Port Forwarding Overview & IQ Cloud

Port Forwarding is a method of mapping traffic from the internet to a specific device on your network. This is helpful for ESP-LX Controllers that are connected to a network via Wi-Fi or Ethernet.

Wireless Networking Examples

Here are some examples that explain how wireless networks function to better understand when port forwarding is necessary.

Coffee Shop

Let's suppose you're in a coffee shop and connect to their WiFi network using your phone. Their router will automatically assign to you a random IP address and then forward all requests you make (such as websites, etc.) directly to your phone.

⚠ **NOTE**: In this case, the IP address is only assigned temporarily. If you go back the next day you may be assigned a completely different IP address.

⚠ **NOTE**: Unlike a WiFi enabled thermostat that goes out on the internet to request data, ESP-LX Controllers with IQ Cartridges do not send out requests, they only receive the inbound communication.

Thermostat example (middle man)

A device like a WiFi thermostat uses outbound communication to communicate to a server which has a fixed IP address, and every user communicates to that server instead of directly to the thermostat. In this situation, the server acts as a middle man passing all the data to the thermostat so you don't have to know where that thermostat is connected or how.

The user always connects to the server, which has a known fixed address, and tells the server to tell the thermostat to make the change the next time the thermostat connects. The thermostat can have any IP address a router assigns to it because it doesn't care, it just goes out to the server which it knows has a fixed address and gets the changes the user requested.
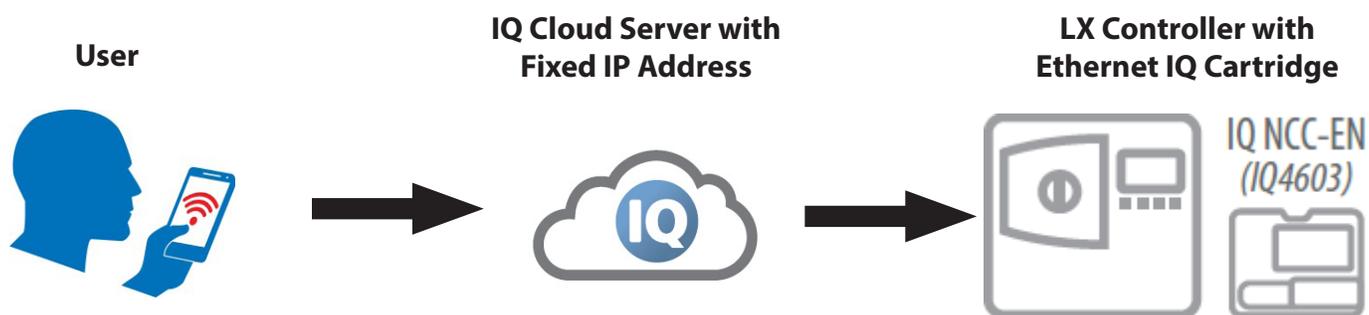
As an example, let's suppose you ask a friend to relay a message to a someone else. You don't really need to know where the 3rd party is at the time. It's up to your friend to relay the message when they see the other person.

User	Cloud Server with Fixed IP Address	Thermostat with Dynamic IP Address

IQ Cloud Example (relay)

Users always connect to the IQ Cloud server with a known, fixed address that the IQ software knows to connect to. A user tells the IQ Cloud server what changes they would like, and unlike the thermostat example, the server must go relay these changes to the LX Controller, because the LX Controller will not check in with the server on its own.

Therefore, the IQ Cloud server must know the actual address of the LX Controller. Port forwarding is a way of publishing that address for the server to reach the LX controller. Using the same friend example, it's equivalent to telling a friend to go to a certain place and relay a message. The message is equally as important as the place they must go. Without both, the message will never be received.

| User | IQ Cloud Server with Fixed IP Address | LX Controller with Ethernet IQ Cartridge |

Port Forwarding Setup

Follow these steps to set up port forwarding. Cellular fees do not apply when WiFi or Ethernet connections are available.

1. First we must tell the router to stop giving a random IP address to the LX Controller / IQ Cartridge every time it connects. Remember the coffee shop example.

> **!** **NOTE**: Most users can skip this step because their router remembers devices and always assigns the same IP address. However, some (not all) routers, in the event of power loss erase any device allocation and assign IP addresses to all the connected devices at random when the power is restored.

The best way to make sure your router gives the LX Controller / IQ Cartridge the same IP address every time is to assign a static IP address in the router administration tools based on the MAC address of the device. Our MAC address for the IQ Cartridge is printed right on the back. This method is referred to as DHCP Reservation, which is a feature on routers. It is especially useful when you are setting up wired or wireless network devices such as printers, network storage, gaming device, or server computers that you want to have access using a specific IP address. Refer to your router manual to configure DHCP Reservation. When doing this, check the list of devices already connected to the router to make sure you aren't picking an IP address used by an existing device on the network. HINT: Googling or You Tube-ing your router model number and DHCP Reservation will often give you exactly the directions you need.

