Connecting MIUs to a Mesh Network

V1.0

This document discusses the issues with getting mesh MIUs to join a mesh network. An optimal method is also discussed on how to connect MIUs to a mesh network. This document does not pertain to drive-by or LoRa based systems.

Background:

MIUs are essentially digital radios that get wired up to various types of equipment(water\gas meters, shutoff valves, etc.). MIUs are packaged in a variety of enclosures. Below are some of these enclosures.

Water Meter MIU

BER Repeater

Gas Meter MIU

At the point of installation, mesh MIUs will attempt to join(aka connect) to a mesh network. For this connection to be successful, several things are required. Below are these things that are required.

- A functionally fit and correctly configured MIU. This includes the following.
  - o Batteries with sufficient charge.
  - o A phy fram that matches that of the mesh network that it is being connected to.
  - o For the remainder of this document, we will assume these items above are good.
- An available RF path. This includes the following.
  - o Sufficient mesh signal strength at the installation location. This item is basically controlled by two things.
    - ▪ The range(aka distance) to the nearest reporting mesh radio(MIU, MIUR, BER, ACER, Collector).
    - ▪ The clearest physical path between the MIU being installed and other nearby mesh radios.
  - o Proper mounting and positioning of the MIU. MIU should not be placed in a basement or under metal pit lids. With meter pits, the MIU must be properly attached to the proper lid lock. Plastic pit lids are recommended.
  - o Nothing blocking these RF mesh signals. This can include lots of trees, metal structures, etc.

MIU LEDs:

This section discusses how the MIU LEDs can be used to verify that the MIU has joined the mesh network.
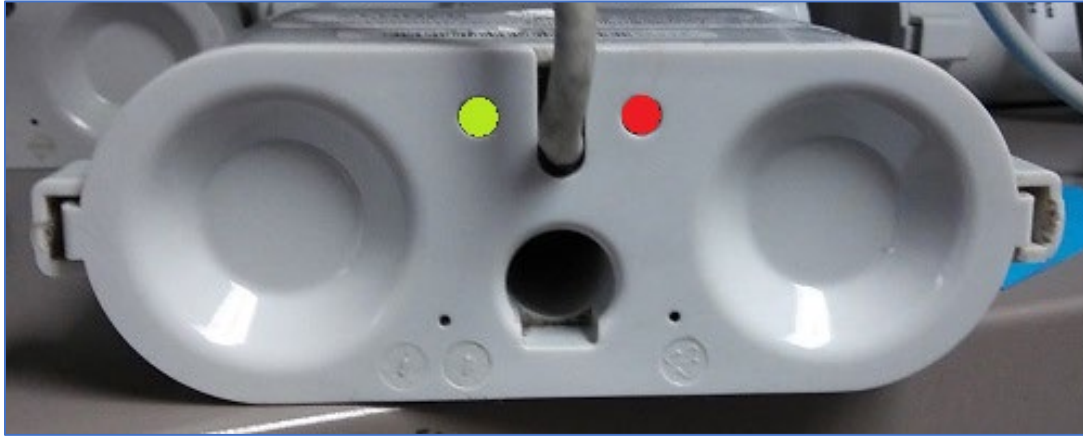
At the end of an MIU installation, the MIU's LEDs will go through a blinking pattern. This overall sequence can take a few minutes. When the MIU joins the mesh network, both LEDs(Red & Green) will turn on together and stay on for a few seconds, then both LEDs will turn off together. Locally, this is the only way to tell if the MIU joined the mesh network.

The following link shows this light sequence as the MIU joins a mesh network. MIU Lights Ad-Hoc Install.mp4

Stealth Network Manager:

This section discusses how to use Stealth Network Manager to verify that the MIU has joined the mesh network. Sorry for the redactions. This was done to preserve privacy.

