



Stealth Repeater Quick Start Guide



Version A.01
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Introduction

MeshPlus[®] networks are used for remote monitoring and control of commercial, industrial, and municipal equipment such as automatic utility metering, municipal lighting, and traffic management. Hundreds of thousands of devices are currently monitored and controlled by MeshPlus[®] networks.

The MeshPlus[®] Battery Repeater 2 (Stealth Repeater) extends the range of a MeshPlus system by receiving, storing, and re-transmitting radio messages from other MeshPlus[®] devices. The Stealth Repeater operates on internal battery power and as such can be discretely located in locations where power is not available. Features of the Stealth Repeater include:

- External high-gain antenna
- Second generation mesh radio
 - long RF range
 - interference resistance
 - backward compatible with 1st generation
- Push-button connect to MeshPlus infrastructure
- Field replaceable batteries
- Integrated battery tester/conditioner
- Compact, light-weight, weatherproof enclosure
- Locking/tamper-resistant access
- Extended temperature range
- Optional USB interface
- Optional external DC power

By following the instructions in this quick start guide, you can get your Stealth Repeater up and running quickly and easily.



MeshPlus Stealth Repeater

Your MeshPlus[®] Stealth Repeater product kit includes:

- Stealth Repeater battery repeater
- High gain antenna
- 4x ER34615 lithium primary batteries

Optional accessories include:

- Pole mount and straps
- Pipe Clamp
- Mounting screws with gasket
- Mounting feet
- Tamper resistant seal

This manual will get you acquainted with your Stealth Repeater and help you get it installed, configured, and connected to your MeshPlus network quickly and easily. Please read this guide completely before installing your Stealth Repeater; pay special attention to safety instructions, especially when mounting antennas near power lines.

FCC Compliance

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.

FCC ID: VE4-BER2

Caution: Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment. Only the manufacturer supplied antenna is approved for operation with the equipment.

To comply with FCC RF exposure requirements, the device and the antenna for this device must be installed to ensure a minimum separation distance of 20 cm or more from a person's body. Other operating configurations should be avoided.

Quick Tour

Let's examine the Stealth Repeater:



The Stealth Repeater is contained in a plastic enclosure making it suitable for outdoor operation; The clamp is the same material that seals the Stealth Repeater so no moisture can come in. The exterior is light grey to resist weather and minimize thermal rise due to sunlight. The Stealth Repeater has many features. Some of the major ones are described below:

1. Battery ports- Where batteries for power are held and used.
2. Buttons- Buttons are used to test the batteries and connect to the mesh.
3. USB Port- A way to directly connect the Stealth Repeater to a computer.
4. LED lights- The lights indicate different things dealing with what is close to the light

Installation

Because it is battery powered, the Stealth Repeater may be discretely mounted in any permitted location. Determine where to mount your Stealth Repeater, making sure to comply with local safety and aesthetic regulations. Flexible mounting options allow the Stealth Repeater to be wall, pole, or pipe mounted using the appropriate accessories.

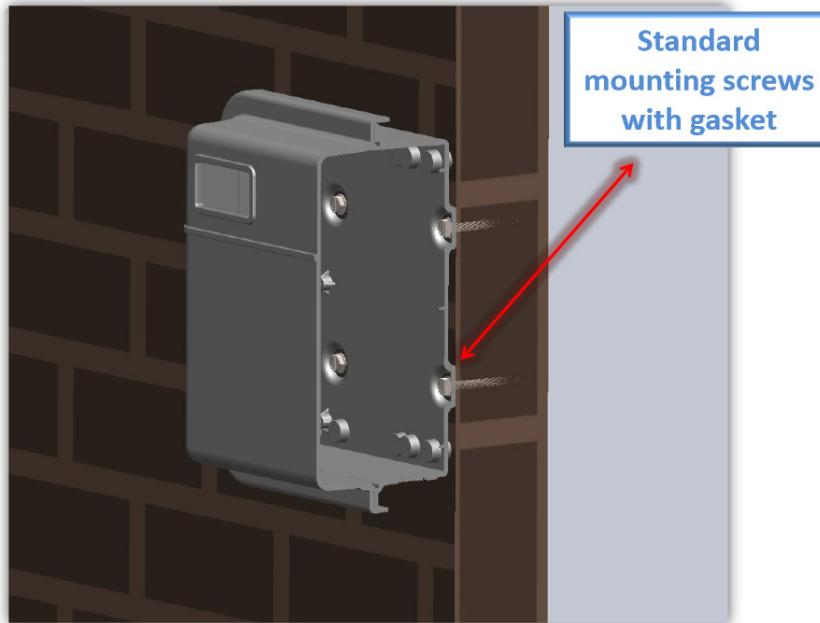


Note:

It is desirable to mount the Stealth Repeater discretely such as placing it behind shrubs and to mount the antenna as high as possible with a clear line-of-sight to other MeshPlus devices for maximum radio range.

