Tough sensors for an insensitive planet
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McQ Connect® User's Manual

Version 1.3

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Document History

Version	Author	Description	McQ Approval	Date
1.3	R.Fish	• Added Aviation antenna information	M Rohrer	02 May 2022
1.2	D Fish	• Changed the status of McQ Connect® from TM to ® • Updated temperature for power measurement • Updated Figure 1: McQ Connect® Kit • Added picture of sealed Ethernet cable • Added pin information, Table 2 • Added part numbers to Figure 7 and Figure 9 • Added antenna guidance • Added Section 4.8.4 Port Forward	N Husson	14 Jan 2022
1.1	D Fish	• Relabeled Figure 7 and Figure 12. • Updated 4.1.	N Husson	20 Sept 2021
1.0	D Fish	• Initial version	N Husson	07 Sept 2021

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SECTION 1 FCC Information to the User

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.

The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

CAUTION: <<< In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. >>>>

SECTION 2 Introduction to the McQ Connect®

The McQ Connect® is a satellite terminal that provides global Internet and telephone access using the Iridium Satellite constellation in a small form factor, rugged device. The McQ Connect® is simple to setup and operate and provides connectivity for all IP type data transfers.

Minimum Input Voltage (DC)	9.0 V
Maximum Input Voltage (DC)	17.0 V
Average Input current @12V DC (at 23C)	300 milliamps
Maximum Input current @12V DC	2 Amps

Table 1: McQ Connect® Power Requirements

The McQ Connect® requires an Iridium Certus SIM card and service to operate. Iridium Certus service is available through authorized service providers that McQ can provide if needed.

There are 3 external connectors on the McQ Connect®. The connector part numbers are listed in Table 2, below.

Power Connector	Switchcraft 7282-4PG-300
Pin #	**Use**
1	VPower (9-17 VDC)
2	GND
3	Pwr Control
4	N/C

Table 2: McQ Connect® External Connections

2.1 McQ Connect® Parts

Figure 1: McQ Connect® Kit

Figure 2: McQ Connect® Top View

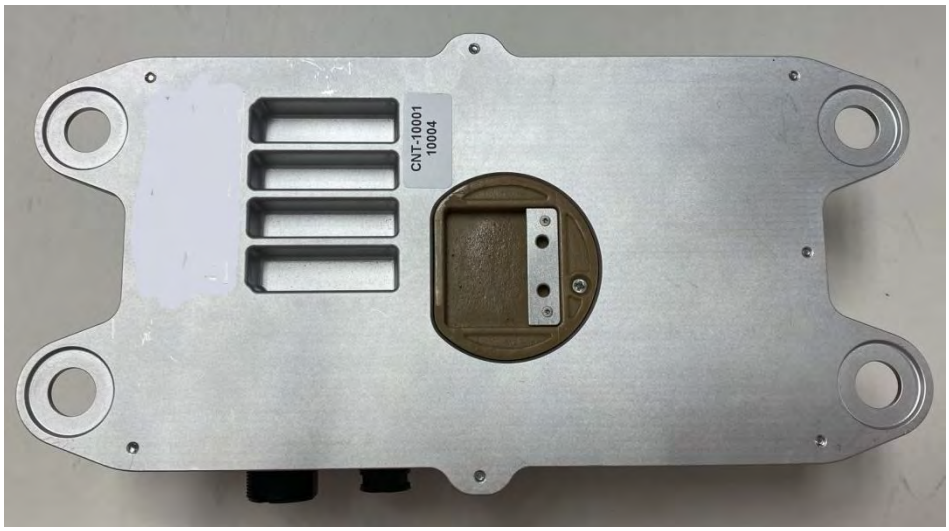

Figure 3: McQ Connect® Back Showing Access Panel

Figure 4: McQ Connect® Back: SIM Card Access

Figure 5: McQ Connect® Antenna: Maxtena M1621HCT-HP

Figure 6 McQ Connect® Antenna: S67-1575-414

Figure 7: McQ Connect® AC-1951.11-3 Power Cable

Figure 8: Ft RG 142 TNC Male Angle to SMA Male RF Coaxial Cable

Figure 9: AC-2131.6-6 Sealed Ethernet Cable

SECTION 3 McQ Connect® Communications

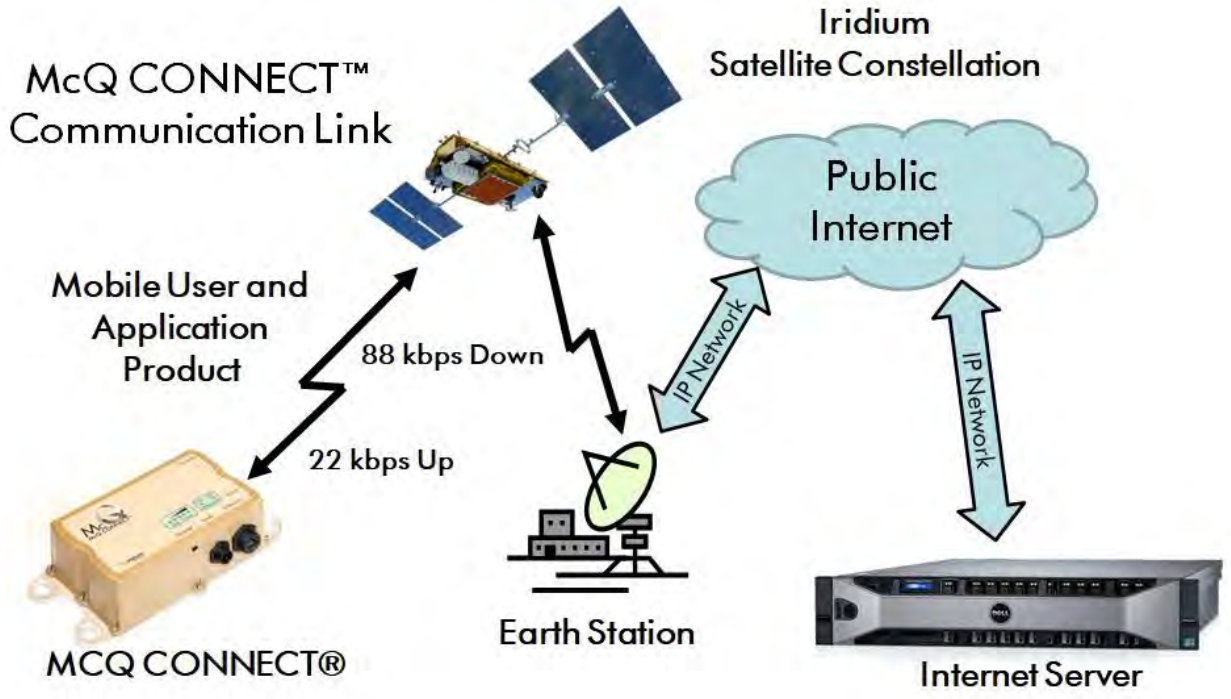

Figure 10: McQ Connect® Communications

The McQ Connect® is used to connect a user device or devices to the internet via the Iridium satellite network. The McQ Connect® supports a standard Ethernet connection using a provided waterproof cable and operates as an Ethernet bridge to the Internet supporting most IP and ICMP protocols. See Figure 10.

