

# Verifying **Communication** Between a **MultiHop** Radio and DXM Controller



## Technical Note

### Initial Steps and Equipment Needed

Follow these steps to monitor the communications connection between a DXM Controller acting as a master radio and the MultiHop slave radios in a wireless network.

Required equipment includes:

- Wireless DXM Controller master with a MultiHop radio module
- Wireless DXM Controller slaves and/or MultiHop slave radios
- Windows-based PC running the DXM Configuration Tool v3 (downloaded from the Banner website)

To confirm the radio communications connection between the master and slave radios, define Read Rules and Action Rules. Use two local registers to monitor each MultiHop radio. Use an optional third register to monitor how long the slave radio was not communicating with the master radio.



Note: This procedure works with the current firmware and DXM Configuration Tool as well as with version 1.0 firmware and the DXM Configuration Tool V2.

1. Connect to the DXM Controller with the MultiHop master radio using serial or TCP/IP.
2. Define the Read Rule.
3. Define the Threshold/Action Rule.
4. Repeat these steps for each MultiHop slave radio you'd like to monitor.

### Define the Local Registers

Define the local registers used to verify the connection between a DXM Controller with the MultiHop master radio and a MultiHop slave radio.

1. Go to the Local Registers > Local Register **Configuration** screen.
2. Define a register to hold a data point. For this example, we will define a Tank Level monitoring data point.

The screenshot shows the configuration screen for register 23, titled 'Tank Water Level'. The units are set to 'Inches'. The 'Display Information' section includes: Units (Custom), Inches; Sign Type (unsigned); Scaling (Divide); Scale value (10.000), Scale offset (0.0000); a checkbox for 'Apply offset before scale value' (unchecked); and LCD permissions (Read). The 'Constant Value and Timer' section is set to 'None'. The 'Logging and Protocol Conversion' section has SD card logging (None) and Protocol conversion (None). The 'Cloud Settings' section has Cloud reporting (On) and Cloud permissions (Read). The 'Host Timeout Parameters' section is set to 0 seconds. The 'Register Group' section has a group name of 'Water Level'.

3. Define a register to be used as an alarm notification register when the MultiHop master radio cannot communicate with the MultiHop slave radios.

The screenshot shows the configuration screen for register 25, titled 'Tank Water Level RF Conn Alarm'. The units are set to 'on/off'. The 'Display Information' section includes: Units (on/off); Sign Type (unsigned); Scaling (None); and LCD permissions (Read). The 'Constant Value and Timer' section is set to 'None'. The 'Logging and Protocol Conversion' section has SD card logging (None) and Protocol conversion (None). The 'Cloud Settings' section has Cloud reporting (On) and Cloud permissions (Read). The 'Host Timeout Parameters' section is set to 0 seconds. The 'Register Group' section has a group name of 'RF Connection Alarms'.

- Define a register to be used to track how long the MultiHop slave radio was not communicating with the master radio.

## Create a Read Rule

Create a Read Rule to define how often to read the sensor register and what to do if the communication attempt fails.

- Go to the Register Mapping > Read Rules screen.
- Click Add New Rule to create a Read Rule.
- Name the Read Rule and define from which slave ID this register is being read, how many registers are being read, and the starting register.  
For the Tank Level example, we are reading one register (register 7) from slave ID 22.
- Define how often to read this register (Frequency).
- Define what value should be written to the register (Apply value) after the number of failed read attempts (read failures).

Select an alarm value that makes sense for the potential values of the application, but won't adversely affect graphing or charting the data point for analysis. For this example, we will use an alarm value of 25, because the likely values for this application will range from 0 to 20. The alarm value of 25 will be written to local register 23 after five read failures.

## Create a Threshold Rule

Create an action rule to define the behavior of the system when the communication fails.

- Go to the **Action** Rules > Thresholds screen.
- Click Add Threshold Rule.

- Define a Threshold Rule so that when the local register Failure to Read value equals the error value (25 for the tank level register), a value of 1 is entered into the Communication Alarm register.

**Water Lvl Radio RF Alarm** When register 23 (Tank Water Level) equals 25 set register 25 (Tank Water Level RF Conn Alarm) to 1

**Definition**

When local register 23 Tank Water Level = Value 25

When TRUE, set local register 25 Tank Water Level RF Conn Alarm to Value 1

When register 23 (Tank Water Level) not equal to 25

Set register 25 (Tank Water Level RF Conn Alarm) to Value 0

**Hysteresis**

Hysteresis value 0

Minimum on time (hh:mm:ss) 00:00:00

Minimum off time (hh:mm:ss) 00:00:00

**On Time**

Record the number of minutes that the rule has been true to register 26 Water Tank RF Conn Alarm Time

**Logging Options**

Save threshold events to cloud

Save threshold events to event log

Push when active

After trigger, set source to 0

**E-mail/SMS on State Transition**

SMS		E-Mail	
Recipient	Send	Recipient	Send
SMS Recipient 1	<input checked="" type="checkbox"/>	E-mail Recipient 1	<input checked="" type="checkbox"/>
SMS Recipient 2	<input type="checkbox"/>	E-mail Recipient 2	<input type="checkbox"/>
SMS Recipient 3	<input type="checkbox"/>	E-mail Recipient 3	<input type="checkbox"/>
SMS Recipient 4	<input type="checkbox"/>	E-mail Recipient 4	<input type="checkbox"/>
SMS Recipient 5	<input type="checkbox"/>	E-mail Recipient 5	<input type="checkbox"/>
SMS Recipient 6	<input type="checkbox"/>	E-mail Recipient 6	<input type="checkbox"/>
SMS Recipient 7	<input type="checkbox"/>	E-mail Recipient 7	<input type="checkbox"/>
SMS Recipient 8	<input type="checkbox"/>	E-mail Recipient 8	<input type="checkbox"/>
SMS Recipient 9	<input type="checkbox"/>	E-mail Recipient 9	<input type="checkbox"/>
SMS Recipient 10	<input type="checkbox"/>	E-mail Recipient 10	<input type="checkbox"/>

For the tank level example, when this register's value equals 1, local register 26 tracks how long this remote MultiHop slave radio was not able to be reached. The alarm is sent to the web server service, and the event is logged in the Events Log on the DXM. A message is sent to one SMS recipient and one email recipient, although you can configure it to send more messages if necessary.