Using Multiple Routers with TECLOG3 and TEC WiFi Links
(1 Linksys EA6900 and 3 TP-Link TL-MR3040)

When conducting a multi-fan airtightness test of a commercial building with TECLOG3, you will typically control the test from a single laptop computer located in a central part of the building. The DG-700 gauges and blower door fan systems used in the test are often located throughout the building in order to create uniform test pressure differentials across the building envelope. The large distance between the gauges, fans and central computer can pose logistical challenges for the testing contractor. Fortunately, the DG-700's versatile communication options provides numerous solutions to this challenge.

The three most common ways to connect the multiple DG-700 gauges and fans used in the test to your central laptop computer are:

1. Run long lengths of CAT5 cable from the RS-232 ports on the gauges to the laptop computer using sets of DB9 to CAT5 adapters and a DB9 to USB hub.

2. Wirelessly connect the DG-700 gauges to your laptop using wireless routers and TEC WiFi Link modules.

3. Use a combination of wireless and wired connections.

This document describes how to use a combination of wireless routers and wired connections to create a robust network of DG-700 gauges and blower door fans to conduct your commercial building airtightness test.
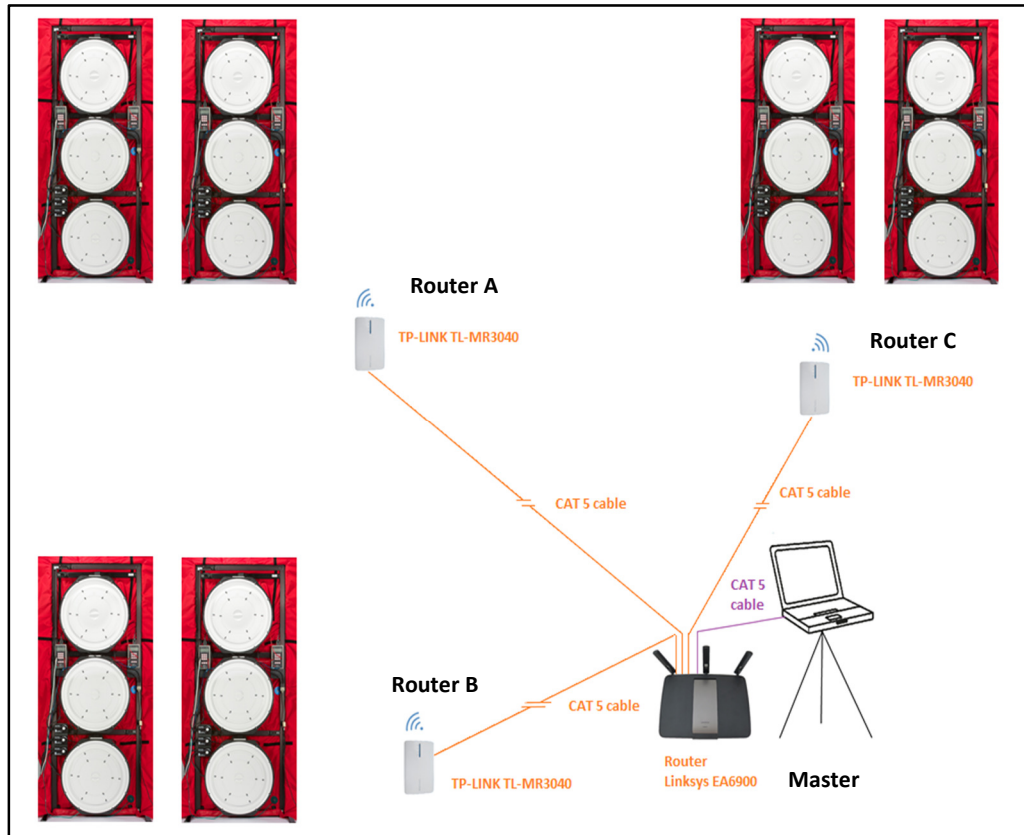
Equipment Needed

- **TEC WiFi Link Adapters:** The TEC WiFi Link adapter attaches to the DG-700 gauge and creates a wireless network that can be directly accessed by any computer or mobile device with WiFi capability. In addition, the WiFi Link can be configured to search for a specific router and automatically connect to it. This router feature allows us to create a network of routers (each connected to multiple DG-700 gauges) that can be accessed from the central laptop computer, and the TECLOG3 software. Each DG-700 gauge will need its own WiFi Link adapter.

