

USER MANUAL

Models:

SMH200-17

SMH200-13

SMH200-10



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NOTE: This manual contains important safety and operating information. Please read and follow the instructions in this manual, failure to do so could be hazardous and result in damage to your cellular booster.

Only professionals are authorized to install

INSTALLATION INSTRUCTIONS FOR THE FOLLOWING CELLULAR BOOSTERS:

Models:

SMH200-17

SMH200-13

SMH200-10

ABOUT THE BOOSTER KITS

Our goal is to give you a proven solution that ends your frustration with weak and dropped cellular signals so you can enjoy excellent call quality, more convenience and greater productivity.



SAFETY AND WARNINGS

- Turn AC power OFF at the mains before working on any electrical connections.
- All AC power wiring and coaxial cable wiring must conform to local or national codes.
- The AC line voltage must be within 10% of the voltage specified for the booster.
- A solid copper conductor no less than No. 8 AWG should be connected to ground.
- DO NOT connect a ground wire to a gas supply line.
- DO NOT open the booster. There are no serviceable parts inside.

Touching internal parts could cause damage from static electrical discharge.

Opening the base unit **DOES VOID THE WARRANTY.**

BOOSTER KIT COMPONENTS

BOOSTER



OUTDOOR ANTENNAS (signal)



YAGI LDPA



PANEL

INDOOR ANTENNAS (distribution)



PANEL



DOME

CABLES (various lengths available)



U5D

TOOLS REQUIRED



Phillips Screwdriver



Drill



Cellular Phone
(to check signal strength)

OPTIONAL ACCESSORIES

(sold separately)



2 Way Expansion Kit



3 Way Expansion Kit



Lightning Surge Protector



Universal Antenna Mounting Pole

Electrical Specification		Uplink	Downlink
Frequency Range	Band 12	698~ 716 MHz	728 ~746 MHz
	Band 14	788~ 798MHz	758 ~768 MHz
Max. Gain	SMH200	50dB	53dB
Max. Output Power	SMH200	22dBm	18dBm
Band Width		Wide Band	
Automatic Level Control		15dB	
Manual Gain Control		$\geq 31\text{dB}$ / 1dB step	
Spurious Emission	9KHz~1GHz	$\leq -13\text{dBm}$	
	1GHz~12.75GHz	$\leq -13\text{dBm}$	
Gain Flatness		$\leq 8\text{dB}$	
Noise Figure		$\leq 8\text{dB}$	
VSWR		≤ 3	
Group Delay		$\leq 1.0\mu\text{s}$	
Frequency stability		$\leq 0.01\text{ppm}$	
Power LED		Power Indicator	
ALC LED		Orange @ ALC 1~5dB, Red @ ALC 15dB~20dB, Off after 5 seconds red	
ISO LED		Flashing Red indicates not enough separation, Solid Red when sufficient	
SMART Function		Uplink & Downlink Gain is automatically adjusted	
Output Signal Strength		Output is displayed with signal bars	
I /O Port		N-Female	
Impedance		50 ohm	
Operating Temperature		$-25^{\circ}\text{C} \sim +55^{\circ}\text{C}$	
Environment Conditions		IP40	
Dimensions		175*131*33mm	
Weight		0.7 kg	
Power Supply		DC 7.0V/3A	

OVERVIEW

This guide will help you properly install your cellular booster kit. It is important to read through all of the installation steps before installing your equipment. Thoroughly read through the instructions, visualize where all the equipment will need to be installed and do a soft installation before mounting any equipment.

If you do not understand the instructions in full, please contact technical support at 1-800-215-7015.

Distributed antenna systems

A DAS network is used to distribute RF signals from a central hub to a specific area with poor coverage or inadequate capacity. Because the facilities deployed at each node of a DAS are physically much smaller than for example macrocell base station and antenna equipment, they can be placed on a variety of short structures or on rooftops. Macrocells and small cells are usually operator-managed and support use by a single wireless service provider, whereas DAS networks can often accommodate multiple wireless providers using different frequencies and/or wireless air interfaces.

