Provisioning and Testing on the
Verizon Wireless Network
for the Digi Connect & ConnectPort Cellular Family Gateways

1. Provisioning Quick Start

Detailed information is listed below. Full documentation is available on the included Digi CD and Digi's support site at www.digi.com/support.

1.1. Verify the ESN was submitted to Verizon and the account activated

1.2. Verify the firmware version of your Digi cellular gateway is current by comparing it to the firmware posted on *www.digi.com/support*.

1.3. Connect antenna(s) and power to the Digi.

1.4. Wait a moment and verify signal strength LEDs. (Minimum 2 LEDs suggested for reliable provisioning and operation)

1.5. It is not necessary to use the Setup Wizard on the CD. (The CD does contain user docs, manuals, etc.)

1.6. Connect a computer to the Digi via Ethernet (Digi Gateway family products require cross-over Ethernet or via hub/switch; ConnectPort WAN uses a standard Ethernet cable).

1.7. The computer should obtain an IP address automatically from the Digi (default DHCP address is 192.168.1.100). Or, manually assign an IP address such as 192.168.1.2

1.8. Point your web browser session to 192.168.1.1 (the Digi's default LAN IP address).

1.9. Observe the mobile Link LED on the front/top of the unit. If the LED is illuminated the device should have a mobile IP address; skip to 1.10;

    1.9.1. Select *Configuration > Mobile*

    1.9.2. Observe the Mobile Configuration screen. It will indicate whether or not the device has been provisioned. If it says the device has been provisioned, first try to enable the connection by clicking "Apply" at the bottom of the screen (see 1.9.3 below); if this fails to connect, try to re-provision.

        1.9.2.1. Select Verizon as the mobile provider

        1.9.2.2. Select *Mobile IP Preferred* for most installations. *Mobile IP Only* may be used if static IP address are required and supplied by the Verizon plan, but not obtained when the device connects.

        1.9.2.3. Follow the provisioning wizard. Click *Finish* when completed. The Mobile Configuration page will refresh.

- If provisioning *fails*, go back to 1.9.2.1 and try again. If provisioning still fails refer to the troubleshooting section below. Do NOT try to manually provision unless directed to do so by Digi and/or Verizon.

1.9.3. Click *Apply* on the mobile configuration screen when the Wizard completes. You MUST click Apply to initiate the connection.

1.9.4. After a couple of minutes, observe the Link LED next to the Primary Antenna connector. When lit this indicates an IP connection on the Verizon Wireless data network.

- If the link LED does not illuminate, refer to the Troubleshooting section below.

1.10. Refresh the computer's IP configuration with Verizon's DNS information. In Windows open a command prompt (i.e. "DOS Window") and enter "ipconfig /release" then "ipconfig /renew". To verify Verizon's IP address and DNS information refer to the Digi's *Administration > System Information > Mobile* page.

1.11. Continue testing by accessing the Internet to confirm operation (assuming the Verizon plan allows Internet access).

2. Detailed Configuration Information

IP Address and Pre-Configuration

Mobile IP Address: The mobile IP address is determined by Verizon Wireless. There is no configuration setting on the Digi to set the mobile IP address.

Ethernet Connectivity: Connect your computer or device to the Digi cellular gateway via one of these methods:

- Digi Connect family: Directly from the computer to the Gateway via an Ethernet crossover cable or via an Ethernet hub or switch using standard (i.e. straight-through) Ethernet cables.

- ConnectPort WAN with built-in 4-port Ethernet switch: Directly from the computer using a standard Ethernet cable.

Default Ethernet IP Address is 192.168.1.1. DHCP server is enabled.

DHCP Sever: The Digi gateway includes a DHCP server and can provide IP address configuration to devices and/or computers connected to the Digi gateway. DHCP server is on by default and is configured to provide computer IP addresses starting at 192.168.1.100.

Static Computer/device IP Addresses: If static IP addresses are used, the Digi's DHCP server can disabled via Configure>Network>DHCP Server Settings and follow these directions:

1. In order to properly communicate via the Digi, your computer must be in the same subnet as the Digi. The simplest way to accomplish this is to use the Digi's DHCP server. If you are using the DHCP server, and the Digi device is at IP address 192.168.1.1, you should configure your computer to be something like:

   - IP address: 192.168.1.2
   - Subnet mask: 255.255.255.0
   - Default gateway: 192.168.1.1 (i.e. the IP address of Digi)

2. As shown above, any device using the Digi as a gateway via the cellular wireless network must have its default gateway configured to the Digi's Ethernet port IP address (e.g., 192.168.1.1).