- **Routers:** This example uses one Linksys EA6900 router, and 3 TP-Link TL-MR3040 battery powered routers. The EA6900 router will serve as the "Master" router and will connect directly to the laptop computer, and to the 3 TL-MR3040 routers (see figure 1 below) using CAT5 cable.

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- **CAT5 Cable:** 4 sets (1 from EA6900 router to laptop, 3 from EA6900 router to TL-MR3040 routers.

Figure 1: Router Network

The network above uses a combination of wireless connections to the gauges (TL-MR3040 routers to the DG-700 WiFi Link adapters) and wired CAT5 Ethernet cables (each up to 300' long) to connect the routers together and to the central computer. This combination provides a robust network that can be used in buildings with high mass concrete walls and floors that make it very difficult to rely solely on WiFi connections during the test. **Note:** In this example we are not using the **Master Router** to wirelessly connect to any DG-700 gauges/WiFi Links, but it can also be used for this purpose.

Configuring the Routers

For both the EA6900 and TL-MR3040 routers, the most important configuration issue is changing the router name (SSID) and changing the default password (security key) to something easy to remember and easy to enter when configuring the WiFi Links (see below). This process is done using the instructions that come with the routers. Once you have renamed the routers and changed the passwords, it is good practice to put a label directly on the router that has the new name and password. In the figure above, the three TL-MR3040 routers were renamed **Router A**, **B** and **C**, and the EA6900 was renamed **Master Router**.

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For the TL-MR3040 routers, be sure to fully charge the batteries. Turn the power switch to on and set the router mode switch to **3G/4G** (**Note:** the mode setting will be changed later in the process). The EA6900 router will need to be plugged into power.
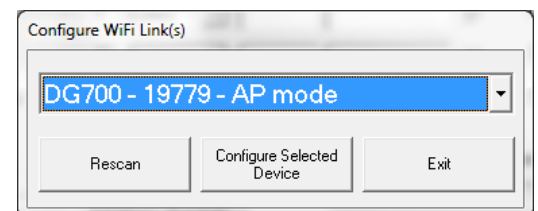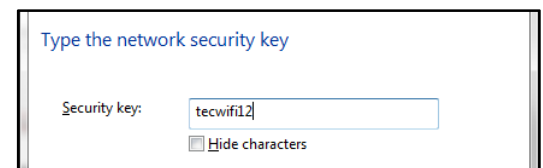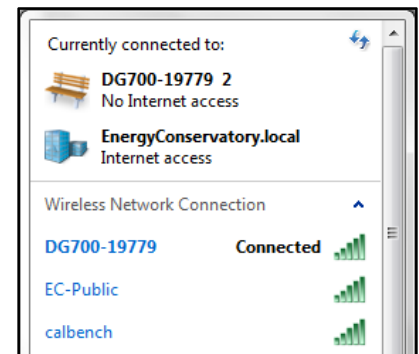
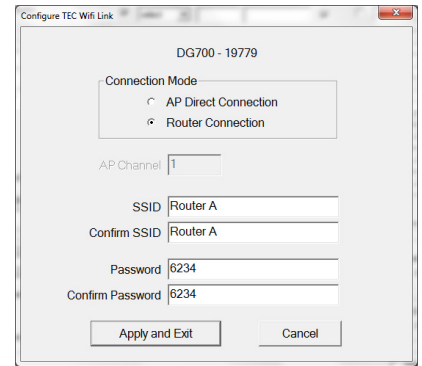## Configuring the TEC WiFi Links to Connect to the Routers

The next step is to configure the individual WiFi Links to connect with the appropriate routers. For example, all WiFi Links in close proximity to TP Link **Router A** will need to be configured to search for and connect to this router.

WiFi Links are shipped from TEC in AP Direct Connect Mode. In this mode, the WiFi Link is providing a wireless access point that your laptop/mobile device connects to directly. This is the recommended mode for single gauge operation, but will need to be changed in order to be used with the routers as described in this document. Configuration of WiFi Links into Router Mode can be done through the TECLOG3 software (it can also be done using our mobile iTEC-700 app and our TECTITE 4.0 software). Below is an explanation of the configuration process using TECLOG3.

