Using the New NCC 4G Cartridge
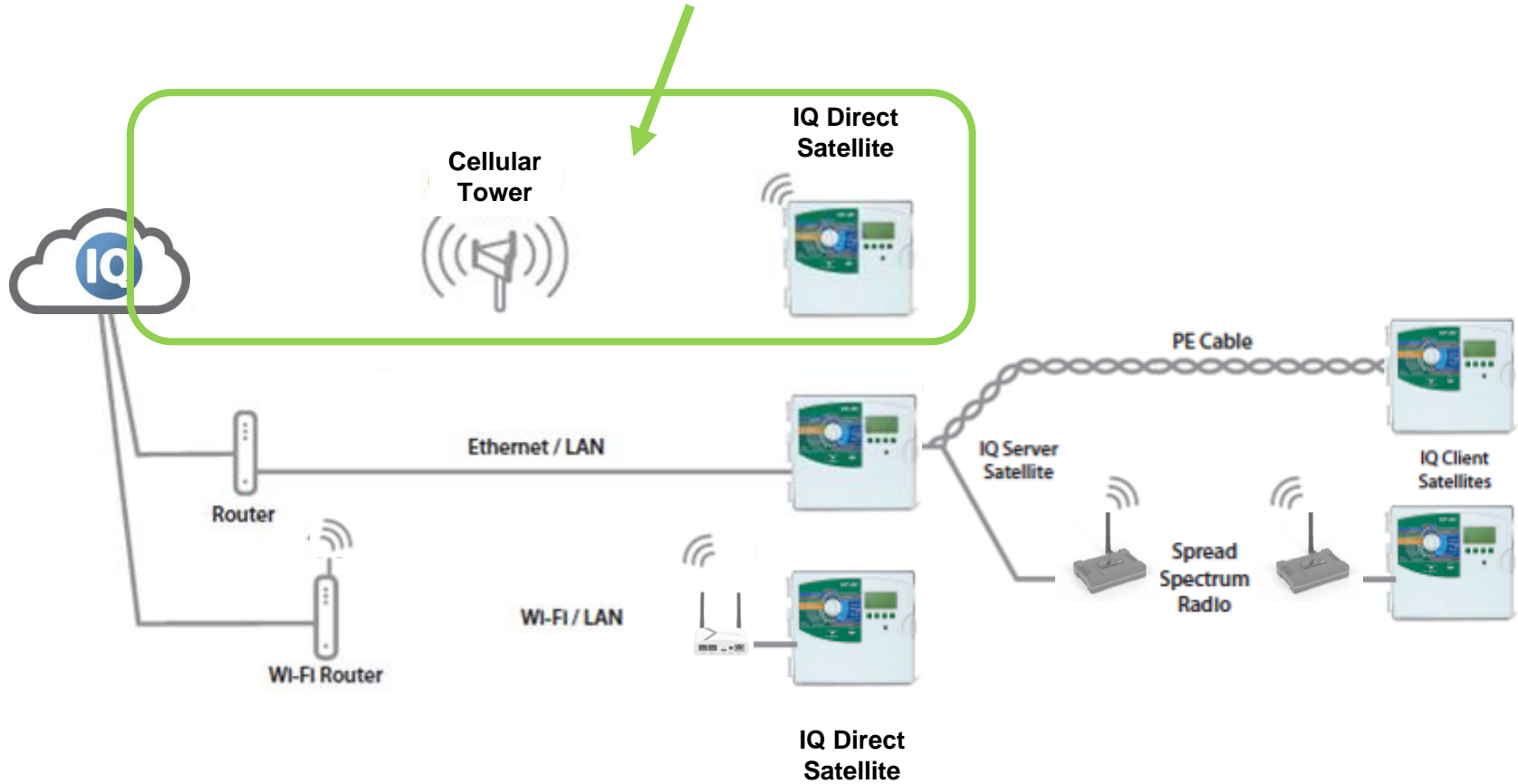
NCC 4G Cartridge

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- **The IQ Cellular Network Communication Cartridge (NCC) provides easy remote access to ESP-LX irrigation controllers**

- **Rain Bird has offered a 3G Cellular Cartridge which allows the IQ Platform to communicate with ESP-LXME, ESP-LXD and ESP-LX-IVM commercial controllers.**
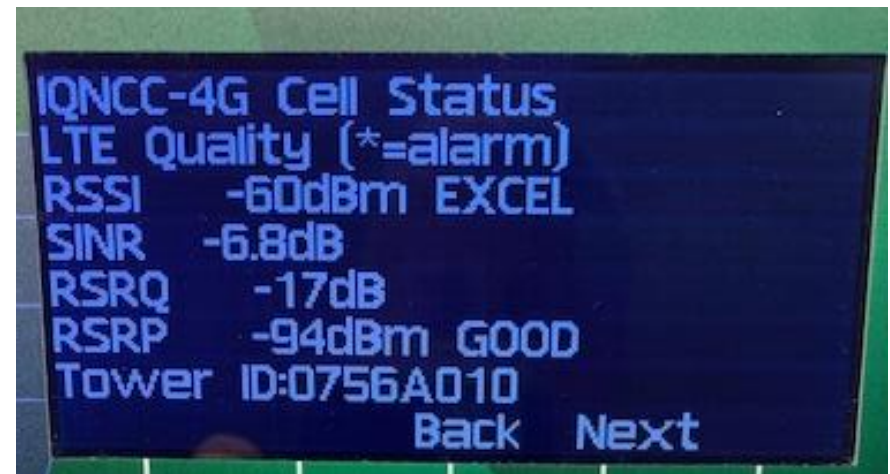
NCC 4G Cartridge