McQ Connect® is configured by default to act as a DHCP server by default automatically assigning connected device an IP address and gateway. The default address is 172.16.1.1, which is configurable. The unit also provides a permanent backup address of 172.16.150.1 that is always available. The Connect is configured via a webpage found at the default IP address. See Section 4.5 for information about configuring the McQ Connect®. The default webpage login credentials are:

User name: admin
Password: mcqAdmin

The McQ Connect® can provide telephone services, using the device webpage for call control. A standard headset is included with the kit and is used for all audio for phone calls.

SECTION 4 Set Up and Configuration

The McQ Connect® is configured via a webpage that is accessible as long as the Connect remains powered.

4.1 Maxtena M1621HCT-HP Antenna Mounting Procedure

NOTE: Ensure that the antenna is positioned so that it has a clear view of the sky and is not near any metal objects.

1. Determine a suitable location for the antenna. The Iridium Certus antenna is designed to be ground-plane independent. It is certified for use one meter above the ground plane and should be mounted at this height. The location must provide the antenna with an unimpeded view of the sky from horizon to horizon. Ensure that the antenna location is within cable's length of the McQ Connect®. The total cable loss between the McQ Connect® and the Maxtena HP antenna should not exceed 1.5dB.
2. Obtain mounting hardware suitable for securing the antenna in the desired location. The mounting hardware should ensure that the antenna is secure and does not move as environmental conditions change.
3. Install the antenna using the mounting hardware.

NOTE: For best results install the antenna in a location that allows a clear view of the sky in all directions and position it away from metal objects.

4.2 Sensor Systems S67-1575-414 Antenna Mounting Procedure

The Sensor Systems Inc. S67-1575-414 (Figure 6) has been granted a TSO for use in aircraft applications. To conform with FAA regulations, the mounting instructions and guidelines provided in FAA AC 43.13-2B chapter 3 must be followed.

The S67-1575-414 Certus antenna is designed to be ground-plane independent and can be used mounted to a metallic airframe or used in open air. The antenna itself provides the necessary ground plane for correct operation.

1. Determine a suitable location for the antenna.
    a. The mounting location must provide the antenna with an unimpeded view of the sky from horizon to horizon.
    b. Ensure that the antenna location is within cable's length of the McQ Connect®. The total cable loss between the McQ Connect® and the S67-1575-414 antenna should not exceed 0.6dB.

2. Obtain mounting hardware suitable for securing the antenna in the desired location. The mounting hardware should ensure that the antenna is secure and does not move as environmental conditions change.

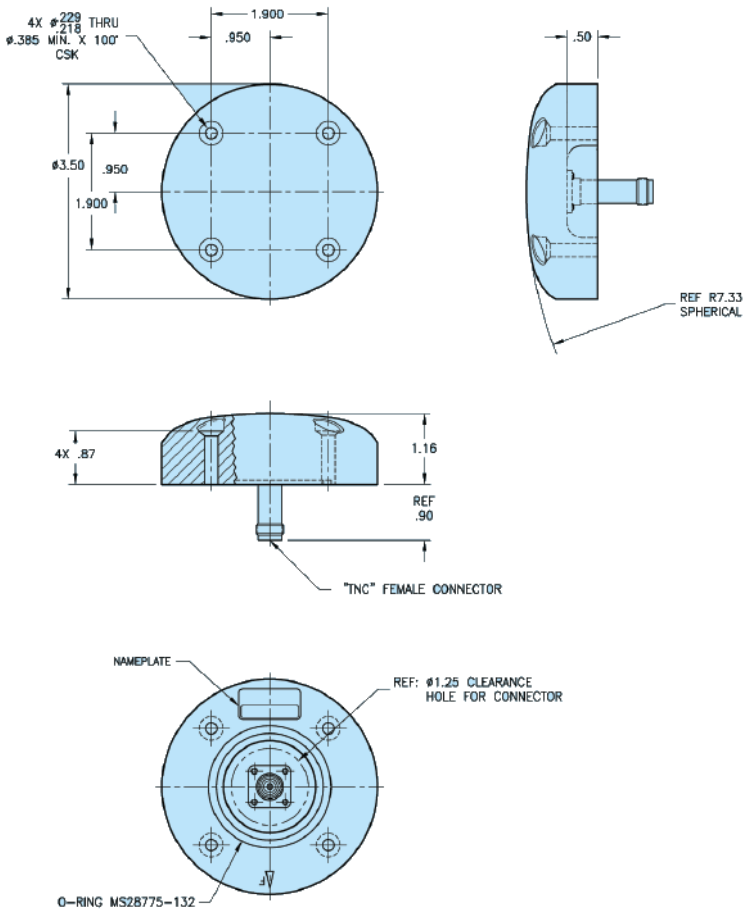

Figure 11 - S67-1575-414 Mount points

4.3 Set Up

Follow the steps below to configure the McQ Connect®.

1. If this is the first time the Connect is used, install the SIM card. See Section 6 for information.
2. Use the provided male right angle TNC to SMA male RF Coaxial Cable to connect the McQ Connect® antenna to the connector labeled **Antenna**.
3. Ensure that the McQ Connect® antenna has a clear view of the sky in all directions.

4. If making a telephone call, connect the headset to the Headset jack on the side of the unit. Ensure that the head set jack is firmly seated in the connector. The webpage is used to manage telephone calls (see Section 4.9)