A DAS network consists of: (i) a number of remote communications nodes deployed throughout the desired coverage area, each including at least one antenna for the transmission and reception of a wireless service provider's RF signals, (ii) a high capacity signal transport medium (typically fiber optic cable) connecting each node to a central communications hub site, and (iii) radio transceivers located at the hub

site (rather than at each individual node as is the case for small cells) to process or control the communications signals transmitted and received through the antennas. A distributed antenna system (DAS: Distributed Antenna System) is a network of multiple antennas distributed in a building dedicated to providing wireless indoor coverage. The signal coverage area is wider.

GETTING STARTED

Plan the layout of your system

Before you get started you will need to plan the layout of your system. This involves checking signal strength for signals coming from the cellular tower, as well as antenna, booster and cable placement.

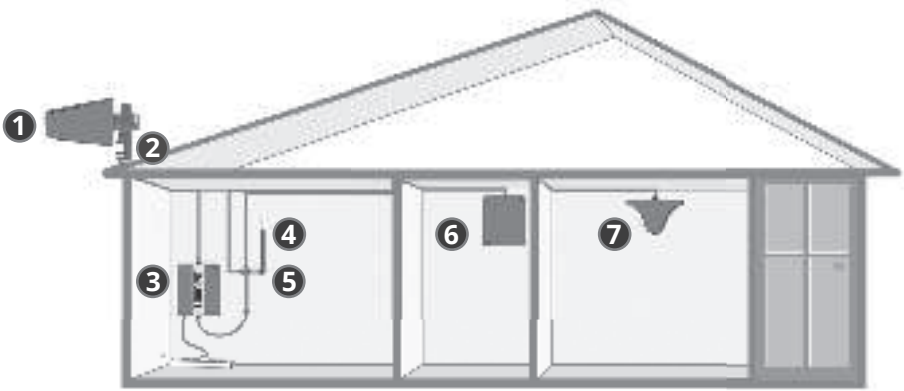


Diagram of Distributed antenna systems

- | | |
|---------------------------------|---|
| ① Signal Antenna (outdoor) | ⑤ Splitter
(if using multiple antenna) |
| ② Surge Protector | ⑥ & ⑦ Distribution Antennas |
| ③ Booster | |
| ④ Distribution Antenna (indoor) | |

1

BOOSTER – select location

Install the booster in an area that is protected from the weather, properly ventilated and is away from excessive heat and moisture.

2

SIGNAL ANTENNA (outdoor) - select location

Mount the signal (outdoor) antenna in an elevated outdoor location so that it points towards the cellular tower and away from where the inside antenna will be located.

3

OUTDOOR COAXIAL CABLE - select location

The outdoor coaxial cable is used to connect the signal (outdoor) antenna to the booster.

4

INDOOR COAXIAL CABLE - (if used)

The indoor coaxial cable is used to connect the distribution (indoor) antenna to the booster.

5

DISTRIBUTION ANTENNA (indoor)

The ideal location for the distribution antenna will be the area of your property where you need to improve the signal most.

NOTE: The signal strength will be strongest closest to the antenna.

6

LIGHTNING SURGE PROTECTOR - (SOLD SEPARATELY)

The lightning surge protector connects in between the signal antenna and the booster.

IMPORTANT: Lightning surge protector must be grounded.

7

COMMISSIONING THE SYSTEM

IDENTIFY THE BEST LOCATION TO INSTALL THE SIGNAL (OUTDOOR) ANTENNA.

