Wi-Fi hardware setup for Raptor streaming using the Ruckus R710
by Playback Technologies, Inc.

Networking 101

A network is a collection of computers and computer-like devices that can communicate with each other.

This document will instruct you on setting up a local area network (LAN) that includes a wireless access point (AP) for streaming over Wi-Fi. Ethernet is the standard for physically connecting all these devices. Ethernet supports wired connections between devices using Ethernet "category cable" and connects wirelessly using the well established Wi-Fi standards.

TCP/IP is the communication protocol that lets your Raptor, iPads, iPhones, MAC laptops, and even your HD-SDI router talk together over Ethernet and Wi-Fi on your LAN. It requires each device to have a unique identifier, called an IP address.

Normally, there is a single router on any network whose job it is to assign a unique IP address to every device, by using dynamic host configuration protocol (DHCP). We will setup your Ubiquiti EdgeRouter to assign IP address to the devices on your network. (A switch is often confused with a router, but a switch only provides additional wired Ethernet connections to expand the number of devices attached to the network, without providing DHCP services.)

The Ubiquiti EdgeRouter offers many advanced features and configurations that we will not use, including creating multiple networks, VLANs and being able to create multiple DHCP servers. Do not be overwhelmed – just follow the step-by-step instructions.

Networking 101 - a little deeper

IP addresses are 32-bit binary numbers. We humans do not efficiently read binary strings of numbers - can you imagine memorizing a 32-bit long number like 1010 0101 1111 0000 1111 0000 1010 0101? A 32-bit IP address is subdivided into four 8-bit segments called octets. The four octets are written in "dotted decimal" to make them more manageable to write out and remember. An IP address in dotted decimal notation looks like 192.168.5.38.

IP addresses are divided up into special "classes" and uses. Most IP addresses are for connecting private networks and computers to the public internet, but some are reserved for private networks (intranets) like we will use. IP addresses in the range of 192.168.0.0 to 192.168.255.255, 172.16.0.0 to 172.31.255.255, or 10.0.0.0 to 10.255.255.255 are reserved for private networks.

You will need a laptop or other computer with a wired Ethernet connection to perform the initial set-up of both the Ubiquiti router and the Ruckus access point. You will connect to each of these devices one at a time, to perform their setup.

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Goals
- Have a compact, wired gigabit router assigning IP addresses (192.168.5.x) to all devices.

- Have an optional Wi-Fi access point attached to the router, providing Wi-Fi connections to allow for video streaming.
  - *With a gigabit router wired into the cart, network settings will not change when you connect or disconnect your Wi-Fi access point.*
  - *The router assigns IP addresses for all devices, including those connected via Wi-Fi.*

What you need

- Ubiquiti EdgeRouter-X wired gigabit router – new, or reset to factory specifications (ubnt/ubnt).
- Ruckus R710 Wi-Fi access point (AP) – new, or reset to factory specifications (super/sp-admin).
- Phone or tablet (iOS, iPadOS or Android) with "Ruckus Unleashed" app installed.
- Computer (Mac or PC) with wired Ethernet connection (for router setup)

Things you must choose

- Wi-Fi network name _____ and password _____
  - *NOTE: Clients will need the above name and password to log into your Wi-Fi network.*

- Ruckus R710 administrator account name (secret): _____ and password _____

- EdgeRouter-X administrator account name (secret): _____ and password _____

Setup R710 access point from a phone or tablet

- Power on R710, wait 5 minutes it to start up. "PWR" LED may become solid, or may continue blinking.
  - *No Ethernet cable should be plugged into Ruckus during this setup.*

- Open "Ruckus Unleashed" app on mobile device.

- Follow on-screen instructions to connect mobile device to Ruckus Wi-Fi, then press "Start" circle.
  - If the app reports an error, the AP might not be quite ready. Wait a few minutes and try again.

- At "Configure Unleashed" screen – step 1
  - Under "Master IP assignment", click "Edit" button.
  - At "Master AP's IP settings", click "Static" button, then enter 192.168.5.10 for "Master IP". Click "Done".
  - Click "Next".

- At "Configure Unleashed" screen – step 2
  - Enter the name you want to use for your Wi-Fi network *(written above)*.
    - *This is the name you will give to clients to use your Wi-Fi.*
    - *NOTE: This one name includes both 5Ghz and 2.4Ghz connections.*
  - Enter Wi-Fi network password you want to use *(written above)*.
  - Click "Next"

- At "Configure Unleashed" screen – step 3
  - Enter the name and password you want to use to administer your access point *(written above)*.
    - *NOTE: This should be a secret. Anyone with this login can change your Wi-Fi network.*
  - Click "Next"

- At "Configure Unleashed" screen – step 4
  - Enter password recovery information *(optional)*
  - Click "Skip" or "Next"

- Click "Finish". Access point will restart, which takes a few minutes. A countdown clock is displayed while AP is restarting.

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Setting up EdgeRouter-X from a computer with a wired Ethernet connection

The following instructions set LAN connections eth1, eth2, eth3, and eth4 so they're available to your computers and devices, and sets eth0 to hook up to the internet, so it won't normally be used in a cart.

- Plug an Ethernet cable directly between your computer and the eth0 port on your EdgeRouter-X.