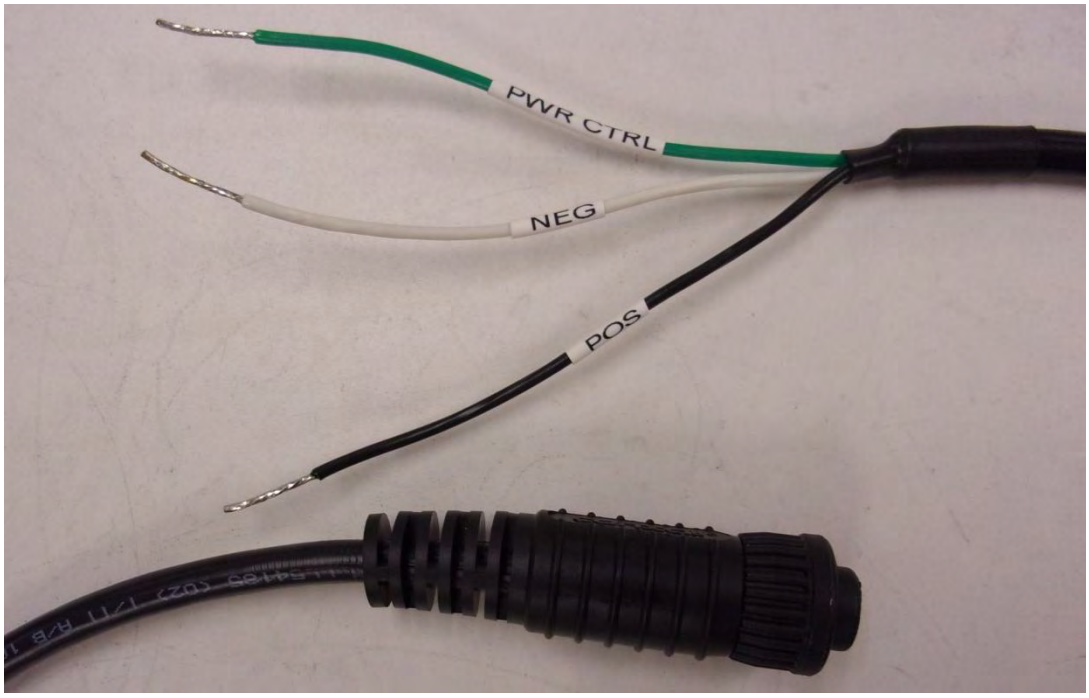

Figure 12: McQ Connect® Power Cable Connectors

5. Connect the McQ Connect® to a 12VDC power source using the power cable provided (Figure 12). The black pigtail end is +voltage and the white end is ground.
    a. A power control 'PWR CTRL' wire is also included with the provided power cable. The power control wire can be used to power and unpower the Connect automatically in place of the power button.
        i. If not used the PWR CTRL line should be left unconnected.
        ii. If used to power the unit, the PWR CTRL line should be driven to the same voltage as the +POS input (VCC) of the McQ Connect®. The PWR CTRL line has the same input voltage limitations as the McQ Connect® (see power input requirements above).
        iii. If the unit was powered using the PWR CTRL line, disconnecting it will gracefully shut down the McQ Connect® after about an 8 second delay.
6. Use the Ethernet cable provided to connect the McQ Connect® to a laptop or other Ethernet enabled device.
7. Once all necessary connections are made to the unit, the device can be powered on by pressing the Power button. The Power button will illuminate red if the unit successfully powers up. The McQ Connect® typically requires about 30 seconds from power on to

operation. Using the factory default configuration, the McQ Connect® will hand out IP addresses in the range of 172.16.1.100 to 172.12.1.200 for any Ethernet connected devices. The built in DHCP server will also correctly configure the netmask and gateway necessary to use the Connect as an Internet gateway.

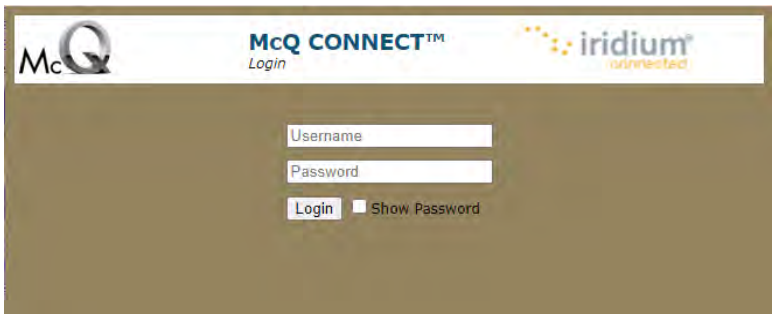

Figure 13: McQ Connect® Log In Page

8. On the laptop or Ethernet enabled device use a browser to navigate to the McQ Connect® webpage. The default address is 172.16.1.1.
9. Enter the following (default) credentials in the Login fields (Figure 13):
    a. User Name: admin
    b. Password: mcqAdmin
10. Configure the McQ Connect®. See Section 4.5 for configuration instructions.

To gracefully power down the unit, hold the power button in for approximately 5 seconds or until the power button LED begins to flash. The unit will then do a shutdown, disconnecting from the Iridium network and then powering off all the unit electronics.

It is recommended that you familiarize yourself with the information in the following sections before attempting to configure the McQ Connect®.

4.4 McQ Connect® Operations

The McQ Connect® has several indicators on the unit to display operational status. See Figure 14.

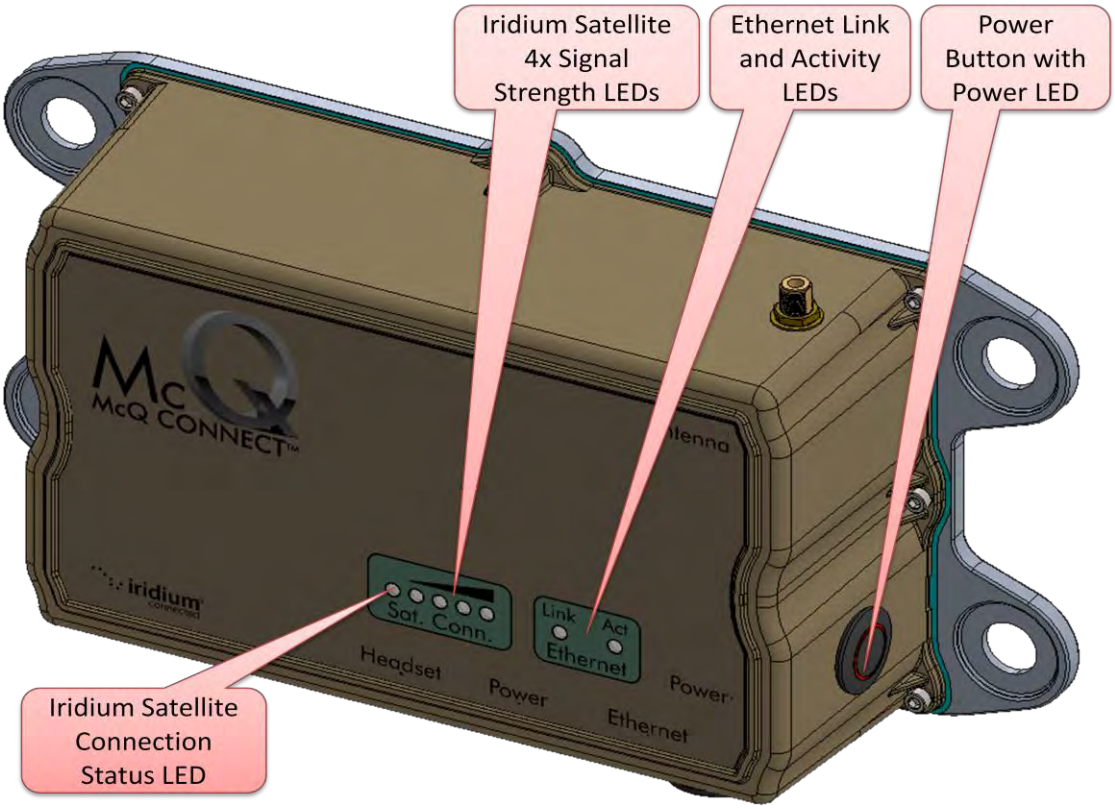

Figure 14: McQ Connect® Indicators

The Iridium Satellite Connection Status LED indicates the status of a data connection over the Iridium satellite link. If illuminated (green), a data session is available to transfer all IP data.