Wall Mount

Mounting through the case is preferred as it hides the mounting screws and optionally secure them if the enclosure is locked, however through-the-case mounting requires use of screws with weatherproof gaskets and a driver with torque control to prevent damage to the enclosure.



Stealth Repeater Wall Mount

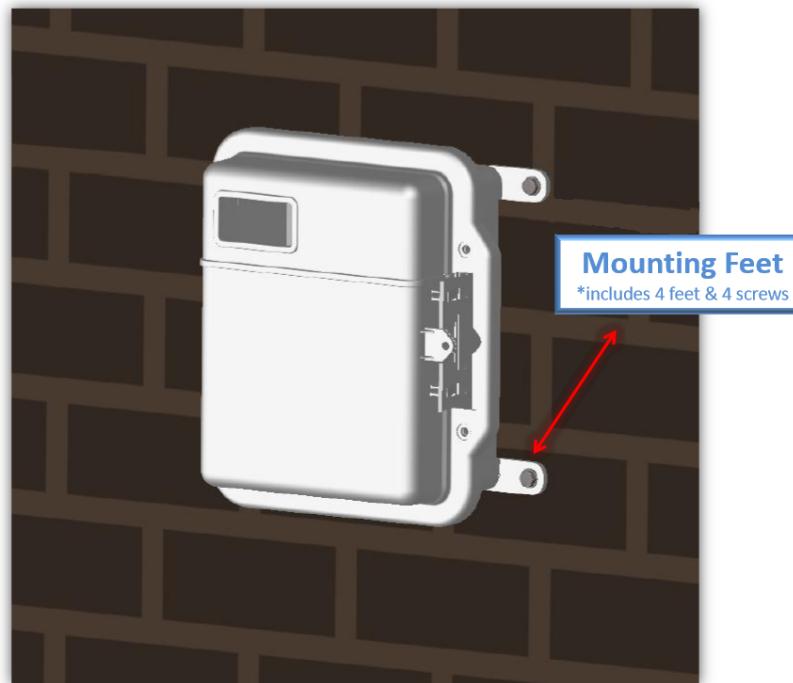
Tools Required

- Wrench
- Screwdriver

Use appropriate safety precautions such as hand and eye protection when mounting the enclosure, particularly when using power tools.

Alternate Wall Mount

Mounting feet are a convenient alternative allowing the enclosure to be mounted to less regular surfaces.