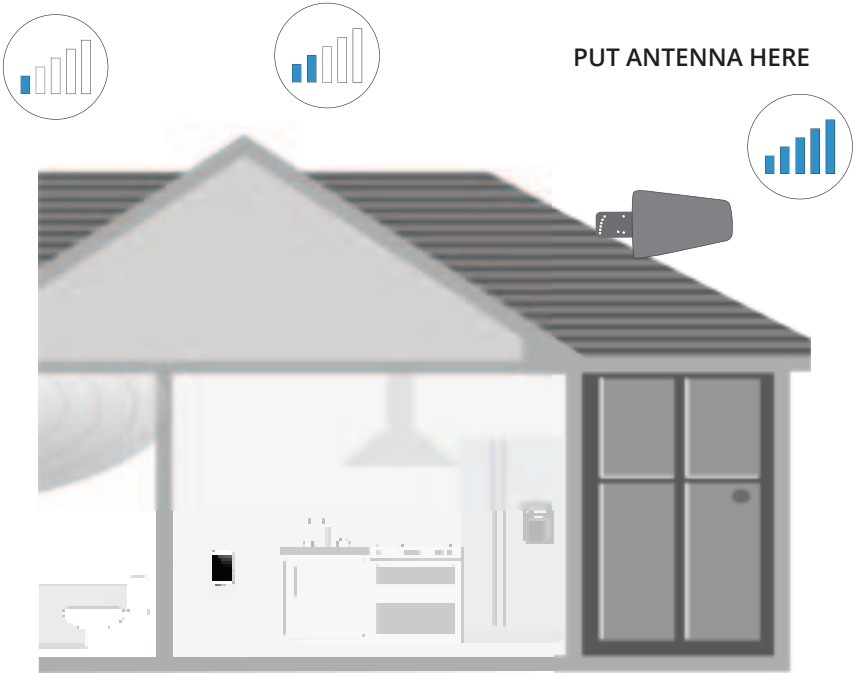
Check for signal strength

Select a location on the roof of the building to install the signal antenna, by monitoring your cellular phone's signal strength (signal bars) to find the strongest signal from your carrier's cellular tower.

Mark the area

Mark that area as the installation location for the signal (outdoor).

Find the Area of the roof with the Best Cell Signal



RUN COAXIAL CABLE

Loosely run the coaxial cable from your outdoor antenna to your booster.
(after you have tested the system you can permanently secure the coaxial cable).

As you route and pull cabling, follow these general guidelines:

- Bend cables and route them smoothly, and protect the outer skin against any damage.
- Keep horizontal cables straight and fasten them with a tie every three to five feet.
- Bind and fasten vertical cables every six to eight feet.
- Waterproof all outdoor connections with silicone caulking
- Be careful when plugging the connector in so as not to damage the center pins on the connectors.

INSTALL THE SIGNAL (OUTDOOR) ANTENNA.

Mount the signal (outdoor) antenna

The signal antenna should be located as high as possible in order to capture the best quality signal from the cellular tower.

Use the mounting hardware in the kit to attach the signal (outdoor) antenna to the building.

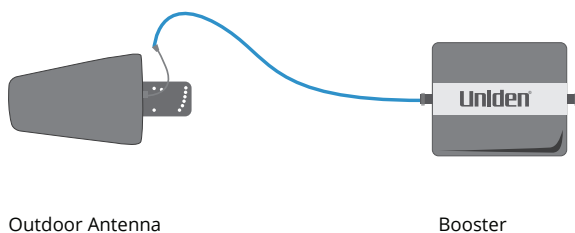
Connect the signal (outdoor) antenna:

Connect the supplied coaxial cable to the antenna. We recommend applying silicone caulking to fully waterproof the connection.

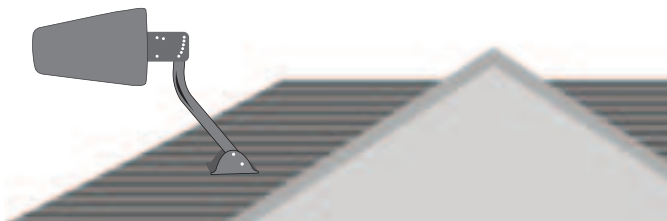
Attach the cable in such a way that a drip loop is formed. (see image on page 14). Once mounted, connect one end of the coaxial cable to the signal (outdoor) antenna and the other end to the cellular booster where it is marked "outdoor".

HOW TO INSTALL THE COAXIAL CABLE FROM YOUR OUTDOOR ANTENNA TO YOUR BOOSTER.

Step 1: Loosely run the coaxial cable from your outdoor antenna to your booster (this way you can test the system before you permanently secure the coaxial cable).



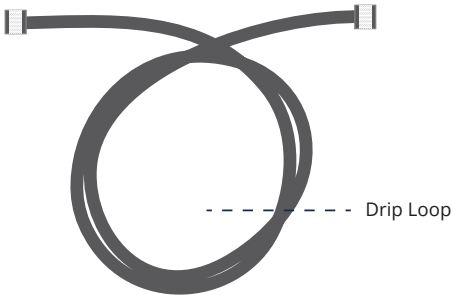
Step 2: Mount the signal (the outdoor antenna).