The Iridium Satellite LEDs provide a visual indication of the quality of the connection to the Iridium Constellation in a range of 0 (no illuminated LEDS) to 4 (all illuminated red), with 4 bars indicating the best connection quality.

The Ethernet Activity LEDS provide an indication of activity on the Connect Ethernet Port. The Link LED (green) indicates the presence of a good Ethernet connection. The Act LED (yellow) flashes when data transfer is taking place.

4.5 McQ Connect® Webpage Configuration Screens

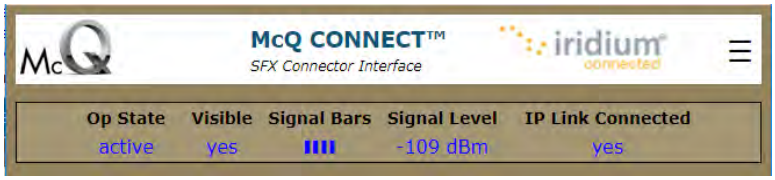

Figure 15: McQ Connect® Status Bar

The Status Bar is found near the top of the webpage screen. The status bar updates once per second, and it displays the following data about the Connect's current state:

4.5.1 Op State

The operational state of the McQ Connect®

- Active: This is the normal state for the McQ Connect® and indicates the device and satellite transceiver are operating normally.
- Inactive: the Connect is in this state when the modem is not yet registered, the SIM card is invalid or there is no SIM card present.
- Firmware upload: the Connect enters this state when modem firmware upload begins. A modem-firmware update is only initiated by a user from the device webpage (see updating modem firmware below)
- Fault: A fault state indicates in internal issue with either the satellite transceiver or the Connect device. The built in software will attempt to recover from any fault state detected, so this state will not be visible for long (or ever).

4.5.2 Visible

- Yes/No
- Indicates whether or not the Connect can see the Iridium satellite constellation.
- Lack of visibility must be corrected in order for the Connect to function. Lack of visibility is an indication of an antenna issue, either an antenna cable problem or lack of a clear view of the sky. If a lack of visibility is indicated by the Connect; power off the unit, ensure all antenna and cable connections are correct and tight, and ensure the antenna has a clear view of the sky and is not blocked by terrain or other solid objects (buildings, vehicles, etc.)

4.5.3 Signal Bars

- Indicates the quality of the Connect's view of the Iridium satellites
- Ranges from 0 to 5 bars with 5 being the best and 0 indicating that the Connect is not interacting with the satellite. Signal bars can vary greatly from second to second.

4.5.4 Signal Level

- Received signal strength from the currently visible satellite.
- Reported in negative values of dBm
- Values closer to positive represent higher strengths, e.g. -102 dBm represents higher signal strength than -118 dBm.
- Typical ranges are from -122dBm to -99dBm. RSSI values can vary greatly from second to second.

4.5.5 IP Link connected

- Yes/No
- Indicates whether the Ethernet enabled device has a valid data connection to the Internet.
- There are numerous reasons that this connection might not be present, e.g. the SIM card must support the type of data that is being transferred. In this case, signal level and bars would indicate favorable conditions, but no connection would be present.

4.6 McQ Connect® Tab

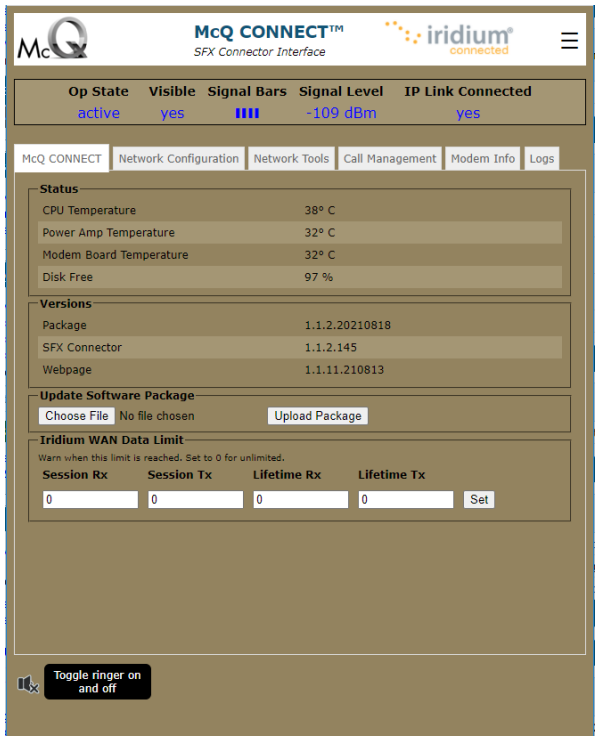

Figure 16: McQ Connect® Tab

4.6.1 Status

This pane provides information about internal temperatures of the McQ Connect® and available disk space on the unit. The CPU temperature is current operating temperature of the Connects processor. The Power Amp Temperature and Modem Board Temperature are the current operating temperature of the internal satellite transceiver.

4.6.2 Versions

This pane contains information about the software components that make up the McQ Connect® unit.

4.6.3 Update Software Package

McQ provides updates to customers as needed. Use these buttons to upload update files provided by McQ.

- Click the Choose File button.
- Navigate to the desired update file and click Open to select it.
- Click the Upload Package button to load the new software.

4.6.4 Iridium WAN Data Limit

- Provide the ability to set an alert to notify you when you reach an assigned data limit over the satellite link. The alert will be displayed on the webpage, but the webpage and the Connect will continue to function. Data is entered as Bytes
- Session Rx/Session Tx: These limits track data usage per session. A session is the time between power cycles with Rx being data received over the satellite connection and Tx as data transmitted.
- Lifetime Rx/Lifetime Tx: These limits track data until reset by clicking the reset button. These totals persist over power cycling.

