

Tehama System Installation Guide

General Description

The Tehama AMR system consists of three device types to remotely monitor various environmental and utility readings and provide the data to a central database or PC for formal presentation and reporting. Metering Data Transceiver (MDT) devices will be placed in all locations requiring local monitoring of data. The MDT devices will transmit time stamped data to the DCAP device, which receives the data and stores it in a Database. The database information is available over Ethernet on the local LAN or the Internet. For MDTs that are out of range from the DCAP, Repeater devices are added in appropriate locations to relay the data between MDTs and the DCAP.

The system operates in the 915MHz ISM bands using off-the-shelf FSK RFIC radios. The system operates as a Frequency Hopper over 60 narrow band frequency channels, incorporating a bidirectional communication link with Acknowledge (ACK) messages to ensure all data reaches the DCAP. The MDTs are battery operated, bursting data packets at pre-programmed times then shutting down to conserve battery life, estimated to exceed 5 years. The DCAP and Repeater units are line powered.

With an typical MDT transmission rate of four per hour for time of use applications, a single DCAP can accommodate up to 1000 MDTs. There is no limit to the number of repeaters, though an average installation may require one Repeater for every 20-30 MDT/MDTs.

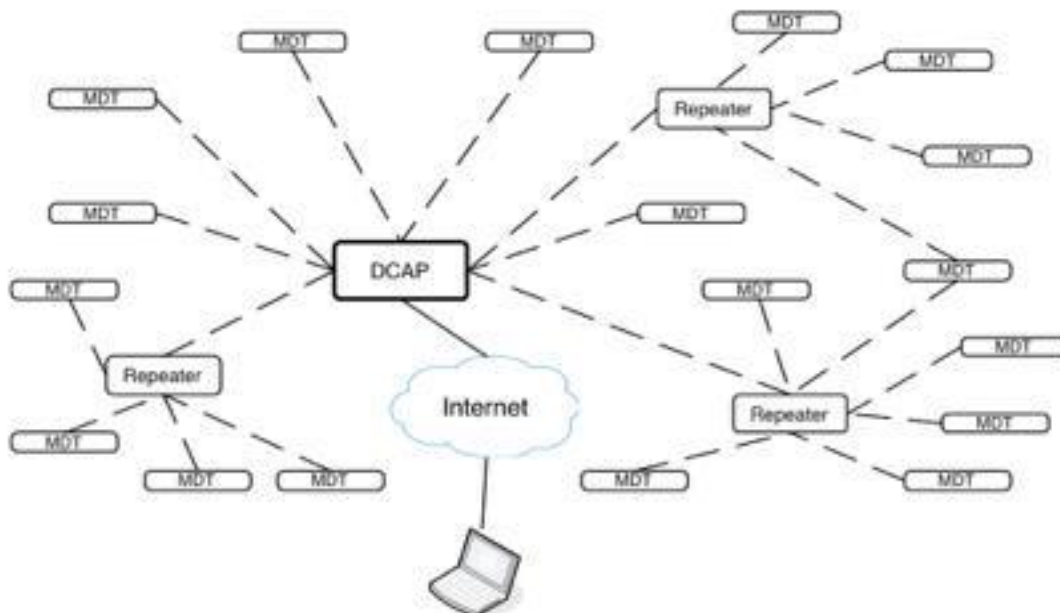


Figure 1: Typical System

A system consists of two or three types of hardware, and a software program:

- One DCAP Unit or Access Point
- A variable number of MDT units, each with 2 AA batteries
- A variable number of Repeater units (optional, depending on size of installation) with external DC power supply.
- Tehama Configuration Utility (CIT) running on a PC

Warning

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT

Tehama Configuration & Installation Tool (CIT)

You should have received a copy of the Tehama Configuration and Installation Tool (CIT) software. If not, please contact support@tehamawireless.com and request the link. The CIT runs on a Windows based PC. More detailed information can be found in the Tehama CIT User Manual or the Tehama QuickStart Guide.

The tool can be run on the PC either prior to or during a site installation, or when new MDTs are added to a system. The tool is used to add configuration data to the database. Examples of configuration data include the name, type, and location of equipment an MDT is connected to, and alarm trigger settings for the different MDTs.

Data Collecting Access Point (DCAP) Setup

This step configures the Internet settings for the DCAP and lets you set unique passwords for remote access.

- Power up the DCAP with the supplied power adaptor.
- Screw in the AP antenna that came with the unit.
- Attach the supplied USB cable to your computer and to the AP. If this is the first time attaching tan AP, Windows may respond with a "found new hardware" message. Follow the steps to let Windows download the driver software.
- Attach the AP to your local LAN with the supplied Ethernet cable.
- Launch the CIT tool on the PC
- Go to the Config menu and select DCAP. The Serial Port field should be automatically populated with the correct COM port
- Click on the Get button to see the current settings
- DHCP (Dynamic IP Address) is the default. If you want a static IP, select static and fill out the extra fields.



- Set the MySQL database passwords for both users and click "Set". Clicking on the "Default Vals" button will fill the fields with the factory default passwords. This is provided as a convenience if password security is not an issue (for example in an evaluation system).
- Click on the "Create a Site Entry" button to auto-fill a Site entry with the information from this panel.
- Unplug the USB cable. It is not needed again unless you need to change the IP address or the database passwords at a future time.

MDT Configuration

All MDT come from the factory with a default factory-set configuration. The following parameters can be custom configured at the factory only; they cannot be changed by the user. There are no parameters which can be configured on the DCAP or Receiver.

