# *Installation Instructions*

# Low Loss Combiner
## LLC-850-5 and LLC-1900-5

**COMMSCOPE®**

## INTRODUCTION

The Low Loss Combiner (LLC) is a Duplex/TX type Same Band Combiner that combines a minor portion (5 MHz) of the TX frequency band at the 3G port with the RX band and remainder of TX band at the 2G port. The combined signals are available at the ANT port.

The 3G passband is tunable via an Ethernet interface. The LLC also outputs alarm information to the base station External Alarm Interface (EAI).

The LLC is housed in a 2 HU, 19" EIA rack-mountable enclosure, designed for indoor installation. RF connectors are located on the rear panel with other connections and indicators on the front panel.

The LLC is supplied with Power Cable and Alarm Cable.

## DOCUMENTATION

This Installation Instruction provides the basic steps of a typical installation performed by a skilled technician.

For additional information, please refer to the following documents, obtainable at www.commscope.com or from your local CommScope Sales Representative:

- Product Specifications
- Installation and Operation User Guide

## TECHNICAL SUPPORT

The CommScope Customer Technical Support center is available 24 hours/day, 7 days/week by calling:

- (800) 279-8185 (North America)
- +1 (703) 726-5556 (International)

**1** **Install LLC.** If installing in a CommScope Integrated Rack or Cabinet, refer to separate instructions provided with the LLC kit. Mount the LLC in the rack using four suitable rack screws (not included). Tighten fasteners securely.

**2** **Attach Ground Cable.** Attach an AWG 5-10 (5-16 mm$^2$) ground cable to the ground stud. Tighten the nut to 3.6 Nm (2.7 ft-lbs) torque using an 8 mm wrench.

Avoiding sharp bends, route the ground cable to the common frame or ground bar. Trim, and attach with suitable terminal and hardware.



**3** **Connect Alarm Cable.** Connect the Alarm Cable to the ALARM OUTPUTS connector and tighten the jackscrews. The cable connector is wired for NC logic but can be rewired for NO logic if required.

- NC logic: Use NC and COM terminals. Open in LLC Alarm state
- NO logic: Use NO and COM terminals. Closed in LLC Alarm state

Terminate the other end at the EAI.



**4** **Connect Power Cable.** Connect the Power Cable to the POWER connector. Terminate the other end at the base station power panel. The LLC accepts 19-75 VDC, positive or negative. Observe color of the two wires:

- Red wire: positive (+)
- Blue wire: negative (–)

Install a 1-5 A fuse or circuit breaker (not included).

The LLC will turn on. All front panel LEDs will initially turn on for several seconds while the LLC performs a power-up sequence. Verify that only the POWER LED stays on after the power-up sequence completes.
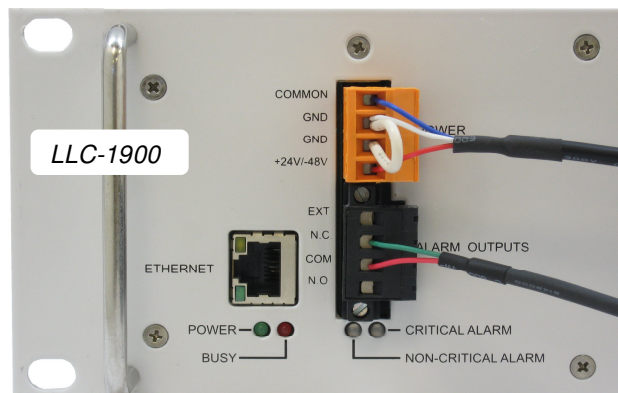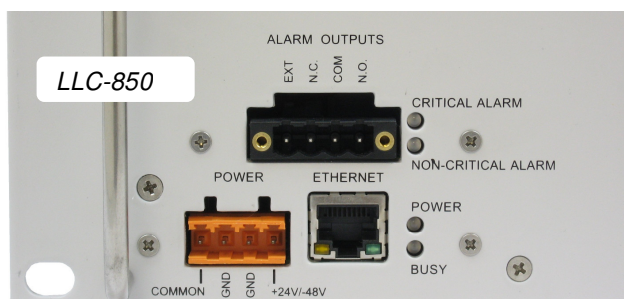
5 **Connect Ethernet Cable.** Connect an Ethernet cable (not provided) to the ETHERNET port. Either standard or cross-over cable may be used. Connect the other end to a personal computer (PC) Ethernet port/LAN card. Verify that the yellow LED in the ETHERNET jack turns on; the green LED may be on intermittently.

6 **Set the IP Address of the PC.** The procedure may differ slightly depending on the version of the Windows operating system used.