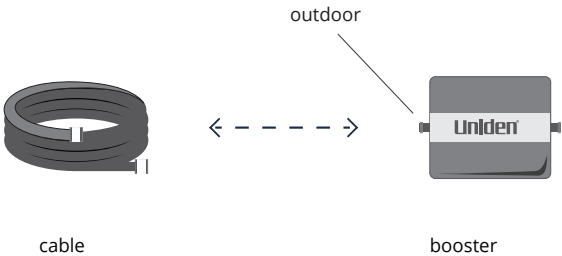
Step 3: After the outdoor antenna is mounted connect the supplied coaxial cable to antenna.



Step 4: Attach the cable so that a drip loop is formed.



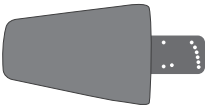
Step 5: Connect the cable to the cellular booster where it is marked "outdoor".



CAUTION: please ensure neither you nor the antenna come in contact with electrical power lines.

UNDERSTAND THE DIFFERENT SIGNAL (OUTDOOR) ANTENNA

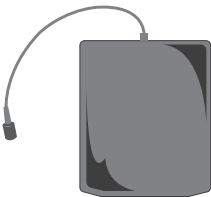
Signal (outdoor) antennas, are needed to capture the signal emanating from your carrier's cellular tower. There are different types of signal (outdoor) antennas each designed to meet your specific needs. The yagi lpda antenna, the post antenna & the panel antenna.



The Yagi Lpda Antenna

The yagi is a very precise directional antenna with a powerful reach. This antenna should be installed in an elevated position and must be pointed towards your carrier's cellular tower.

Note: This antenna is not meant to capture signal from multiple carriers.



The Panel Antenna

The panel is a directional antenna with a 120 degree reach and is designed to capture the signal from multiple carrier towers. This antenna should be installed in an elevated position and must be pointed towards your carrier's cellular towers.

LIGHTNING SURGE PROTECTOR

(sold separately)

The lightning surge protector can be installed indoors or outdoors. When connecting outdoors, install the lightning surge protector inline between the signal antenna (outdoor) and the coaxial cable. When connecting indoors, install the lightning surge protector inline between the outdoor coaxial cable and the booster.



IMPORTANT: Lightning surge protector must be grounded. Connect a ground wire to the appropriate place on the lightning surge protector and connect the other end to a verified ground source.

INSTALL THE DISTRIBUTION (INDOOR) ANTENNA

Select the installation location of your supplied distribution (indoor) antenna based on the following:

Dome omni directional antenna

Place in the center of the area where the signal needs to be amplified.

Panel directional antennae

Place in the outer perimeter of the area the signal needs to be amplified.

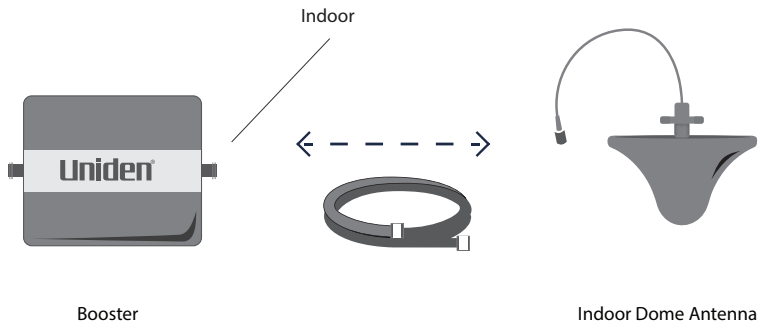
Whip omni directional antenna

Mount directly to the connector marked "indoor" on the cellular booster.

