NETGEAR Nighthawk (R7000) Router Setup Guide For AR-Drone Use (Multiple Drones)

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Contents

0 Introduction

AR-Drones have their own internal routers. In order to send commands to an AR-Drone (eg. via ROS) you will need to connect your computer to the drone's wifi network. In order to connect to multiple drones you will need to have your router create a local LAN distributing its own IP address using DHCP. You will also need to reconfigure each drones network settings to have it connect to the new LAN.

In the robotics room at MSL we use the NetGear Nighthawk (R7000), and thus this setup will guide you through configuring this specific router.

This guide was mostly taken from:
https://github.com/AutonomyLab/ardrone_autonomy/wiki/Multiple-AR-Drones

Note:
There is a separate guide available for configuring your router and drones to use a single drone. This guide will also work for a single drone, but is more complicated. This over-complication is not needed if you only intend to use a single drone.

1 Pre-Setup

1. Connect the NetGear router to power and an ethernet cable from the PC to one of the numbered ports (not the internet port) on the back of the router.

1.1 Reset NetGear router to factory defaults

1. Take a thin screwdriver or anything else and press the "reset" button on the back of the router, untill the lights turn off except for 2 lights (approx. 7 seconds)

2. Wait for the router to restart itself and the power light appears white.

2 Router Configuration

2.1 Enter router configuration via web browser

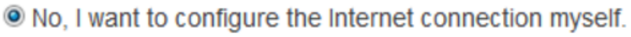
1. Open your favorite web browser.

   (a) If you opened Google Chrome or Microsoft Edge re-evaluate your life, close the browser, and open a nice, open-source, web browser.

2. Make sure your proxy settings are off!

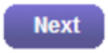
3. Go to http://www.routerlogin.net/

4. After the router finished searching for stuff, choose:



● No, I want to configure the Internet connection myself.

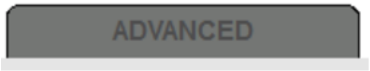
and:



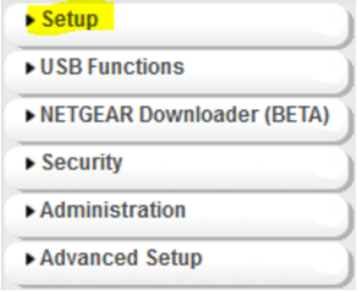
5. Default Username: admin
   Default Password: password

2.2 Configure Wireless Settings

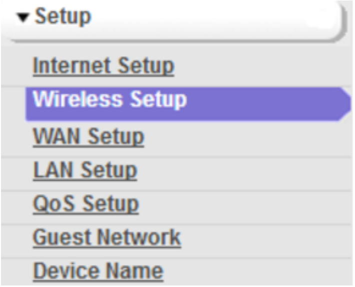
1. Go to the "ADVANCED" tab:

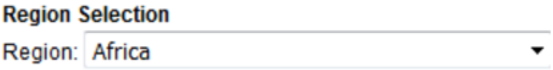
2. Click on "Setup":

3. Go to "Wireless Setup":

   (a) Set "Region" to "Africa (may not be necessary):

   Region Selection

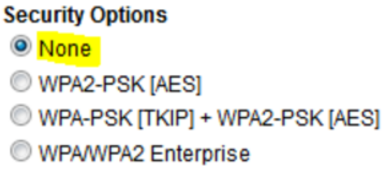
   Region: Africa

   (b) Under "Wireless Network (2.4GHz b/g/n)" and "Wireless Network (5GHz a/n/ac)" do the following: (5GHz maybe not necessary, but do it their to stay on the safe side):

   i. Change "Name (SSID)" to an SSID of your choice (in this guide we choose "dronenet", remember this because it will be relavent in the future)