- From *Control Panel*, select *Network Connections* and find the entry for the *Local Area Connection* (LAN card).
- Right-click the entry and select *Properties*.
- Select *Internet Protocol (TCP/IP)* or *(TCP/IPv4)* as applicable. Click *Properties*.
- Record the settings displayed so that they may later be restored.
- Select *Use the following IP address* and enter *IP address:* 192.168.255.2, *Subnet mask:* 255.255.255.0. Click *OK*.
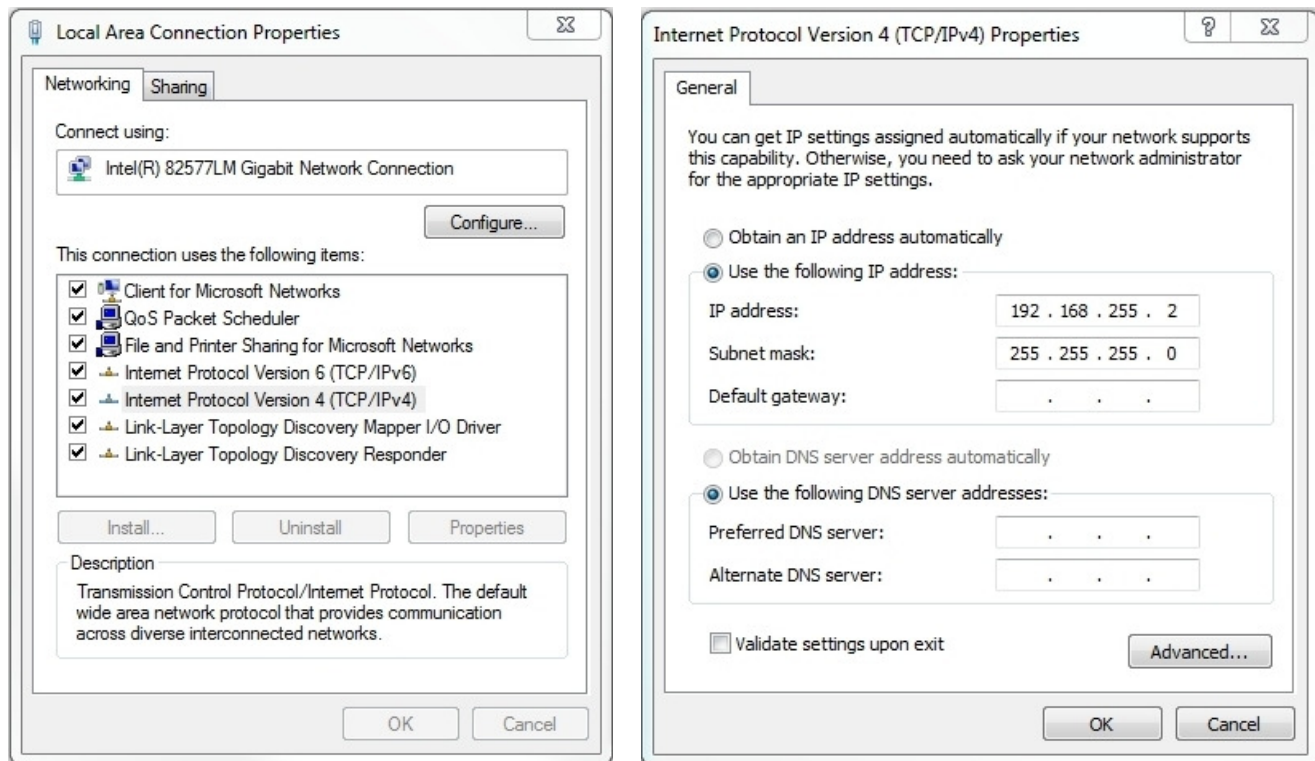
7 **Connect to LLC System Management.** LLC features are accessible via web pages delivered from the built-in web server.

- Open a web browser window on the PC.
- In the address bar, enter http://192.168.255.141. The LLC homepage will open. See home page examples shown below

The padlock symbol or text alert indicates whether the LLC is locked or unlocked. To make changes to the setup, the LLC must first be unlocked.

- Enter password and click *Confirm*. The default password is "pass".

After a period of inactivity, the LLC will be automatically locked. To lock the LLC at any time, simply click *Confirm*.

on the go
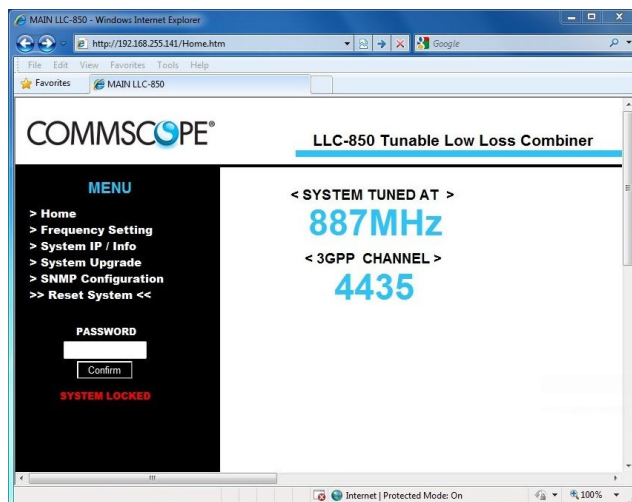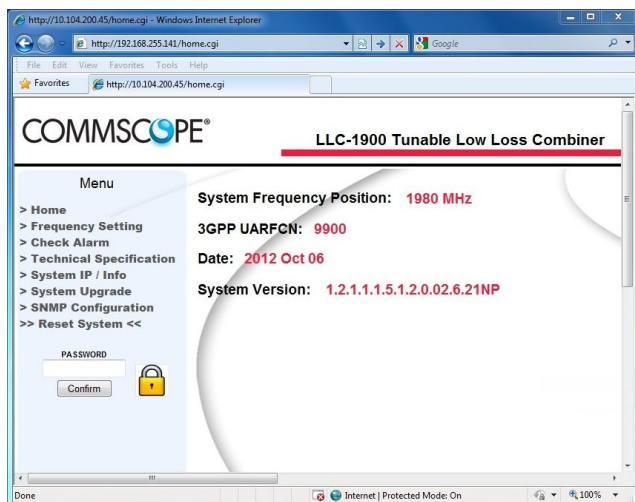