3. DNS Server IP addresses: If you plan to "browse" the Internet or make other outbound connections that utilize DNS names (e.g., www.digi.com), the carrier's DNS server IP addresses should be entered into the computer's IP configuration. DNS info can be confirmed once the Digi Gateway has connected to the cellular network using the Digi Gateway Web UI via *Administration>System Info>Mobile*.

4. See "Testing the Connection" below in this document.

Changing the Digi's Ethernet port IP Address: The Digi's Ethernet IP address settings can be changed from the default of 192.168.1.1 using the Digi's Web UI or command line.

1. **Via Web UI:** Point your browser to the Digi Gateway's Ethernet port IP address, select Configuration>Network and enter the desired settings, as shown below.

Note the Digi's default gateway should be 0.0.0.0 or blank. The wireless PPP connection will automatically update the default gateway when it connects to the wireless network.

Press *Apply.* You will lose connectivity to the unit until you reconfigure your computer or refresh the IP config to be in the same subnet as the Digi.

2. **Via Command Line:** Use either the console port and a terminal emulation program or telnet/SSH to the Digi Gateway's IP address. Use the "set net" command similar to:

   a. `set net ip=172.16.5.88 mask=255.255.0.0 gateway=0.0.0.0`

   b. Type "set net" with no parameters to verify the settings.

3. **DHCP Address Pool**: If the LAN IP address is changed and DHCP server is still to be utilized, change the DHCP address pool via the DHCP Settings page. This should be done *before* changing the IP address.

ConnectPort WAN Firmware Version

Please verify the Firmware version of your ConnectPort WAN is 82001350_E4 or later via Administration > Upgrade Firmware. If not, please download and install the latest Verizon firmware from the Digi support site www.digi.com/support.

Wireless Provisioning

In order to communicate on the Verizon Wireless network, the Digi cellular gateway must be *provisioned*. These instructions assume the modem's ESN has been given to Verizon Wireless for registration and you have received confirmation of device activation.

Connecting the Digi cellular gateway:

1. Attach the antenna(s) to the Digi device. Place in a location that will provide the best signal strength.

2. Connect the Digi cellular gateway to your computer or device using the Ethernet method described above.

3. Apply power to the Digi. After a few minutes observe the following:

   - The green Ethernet Link LED located on the Ethernet port should be on. If not, make sure you are using the proper cable.

   - Signal Strength LEDs on the top or side of the unit should show 2-4 LEDs. If not, try repositioning the antenna and/or unit if necessary. Do not extend the antenna cable without using a cable and antenna designed specifically for longer distances.

   - Active LED will be on solid for a few moments, then go off and may blink occasionally when passing traffic.

4. Verify/change the provisioning information via the WebUI *Configuration > Mobile* page*.*

5. If the device needs to be provisioned:

   > NOTE: If the device as been provisioned, but reset back to factory default, it may not be necessary to reprovision. Instead, simply click "Apply" to initiate the PPP session and observe it connects to the wireless network.

   a. Select *Verizon Wireless* in the Service Provider box.

   b. *Mobile IP Preferred* is the most common Mobile IP mode. Change to *Mobile IP Only* if directed to do so by Verizon or Digi (usually when static IP addresses are required but for some reason a static IP is not being provided).

c. Next click the *Provision Device* button and proceed to the next set of provisioning screens.