   Name (SSID): dronenet

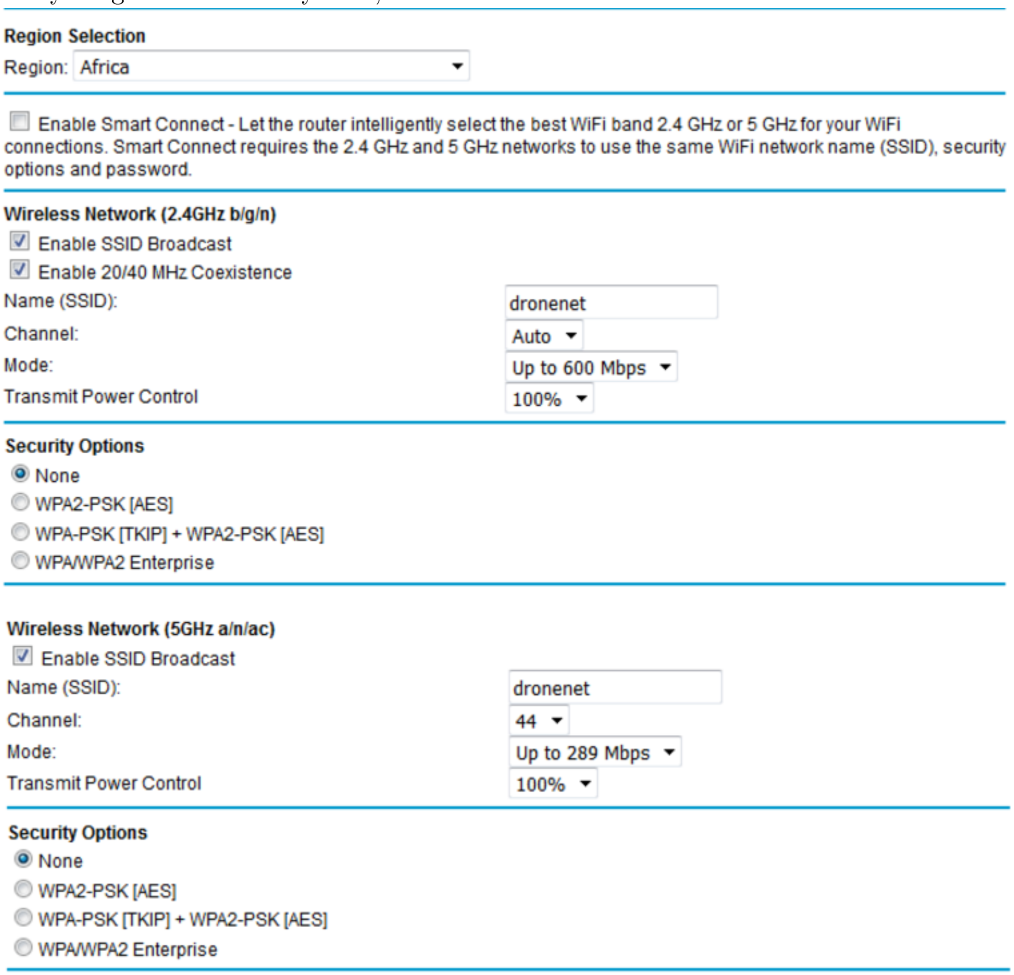
ii. In "Security Options" choose "None":



Security Options

● None
○ WPA2-PSK [AES]
○ WPA-PSK [TKIP] + WPA2-PSK [AES]
○ WPA/WPA2 Enterprise

(c) Everything else should stay as is, so the final result should look like:



Region Selection

Region: Africa

□ Enable Smart Connect - Let the router intelligently select the best WiFi band 2.4 GHz or 5 GHz for your WiFi connections. Smart Connect requires the 2.4 GHz and 5 GHz networks to use the same WiFi network name (SSID), security options and password.

Wireless Network (2.4GHz b/g/n)

☑ Enable SSID Broadcast
☑ Enable 20/40 MHz Coexistence

Name (SSID):	dronenet
Channel:	Auto
Mode:	Up to 600 Mbps
Transmit Power Control	100%

Security Options

● None
○ WPA2-PSK [AES]
○ WPA-PSK [TKIP] + WPA2-PSK [AES]
○ WPA/WPA2 Enterprise

Wireless Network (5GHz a/n/ac)

☑ Enable SSID Broadcast

Name (SSID):	dronenet
Channel:	44
Mode:	Up to 289 Mbps
Transmit Power Control	100%

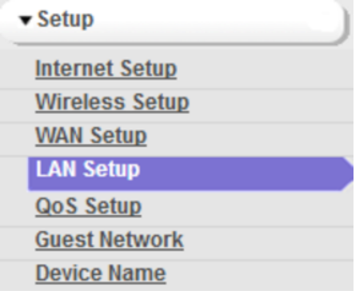
Security Options

● None
○ WPA2-PSK [AES]
○ WPA-PSK [TKIP] + WPA2-PSK [AES]
○ WPA/WPA2 Enterprise

(d) Click "Apply" at the top:

2.3 Configure LAN Settings

1. Go to "LAN Setup" on the left:



   (a) Make sure that the following is set:

      i. "IP Address" is set to "192.168.1.1"

      ii. "IP Subnet Mask" is set to "255.255.255.0"

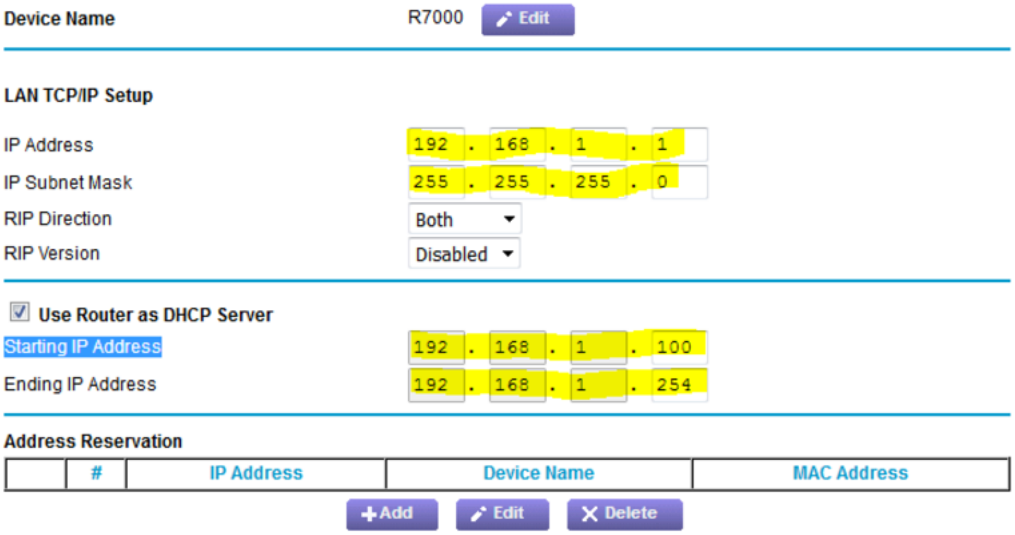
      iii. "RIP Direction" and "RIP Version" stay as they were.