2. Configure your Ethernet cartridge with the IP address you just reserved for it and the local router's information. Refer to example below for steps a through d. Please note if this is a WiFi cartridge, you will also need the WiFi SSID, encryption method, and WiFi password. These steps aren't depicted below.

NCC Type:	NCC-EN
Firmware Version:	v1.35
Modem Version:	VERSION 0.22 Nov 30 2010 17:24:25 E

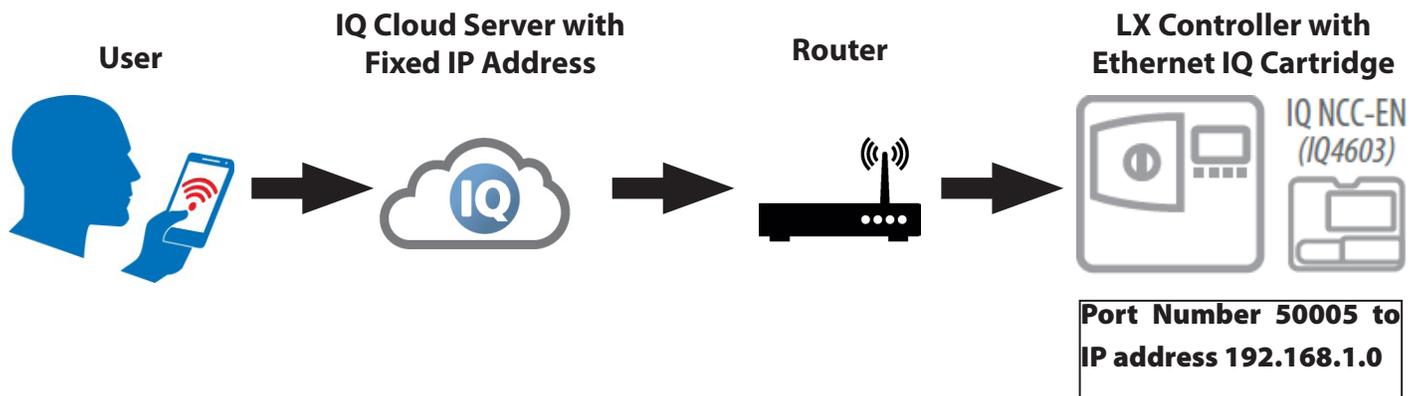| Configuration Name:	NCC-EN 001
IP Address:	192.168.0.75
Port Number:	50005
Subnet Mask:	255.255.255.0
Default Gateway:	68.8.5.216
MAC Address:	00:08:00:D3:91:DD

a. The IP Address is the local one you assigned using DHCP Reservation in Step 1 or the available IP address you chose if you skipped DCHP Reservation setup.

b. Leave the port number as 50005 for the first cartridge you configure.

If this is the second be configured, pick a new port number. Hint: add 1 for each cartridge. Example: Cartridge 2 will use 50006, Cartridge 3 will use 50007, etc.

c. The subnet mask should be 255.255.255.0

d. The default gateway is the local address of the router on the home network. The best way to find this from a windows computer is click Start > All Programs > Accessories > Command Prompt. When Command Prompt is open, type the following command "ipconfig" In this example the default gateway is 68.8.5.216.

```
Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . : rainbird.local
   Link-local IPv6 Address . . . . . : fe80::7104:14be:1a0f:af7e%10
   IPv4 Address. . . . . . . . . . . : 192.168.149.129
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 68.8.5.216
```
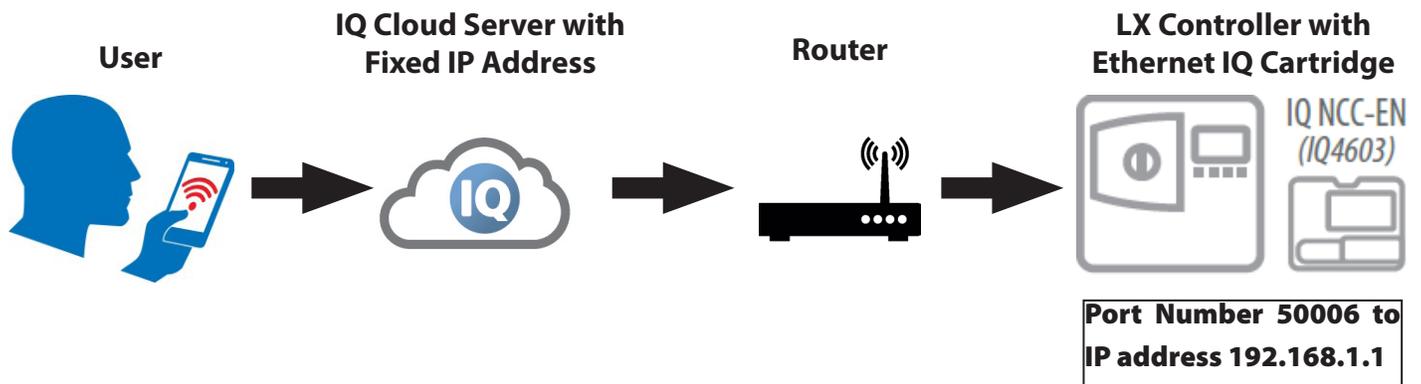
3. If you would like to use a WiFi network, instead of bringing an ethernet cable to the location of the LX Controller, you will need a WiFi-to-ethernet adapter, sold separately. Step by step instructions for these devices, as well as a setup video for the model we found that best fits inside the LX cabinet (NETGEAR WNCE2001) can be found at www.rainbird.com/iq under the Resources section.