d. A configuration window will pop up. On the next screen, select "***Automatically*** *provision the mobile device"* and click next.
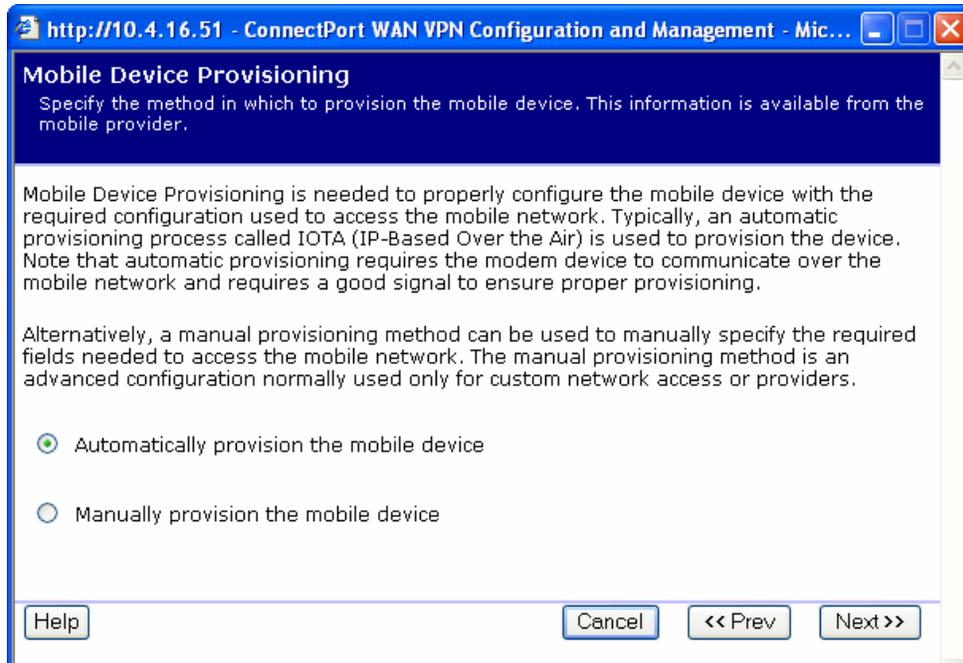
e. Do not close this window, or turn of the Digi while provisioning is in process. The dialog box will indicate when finished.
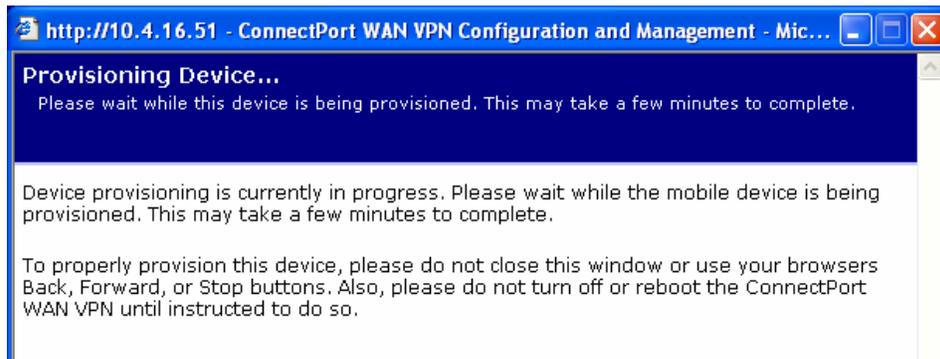
f. When the device indicates provisioning is finished click *Finish.*
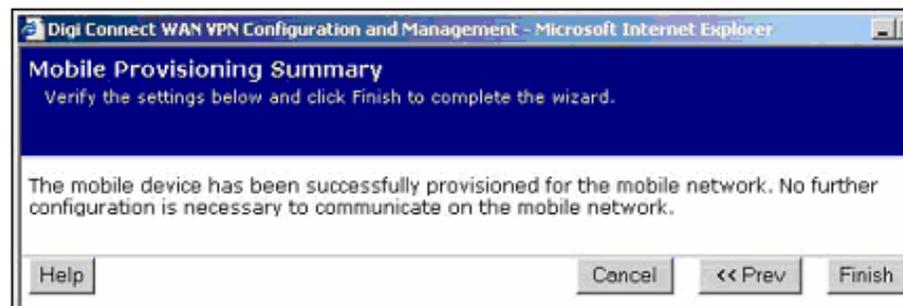
- If provisioning fails, do not attempt to manually provision unless directed to do so by Digi or Verizon support. Try an automatic provision again instead. If provisioning still fails, contact Verizon to verify the account is setup correctly with this device's ESN. Refer to the troubleshooting section below as needed.

g. The Mobile Configuration page will refresh indicating the unit has been provisioned. Click *Apply*. This *must* be done to activate the Digi's wireless PPP link to the Verizon Wireless IP network.

6. After a minute or so the Mobile Link LED on the front of the Digi unit should come on solid. Verify the mobile IP address via the Digi's WebUI home page, via *Management > Connections*, or via *Administration > System Information > Mobile*, as shown below.

The Digi cellular gateway should now be ready to use.

3. Testing the Connection

Outbound Connection: Once the Digi cellular gateway is connected to the cellular network and is accessible from network devices connected to its Ethernet port, you should verify communications through the device from a computer or device connected behind the Digi via Ethernet.

