

# Test Train Wireless Network Configuration

## Instructions for Configuration



May 2020

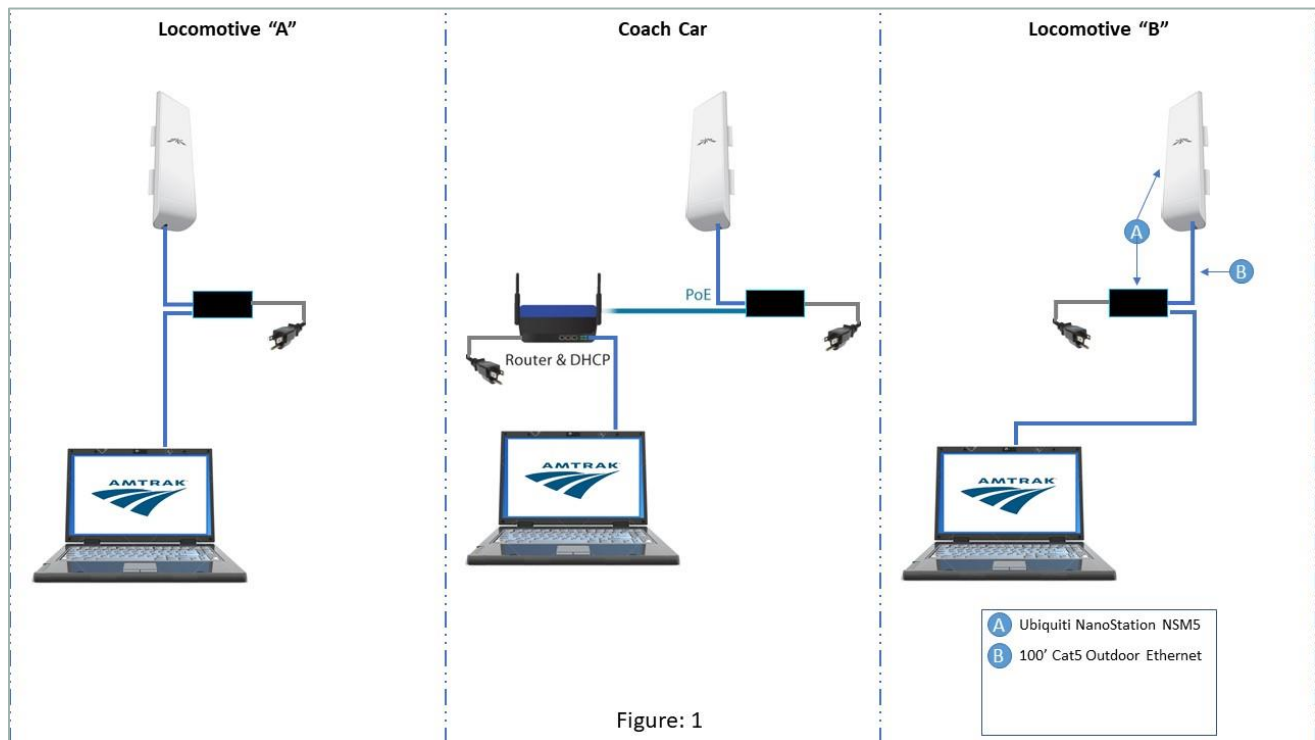
Presented by:  
Burns Engineering & Amtrak

The following instructions are provided to configure a **Test Train Wireless Network**.