**8** **Set Center Frequency of 3G Path.** The center frequency is tunable in 100 kHz increments between the limits shown on the *Frequency Setting* screen. Select *Frequency Setting* from the Menu on the left.

- To calculate Frequency from 3GPP UARFCN, use the *3GPP Channel Calc* area.
- Enter the target center frequency in the *Frequency Setting* area and click *Set Frequency Target.*
- While tuning, *System Moving to Frequency Target* is displayed and the Busy LED on the front panel is lit.
- After successful completion, *SYSTEM POSITION* is displayed with Frequency and 3GPP UARFCN.
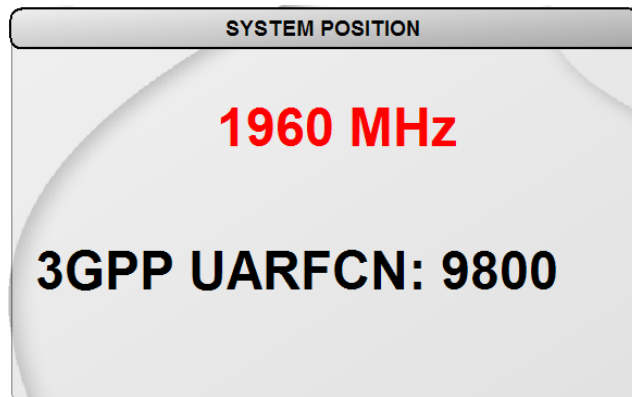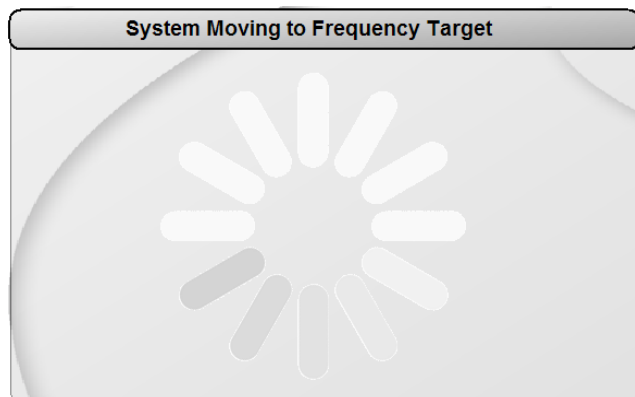






**9** **Manage another LLC.** Disconnect the Ethernet cable from the LLC. Then connect the Ethernet cable to the Ethernet port of the next LLC.

- Refresh the web page. Normally, the home page opens.
- If the home page is not displayed, close and restart the web browser, then navigate to http://192.168.255.141.
- If still unsuccessful, power cycle the LLC by disconnecting, then reconnecting the Power Cable. Repeat as above.

After completing all settings, the IP address of the PC may be restored as described in section 6 above.

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**10** **Connect RF Jumper Cables.** Connections to the LLC depend on the specific application. Refer to RF design sheets and diagrams for any particular installation. The following steps are for general guidance:

- Connect a jumper from base station to the 3G port of the LLC. This must carry only a transmit (TX) signal; a duplexer is often required before the LLC to un-duplex the TX band from the receive (RX) band. The bandwidth of the TX signal must be compatible with the 3G path bandwidth, e.g., a single UMTS carrier, 3 adjacent CDMA carriers, or an LTE carrier of up to 5 MHz channel width.
- Connect a jumper from base station to the 2G port. This can be a duplexed connection, passing the full RX band and the TX band with exception of the 3G path TX bandwidth. DC and AISG signals can be carried as well.
- Connect a jumper from the ANT port to the antenna feeder. The combined 2G and 3G RF signals along with any DC and AISG from the 2G port are carried from the ANT port.
- Tighten all connectors to 18-22 ft-lbs (25-30 Nm) torque.



*Rear panel – LLC-1900*



*Rear panel – LLC-850*

**11** **Check and Finish.** Check all connections and settings to ensure they are correct and secure. Dress and tie the cables making sure they are not exposed to excess strain, crush, abrasion, heat, or accidental damage.

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