Use the Windows "ipconfig" command to verify or refresh your computer's IP settings. For example, once the Digi connects to the wireless network you may need to refresh the computer's IP configuration to update with the new DNS settings. For example, from the Windows command prompt enter:

> ipconfig /release
> ipconfig /renew
> ipconfig /all   (Verify Verizon's DNS servers are listed. Compare these IP addresses to the DNS servers shown via the Digi's Mobile Information page.)

You should now be able to browse the Internet via the Digi gateway (assuming the Verizon account provides Internet access). A simple test is to connect *out* through the Digi to an Internet website like www.digi.com using a web browser.

Further diagnostics can be done from the Digi device itself. For example you can ping a remote host from the Digi's command line via "ping [host]" or via the WebUI's ping tool under *Administration > System Information > Diagnostics*.

Inbound connections (i.e. terminated by a device connected to the Digi gateway) usually requires additional configuration to test. The Digi gateway uses NAT (Network Address Translation) by default which will block any unsolicited traffic through the device. IP Forwarding entries or IPsec policies must be added to pass incoming traffic through the Digi to a device or computer connected to the Digi's Ethernet port. See the User's Guide or WebUI help for details. Detailed application notes are available via Digi's support site at www.digi.com/support. See the Documentation link and look for documents such as "Application Guide: NAT, GRE, ESP and TCP/UPD Forwarding and IP Filtering".

A simple test to verify the Digi is on the wireless network and is accessible from the outside is to ping the mobile IP address from an Internet connected computer (assuming your wireless plan supports connectivity from the Internet and does not block ping). For example if the mobile IP address is 172.26.5.8:

> ping 172.26.5.8

Application Guides, such as using the Digi cellular gateway for wireless WAN backup wireless WAN connection, are available from Digi International's support site at http://www.digi.com/support.

4. Troubleshooting

If Provisioning Fails

First, what is the signal strength? A minimum of one LED should be lit, ideally two or more. Move the Digi unit or use a better antenna to increase the signal. The Digi supplied magnetic-base hi-gain antenna requires a metal ground plane to work properly; therefore it must be placed on a flat metal surface.

Contact your Verizon Wireless rep to verify the unit's ESN is activated on the Verizon Wireless network.

The account information, such as phone numbers (i.e. MDN, MSID) can be viewed using the "display provision" command, which can be accessed via telnet, SSH or local serial port (see below for details on using the CLI).

This example shows a unit that has not been provisioned:

```
#> disp prov

Current Provisioning Information:

MDN:                 : 0000009958
MSID:                : 0000009958
MIP Profile:         : 0
NAI:                 : 0000009958@vzw3g.com
HA:                  : 0.0.0.0
PRIHA:               : 255.255.255.255
SECHA:               : 255.255.255.255
HA SS:               : Set
HA SPI:              : 300
AAA SS:              : Set
AAA SPI:             : 2
RTUN:                : 1
```

The NAI contains "vzw3g.com". This indicates the wireless embedded modem is manufactured for the Verizon Wireless network, but has *not* been provisioned since the MDN and MSID are invalid phone numbers.

The example below shows a unit that has been, at one time, properly provisioned:

```
#> disp prov
Current Provisioning Information:
MDN:                 : 2023654294
MSID:                : 2023654294
MIP Profile:         : 1
NAI:                 : 6121234567@vzw3g.com
…
RTUN:                : 1
```

"Unable to obtain module settings" will display if the unit is properly connected, attempting connection, or in the provisioning process. It may be necessary to disable the mobile PPP session to properly view this information. Enter the following at the Digi's command line,:

```
#> set ppp port=[2|5] state=disable
```
(port=2 for Digi Gateway; port=5 for ConnectPort WAN)

Next enter "who" and look for the PPP connection attempt "`[mobile retry] or
[mobile init] or [PPP redial], etc`":

```
#> who
 ID  From                  To                    Protocol
 --  --------------------  --------------------  -------------
  1   serial 1              local shell           term
  2                                               [mobile retry]
```

Enter "kill n" where *n* is the PPP ID; in this case "kill 2". Enter "who" again to verify the PPP connection is gone (this may take a minute or so). Then reissue the "disp prov" command.

Contact Verizon to verify the ESN has been activated. Verizon support may need to perform a **DMU key reset** or **Account reset**.
▶ IMPORTANT: Make sure the Digi device is powered **OFF** during the DMU/Account reset process.

If provisioning still fails and you verified with Verizon the plan is okay, contact Digi support at 952-912-3456 or via http://www.digi.com/support.

No Link LED or Mobile IP Address

1. What is the signal strength? Move the Digi unit or use a better antenna. Note the Digi supplied magnetic-base hi-gain antenna must be mounted on a flat metal surface to work properly.