CONNECTING THE DISTRIBUTION (INDOOR) ANTENNA

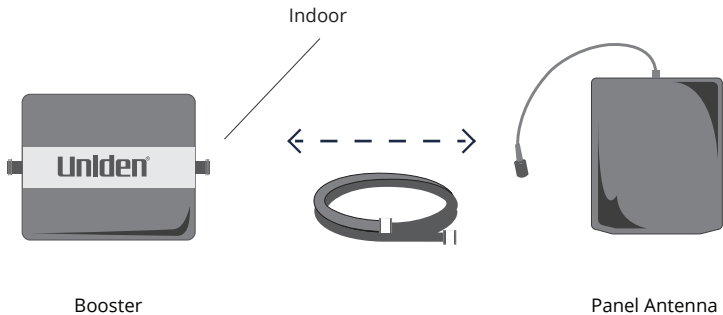
Dome omni directional antenna

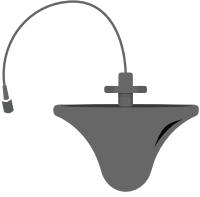
Connect one end of the coaxial cable to the dome antenna and the other end to the cellular booster where it is marked "indoor".



Panel directional antenna

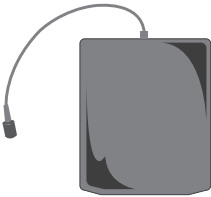
Connect one end of the coaxial cable to the panel antenna and the other end to the connector on the cellular booster where it is marked "indoor".





THE DOME ANTENNA

The dome antenna is an omni-directional antenna with a 360 degree reach. It is designed to distribute the signal from the center of the affected area. Typically it is installed in a false or dropped ceiling.



THE PANEL ANTENNA

The panel is a directional antenna with a 120 degree reach and is designed to distribute the signal from a perimeter wall or ceiling.

NOTE: installing additional distribution (indoor) antennas may be necessary when the area that needs coverage is very large or has barriers that block cellular signals such as multi level homes and buildings.

The following diagrams show the reach of each antenna based on the layout of the space they are mounted in:

Image 1&2: Omni directional antennas will provide better coverage for square rooms.

Image 3: Directional antennas will provide better coverage in rectangular rooms.

Image 1

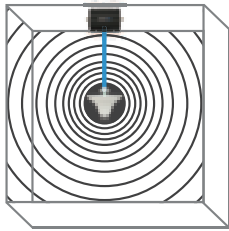


Image 2

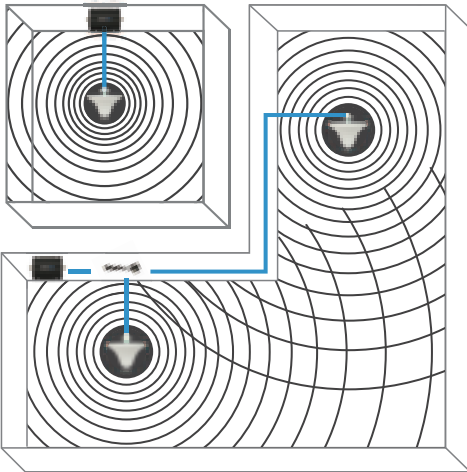
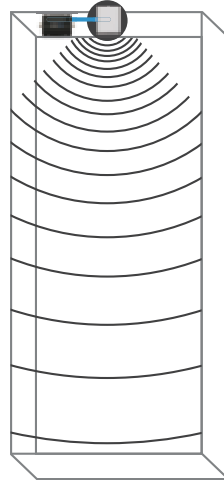


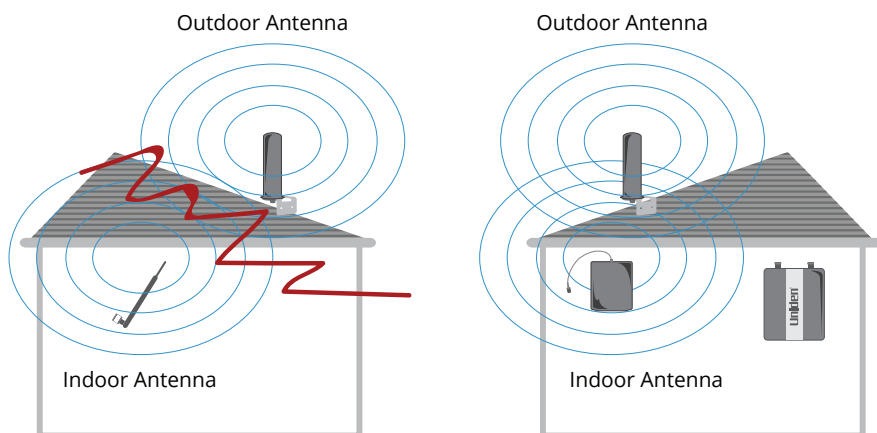
Image 3



ANTENNA SEPARATION

Oscillation is caused when the indoor (distribution) antenna sends a signal back into the outdoor (signal) antenna. Similar to a PA system, when the microphone gets too close to the speaker it causes feedback. This will occur if your antennas are too close together, or the indoor antenna is pointed at the outdoor antenna. Make sure you have adequate separation and some types of shielding between the antennas (usually your roof or a cement wall is good enough).

