

SCADADroid Antenna



Technical Note RAI-TN-001



Objective

A good antenna installation is key to getting the best cell reception for the SCADADroid. This document is intended to assist in selecting and installing an antenna for your unit. When using third-party equipment, always refer to the manuals provided.

Selecting and Setting Up the Antenna

The 3 antenna factors affecting cell reception other than proximity to a cell tower are:

1. *Antenna Location/height*
2. *Antenna Type*
3. *Use of a booster for really marginal installations*

Signal strength should be less than -95dBm and preferably less than -85dBm. Data traffic in particular is better at higher signal strength (lower dBm levels). You can find the cell modem signal strength on the Overview tab under Cell Settings

RSSI	SIGNAL STRENGTH
-53 dBm to – 75 dBm	Excellent
-76 dBm to -85 dBm	Good
-86 dBm to -95 dBm	OK
< -95 dBm	Marginal

Antenna Location/ Height and Type

The antenna provided with the SCADADroid is meant for testing and to protect the modem, as this antenna provides a load for the transmitter.

Generally, an external antenna should be used. This should be mounted as high as reasonably possible depending on the signal strength. If signal strength is weak in the



area, make sure that the antenna has as clear a path to the cell tower as possible (ie. Above the roof line, or on the same side of the building as the cell tower). Depending on the distance between the SCADADroid and the antenna, higher grade coaxial cable should be used to minimize the loss of signal between the SCADADroid and the antenna. A lightning arrestor should also be used to protect the SCADADroid from lightning strikes.



Important:
Refer to the manual provided with your antenna for proper mounting and installation instructions.



Important:
When installing an external antenna, ensure proper lightning protection is installed.



Important:
When mounting an external antenna, ensure the height does not exceed local zoning bylaws and restrictions. Depending on location, heights in excess of 10 meters will often require special zoning designation or permits.

Antenna Type

When referring to Antenna Type, there are three important factors:

- 1. Omni vs Directional Antenna*
- 2. Technology and Wavelength*
- 3. Antenna Gain*



Omni vs Directional Antenna

Where multiple cell towers are available, it is best to use an omni-directional, or stick antenna.

An omni antenna receives and radiates energy equally all around the antenna.



In more remote locations that may only have one cell tower which is at a distance, it is best to use a Yagi or directional antenna. A yagi antenna focuses most of its energy in the direction it is pointing. If using a Yagi antenna, you will need to know the location of the nearest cell tower. Check with your service provider.

Technology and Wavelength

SCADADroid uses a Penta-Band HSPA+ modem. When selecting your antenna and booster, ensure it is compatible with the cellular carrier technology used, and the available wavelengths for that technology.

GSM Quad Band 850, 900, 1800, 1900 MHz

UMTS/HSPA Penta Band 850, 900, 1700, 1900, 2100 MHz

If an antenna is not listed as GSM or UMTS/HSPA, or it does not list one of the wavelengths above, it will not be compatible with the SCADADroid

Antenna Gain

Antennas also come in different gains. Gain allows an antenna to passively increase the sensitivity of the SCADADroid as well as to increase its effective radiated power. For every 3db gain, the antenna output power is doubled.

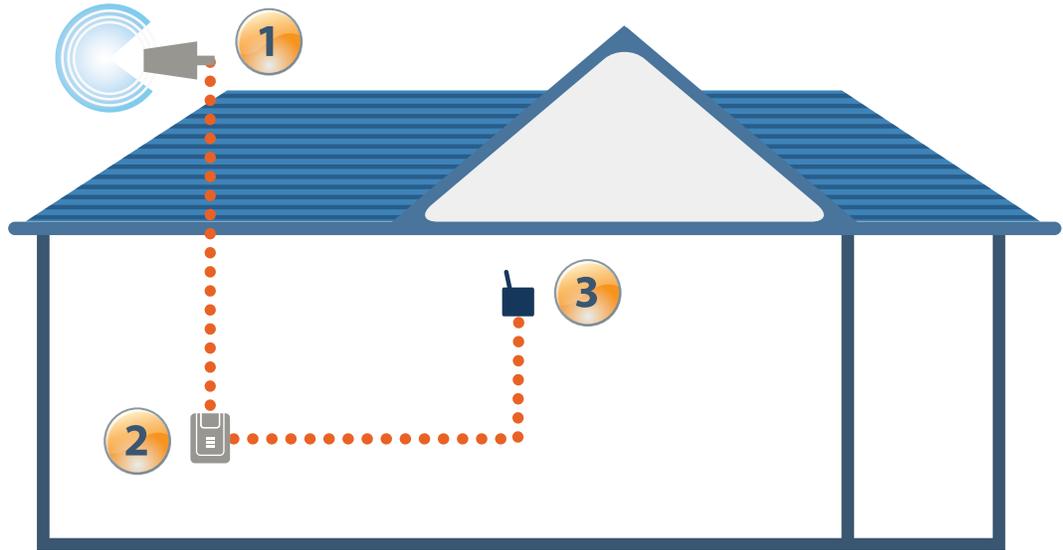


Important:
Ensure antenna output power does not exceed regulated levels. Canadian limits set in RSS-247, section 5.4, and FCC limits set in section 15.247, will limit most applications to an output power of 1W (30 dBm), and a maximum e.i.r.p (effective irradiated power) of 4W (36 dBm).

Cell Booster

A cell booster can increase signal by 32 times in low signal areas. A good cell booster will dynamically adjust its level based on the cell reception. Cell boosters are normally installed so that any cell device within a few feet, such as the SCADADroid or smartphone, can benefit. A cell booster, depending on the type, can also be plugged directly into the SCADADroid antenna connector. A cell booster will require external power to operate, normally 12VDC or 110VAC adapter. Make sure to select a cell booster which, when turned off, will still allow cell coverage to pass.





1

Outside Antenna

Pulls in Tower Signal



2

Signal Booster

Amplifies the Signal



CELL Phone



3

SCADADroid Antenna

Re- broadcasts signal



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