4.7 Network Configuration Tab

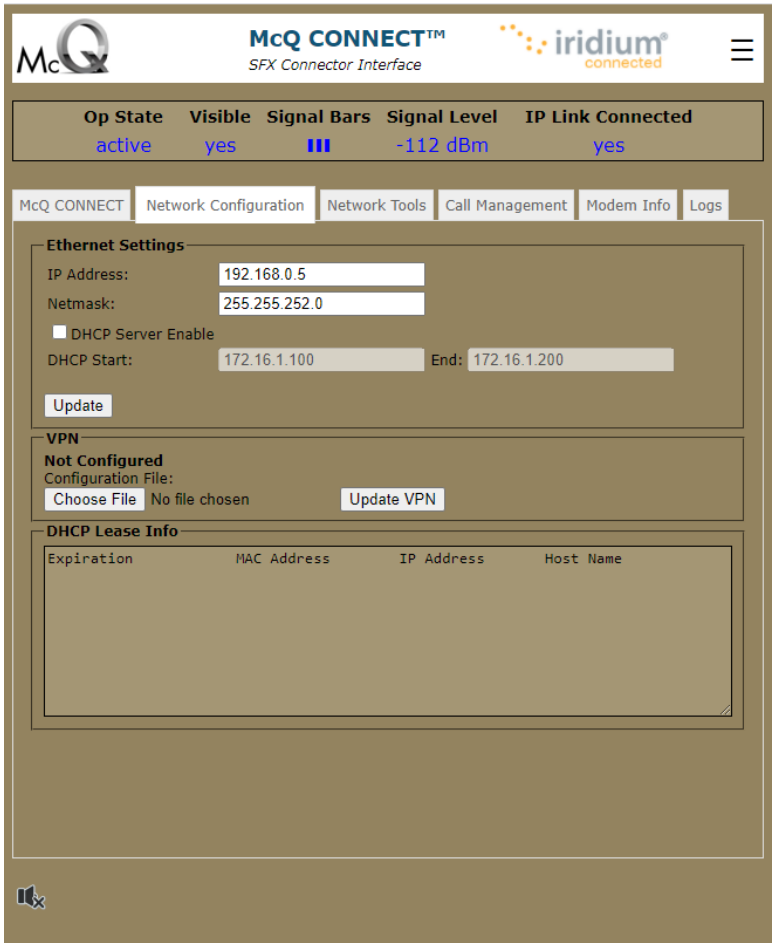

Figure 17: McQ Connect® Webpage Network Configuration Tab

4.7.1 Ethernet Settings

- IP address and Netmask: the IP address and net mask of the Connect.
- These will be the default values unless they have been changed by the user.

4.7.2 DHCP

- This checkbox turns on or off the DHCP server in the Connect.
- If using DHCP fill in Start and End values to define the range of IP addresses for the DHCP server to hand out. The entered ranges must be consistent with the Connect's IP address and net mask.
- The Connect hands out leases that are identified as a metered link so that operating systems can decide whether to use that connection for purposed likes updates or similar.

4.7.3 VPN

- This is a future enhancement.
- The Connect can communicate with the server via an OpenVPN connection.
- Click the Choose File button.
- Navigate to the desired update file and click Open to select it.
- Click the Update VPN button to load the new software.

4.7.4 DHCP Lease Info

If the Connect's DHCP server is enabled, this list will be populated with information about the leases it has handed out.

4.8 Network Tools Tab

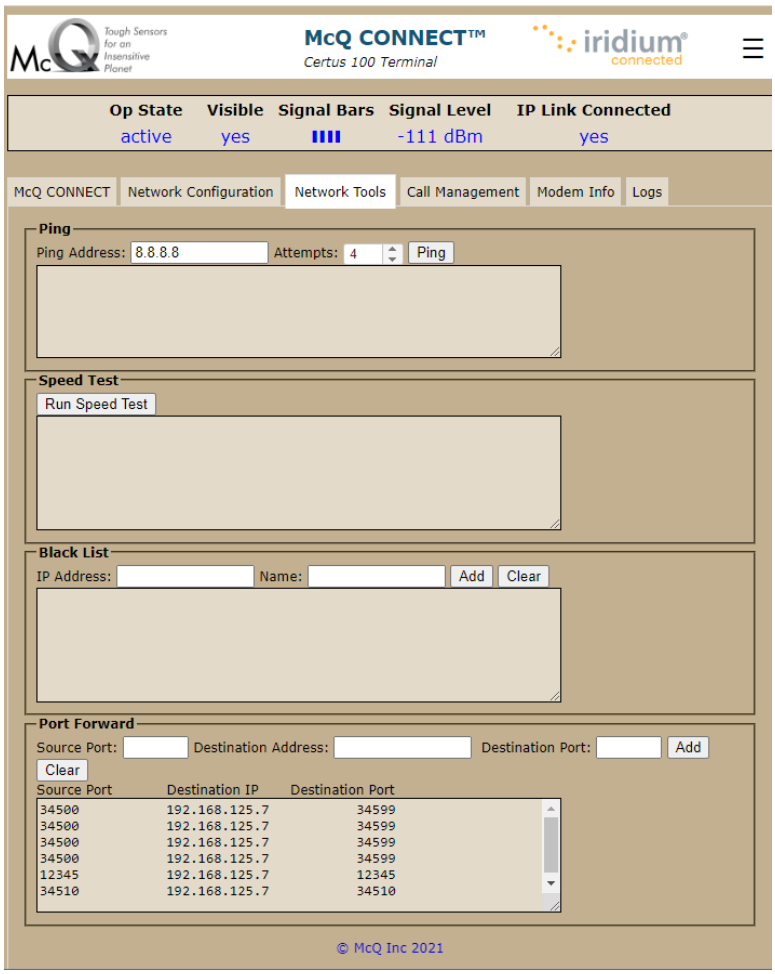

Figure 18: McQ Connect® Network Tools Tab

4.8.1 Ping

- Allows you to Ping a local or remote internet address and display the results using the standard ping tool.
- To use, enter the address or FQDN that you wish to ping and the number of attempts and click the Ping button. Results will be displayed in the box directly below the controls.
- Note: The use of ping accrues air time charges.

4.8.2 Speed Test

- Runs a speed test using a built in speed test tool and provides results

- To run a speed test, simply click the **Run Speed Test** button. The built in speed test tool will attempt to identify the 'best' server to communicate with and then upload and download data to that server. Results of the speed test (bytes per second) are shown in the box directly below the button. Depending on the quality of your satellite view, the speed test can take 30 seconds or more to complete.
- Speed Tests result in air time charges.

4.8.3 Black List

- Allows you to block destinations on the Internet by domain name or IP address.
- This can be helpful in preventing air time charges for things like auto updates.
- The Connect must be power cycled after the addition of black list IP addresses.

4.8.4 Port Forward

The Iridium system provides for isolation of networks from the Public Internet to the internal network used for the transfer IP data over the Certus system to connected units. This isolation prevents inbound connections from the Internet to Certus connected systems. Your Irdium Certus service can provide the ability to enable inbound connections, allowing connectivity from your applications on the Internet to a McQ Connect unit. The Certus provider can establish a static public IP address that can route to your McQ Connect unit, as well as rules for inbound connections. Contact your Iridium service provider for details.

The McQ Connect also provides firewall capabilities, preventing connections from the public Internet (via the Iridium system) to reach the private Ethernet network maintained by the Connect unit. Once an inbound connection is configured and available from your service provider, it is necessary to also provide port forwarding rules on the Connect unit itself. A port forward rule allows a connection from the public internet, through the McQ Connect® unit to the local Ethernet network. The McQ Connect provides the ability to add multiple port forward rules under the Network Tools tab. Port forwarding is only required for connections that are initiated from the public internet to the McQ Connect network. Data connections from the McQ Connect® network to the public internet do not require any rules; all outbound ports are open.

To add a port forward rule:

1. Input the source port (the public port the external application wants to connect to (e.g. 80 for http, 443 for https).
2. Add the local destination address of the computer or device on the McQ Connect® local network along with the IP port that is listening
3. Press the Add button.

Port Forwarding rules on the McQ Connect®, once added to the unit, forward both IP and UDP traffic.