2. Is the account setup properly? Check with Verizon Wireless.

3. Did the unit provision properly?

4. Did you click *Apply* in the Mobile Configuration screen?

5. Verify the Digi is attempting to connect to the network. Under *Management > Connections* look for an entry showing the PPP connection being attempted. You should see something like "mobile init" or "dialing". If nothing appears go back to the Mobile Configuration page and click *Apply*. If it still will not connect, try to reprovision the device.

6. Review logs via Management > Logging or via CLI "disp log"

Reprovisioning

In some cases it may be necessary to reprovision the Digi device. For example:

- Update the PRL (roaming list)
- Account change or reactivation

In the Digi's WebUI select *Configuration > Mobile*, click on the link labeled "To reprovision this device … *click here*."

A message will appear that the mobile connection must be disconnected before continuing. Check to "Close all mobile connections and disable the mobile device temporarily." Then click *Next* and follow the provisioning steps outlined above.

Advanced Troubleshooting

The Digi device command line interface (CLI) can be accessed via local serial port login, telnet or SSH. If available the Digi cellular device's serial port is the most direct method to access the CLI If the port is being used by a device that cannot be disconnected, telnet or SSH can be used.

1.1. Use a **terminal emulation package** such as HyperTerminal, PuTTY, TeraTerm Pro, etc. for local serial, telnet or SSH. These will allow capture of the trace data to a log file. For example, with HyperTerminal select Transfer > Capture Text.

1.2. **Serial console port**: Connect a null-modem DB-9 cable from the Digi's serial port to a COM port on a Computer. The default COM port settings should be 9600 bps, 8 data, 1 stop, no parity, no or software flow control. NOTE: The serial port profile must be at either factory default setting or to the "Local Configuration" profile to allow local login.

1.3. **Telnet/SSH**: Telnet or SSH to the Digi's Ethernet port or mobile IP address. Use the appropriate TCP port if changed from defaults of 23 for telnet or 22 for SSH.

1.4. Enter the user login name and password if prompted (off by default).

1.5. The command prompt "#>" is displayed.

Event log: Refer to the event log via the WebUI or "disp log" from the CLI.

disp tech: is a CLI command that outputs the most commonly used CLI diagnostic commands. A log file must be used to capture this information.

who: "Who" is used to view the mobile IP address and connection status. The output should look similar to:

```
#> who

 ID  From             To               Protocol
 --  --------------   --------------   --------------------
 1   172.17.5.9       10.0.0.1         ppp [connected]
 2   serial 1         local shell      term
```

ID 1 is the active mobile PPP session; 172.17.5.9 is the mobile IP address. ID 2 is the local serial port command line session.

The PPP session may say "mobile init" or "dialing" if the session is being established. Use PPP and chat traces to help diagnose issues when the session does not connect.

Note: "who" is equivalent to the WebUI "Management > Connections" page.

See also "disp ppp".

kill n: The "kill" command terminates an active session. The "n" is the ID obtained from the "who" command. For example, the current PPP session can be "killed" to view PPP or Chat negotiations during call teardown and re-establishment. From the "who" output above, enter "kill 1".

disp ppp: Shows details about mobile PPP sessions. Pay close to attention to the "resets" section.

```
#> disp ppp

PPP Status (ppp4):

    state                : active
    ip address           : 172.55.66.173
    primary dns addr     : 172.66.146.11
    secondary dns addr   : 172.66.154.11
    tx bytes             : 2911
    rx bytes             : 2290
    session tx bytes     : 2911
    session rx bytes     : 2290
    idle resets          : 0
    no carrier resets    : 0
    no service resets    : 0
    admin resets         : 0
    non-admin resets     : 0
    surelink resets      : 0
    lcp keepalive resets : 0
    last reset reason    : unknown
```

o **Resets** – The PPP session was terminated for the following reason:
  ▪ idle resets: due to Digi's inactivity timer expiring
  ▪ no carrier resets: Carrier dropped (for any reason)
  ▪ no service resets: Data network not available - could be due to loss of signal strength
  ▪ admin resets: Reset by the admin via "kill" or "disconnect"

- non-admin resets: Cellular network/carrier ended the call gracefully (for example Verizon typically drops the connection about every 23h55m for billing purposes)
- LCP keepalive resets: typically not used
- **No carrier and no service resets** indicate problems with cellular service. Review the signal strength and reposition antenna and/or Digi device as needed. An external high-gain or directional antenna may be needed. These resets can also be due to roaming issues. Use the "display mobile" command to see signal strength and current carrier settings.