EXAMPLES OF OSCILLATION



The indoor antenna is pointed at the outdoor antenna. The antennas are too close together

INSTALL YOUR CELLULAR BOOSTER

Install the cellular booster in a location that is properly ventilated and not exposed to excessive heat, moisture and/or direct sunlight. The optimal area would be on a wall located near a power outlet.

It should be mounted in an easily accessible area so it's easy to perform general maintenance with the coaxial cable connections, dip switch settings and power adaptor.

Make sure all cables and antennas are securely connected before commissioning the system.

POWER UP YOUR CELLULAR BOOSTER

Once you have placed your outdoor and indoor antennas and connected all the cables between the antennas and the booster, you are now ready to plug your booster into its power source.

IMPORTANT

After you plug in the booster the LED light will turn GREEN signaling it has been powered on.

You can now make some final adjustments to the antennas and cable placements to fine tune your system in order to give you maximum coverage.

N.B. Be sure to check the LED alarm lights on the booster to be sure your system is working properly. Please refer to the table below for an explanation of the LED readings.



IMPORTANT: Do not connect your cellular device to the cellular booster, as it may damage your cellular device.

IMPORTANT:

- 1 Never point the front of the yagi signal (outdoor) antenna towards the inside of the distribution (indoor) antenna.
- 2 Verify that the supplied coaxial cables from both the signal (outdoor) antenna and the distribution (indoor) antenna are properly connected to the cellular booster before powering it up.
- 3 Carefully plug in the supplied 110-volt power adaptor into the back of the cellular booster where it is marked 'power' and connect the other end to a power outlet.



WARNING! Using a power supply that is not included in your kit could damage your equipment and void your warranty.

CHECK THE BOOSTER LED ALARM LIGHTS

Your cellular booster comes equipped with electronic sensors designed to identify cellular signal overload or oscillation which can hinder signal-boosting performance. Your cellular booster is specially designed to automatically decrease gain to compensate for these circumstances. The device also has a feature to automatically shut down in case of excessive oscillation.

Improper equipment installation and unusable signal quality can cause oscillation, this is why it is important to fully understand the LED alarm lights on your booster, as they will help you identify and solve any potential issues.

Your booster is equipped with LED alarm lights to let you know the status of each frequency band.

LED	Status	Description	Solution methods
Alarm LED	Green	Functioning Properly	*If you still have small coverage, this is probably due to a weak input signal
	Orange	Slight Oscillation	Your booster will automatically reduce the gain up to 10dBm
	Red	Medium Oscillation	Your booster will automatically reduce the gain up to 20dBm
	Off	Strong Oscillation	Your booster will automatically reduce the gain up to 30dBm and will shut off after 5 seconds

FCC RF Exposure Statement

The device has been evaluated to meet general RF exposure requirement. The device can be used in fixed exposure condition without restriction with minimum distance 20cm between the radiator and your body.

FCC Warning

Part 90 and Part 20 Signal Boosters . . This is a 90.219 Class B device.

WARNING. This is NOT a CONSUMER device. It is designed for an installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC licensee to operate this device. You MUST register Part 90 Class B signal boosters(as defined in 47 CFR 90.219)online at www.fcc.gov/signalboosters/registration.

Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

FCC Warning

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

TROUBLESHOOTING

The LED alarm lights represent the status of the booster on each frequency. When the lights are green the device is operating normally meaning that it is not experiencing any oscillation (feedback) and it is boosting the signal at maximum power. When the LED lights begin to change color from green to orange to red, it means that particular frequency is experiencing some oscillation (feedback).

If the oscillation is excessive the booster will shut down for that particular frequency. The booster will still work for the other frequency on a multi-band booster.