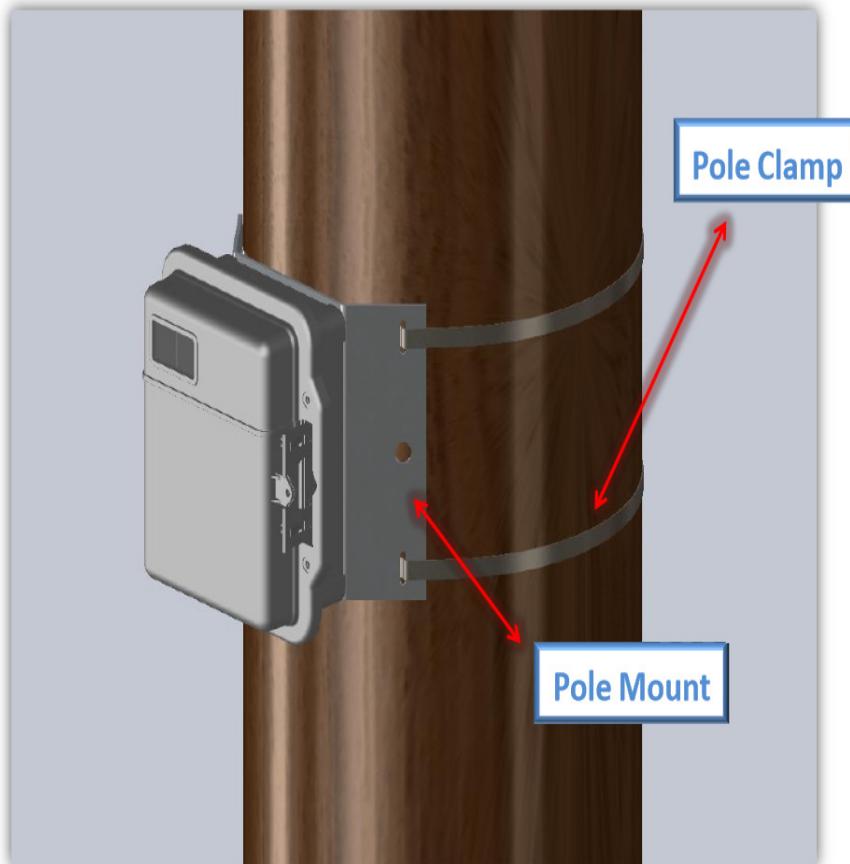
Stealth Repeater Wall Mount Feet

Tools Required

- Wrench
- Screwdriver

Pole Mount

Lighting and telephone poles often offer convenient mounting locations. Using the optional pole mount and clamp accessories, the Stealth Repeater may be mounted to a suitable pole.



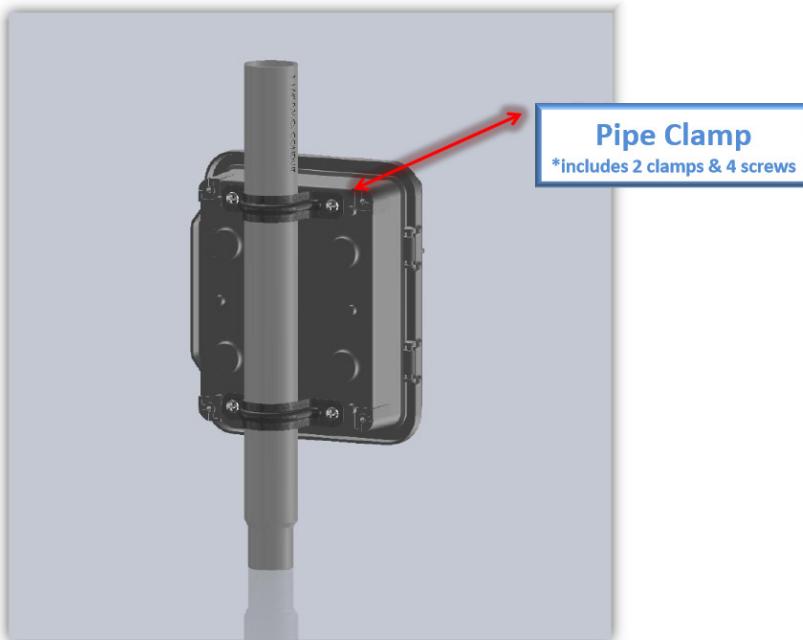
Stealth Repeater Pole Mount

Tools Required

- Wrench
- Screwdriver

Pipe Mount

The pipe clamp accessory kits allow mounting the Stealth Repeater to a variety of diameter poles. When mounting the Stealth Repeater to a metal pole, be sure to position the base of the antenna at the top of the pole so that the antenna is not next to the metal pole. Placing the antenna body near the metal pole will severely degrade the performance of the Stealth Repeater.



Stealth Repeater Pipe Mount

Tools Required

- Wrench
- Screwdriver



Note:

GPS location data is important for MeshPlus and MeshMaster features.

Antenna

The Repeater requires a 902-928MHz antenna connected via coaxial cable to the N-type connector (12) on the top of the chassis. The Repeater transceiver communicates with the wireless mesh network via this antenna; a gain antenna is highly recommended; up to 8dBi antennas may be used for maximum coverage.

The Repeater has built in antenna monitoring circuitry that measures the efficiency of the antenna and the coaxial cable; if the antenna is missing or if the connection to the antenna is open or short-circuited, or if the antenna is positioned in such a way as to make communications ineffective, the Repeater will light the red fault indicator in the Antenna Status LED bar.

Transmissions are monitored for VSWR and power to ensure an efficient antenna system is in place; the VSWR and power measurements can be viewed in the System Manager; this eliminates the need for expensive and complex antenna analyzers during installation and allows continuous monitoring of the antenna during operation. If the antenna or the coaxial feed-line are damaged or removed, the Repeater will detect the condition and issue an alarm.