4.9 Call Management Tab

Figure 19: McQ Connect® Call Management Tab

- Allows you to make and answer voice calls over the Iridium satellite to any standard phone call calls from the McQ Connect®.
- Requires that the headset be plugged into the Connect.
- Requires a SIM card that supports voice calls.
- Type in the number and click Dial.

Note: Since the McQ Connect can operate globally country code prefixes are required to complete a call.

- The Connect will initiate the call and indicate 'Dialing'
- When a call is in process and the remote phone is ringing the Connect will indicate 'remote_ringing'
- When the remote telephone is answered the Connect webpage will indicate 'connected'. Once connected the head set is used for all voice communications.
- The volume control on at the top of the dial pad on the webpage can be used to manage in call volume.

  - To disconnect the call, press the Hang Up button on the webpage.
- You can also call the Connect. When the Connect detects an incoming call, the webpage sounds a ring tone to alert you. If the Connect is able to obtain the phone number of the caller, it will be displayed on the webpage.
- Use the Answer Call button to answer incoming calls.
- The phone number of the Connect modem is the number assigned when the SIM card was purchased. It is also found on the Modem Info tab as MSISDN.

4.10 Modem Info Tab

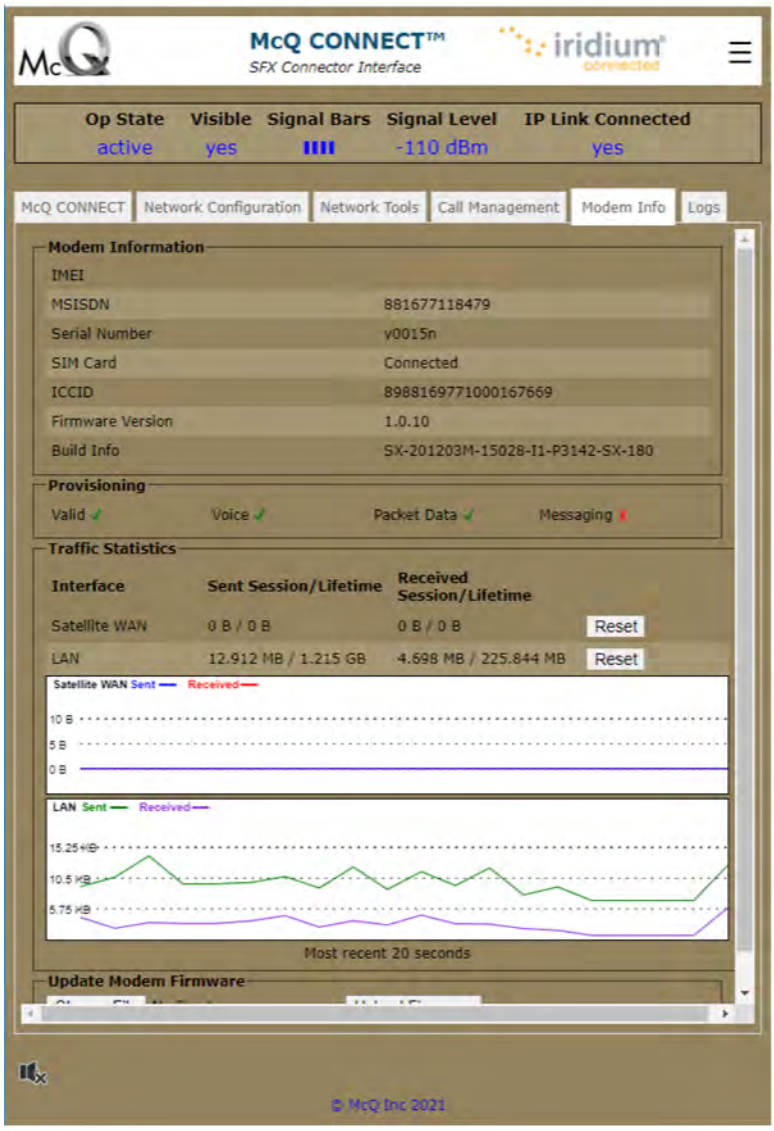

Figure 20: McQ Connect® Modem Info Tab

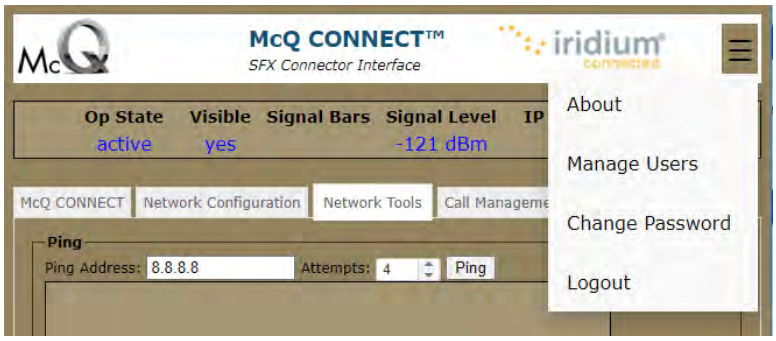

Figure 21: Modem Info Tab, bottom

4.10.1 Modem Information

- Auto fills from the modem in the Connect.
- Provides information about the internal satellite transceiver and information about the SIM card currently in the unit. To obtain any support from McQ or the service provider, please include all of this information

4.10.2 Provisioning

- These fields indicate the provisioning that the installed SIM card can allow based on the services you purchased and what the satellite service is currently allowing.
- When the Connect is first powered on, all the Provisioning field will contain red Xs while the modem registers and negotiates with the Iridium services.
- These fields do not auto refresh. Use the refresh button on your browser to update the Provisioning fields.
- As long as the webpage shows a red X in the Voice field, the Call Management tab will indicate that voice calling is unavailable.

Provisioning Fields:

- Valid: SIM card is valid
- Data: SIM card supports data
- Voice: SIM card supports voice calling
- Messaging: Future enhancement; not currently available

4.10.3 Traffic Statistics

- Displays the data traffic over both of the Connect's communications interfaces: satellite WAN (over Iridium satellite network) or LAN (Ethernet)
    - Sent Session/Lifetime: the total amount of data sent during the current session and over the lifetime of the connection

  - Received Session/Lifetime: the total amount of data received during the current session and over the lifetime of the connection.
- As with data limits, a session is defined by power cycling while lifetime totals accumulate until reset using the reset button.
- The graph at the bottom shows data usage as a real time plots as data is transferring.

4.10.4 Update Modem Firmware

- Over the lifetime of the McQ Connect, it may be necessary to update the firmware that operates the internal satellite transceiver. Only use firmware provided by McQ or your service provider to modify the unit.
- Allows you to update the Iridium modem firmware.
- Browse to the appropriate file then click the Upload Firmware button.
- The upload process can take three to five minutes. Do not cycle power on the Connect until the process is completely finished.