- **The official statement is that the 3G network will remain on until at least February 2022**

- **Rain Bird has developed a cartridge with 4G-LTE communication capability**

- **The new NCC 4G Cellular Cartridge is available now**

- **Customers can continue to use the 3G Cellular Cartridge until February 2022**

NCC 4G Cartridge

- **Users should update their NCC cartridges to firmware v1.67 (3G, 4G, EN and RS Cartridges as of time of publication)**

- **The IQ Platform and ESP-LX controllers will support both the NCC 3G and NCC 4G Cellular Cartridges**

- **Installation is identical between the NCC 3G and NCC 4G cartridge other than antennas**

- **Configuring the cartridge is identical between the NCC 3G and NCC 4G Cartridge**

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- **The NCC 4G Cartridge now uses Signal Quality for troubleshooting cellular issues**

- **Similar to the NCC 3G Cartridge, a scale of 1 to 10 bars is used to show signal quality**

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- **Any signal quality below 2 may require additional hardware to assure robust connectivity (Signal booster, Directional antenna)**

NCC 4G Cartridge

- ## <u>NCC 4G Cartridge</u>

- ## Troubleshooting the NCC 4G cartridge is different

- ## Verify the status of the Cellular Data Plan for the IQ Cartridge
  - IQ3:
    - Select Satellite through "Satellites" -> "Configure…"
    - Select "Edit Configuration and Stations…"
    - Verify the expiration of the cellular data plan from the information displayed in the "Type" section
    - If the Cellular Data Plan has expired, renew it through "Help" -> "Cellular Data Plan Renewal"

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- **Verify the status of the Cellular Data Plan for the IQ Cartridge**
  - IQ4:
    - When logging into IQ4-Cloud, a banner will appear at the top of the webpage indicating the need to renew one or more cellular plans for the controllers listed in your system

- **Check all connections (antenna, cable to front panel, IQNet cables)**

- **Check IQ communications (Sync, Reverse Sync, Log Retrieval)**

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- **Verify the status of the IQ Cartridge**
  - Check the IQ LED indicators on the back of the cartridge:

LED State	IQ4G Status	Troubleshooting Steps
Dark (no LEDs lit)	Cartridge Inactive/Inoperative	No power to modem 1) Check connection to controller 2) Check AC power to controller 3) Check with known good cartridge
Blinking Red/Orange	No cell service connected	This is the initial condition after cartridge installation, AC power cycle or reset button press while the cartridge is attempting to establish a service connection. If this condition persists after five minutes: 1) Confirm that installation location has cellular service available 2) Check Signal Quality 3) If poor Signal Quality, install directional antenna and/or signal booster
Blinking Red	Cellular service detected, but service authorization unsuccessful	This indication may occur during normal reset sequence after power cycle, cartridge installation or reset button press. If this condition persists for longer than two minutes: 1) Confirm that SIM is properly installed 2) Confirm that service subscription is valid and active
Solid Orange	Active connection to cell service and service is authorized	This is the normal idle condition of a properly working IQ4G installation. If IQ access is unsuccessful: 1) Check all IQ settings, retry connecting to cartridge from IQ
Solid Green	Authenticated with IQ but no data is being sent or received	1) None
Blinking Green	Authenticated with IQ and data is being sent or received	1) None

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- **Verify the status of the IQ Cartridge**
  - ESP LXME/ESP LXD: Turn the dial to "IQ Settings"
  - ESP LXIVM: Turn the dial to "Advanced Settings" -> "Configure Cartridge"
  - Select "Status" using the arrow and Next button

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- **IQ 4G Cartridge Communication Ports**
  - The 4G cartridge has 3 communication ports:
    - **IQ** – Primary Cellular communication with IQ
    - **Radio** – Secondary radio communication with Client controllers
    - **CM** – Secondary Connection Module communication with Client controllers

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- **Verify the status of the IQ Port**
    - **Resetting** – Cartridge is resetting itself prior to connection attempt
    - **No Service** – Cartridge has no connection to the local Cellular tower or the service.