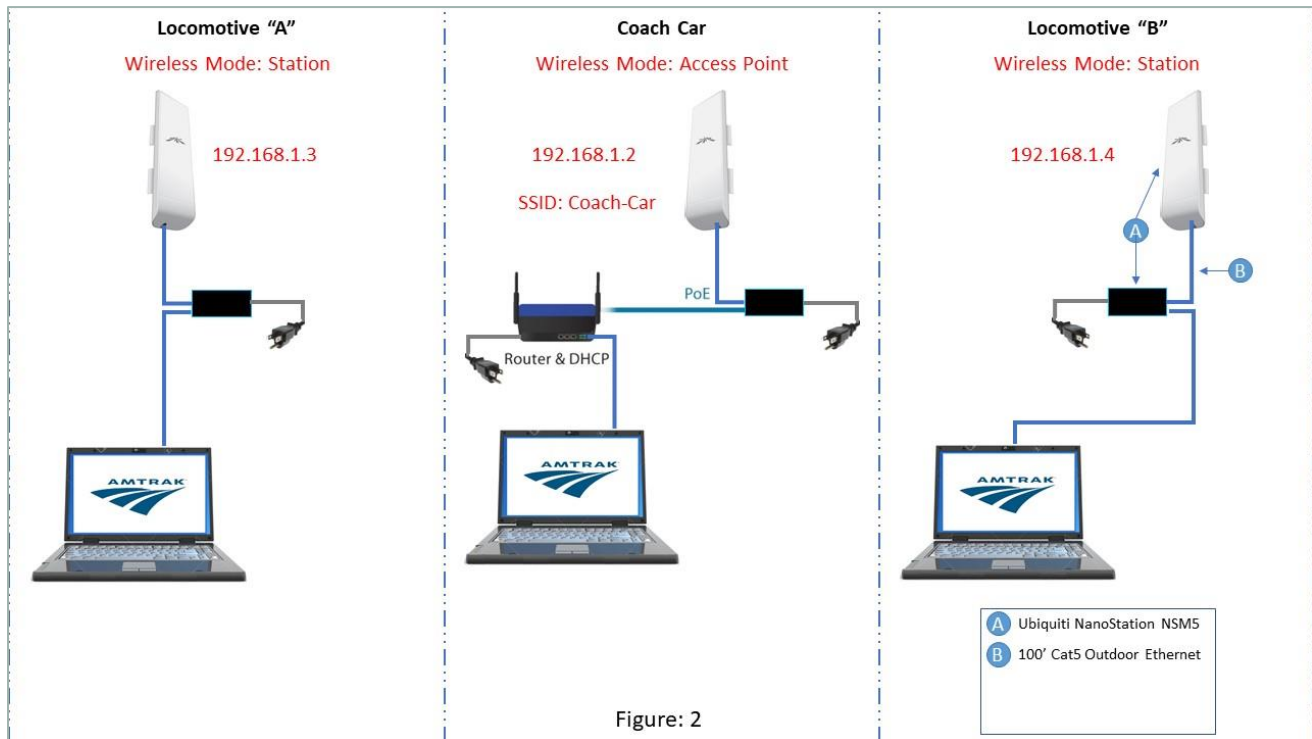
**Required equipment:**

QTY	Description	Location	Notes
3	Ubiquiti NanoStation NSM5	1. Coach Car roof 2. Locomotive "A" roof 3. Locomotive "B" roof	Provides wireless connectivity for devices on a Test Train Wireless Network.
3	100' Cat5 Outdoor Ethernet	1. Coach Car 2. Locomotive "A" 3. Locomotive "B"	Connects laptops to NanoStations
3	Laptops	1. Coach Car 2. Locomotive "A" cab 3. Locomotive "B" cab	
1	Router / DHCP	4. Coach Car	Provides IP addresses for devices on a Test Train Wireless Network

Assemble the equipment in the various locations as shown in **Figure 1**:



The following steps describe how to configure each NanoStation on a Test Train Wireless Network with the appropriate network configuration parameters, as shown in **Figure 2**:



1. Configure laptop to have a static IP address of 192.168.1.100
2. Reboot laptop
3. Connect laptop to NanoStation using Ethernet cable.
4. Launch web browser connect to URL <http://192.168.1.20>  
(This connects the laptop to the NanoStation)
5. When the login screen appears, type **ubnt** for the username and **ubnt** for the password  
(At some point during the configuration you be required to change these defaults, but not sure when that occurs.)
6. You must agree to the terms and conditions
7. Configure the NanoStation as an **Access Point** or a **Station**, as described below.

**NOTE:** The Access Point on the Coach Car must be configured and operational before configuring the Stations in each locomotive.

8. After configuring the NanoStation, Re-configure laptop to obtain IP address automatically
9. Reboot laptop
10. Laptop and NanoStation are ready for use.