- Set the computer networking parameters to "Manual", with the following settings:

      IP or IPv4 address: 192.168.1.100
      Subnet mask (if present): 255.255.255.0
      Subnet prefix length (if present): 24
      Gateway (or router): 192.168.1.1
      DNS (if present): no entry needed

- Open a browser and navigate to 192.168.1.1 to open the EdgeRouter-X management screen.
    - *Ignore any "certificate error" or other security warnings when you open this page.*
    - *You may need to click "Advanced", then "Proceed to 192.168.1.1"*

- Log into the router – the default user and password are both ubnt

- At "Basic Setup" / "Do you want to start with the Basic Setup Wizard?", click "Yes".
    - *If you didn't get that question, click "Wizards" in the top right corner, then "Basic setup" in the upper left.*

- Assign new IP address range
    - In the central part of the screen, click "LAN ports (eth1, eth2, eth3 and eth4)" to expand that section
        - NOTE: If you don't see this section heading, click the gap in the box underneath the box surrounding "One LAN" to show "Address" box
    - At "Address", enter 192.168.5.1

- Under "User setup", type a password you want to use to manage your EdgeRouter-X under "Password" and "Confirm password".
    - *You may change the user name, if you'd like.*
    - *NOTE: Nobody else will need to know this user and password information.*

- Click "Apply" button, then click "Apply Changes", "Reboot", then "Yes, I'm sure" to restart router.
    - Wait a few minutes for router to write changes and restart.
    - Move Ethernet cable out of eth0 port, since that port will not be utilized in this configuration.

- Set the computer networking parameters back to Automatic (DHCP).

Hookup router and access point in your cart

- Plug your Raptor, Videohub, and any other devices that need wired Ethernet into the eth1, eth2, or eth3 connections on your router.
    - *If you need more than 3 connections, please plug a gigabit switch into eth1, eth2, or eth3, and plug all your devices into that switch.*

- Plug a long Ethernet cable into the eth4 connection on the router, and attach the other end to the access point.
    - *It is very convenient to install a PoE injector in your cart to power your access point, so you don't need a power supply or battery at the access point. If you use PoE, please ensure your PoE injector is supported by your access point, and attach the Ethernet cable to the PoE port on the access point.*

Resetting router or access point to factory specifications *(optional)*

- Power on device, let it sit for a few minutes so it's completed it's power-on sequence.

- With power still applied, find the "Reset" hole in the rear panel, and push a straightened paper clip through the hole, depressing the hidden button inside. Keep the button pressed for 10 seconds, then release.

- The device will restart. When it comes up, it will be reset to factory specifications.

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How to update Ruckus R710 firmware from a computer *(optional)*

The Ruckus "Unleashed" app can ease management of the R710, but it can't configure R710 APs that have older firmware versions installed. Here's how to upload current firmware to your R710.

Download firmware update file

- On an internet-connected computer, navigate to https://support.ruckuswireless.com/products/79-ruckus-r710

- Click on the "Downloads" tab to download the latest firmware for your AP. This firmware update should come as a file with extension BL7.

    ○ *NOTE: At the time of this writing, I chose firmware labeled "Ruckus Unleashed AP 200.7.10.202.94 (GA Refresh3) Software for R710".*

    ○ *NOTE: You might need to create a login on their site to download firmware*

Hook up Ruckus R710 to computer

- Plug an Ethernet cable directly between your computer and either LAN port on the R710.

- Set the computer networking parameters to "Manual", with the following settings:

    IP or IPv4 address: 192.168.0.50
    Subnet mask: 255.255.255.0 (if present)
    Subnet prefix length: 24 (if present)
    Gateway: 192.168.0.1
    DNS: not needed (if present)

- Open a browser, and enter https://192.168.0.1 in the address bar, to open the Ruckus management screen.
    ○ *Please note this is a secure address (https). If that doesn't work, you could try http://192.168.0.1*
    ○ *Ignore any "certificate error" or other security warnings when you open this page.*
    ○ *You may need to click "Advanced", then "Proceed to 192.168.0.1"*

Update firmware

- Under "Maintenance", click "Upgrade". Then click the "Local" radio button at the top of the page, click the "Browse" button, and select your R710 firmware file. Click the "Perform Upgrade" button.

- The screen will say "Loading..." at the top. Soon, it should show "Please wait, reboot in progress" with a progress bar. After the upgrade is done, click "OK" on the "Great. I'm all done." message box.

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How to update EdgeRouter-X firmware from a computer *(optional)*

Download firmware update file

- On an internet-connected computer, navigate to: https://www.ui.com/download/edgemax/edgerouter-x to download the latest firmware file for your router.

Hook up EdgeRouter-X to computer

- Plug an Ethernet cable directly between your computer and the eth0 port on your EdgeRouter-X.

- Set the computer networking parameters to "Manual", with the following settings:

    - *IP or IPv4 address: 192.168.1.100*
    - *Subnet mask: 255.255.255.0 (if present)*
    - *Subnet prefix length: 24 (if present)*
    - *Gateway: 192.168.1.1*
    - *DNS: not needed (if present)*

- Open a browser, and navigate to 192.168.1.1 to open the EdgeRouter-X management screen.
    - *Ignore any "certificate error" or other security warnings when you open this page.*
    - *You may need to click "Advanced", then "Proceed to 192.168.1.1"*

- Log into the router – the default user and password are both ubnt

Update firmware

- At the bottom left of the page, click "System", scroll down to "Upgrade system image" and click the "Upload a file" button. Select the firmware file you downloaded, earlier.

- *NOTE: When you start uploading the file, circular arrows will start moving – the upload takes about 5-10 minutes. When the upload is complete, your browser will offer to download a file called "upgrade.json". This is your only indication that the firmware update has completed – the circular arrows will still be moving.*

- When your browser offers to download "upgrade.json", you don't need to download it. Instead, just scroll down to the "Restart device" section, and click the "Restart" button. You'll need to click a few more confirmation buttons, and then your EdgeRouter-X will restart.

- After your EdgeRouter-X restarts, log into the router again, and verify that the firmware version reported in the top left corner matches what you installed.