4.11 Logs Tab

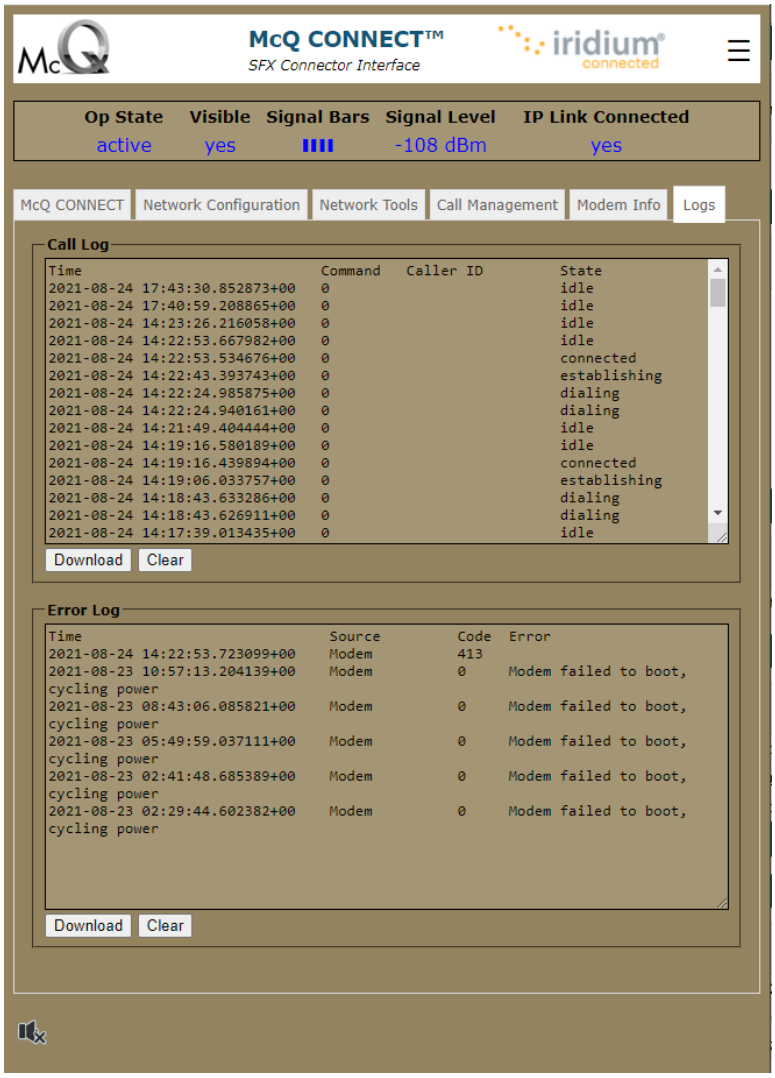

Figure 22: Logs Tab

The Logs tab (Figure 22) contains two data logs: a call log and an error log.

- You can download the logs to a location of our choice using the download button
- You can clear all data in the logs using the Clear button. Once cleared the data cannot be retrieved.

SECTION 5 Admin Menu

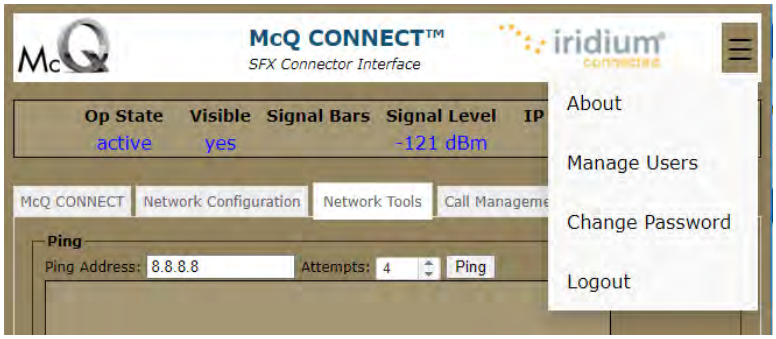

Figure 23: Admin Menu

The Admin Menu options are available only to users assigned administrative privileges.

Click on **Admin** at the top right of the webpage to access the **Admin Menu** (Figure 23.)

5.1 About

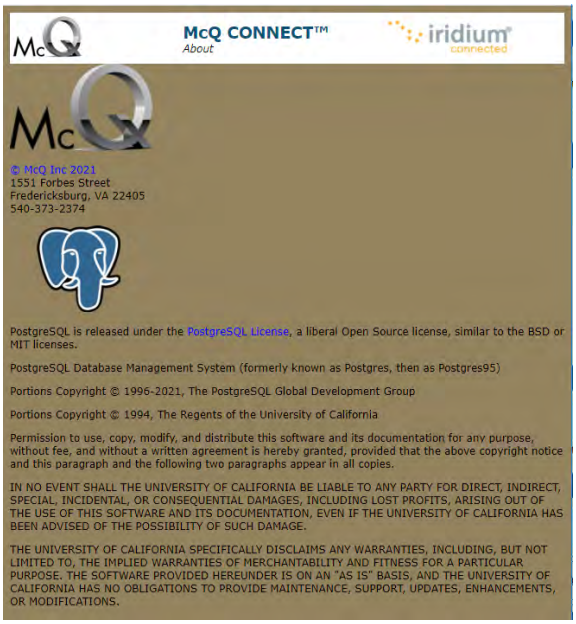

Figure 24: Admin Menu: About Screen

The About screen (Figure 24) contains copyright information, liability and warranty information.

5.2 Manage Users

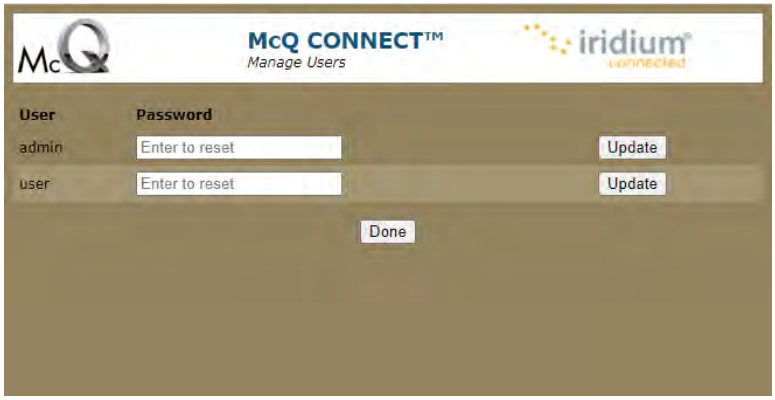

Figure 25: Admin Menu: Manage Users Screen

The Manage Users screen (Figure 25) displays a list of users authorized for the McQ Connect® device.

- Change the administrator password by typing a new password in the field next to the admin user. Click the Update button to change the password.
- Reset a user's password by typing a new password in the field next to the user's name. Click the Update button to change the password. Click Done to exit the Manage Users screen.

5.3 Change Password

Figure 26: Admin Menu: Change Password Screen

Allows you to reset your admin password for this McQ Connect® device.

SECTION 6 Installing the SIM Card

1. To install the SIM card, remove the bottom access door by unscrewing the single Phillips screw. The screw is not captive; use caution to ensure that it is not lost.