- Each WiFi Link will need to be configured one device at a time. First connect the WiFi Link to the gauge, attach the power jumper cable between the WiFi Link and the gauge, and turn on the gauge. Lights #1 and #2 on the WiFi Link should turn on and eventually turn solid. Now connect your laptop to the wireless network being generated by the WiFi Link. The wireless network will be named DG700-SN (where SN is the serial number of the DG-700 gauge).

- If you are wirelessly connecting to this DG-700 gauge for the first time, you will be asked to enter the default WiFi Link security key (tecwifi12).

- Launch the TECLOG3 software and choose **Settings** from the **Configuration** pull down menu.

- Click on the **Configure WiFi Settings** button. The **Configure WIFI Links** window will come up and display the DG-700 gauge(s) that TECLOG3 can wirelessly detect. Choose the DG-700 that you want to configure to Router Mode and then click on the **Configure Selected Device** button.
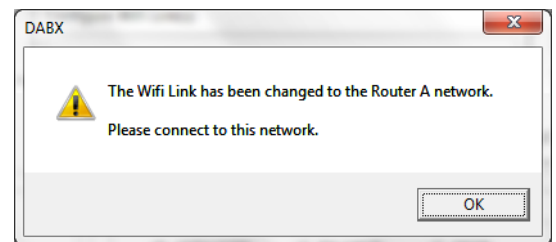
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- When the **Configure TEC WiFi Link** window comes up choose the *Router Connection* mode. Fill in the *SSID* (name of your router) and its *Password*. When that is complete, click on *Apply and Exit*.

- Once you click on *Apply and Exit*, the WiFi Link is put into Router Mode and will immediately begin searching for the router SSID to connect with. Light #2 on the WiFi Link will begin flashing until it finds the router and connects with it. Once the connection is made, light #2 will remain on solid (the TL-MR3040 router must on and in *3G/4G* mode for the connection to be made during this process).

  TECLOG3 will also issue the message "The WiFi Link has been changed to the XXXXX network. Please connect to this network." Click *OK* to return to the **Configure WiFi Link** window.

- Turn on the next WiFi Link and gauge to configure, connect your computer to the new network, then click on *Rescan* in the **Configure WiFi Link** window to display the new gauge. Repeat the configuration process by clicking on *Configure Selected Device*.

- It is good practice to put a label on the WiFi Links indicating which router it is configured to connect with.

Note: If light #2 on a WiFi Link continues to flash after you have configured the Link to Router Mode, you may have incorrectly entered in the router SSID or password when configuring the device (the TL-MR3040 router must on and in *3G/4G* mode for the connection to be made during this process). If this happens, you will need to put the WiFi Link back into AP Mode and try again. To put the WiFi Link into AP Mode, press and hold down button A on the bottom left corner of the WiFi Link until all four lights begin flashing, and then release the button. Now repeat the procedure to change from AP Mode to Router Mode.

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Connecting the Routers Together

Once the WiFi Links are all configured properly to wirelessly connect with the appropriate routers, we need to connect the routers together and to the central computer using CAT5 cables.

- Plug one end of a CAT5 cable into Ethernet Port 1 on the EA6900 (Master) router, and the other end into the Ethernet network port on your central laptop computer (this cable can be up to 300' long).

- For each of the TL-MR3040 routers, plug one end of a CAT5 cable into the Ethernet port on the router and the other end into one of the remaining Ethernet Ports 2–4 on the EA6900 (Master) router (these cables can each be 300' long).

- Change the mode setting on the TL-MR3040 routers from *3G/4G* to *AP*. **Note:** As the TL-MR3040 routers switch to *AP* mode, light #2 on the WiFi Links configured to these routers may blink until the routers are fully switched.

Because the **Master Router** is now physically connected to **Routers A**, **B** and **C,** you will be able to access gauges connected to any of the routers through the one network connection to the laptop computer.

Run TECLOG3 and Confirm Communication with All Gauges

- Launch the TECLOG3 software and choose *Settings* from the *Configuration* pull down menu.

- Click on the *Scan for Ports/Devices* button to initiate a scan for all connected gauges.

- Confirm that all DG-700 gauges being used in the test show up in the list of devices found.

- Set up TECLOG3 for your airtightness test. Refer to the document "Airtightness Testing with TECLOG3" found in the TECLOG3 help menu.

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