The coaxial cable connecting the antenna to the Repeater should have low loss at 902-928MHz. Only high quality cable such as LMR400 should be used. Many popular calculators are available on-line to determine the loss a given type of cable will cause at 915MHz for example: <http://www.timesmicrowave.com/cgi-bin/calculate.pl>

Although N-connectors are waterproof and designed for rugged outdoor operation, it is often desirable to further waterproof the connections; heat-shrink tubing with internal glue is often used to seal the connection between the cable and the connector.

The antenna should be mounted as high as possible. The antenna should not be placed close to other objects (including the pole itself); other objects, especially metal objects, in close proximity to the antenna will result in particularly poor performance.

If the antenna cannot be mounted at the top of a pole, it should be mounted on an arm that places the antenna as far from the pole as possible. Refer to the diagrams in Illustration 1 for examples of good and bad antenna mounting practices.

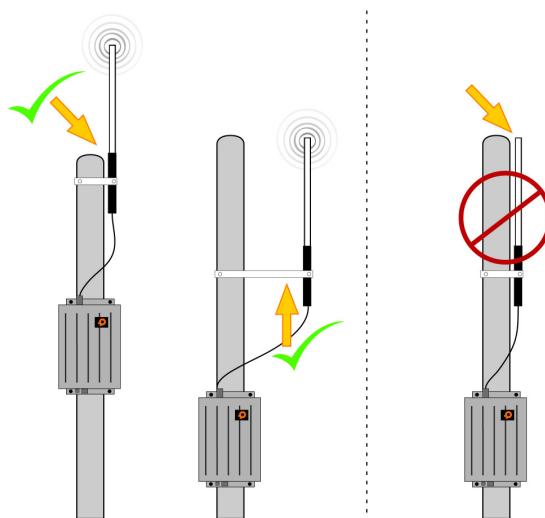


Illustration 1: Good and Bad Antenna Mounting Positions

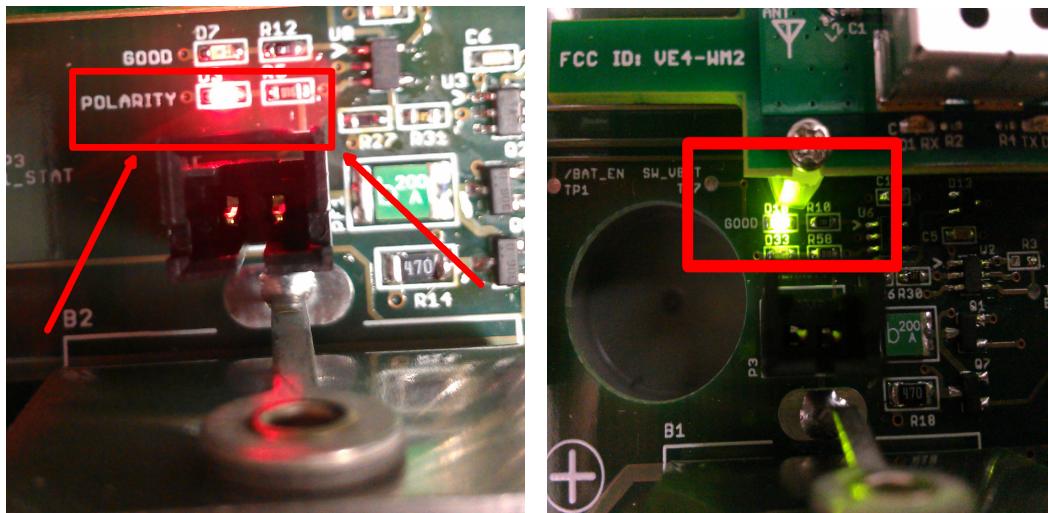


Warning:

The Stealth Repeater can not operate **WITHOUT** an antenna. Damage **WILL** happen without one.

Power

The Stealth Repeater is powered by one to four lithium-ion batteries. So to make sure that the batteries are good batteries when they are put in there is a button to test them. When testing the batteries to see if they are good batteries put them in the Stealth Repeater. If you put in a battery the wrong way, a red LED light will illuminate saying the polarity is incorrect.