Cycle	Route	Seq	MIU SN	Association Date	Meter ID	Address	Account#	Name	GW	Mesh ID	Last Read Date	Latency	Read	TC Date
									1					
									50081					

When a mesh MIU has been installed and the handheld has been synced, the handheld reports the installation information with a collector(aka GW) identification of 1.

If the installed MIU joins the mesh network, the real collector ID will override the GW=1 identifier. If the installed MIU did not join the mesh network, this GW identifier will remain a value of 1.

This GW identifier can be seen within the "All Data" report. Inside this report, there is a column entitled "GW". If you see a GW identifier with a value of 1, this indicates that the newly installed MIU did not join the mesh network.

Optimal Method:

This section discusses ways to optimize the chances of a newly installed MIU joining the mesh network.

1. Ensure adequate RF mesh signals at the service location. Checking the distance between the service location and the nearest infrastructure device. Below are guidelines on the effective distances involved. You want the actual distance to be less than these guidelines. If the service location is not within range of any reporting device, additional infrastructure is required to cover the service location.

   a. Collector   1.0 mile
   b. ACER   1.0 mile
   c. BER   0.75 mile
   d. MIUR   0.25 mile
   e. MIU   0.25 mile
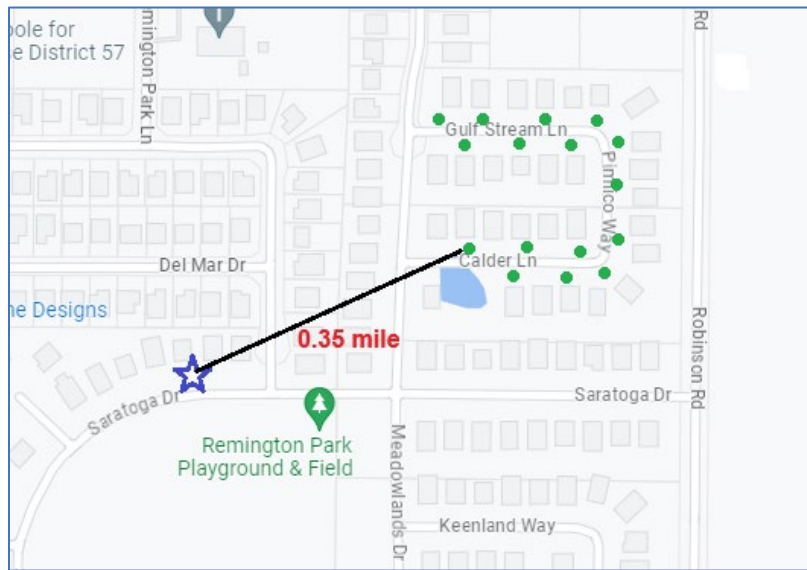
   The blue star represents the new service location prior to installation. In the example above, a repeater may be required to extend the mesh network into the area Southwest of the rest of the network. Infrastructure(like repeaters) should always be set up prior to installing MIUs. In this way, we can ensure adequate mesh signal strength at the service locations.

2. Ensure the proper positioning and mounting of the MIU.
3. Use the Neighbor Swipe method. This is covered by the following document. Neighbor Swipe(Mesh).pdf
4. After the last handheld install screen has been addressed, watch the MIU LEDs for a good mesh network connection.
5. After the installation is complete and the handheld has been synced, wait at least 24 hours. After the waiting period is over, search the **Stealth Network Manager – All Data Report** for the record associated with the MIU that was installed. The value inside the GW column should have a real collector ID. Like the image below.

Cycle	Route	Seq	MIU SN	Association Date	Meter ID	Address	Account#	Name	GW	Mesh ID	Last Read Date	Latency	Read	TC Date
01	000001	000000	2002799	08/21/22	01509131	23333 NW Rosewood Cir	23799-1	Jessica Graham	50081	50081	10/05/23 02:00 AM	01:00:12	0818	
01	000001	000000	2020003	08/21/22	01509188	23025 NW 8th St	23115-1	Angela Bailey	50081	50081	10/05/23 02:00 AM	00:00:04	5545	