See also "disp dev" for total system uptime and current firmware info.

Signal Quality

Signal quality directly relates to performance and connection issues. There are two main components to Signal Quality on EVDO:

- Signal Strength (RSSI): -85 dBm or better (i.e., -50 to -85)
- Ec/Io (signal-to-noise): -9 dB or better (i.e., more positive; the EV-DO Ec/Io shown below is unacceptable)

CLI "disp mob" and WebUI System Info > Mobile shows the current mobile status and modem information. This information can be helpful to the carrier. The most important output is:

- Registration Status: Shows whether home network or roaming
- Signal Strength
- Signal Quality
- ESN (Serial Number)

Sample output:

```
#> disp mob

Mobile Status:

  Network Registration Information:
       Registration Status   : 1, Registered (Home Network)
       System ID             : 0x103D (4157)
       Network ID            : 0x0052 (82)
       Signal Strength       : 2 of 4 bars (-86 dBm)

  Subscriber and Equipment Information:
       Phone Number          : MDN:9133785240  MIN:9132268546
       Manufacturer ID       : Sierra Wireless, Inc.
       Model ID              : MC5720 PU6.0
       Serial Number         : 0x602C026D
       Revision ID           : p1820100,20212 [Aug 24 2005 11:14:05],  Boot: MC57
20_FP_18.02.01 2005/08/24 16:02:47, VID: 4505 PID: 24
       Provisioning Status   : Provisioned
       PRL Version           : 20212
       Base Station Lat/Lon  : 35 58' 10" -86 45' 29"
       Current Band Class    : 1900Mhz
       Available Service     : 1xEV-DO and 1xRTT
       Signal Quality (CDMA) : 1xRTT: RSSI -86 dBm, Ec/Io -3.0 dB
       Signal Quality (HDR)  : 1xEV-DO: RSSI -86 dBm, Ec/Io -24.0 dB
       Call Status           : Connected, Dormant
       Call Map, Service Opt : 0x4040, 33023
       HDR AT, Session State : Acquisition, Open
       Current HDR Channel   : 125
```

Changes in RSSI and Ec/Io can be seen in the event log (WebUI > Event Logging; CLI: "disp log"). For example, look for spikes in Ec/Io or RSSI.

```
83690       mobile      HDR (EvDO) RSSI: -81
83703       mobile      HDR (EvDO) RSSI: -86
83928       mobile      HDR (EvDO) Ec/Io: -1.5
83937       mobile      HDR (EvDO) Ec/Io: -20.5
83953       mobile      HDR (EvDO) Ec/Io: -1.5
83964       mobile      HDR (EvDO) RSSI: -81
```

The entry at time stamp 83937 indicates a noise spike. This could be caused by any number of things such as a motor starting or someone closing a door to the room where the Digi is placed thus blocking the signal (this would likely be in conjunction with a drop in RSSI). The source of the problem should be eliminated by moving the Digi to a better location or using external antennas.

Note if EV-DO is available, both it and 1xRTT will be listed. You can for the most part ignore the 1xRTT information.

Advanced Command Line Tracing

Digi tech support may direct you to use advanced command line tracing to for example capture RSSI and Ec/Io changes in real time. Please be prepared to save detailed output to a log file as described above.

5.   Factory Reset

The Digi cellular gateway can be reset back to factory defaults for various reasons – for example you forgot the password or the device will not respond via Ethernet. To reset to factory defaults:

1. Remove power.

2. Press and hold reset.

3. Reapply power and continue holding reset.

4. Observe the status LED blinks in a 1-5-1 pattern (should happen within a few seconds).

5. Release the reset button. The Digi will complete the reboot process. The unit is now at factory default.

6. Using a browser, go to 192.168.1.1 > Config > Mobile. At this point, the modem should still be provisioned. Resetting the Digi back to factory settings does not reset the internal modem to factory defaults; it only disables the mobile PPP connection. So, you should be able to simply select Verizon Wireless as the provider and click "Apply". See above for details if re-provisioning is required.

# 6.	Finishing Up and Getting Assistance

Please register your Digi product at
http://www.digi.com/support/customer%20services/warranty.jsp.

If you have any questions or need assistance, please contact

- Your Digi vendor

- Digi International sales at 952-912-3444,

- Digi technical support at http://www.digi.com/support/ > Online Support Request or 952-912-3456.