4. Finally, we must enable port forwarding in the router. All the data exchanged on the internet goes through numbered ports. Our IQ cartridges are setup by default to use port 50005. The way port fowarding works is that the IQ Cloud server will send the requested changes for the LX Controller to router at the site. The router sees that the data is coming in on a pre-defined port and routes it to the IP Address that you tell it to. Every router has a different way to enable port forwarding and we've created step by step instructions for many popular brands of routers at www.rainbird.com/iq under the Resources section. The thing to remember is that you will need to do this for each cartridge and use a different port number and ip address for each cartridge both in the port forwarding assigment. Examples:
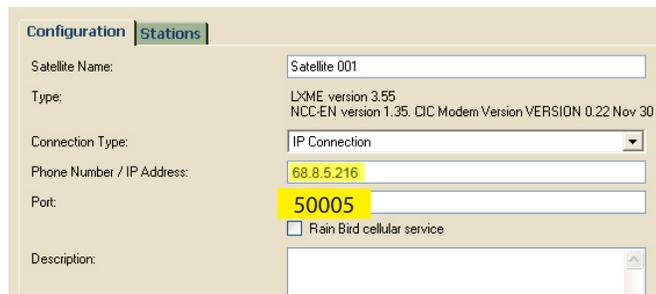
CONTROLLER 1

User	IQ Cloud Server with Fixed IP Address	Router	LX Controller with Ethernet IQ Cartridge

IQ NCC-EN
(IQ4603)

Port Number 50005 to IP address 192.168.1.0

CONTROLLER 2

User	IQ Cloud Server with Fixed IP Address	Router	LX Controller with Ethernet IQ Cartridge

IQ NCC-EN
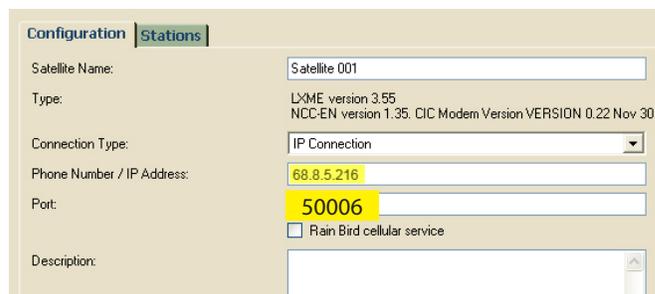(IQ4603)

Port Number 50006 to IP address 192.168.1.1

5. In the IQ software you will enter the external IP address of the router and the port you chose for that controller. To get the external IP address of your router, open your internet browser, go to google and type "what's my ip address". This IP address will be the same for every controller you setup in IQ Cloud, but the port number will be different.

CONTROLLER 1   ## CONTROLLER 2

6. That's it, you're done. Now when you connect to the IQ Cloud server and ask it to make a change in your LX Controller, it will go out and send the request to your router which looks at the port number in which the traffic comes in and routes it to the appropriate LX Controller / IQ Cartridge.

Helpful links:

IQ Platform Overview - http://www.rainbird.com/documents/turf/IQPlatformTech_Data_Sheet.pdf

IQ Cartridge Configurator - https://www.rainbird.com/documents/turf/man_IQ%20NCC%20Configurator%20 Instructions.pdf

Port Forwarding Instructions - http://www.rainbird.com/documents/turf/IQ_port_forwarding_instructions.pdf

IQ Cloud Sign Up Instructions - https://iqweb.rainbird.com/CloudRegistration/content/pdf/IQ%20CLoud%20 Registration%20and%20Login%20Instructions%20for%20Windows%20computers.pdf