After putting in all the batteries correctly there are buttons in the lower right hand corner of the Stealth Repeater. (Refer to Illustration 2 below) One is to test the batteries to see if they are good or bad batteries. When you press the button a light will illuminate beside it saying it is testing. As long as this light is lit, the test is still active. If the battery is good the good light will illuminate and light a green LED.

The lithium batteries have a typical service life in excess of 10 years. In most cases, the SLA battery will power the Repeater through any power outages and the lithium battery will last for its expected service life. If an extended power outage drains the lithium battery, it must be replaced.



Warning:

Lithium-ion batteries are capable of supplying large amounts of power and can be dangerous if short-circuited. The Repeater circuitry includes a self-resetting fuse that automatically limits the battery current in the event of a short circuit, however care should be exercised while handling Lithium batteries.

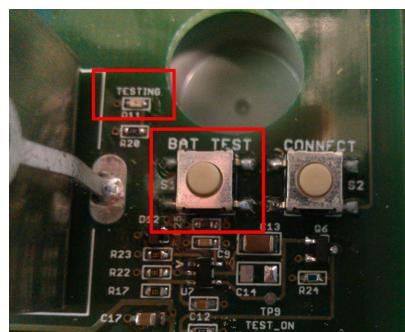


Illustration 2

Stealth Repeater® - QSG

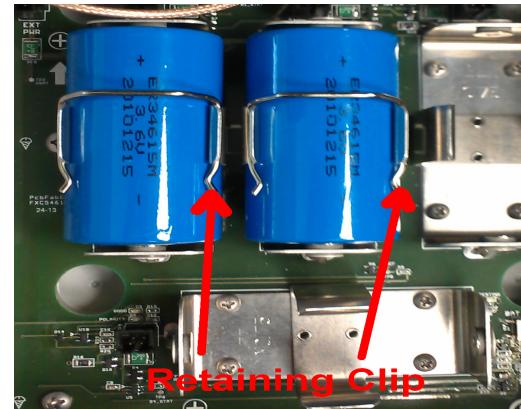
Passivation

When lithium batteries are not used, they develop an internal oxidation layer called passivation that prevents them from delivering their rated current. As the battery is used (loaded), the passivation dissipates and the battery is able to deliver full current. When batteries sit on the shelf for extended periods or are used in a standby capacity, this passivation can render the batteries unusable. When a new battery is installed in the Repeater, a load is automatically applied for 5 minutes to remove passivation; thereafter, a load is applied weekly to prevent accumulation of more oxidation; this assures that battery will always be ready to provide backup power.

Battery Clips

For shipping and extended storage, Attach a Battery Clip or Retaining Clip. When the Clip is attached the battery cannot be moved from the holder. This prevents the batteries from possibly getting out of the holder and cause damage to the interior of the Stealth Repeater.

Battery holder has a retaining clip that holds the battery securely against vibration and shock. When the Lithium battery is depleted, slide the clip off the holder, remove and replace the battery, then replace the clip.



Configuration

Handheld

To connect the Repeater to MeshMaster it must be installed. The installing process is the same as installing a device through the SMiRF or PDA. To start the installation process go to your hand-held device and find the SMiRF application.

You find this application and tap it to open it the main menu will open.

If the installation is a work order go to tasks and complete the installation there. If not tap install to open the install menu.

When the install menu appears tap, Repeater. The screen will change to show that the technician will have to fill out the address information for the device so it can be found in the future.



Stealth Repeater® - QSG

When you have typed in the information on the location of the Stealth Repeater, check over it that the information is correct. After checking, tap "Next".

When you have tapped next the screen will change asking you to swipe the Stealth Repeater with a magnet to activate it. Another way to activate the Stealth Repeater is to push the "Connect" button on the device. This button will activate the Stealth Repeater that will allow it to be recognized by the SMiRF program.

When the it has Stealth Repeater has been activated the SMiRF will display a screen showing all the information that it got from the device. Make sure that all the information is correct before continuing forward.

When you tap "Next" the SMiRF will install all the information into the Stealth Repeater and acquire GPS information. If GPS information is not available a warning message will be displayed. Upon successful instalation of the Stealth Repeater an installation summary window is shown for review. When done evaluating the information, tap "OK".

With this the Stealth Repeater has been fully installed and ready for use.