- **Monitor Type**, defined as the type of meter the MDT is attached to for readings. Our basic pulse MDT all work with 99% of the meters, but special units can be ordered for Hersey pulse meters, Encoder meters, etc. Additional data can be factory configured, such as temperature measurements.
- **Transmit Interval**, defined as the time between scheduled transmissions of temperature data. Regular pulse meters transmit once every hour (60 minutes). Our Time of Use units are configured to transmit four times an hours (15 minutes).
- **Measure Interval**, defined as the time between scheduled temperature measurements. This is used in conjunction with Temperature Change (see below) and must be smaller than the Transmit Interval time. A value of 0 for this parameter will disable measurements in between the Transmit Interval. The units for this parameter are in seconds, with default set to 0.
- **Temperature Change**, defined as a percentage change in the Thermistor resistance value (i.e. temperature) detected by the MDT. A Delta Temp alarm will be generated within the PC Software if a MDT reading taken at a Measure Interval is more than Temperature Change percent from the prior Transmit Interval value. The units for this parameter are Percent (%), with the default value set to 0.

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.



Turning on the Unit (for MDT and Repeater)

MDT and Repeater devices come from the factory in a powered off state. They can be powered on using a hidden button under the label.

The yellow circle in the photo below shows where the hidden button is located on the enclosure. It may take a few times to get the feel of the button, but an LED in the clear



window to the right gives you feedback when the button is pushed.

- To turn a unit ON, press and hold the button until the LED starts to blink (about four seconds).
- After about 30 seconds the LED flash frequency should change from slow to fast. After another 30 seconds or so, the LED will stay solid for 10 seconds than go out. The long flash indicates the unit is communicating with the network.
- To turn a unit OFF, press and hold the button again until the LED flashes twice (about four seconds).

LED Flash Indication States during power-up:

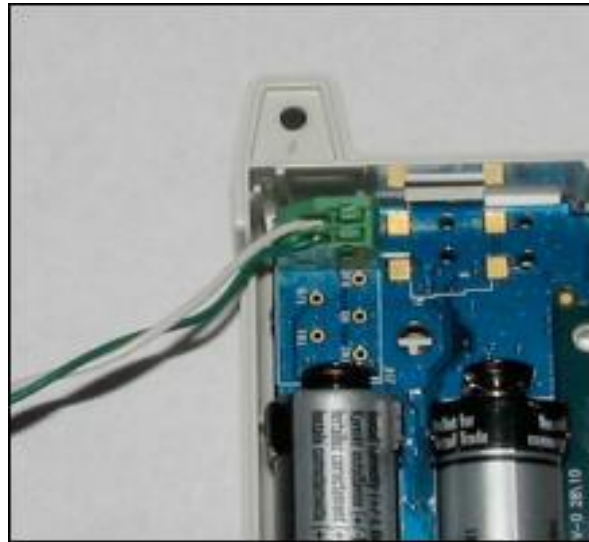
- Slow flash: The unit is listening for a DCAP and/or a WAM network
- Rapid Flash: The unit has heard a DCAP and/or a WAM network beacon and is in process of joining the system.
- Solid Flash: The unit has confirmation that it has successfully joined the WAM network.

LED Flash indication States when button is momentarily pressed:

- Single Flash: The unit is in a light sleep mode. It will wake up every 10 minutes to listen for a WAM network. This mode can prematurely drain the batteries if no WAM network is nearby.
- Double Flash: The unit is OFF
- Long on: The unit is part of a WAM network. Stays on for about 10 seconds.

MDT to Meter wiring

Wiring an MDT to a pulse output meter is quite simple. From the factory the MDT's can optionally come pre-wired with about 24 inches of pre-stripped wire. If a longer length is



required, it is easy to switch wires. Polarity of the wires does not matter since the MDT simply detects the open/close nature of the isolated pulse output switch from the utility meter.

To add or switch pulse input wires:

- Unscrew single screw to open the case
- Locate the green connector shown in the image above. Push down on the little button with a flat blade screw driver to release the old wire.
- Repeat to insert a new 3/8 inch stripped wire into the opening. Up to a 22 gauge wire, stranded or un-stranded, can be used. It is convenient to angle the wire about 30 degrees from vertical when inserting them into the connector.
- Release the button to secure the wire.
- Route the wire pair through the hole in the enclosure. Wrapping the wire around one battery can provide some strain relief. Allow for an extra five inches in wire length if doing this.
- Close the case and secure with the screw.

Device Placement

Warning: All radio devices should be placed at least 8 inches (20 cm) away from people in order to minimize RF exposure.

With the DCAP Unit powered up and the CIT tool running, the repeater backbone can be placed. Start with units closer to the DCAP/AP, and use the LED feedback indication to verify the range is acceptable. At first just the minimum numbers of repeaters can be placed, with additional repeaters added to fill in holes after MDT placement.

Once the initial Repeater placement is complete, the MDT placement phase begins. Again the LED feedback can be used to verify that MDTs are communicating with the network. Additional repeaters can be placed in areas with minimal coverage. The CIT software can also be used in the placement phase to provide more detailed information such as Link Quality and Signal Strength reading generated by MDT and Repeaters. In particularly dense sites such as in modern Hospitals, a Sniffer unit may be used to monitor local radio traffic. A Sniffer is just a receiving unit that displays any received message on a Laptop over a USB cable.

Guidelines

MDTs can be mounted in a number of ways by utilizing velcro strips, tie-wraps, or screws. Units may be mounted to the wall or other *NON METAL* flat surfaces with screws or velcro, and strapped to pipes or posts by placing tie-wraps through the two slots on the flanged case.

Units should not be placed directly on the metal surface. Mounting on a metal surface will significantly affect the radio performance of the device.

Notes

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