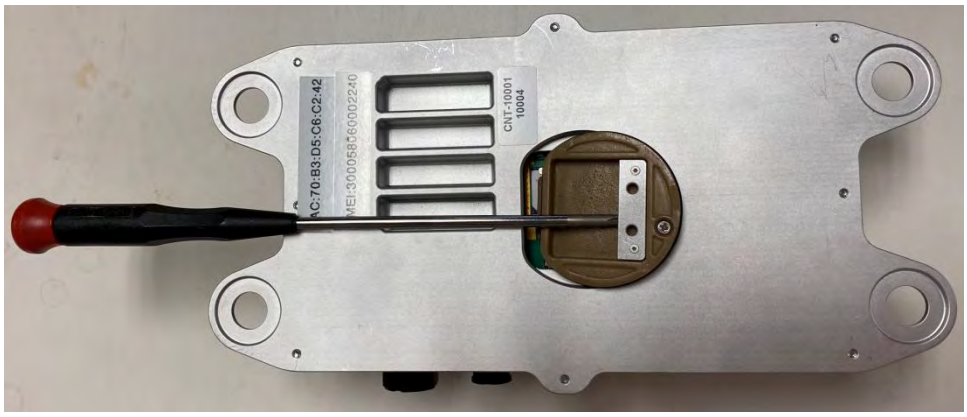

Figure 27: Lifting the Access Door

2. Insert a screwdriver under the silver metal plate on the access door and lift upward. The edge of the access door opposite the screw is loosely attached, so the door will pivot upward (Figure 27.)

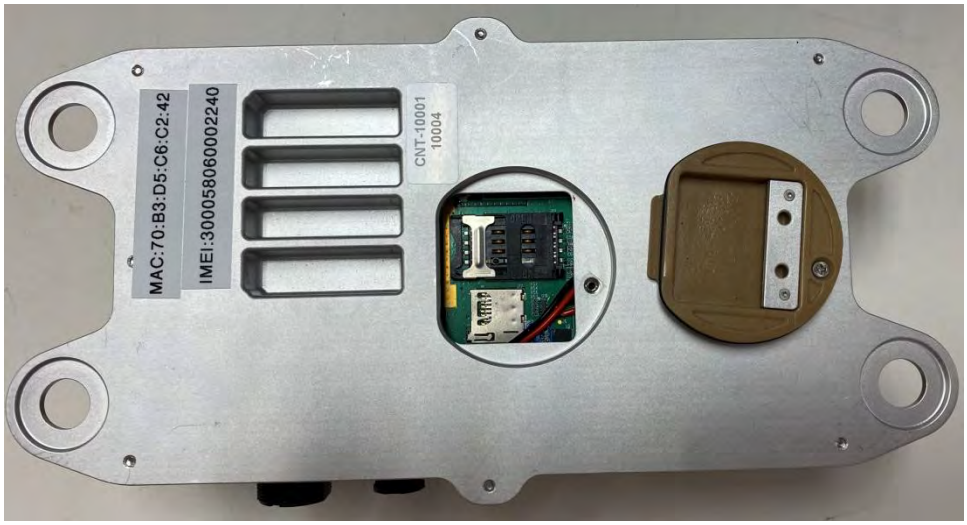

Figure 28: Access Door Removed

3. Remove the Access Door completely to expose the SIM card holder (Figure 28.)
4. To open the SIM card holder, slide the metal portion toward the screw hole. In Figure 28, this would be toward the right.
5. Gently lift the SIM card holder flap.
6. Insert the SIM card into the holder with the SIM card notch facing upward and the contacts facing to the left (Figure 29.)

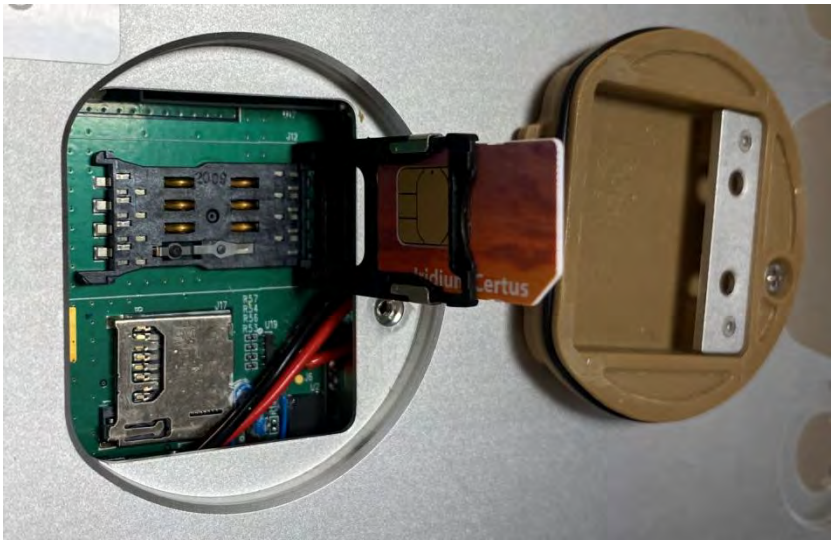

Figure 29: SIM Card Inserted in Holder

7. Gently close the SIM card holder and slide the metal portion away from the screw hole to lock the card in place.
8. Replace the access door by first the flat side into the unit at the pivot point and then pressing the access door down.
9. Replace the screw.

SECTION 7 Technical Support

The purpose of this manual is to provide an overview of the McQ Connect®. McQ Inc. provides training on setting up and maintaining communications for specific installations. Call McQ Inc. at (866-373-2374), or email info@mcqinc.com for more information.

APPENDIX A McQ Limited Product Warranty

McQ provides a variety of sensor system components to meet customer requirements. Any unit of the system which proves to be defective in material or workmanship within one year of delivery will be repaired or replaced at no charge. Failure due to unauthorized modifications, accidental damage or abuse is not covered by the provisions of this limited warranty. McQ shall not be responsible for damage to property or injury to person(s) based on a failure of or defect in the product, or use of the product for purposes other than those intended by McQ. After the initial one year warranty period, McQ will negotiate, on an annual basis, a fixed repair/replacement charge for each failed unit and maintenance service charges to support customer requirements. McQ recommends a customer spare unit inventory out of which failed units are replaced to restore system operations. The failed units can then be returned to McQ for repair or replacement. This approach eliminates the customer's cost of establishing a maintenance training program, a maintenance personnel pipeline, and acquiring and maintaining unique test equipment needed to repair the system.

This McQ product is part of an integrated family of system components designed to provide end to end capabilities for our customers. These include activity detection, communication of the information to the user, display of the information to the user, storage of the information for replay and use of the data for system trouble shooting. McQ system training and support is based on the authorized system units provided by McQ to the customer. Use of components or devices not authorized by McQ will void the warranty provisions. When components that are not part of the McQ product line are used they must be independently tested by McQ and receive a McQ "Usage Authorization" to retain the warranty provisions. Contact McQ to obtain a "Usage Authorization" agreement prior to the use of any non McQ components.