Configure the Coach Car NanoStation as an **Access Point** as follows:

1. Restore the radio to factory default values. This is critical, especially when troubleshooting a problem. To perform a reset, press-and-hold the **Reset** button, power-on, release the **Reset** button when the lights begin to flash.
2. Choose the [Wireless] tab
  - a. Change Wireless Mode to **Access Point**
  - b. Select WDS:  Enable
  - c. Set the SSID as **Coach-Car**
  - d. Click the Change button
3. Choose the [Network] tab
  - a. Change IP Address to **192-168.1.2**
  - b. Click the Change button
  - c. Click the Apply button

The screenshot shows the 'Basic Wireless Settings' configuration page. The 'Wireless Mode' dropdown is set to 'Access Point' and is highlighted with a red box. Below it, 'WDS (Transparent Bridge Mode)' is checked and set to 'Enable'. The 'SSID' field contains 'Coach-Car'. Other settings include 'Country Code' set to 'United States', 'IEEE 802.11 Mode' set to 'A/N mixed', 'Channel Width' set to '40 MHz', 'Frequency' set to 'auto', 'Extension Channel' set to 'None', 'Frequency List' unchecked, 'Calculate EIRP Limit' checked, 'Antenna' set to '300 (2x2) - 22 dBi', 'Output Power' set to '26 dBm', 'Data Rate Module' set to 'Default', and 'Max TX Rate' set to 'MCS 15 - 270/300' with 'Auto' checked.

Figure: 3

### Reminder:

4. After configuring the NanoStation, re-configure laptop to obtain IP address automatically
5. Reboot laptop
6. Laptop and NanoStation are ready for use.

Configure each locomotive NanoStation as a **Station** as follows:

**NOTE:** The Access Point on the Coach Car must be configured and operational before configuring the Stations.

1. Restore the radio to factory default values. This is critical, especially when troubleshooting a problem. To perform a reset, press-and-hold the **Reset** button, power-on, release the **Reset** button when the lights begin to flash.
2. Choose the **[Wireless]** tab
  - a. Change Wireless Mode to **Station**
  - b. Select WDS:  Enable
  - c. Set the SSID – Click the **Select** button to display a list of available access points. Select **Coach-Car** from the list. Click **Lock to AP** (at bottom of list) to always maintain a connection to the Coach Car access point.
  - d. Click the Change button
3. Choose the **[Network]** tab
  - a. Change IP Address to **192.168.1.3 (loco “A”) or 192.168.1.4 (loco “B”)**
  - b. Click the Change button
  - c. Click the Apply button

The screenshot shows the 'Basic Wireless Settings' interface. Key elements include: 'Wireless Mode' dropdown set to 'Station'; 'WDS (Transparent Bridge Mode)' checkbox checked and labeled 'Enable'; 'SSID' field containing 'Coach-Car' with a 'Select...' button to its right; 'Lock to AP' field containing '[Coach-Car MAC address]'; 'Country Code' dropdown set to 'United States'; 'IEEE 802.11 Mode' dropdown set to 'A/N mixed'; 'Channel Width' dropdown set to 'Auto 20/40 MHz'; 'Frequency Scan List, MHz' checkbox unchecked; 'Calculate EIRP Limit' checkbox checked and labeled 'Enable'; 'Antenna' dropdown set to '300 (2x2) - 22 dBi'; 'Output Power' slider set to '26 dBm'; 'Data Rate Module' dropdown set to 'Default'; and 'Max TX Rate, Mbps' dropdown set to 'MCS 15 - 130/144.4 [270]' with an 'Auto' checkbox checked.

Figure: 4

### Reminder:

4. After configuring each NanoStation, Re-configure laptop to obtain IP address automatically
5. Reboot laptop
6. Laptop and NanoStation are ready for use.

Add cameras and additional monitors as desired, as shown in **Figure 5**:

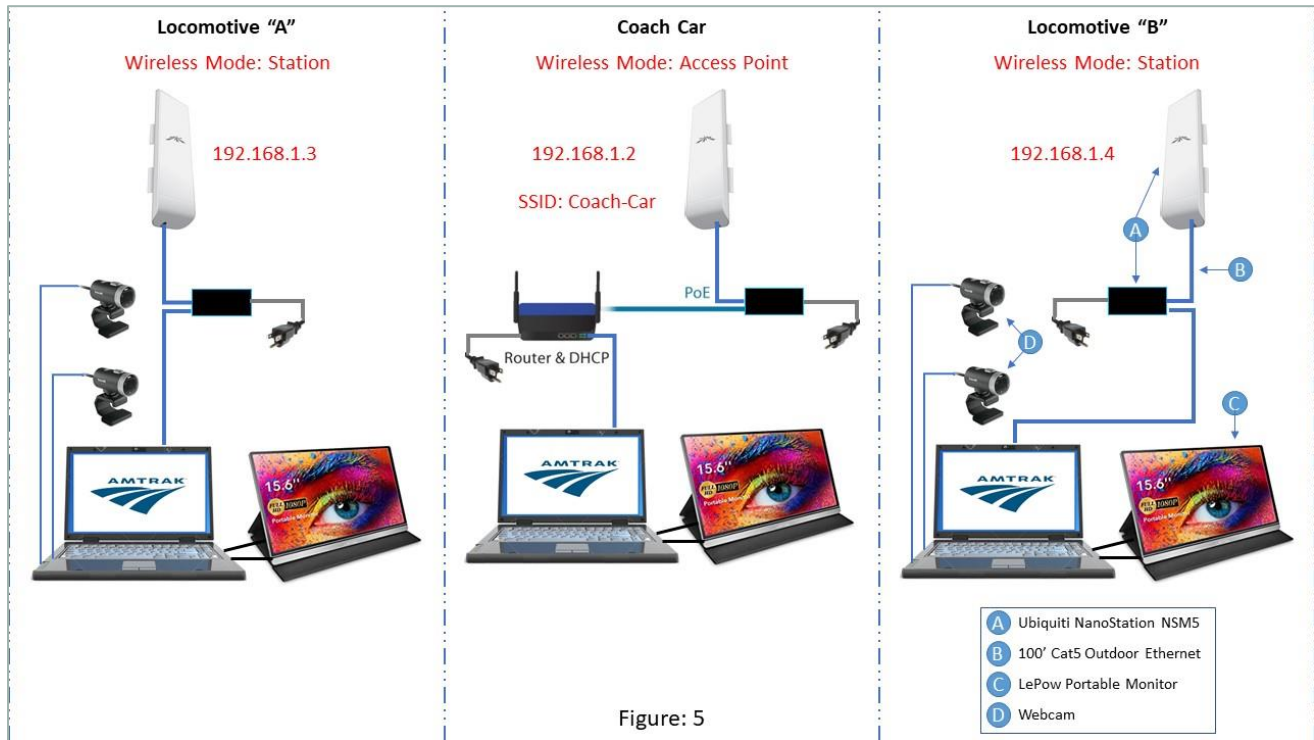


Figure: 5

**Optional:** If additional networked devices are needed in the locomotive cab, a network switch can be inserted between the laptop and NanoStation once configuration has been completed.



To remotely access and control the laptops in each locomotive cab from the laptop in the Coach Car, use TeamViewer, Remote Desktop, or similar,

The Wireless Network configuration described above was successfully deployed on the Amtrak ACSES Rev. 11 Test Train in April 2020 and is shown below:



### References:

1. Ubiquiti NanoStation Quick Start Guide  
[https://dl.ubnt.com/qsg/NanoStationM\\_NanoStationLocoM/NanoStationM\\_NanoStationLocoM\\_EN.htm](https://dl.ubnt.com/qsg/NanoStationM_NanoStationLocoM/NanoStationM_NanoStationLocoM_EN.htm)
2. Ubiquiti airOS 6 User Guide  
[https://www.ui.com/downloads/guides/airOS/airOS\\_6\\_UG.pdf](https://www.ui.com/downloads/guides/airOS/airOS_6_UG.pdf)
3. AirMAX – Configure a Point-to-Multipoint (PtMP) ISP-Style Access Point  
<https://help.ui.com/hc/en-us/articles/205197610-airMAX-Configure-a-Point-to-Multipoint-PtMP-ISP-Style-Access-Point>
4. AirMAX – How to Align airMAX Antennas  
<https://help.ui.com/hc/en-us/articles/360013252034-airMAX-How-to-Align-airMAX-Antennas>
5. How to set a static IP address on Windows 10  
<https://pureinfotech.com/set-static-ip-address-windows-10/>