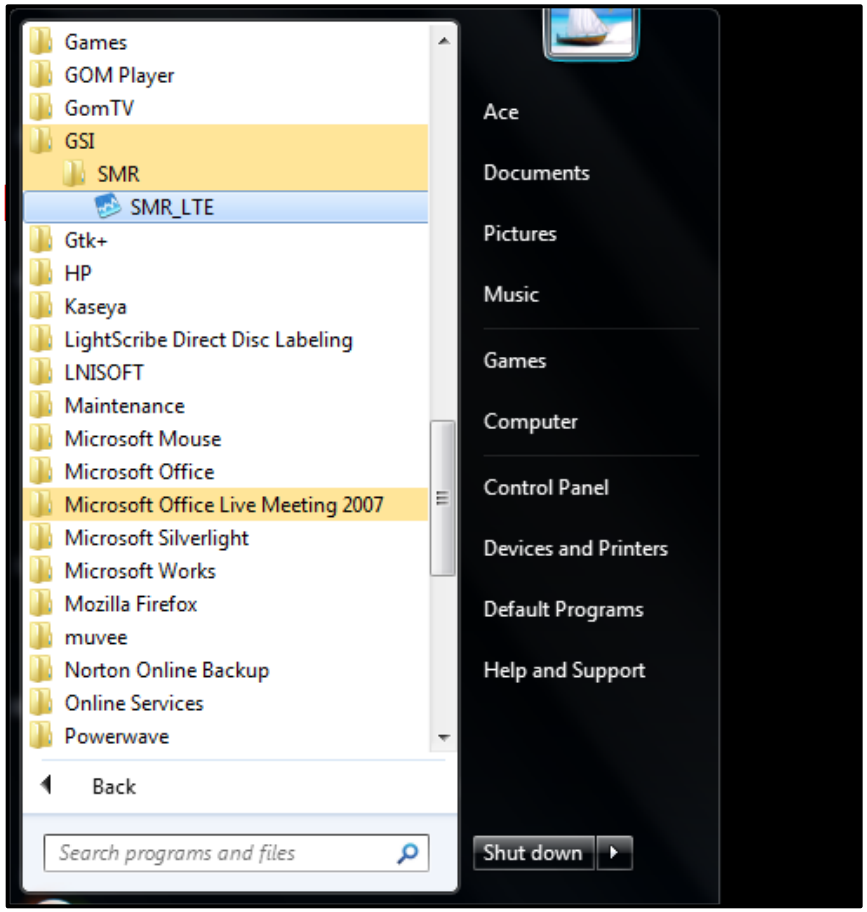
※ Please connect USB cable to both Laptop PC and SMR

GUI Installation

User Guide Manual

◇ **Start 'GUI' – Laptop PC**

'Start' => 'Program' => 'GSI' => 'SMR'=>'SMR_LTE'



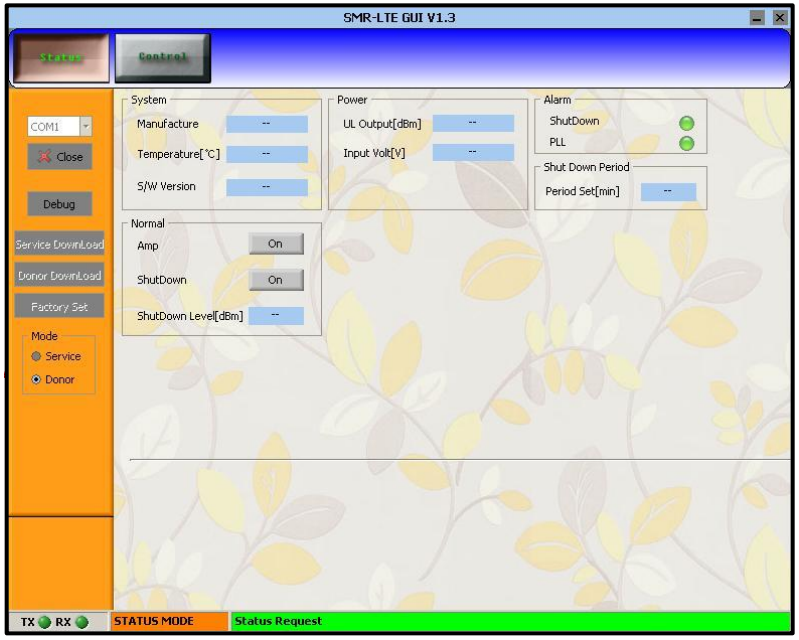
GUI Installation

◇ **Start 'GUI' – Laptop PC**

'Select Com port' => Click 'Open'