Oscillation is caused when the indoor (distribution) antenna sends a signal back into the outdoor (signal) antenna. Similar to a PA system, when the microphone gets too close to the speaker it causes feedback. This will occur if your antennas are too close together, or the indoor antenna is pointed at the outdoor antenna. Make sure you have adequate separation and some type of shielding between the antennas (usually your roof or a cement wall is good enough).

IMPORTANT NOTES

The 2 most important things to look for when setting up your system is:

1

A good input signal (the best you can find)

2

Isolating the outdoor (signal) antenna from the indoor (distribution) antennas so they do not feedback into each other.

By capturing the best input signal you will be able to enjoy the maximum coverage and best quality signal inside where your distribution antennas are located. The better the input signal, the better the output signal. In order to find the best input signal, you want to place your outdoor (signal) antenna as high as possible with the least amount of obstruction between the antenna and the cellular base tower. A clear line of site is ideal.

Isolating the signal from the antennas is done by ensuring that the antennas are not pointing to each other and by having enough distance or barrier shielding in between them. The signals travel like rays of sunlight, a directional antenna will send the signal in the direction that it is pointing. An omni directional antenna will send the signal in every direction around it. So depending on your equipment its important to be sure that your distribution antenna (indoor) is not sending the signal back into the outdoor (signal) antenna.

THINGS TO CHECK WHEN EXPERIENCING WEAK CELLULAR SIGNAL

1 Ensure the signal antenna (outdoor) is pointing in the correct direction and is capturing adequate signal for the booster.

2 Check all connections on the cable, antennas, and booster.

3 Check cable for bends and or cuts.

4 All LED lights on the booster should be green.

5 Signal antenna (outdoor) and the distribution antennas (indoor) have adequate separation and are not causing feedback.

FREQUENTLY ASKED QUESTIONS



WHY ARE THE LED LIGHTS TURNING ORANGE, RED OR SHUTTING OFF?

There are certain cases where your system could be experiencing oscillation. This can be attributed to either the quality of your input signal or having your signal (outdoor) antenna and distribution (indoor) antenna too close together. Please review the following guidelines to help resolve this issue:

1. Adjust the direction of the signal (outdoor) antenna. If the system is receiving a very high input signal, you can point your signal (outdoor) antenna away from the cellular tower to reduce the strength of the input signal and therefore, reduce the oscillation. Alternatively if your system is receiving a very poor quality signal (weak and unusable signal), you can point your signal (outdoor) antenna more directly towards the cellular tower to increase the strength of the input signal. Sometimes this may require completely repositioning the antenna to a location where you can achieve a line of site to the tower.
2. Increase the separation between the signal (outdoor) antenna and the distribution (indoor) antenna. This can be achieved by increasing the distance between the two antennas or by placing barriers between them, such as moving the distribution (indoor) antenna to an adjacent room where there would be an additional wall separating them from the signal (outdoor) antenna.



I INSTALLED THE BOOSTER AND MY SIGNAL STRENGTH IS STILL WEAK

In order to correct a weak signal; essentially you have the options of:

- Adjust the aim of the signal (outdoor) antenna or replace it with a higher gain antenna.
- Move the distribution (indoor) antenna.
- Increase the number of distribution (indoor) antennas.



I CANNOT MAINTAIN CALLS, MY SIGNAL STRENGTH FLUCTUATES

If you find the booster is working but drops calls or delivers fluctuating signal levels, the most likely cause is oscillation between the signal and distribution antenna(s).

Determine the status of the cellular booster led alarms. If so there is insufficient isolation between antennas. You can either increase the distance between antennas or place barriers between them to attenuate the signals.

A second cause for this symptom is poor cable connections. Confirm that all cable connections are tight and secure.

A third cause may be interference from other cellular service providers operating in the same frequency bands. If their signals are stronger than the cellular signals you want to receive from the cell tower. In this case the unwanted signal needs to be attenuated either by repositioning or re-aligning the signal (outdoor) antenna, or by using barriers (buildings, trees, etc) to block the signal.



MY LED'S ARE ALL GREEN BUT MY SIGNAL IS STILL WEAK - MY COVERAGE IS POOR

If you receive a signal where you did not previously... or, if the radius of the service area covered is small...and your LED's are all green... the booster is working properly but for some reason the signal is not very strong. This can be due to weak input signal.