      iv. "Use Router as DHCP Server" is ticked and:

         A. "Starting IP Address" is set to "192.168.1.100"

         B. "Ending IP Address" is set to "192.168.1.254"

   (b) By the end it should look something like this:



Device Name R7000 Edit

LAN TCP/IP Setup

IP Address 192 . 168 . 1 . 1

IP Subnet Mask 255 . 255 . 255 . 0

RIP Direction Both

RIP Version Disabled

☑ Use Router as DHCP Server

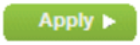
Starting IP Address 192 . 168 . 1 . 100

Ending IP Address 192 . 168 . 1 . 254

Address Reservation

	#	IP Address	Device Name	MAC Address

2. Click "Apply" at the top:



3 Drone Configuration

Note:
This section requires you to have a separate computer with wifi.
This is due to your router not being configured to bridge the connection.

3.1 Changing Drone Settings

1. Connect to your AR-Drone's ad-hoc wifi (directly to the drones wifi router, like you would connect to any wifi connection)

2. Open the terminal and telnet to the drone:

   (a) Run:

   ```
   telnet 192.168.1.1
   ```

3. create a file called wifi.sh in /data of the drone:

   ```
   vi /data/wifi.sh
   ```

4. Copy the following into the file:

   ```
   killall udhcpd
   ifconfig ath0 down
   iwconfig ath0 mode managed essid dronenet
   ifconfig ath0 192.168.1.10 netmask 255.255.255.0 up
   ```

   Notice:

   - In line 3 change "dronenet" to the SSID you chose when setting up the router.
   - The IP in line 4 should be unique to each drone, so change it between different drones.

   If you are not familiar with vi:

   - To enter insert mode in vi press "i".
   - To save and exit vi press "esc" to exit insert mode and then ":wq")

5. Make the newly created file executable:

   ```
   chmod +x /data/wifi.sh
   ```

6. Close the telnet connection:

   ```
   exit
   ```

3.2 Run wifi.sh from PC:

Notice:
While the previouse sections should only be done once, this step should be done whenever you want to make the AR-Drone connect to your wireless (for example every time you turn on the drone)

1. Connect to your AR-Drone's ad-hoc wifi (directly to the drones wifi router, like you would connect to any wifi connection)

2. Open a terminal

3. Execute the following command to remotly run wifi.sh on the drone:

   ```
   echo "./data/wifi.sh" | telnet 192.168.1.1
   ```

   (a) Your computer should now disconnect from the drones network. This is due to the drone's network configurations being changed.

4. On the computer that is connected to the previously configured routers wireless network check that you have connection to the drone using ping:

   ```
   ping 192.168.1.10
   ```

   (a) Where the IP address is the same as the one configured in wifi.sh of this drone.

4 Run the ROS Driver

Congratulations, everything should be working now!
When connecting to the drone using ROS you will need to make sure to supply the correct drone IP to ardrone_autonomy. This can be done by:

1. If running ardrone_autonomy directly in the command line use:

   ```
   rosrun ardrone_autonomy ardrone_driver -ip 192.168.1.10
   ```

2. If using a launch file add/change in the node line the argument:

   ```
   args="-ip 192.168.1.10"
   ```

   Thus you will end up with something like:

   ```
   <node name="ardrone_driver" pkg="ardrone_autonomy"
   type="ardrone_driver" args="-ip 192.168.1.10" />
   ```

Notice:

- The IP address in the above examples should be the same as the one configured in the wifi.sh file of this drone.
- Make sure to give the different nodes for different drones different names, i.e:

  ```
  <node name="ardrone_driver1" pkg="ardrone_autonomy"
  type="ardrone_driver" args="-ip 192.168.1.10" />
  ```

  and

  ```
  <node name="ardrone_driver2" pkg="ardrone_autonomy"
  type="ardrone_driver" args="-ip 192.168.1.12" />
  ```

  If using two drones, one with the ip 192.168.1.10 called “ardrone_driver1” and the other with ip 192.168.1.12 called “ardrone_driver2”

3. Program to your hearts content!