GUI Installation

◇ **GUI Screen – Laptop PC**



[DAU GUI Screen Shot]

[DAU GUI Screen Shot]

#	Items	LED Indications	Explanations	Trouble Shooting
1	Checking	Alarm → GREEN LED Blinking Power → GREEN LED Blinking	Auto Setup	* It is a self-optimization for good performance with parameter settings automatically
2	Normal	Alarm → Green LED ON Power → Green LED ON	Standard operation	* It is normal operation without fails
3	Alarm	Alarm → GREEN LED Blinking Power → OFF	Low Input Signal	* Please check 'DL RSSI' signal level of GUI at Donor Screen * The signal level should be more than -93dBm * Please move DAU to other site to get good signals from BTS if the signal level is low
4	Alarm	Alarm → GREEN LED Blinking Repeatedly Power → GREEN LED Blinking Repeatedly	Isolation Re-Check	* It is a self-checking stage when the isolation (90dB) between DAU and SAU is not enough * Isolation value (at Service screen of GUI) = Gain + 15dB
5	Alarm	Alarm → OFF Power → RED LED ON	Low Input Voltage (Feeding to DAU)	* Please check the connection of Link Cable
6	Alarm	Alarm → RED LED ON Power → RED LED ON	Link Fail between DAU and SAU	* Please check the connection of Link cable at connector of DAU and SAU
7	Alarm	Alarm → Red LED Blinking Repeatedly Power → Red LED Blinking Repeatedly	Shutdown	* It is hardware fail of SAU * Please exchange SAU with new one
8	Alarm	Alarm → RED LED Blinking Power → RED LED Blinking	Lack of Isolation between DAU and SAU	* Please reposition DAU to be isolated between DAU and SAU

Appendix – Safety Hints

Customer safety is a concern we would like to address in a sensible and proactive manner. To this end, the following notes have been provided as a reference to help installers remain safe and think about safety in all aspects of the installation.
The following notes are to be considered as informational only, and not exhaustive or complete.

1. Lightning
Never attempt to install the DAU outdoors while a lightning storm is in progress in your immediate or neighboring vicinity.
The National Lightning Institute says for every five seconds between the flash of lightning and a thunderclap, the lightning is one mile away.
If lightning is within 3 miles (15 second count between flash and thunder) of your location, do not attempt an installation.

2. Working Aloft
When working aloft, it is best to work in pairs. Avoid attempting procedures alone that are best carried out with a spotter or by two people.

2.1 Power Tools
Proper eye protection should be worn when using a drill or any other type of power tool.

2.2 Working with Ladders
Properly secure your ladder and work in pairs. Make sure the ladder is properly tied off and use an insulated ladder when working around power lines.

2.3 Grounding
Ensuring the DAU is properly grounded in external installations will help to prevent property damage and personal injury during lightening storms .

3. Overhead Power Lines
While overhead power lines may appear to be insulated, they most likely are not insulated. Always thoroughly investigate your surroundings prior to installing masts or the DAU in an outdoor location.
Never attempt installation without adequate lighting, as shadows and trees can obscure power lines.

GST Technical Support

24X7 Toll Free Technical Support
1-866-9-GST-USA

Phone:

Toll Free: 1-866-9 GST USA
Phone: 913-469-6699

Write:

GS Teletech Inc.
6900 College Boulevard, Suite 850,
Overland Park, KS 66211, USA

Product Information and Technical Assistance:

www.gsteletechinc.com
support@gsteletechinc.com

Specifications and features of this installation guide are subject to change without notice or obligation.