- Adjust your signal (outdoor) antenna to point more accurately at the cellular tower in order to increase the input signal.
- Check the coaxial cable to ensure there are not any creases or cuts in it. Perhaps the cable was damaged during installation.



WHY ISN'T MY CELL PHONE INDICATING MORE SIGNAL WITH MORE BARS?

You may not always observe more bars on your signal meter because of the signal spreading out from the antenna. If your phone has a db meter, 3db is a significant increase of 2 times, 6db is 4 times, and 10db is 10 times. on a four bar phone, one "bar" equals about 10db.

The increase in signal you will see depends upon:

- The level of signal at the signal (outdoor) antenna
- The care of the antenna placement (2 feet away from metal, adequate antenna separation [30 feet recommended]).
- The distance of your phone/device from the distribution (indoor) antenna (signal spreads or diminishes rapidly with distance.)

9.5dBi Beautification Yagi Antenna



Electrical Specifications	
Model NO.	SYN-BY-9D
Frequency Range (MHz)	698-960/1710-2700
Polarization	Vertical
Gain (dBi)	9.5
Half Power Beam width	Hor: 60°/55° Ver: 90°/75°
Front-to-back ratio	≥ 18dB
V.S.W.R	≤1.5
Impedance (Ω)	50
Power Handling (W)	50
Connector Type	N-Type or Customized
Product Size (mm)	300×210 ×65
Weight (KG)	1.05
Reflector Material	Aluminum Alloy
Operating temperature (℃)	-40～60

Outdoor Panel Antenna



Electrical Specifications	
Model NO.	SYN-OPA-8D
Frequency Range (MHz)	698-960
Polarization	Vertical
Gain (dBi)	7
Half-power beam width (°)	Hor: 78±10/70±10 Ver: 70±10 /65±10
Front-to-back ratio (dB)	>12
V.S.W.R	≤1.5
Impedance (Ω)	50
Power Handling (W)	50
Connector Type	N-Type or Customized
Product Size (mm)	210*180*45
Weight (KG)	0.63
Rated wind velocity (m/s)	60
Material	Reflector: Aluminum Alloy; Radome: ABS
Operating temperature (℃)	-40~60

Indoor Panel Antenna



Electrical Specifications	
Model NO.	SYN-IPA-8D
Frequency Range (MHz)	698-960
Polarization	Vertical
Gain (dBi)	7
Half-power beam width (°)	Hor: 65/60 Ver: 55/45
Front-to-back ratio (dB)	≥15
V.S.W.R	≤1.5
Impedance (Ω)	50
Power Handling (W)	50
Connector Type	N-Type or Customized
Product Size (mm)	210*180*45
Weight (KG)	0.48
Material	Reflector: Aluminum Alloy; Radome: ABS
Operating temperature (°C)	-40~60

Indoor Ceiling Antenna



Electrical Specifications	
Model NO.	SYN-CA-3D
Frequency Range (MHz)	698--960
Polarization	Vertical
Gain (dBi)	3
Beam width (°)	Hor: 360 Ver: 90
V.S.W.R	≤1.5
Impedance (Ω)	50
Power Handling (W)	100
Connector Type	N-Type or Customized
Product Size (mm)	Φ180×90 mm
Weight (g)	240
Material	Reflector: Aluminum Alloy; Radome: ABS
Operating temperature (°C)	-40~60

5D-FB Coaxial cable



Specifications		
Model NO.		5D-FB
Frequency Range (MHz)		1~6GHz
Rated capacitance		81.5±2 pf/m
Velocity		81%
Delay		3.75ns/m
Maximum Pull Tension		42 lbs
Minimum bending radius		91mm
Attenuation at typical frequencies: (dB/m)	400M	7.6
	698~900M	15.0
	1800M	26.3
	2500M	33.0
VSWR 50~3000MHz		≤1.2
Inner conductor		Copper clad aluminum
Dielectric		Foam PE
Impedance (Ω)		50
Outer conductor		AP+AA
Jacket :		PVC Black
Operating Temperature		-40 °C ~+70 °C

INSTRUCTION MANUAL

Phone: 1-800-215-7015

Email: support@signifimobile.com