System Manager Software

The MeshPlus® System Manager software makes configuration and management of your Repeater easy and intuitive. System Manager graphical software allows you to use your computer, notebook, or tablet to communicate with a Repeater via direct USB connection, via TCP/IP network connection, or remotely via wireless link. In the field, System Manager is typically installed on a rugged IP-65 MeshPlus tablet computer. The tablet computer is equipped with integral GPS and USB Mesh Stamp® allowing a field technician to install, diagnose, and configure Repeaters and other mesh infrastructure devices from the safety and convenience of their truck.

The latest System Manager software can be downloaded from the MeshPlus website; it is also supplied on the MeshPlus Software CD or DVD.

Requirements

- System Manager requires Microsoft Windows XP, Vista, or 7.
- Pentium IV processor or better
- 1GB RAM or more
- 20GB hard disk drive or larger

To install System Manager, download SystemManagerInstaller.exe from:
<http://www.meshplus.com/Downloads/SystemManager/current/>

Stealth Repeater® - QSG
or insert your MeshPlus CD/DVD and either launch SystemManagerInstaller.exe from Windows Explorer or select “Install System Manager” from the MeshPlus Software menu.



Note:

The MeshPlus® System Manager installer also installs the USB drivers for the Repeater and other MeshPlus® products. It is best to install System Manager and drivers **before** connecting MeshPlus® products to your computer.

System Manager Installation

The installer will prompt you through each step of the installation



For most installations, the default settings are fine; the software will be installed under Program Files (x86)/MeshPlus/System Manager <version>. The installer will create entries in your Start menu to launch the System Manager application and will optionally create a desktop shortcut.

USB Driver Installation

Following installation of the application, the installer will install the USB drivers for MeshPlus® products, automatically launching the Windows Device Driver Installation Wizard as appropriate. In most cases, the default settings are fine. Windows will display information regarding the USB driver installation when it is complete.

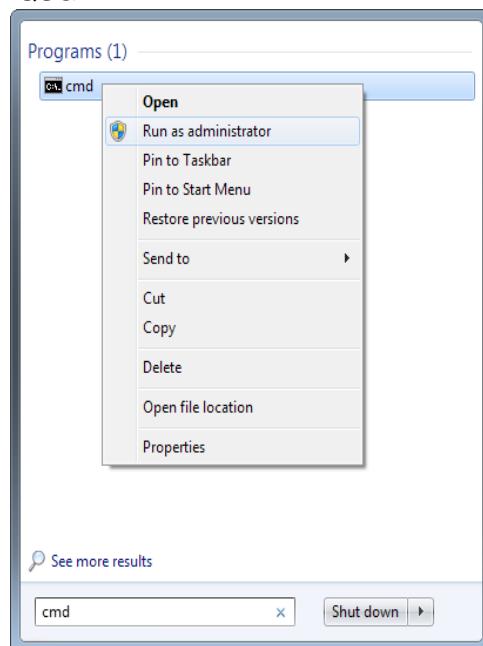


Stealth Repeater® - QSG
Windows 7 64-bit Driver Installation

Windows 7 64-bit edition will only allow Microsoft certified drivers to be installed by default; the MeshPlus® USB drivers have not been Microsoft certified, so to install them you must disable driver signing to install the USB drivers. To disable driver signing:

- From the Start menu, type cmd.exe in the Search bar. Right click on cmd.exe and choose Run as Administrator:

If you have the UAC turned on, choose Yes to proceed. Otherwise, you should see the command window opened already. In the shell window, copy paste the following and hit Enter:



```
bcdedit.exe -set loadoptions DDISABLE_INTEGRITY_CHECKS  
bcdedit.exe -set TESTSIGNING ON
```

You'll get a confirmation that the operation completed successfully:

A screenshot of a Windows Command Prompt window titled 'Administrator: C:\Windows\System32\cmd.exe'. The window displays the following text:

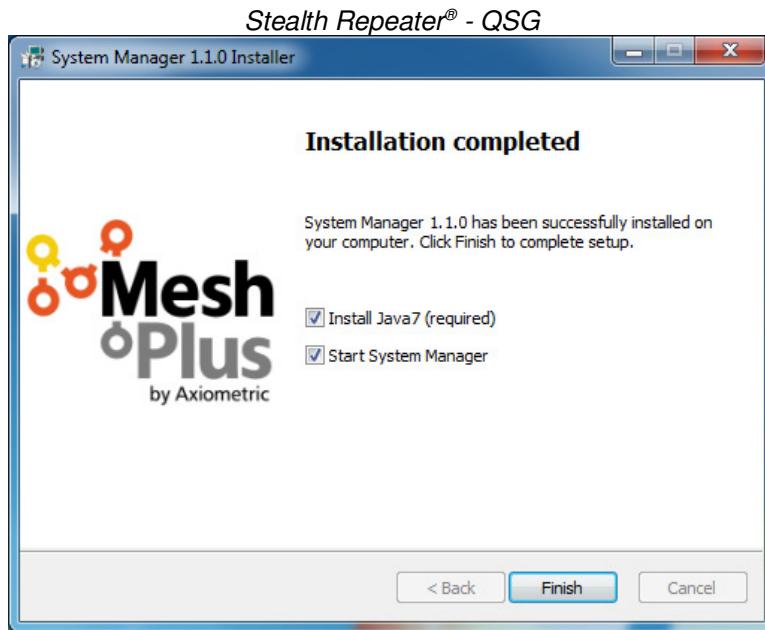
```
Microsoft Windows [Version 6.1.7100]  
Copyright © 2009 Microsoft Corporation. All rights reserved.  
C:\Windows\system32>bcdedit.exe -set loadoptions DDISABLE_INTEGRITY_CHECKS  
The operation completed successfully.  
C:\Windows\system32>bcdedit.exe -set TESTSIGNING ON  
The operation completed successfully.
```

The window has a standard Windows title bar and a scroll bar on the right side.

Restart your computer for the changes to take effect. You've just disabled digital driver signing in Windows 7.

Java Installation

After the System Manager application and USB drivers have been installed, the installer will check to make sure Java 7 or higher is installed on your computer. System Manager is a Java application and requires Java to function. If Java is not installed on your system, the installer will automatically install it for you:



When installation is complete, the installer will start System Manager by default; you can un-check this option if you do not wish to start System Manager now. On some systems, Windows may require a reboot to make the newly installed USB drivers operational.

Windows 64-bit Java Installation

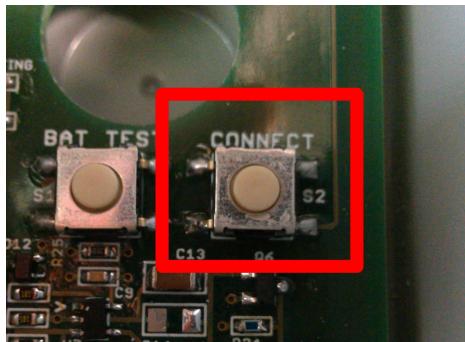
Windows 64-bit edition requires a special 64-bit version of the Java Runtime Environment (JRE) to be installed. Java 7 32-bit (i586) and 64-bit (amd64) are included on the MeshPlus Software CD/DVD and can also be downloaded directly from Oracle here:

<http://www.oracle.com/technetwork/java/javase/downloads/java-se-jre-7-download-432155.html>

To install from the MeshPlus Software CD/DVD, select “Install Java 7 (64-bit)” from the CD/DVD menu or you can directly run the program jre-7-windows-x64.exe.

Connect to Mesh

In order to connect to the rest of the mesh, a simple operation must be done. At the bottom right corner on the Stealth Repeater there are buttons. Press the one labeled “Connect”, in doing this a green light will be lit in the upper right corner. If it is blinking that means it is finding the mesh. If it stops blinking and stays lit that means that the mesh was found. When you have clicked the “Connect” button it sends a message to all AC powered electronics to connect the Stealth Repeater to the mesh.



Trouble-shooting

LED not working

When checking batteries

If a LED light doesn't come on when you are checking a battery. This means that the battery is bad. To make sure that it is in fact a bad battery complete a Battery Test 2-3 times to make sure if the battery is bad. If it doesn't light up then the battery is bad and should be properly disposed of.

Antenna

If the Stealth repeater isn't connecting properly it maybe an antenna problem. The Antenna's connection to the Stealth Repeater might have been damaged from weather or nature. Check the connection between the Stealth Repeater and the Antenna to make sure that it is the connection that is the problem and not else where.

No Connection

When trying to connect the Stealth Reapter to a device (either MeshMaster System Manger or a Mesh. If when clicking the "Connect" button doesn't work check on the Antenna to make sure it isn't a problem with the connection between the two. If this doesn't work check to other side to make sure nothing is wrong. So that means to check the System Manager or a device from the Mesh. If this doesn't seem to work manually connect the devices together with a usb cable.

Specification