        If this condition persists after five minutes:

        1) Confirm that installation location has cellular service available

        2) Check Status/Signal Quality

        3) If poor Signal Quality, install directional antenna and/or signal booster
    - **Connecting** – Cartridge is trying to establish a connection to the local Cellular tower and Internet service
    - **Idle** – Active connection to cellular tower & service is authorized; Waiting for a connection from IQ
    - **Connected** – IQ is connected to the cartridge
    - **Connected/Active** – IQ is connected and data is being transferred between IQ and the cartridge

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- **Verify the status of the IQ Cartridge Ports**
  - Radio Port Status (Server configuration only):
    - Disabled – Configured as "Radio Not Installed"
    - No Service – Cartridge is not connected to a powered radio
    - Connected – Cartridge is connected to the radio and it is trying to communicate with Client controller(s)
    - Connected/Active – Data is being transferred between Server and Client controller(s)
  - CM Communication Module Port Status (Server configuration only):
    - Disabled – Configured as "CM Module Not Installed"
    - Connected – Cartridge is connected to CM Module and it is trying to communicate with Client controller(s)
    - Connected/Active - Data is being transferred between Server and Client controller(s)

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- **Verify the Cellular Signal Quality**
  - In the Status screen select "Signal" using the button
  - Signal Quality Indications (1 to 10 bars):
    - 1 = POOR signal quality, consider signal booster or directional antenna
    - 2 - 5 = Fair signal quality
    - 6 – 9 = Good signal quality - good connection
    - 10 = Excellent signal quality - excellent connection

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- **Verify the status of the IQ Cartridge**
  - If the Signal Quality is below 2
    - Use IQ4GEXTANT Cellular External Antenna if the controller is in a metal enclosure
    - Relocate antenna where cellular quality is above 1
    - Install Directional 4G Antenna
    - Install Signal Booster

  - Directional Antenna and Signal Booster information can be found at rainbird.com/nccx

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- **Verify the Cellular Signal Quality**
  - In the Signal Quality screen press "Detail" to get details on Signal Strength and Signal Quality
  - Detail:
    - RSSI - <u>Received Signal Strength Indicator</u> is a negative value, and the closer to 0, the stronger the signal
    - SINR - <u>Signal to Interference plus Noise Ratio</u> is the strength of the signal divided by the strength of any interference
    - RSRQ - <u>Reference Signal Received Quality</u> indicates the quality of the received reference signal
    - RSRP - <u>Reference Signal Received Power</u> is the power of the 4G Reference Signals spread over the full bandwidth
    - Tower: indicates the tower ID that the cartridge is connected to

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- – RSSI for 4G/LTE is calculated from several other signal related measurements: RSSI = noise + serving cell power + interference power.

- – For example, a 4G LTE modem might report an RSSI of -68 dBm, but:
  - RSRP = -102 dBm
  - RSRQ = -16 dB
  - SINR = -1.8 dB

- – In this case, the signal quality is actually very poor. This could be due to the device being some distance away from the 4G transmitter or something is interfering with the signal, such as a building or other obstructions between the device and the tower.

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Signal Quality Measurement Ranges

RSSI

RSSI	Signal strength	Description
> -65 dBm	**Excellent**	Strong signal with maximum data speeds
-65 dBm to -75 dBm	**Good**	Strong signal with good data speeds
-75 dBm to -85 dBm	**Fair**	Fair but useful, fast and reliable data speeds may be attained, but marginal data with drop-outs is possible
-85 dBm to -95 dBm	**Poor**	Performance will drop drastically
<= -95 dBm	**No signal**	Disconnection

RSRP

RSRP	Signal strength	Description
>= -80 dBm	**Excellent**	Strong signal with maximum data speeds
-80 dBm to -90 dBm	**Good**	Strong signal with good data speeds
-90 dBm to -100 dBm	**Fair to poor**	Reliable data speeds may be attained, but marginal data with drop-outs is possible. When this value gets close to -100, performance will drop drastically
<= -100 dBm	**No signal**	Disconnection

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Signal Quality Measurement Ranges

RSRQ		
RSRQ	**Signal quality**	**Description**
>= -10 dB	**Excellent**	Strong signal with maximum data speeds
-10 dB to -15 dB	**Good**	Strong signal with good data speeds
-15 dB to -20 dB	**Fair to poor**	Reliable data speeds may be attained, but marginal data with drop-outs is possible. When this value gets close to -20, performance will drop drastically
<= -20 dB	**No signal**	Disconnection

SINR		
SINR	**Signal strength**	**Description**
>= 20 dB	**Excellent**	Strong signal with maximum data speeds
13 dB to 20 dB	**Good**	Strong signal with good data speeds
0 dB to 13 dB	**Fair to poor**	Reliable data speeds may be attained, but marginal data with drop-outs is possible. When this value gets close to 0, performance will drop drastically
<= 0 dB	**No signal**	Disconnection

FREQUENTLY ASKED QUESTIONS

FAQs