Lab 4.2.9d Fluke LinkRunner – LAN Tests

LinkRunner™

Objective

- Become familiar with the capabilities of the Fluke LinkRunner

- Determine whether a cable drop is active

- Identify the cable drop speed, duplex capabilities, and service type

- Verify network layer connectivity with **ping**

Background / Preparation

In this lab, the student will work with Ethernet cable drops that are attached to networking devices such as hubs and switches. This is to determine the characteristics of the devices and cabling and identify potential networking problems. Use some of the key capabilities of the Fluke LinkRunner, such as drop activity and ping, to perform the analysis.

As networks run faster and become more complex, infrastructure cabling and devices must operate to precise levels in a tighter performance window. As a result, nearly 80% of network problems stem from simple wiring and connection problems. The following resources will be required:

- Ethernet hub and switch

- Several Ethernet straight-through patch cables

- Cable run from a wall-plate to switch through a patch panel

The following URLs provide information on the Fluke LinkRunner. The first one is a virtual demo of LinkRunner capabilities, and the second is a link to the downloadable LinkRunner Quick Reference Guide in various languages.

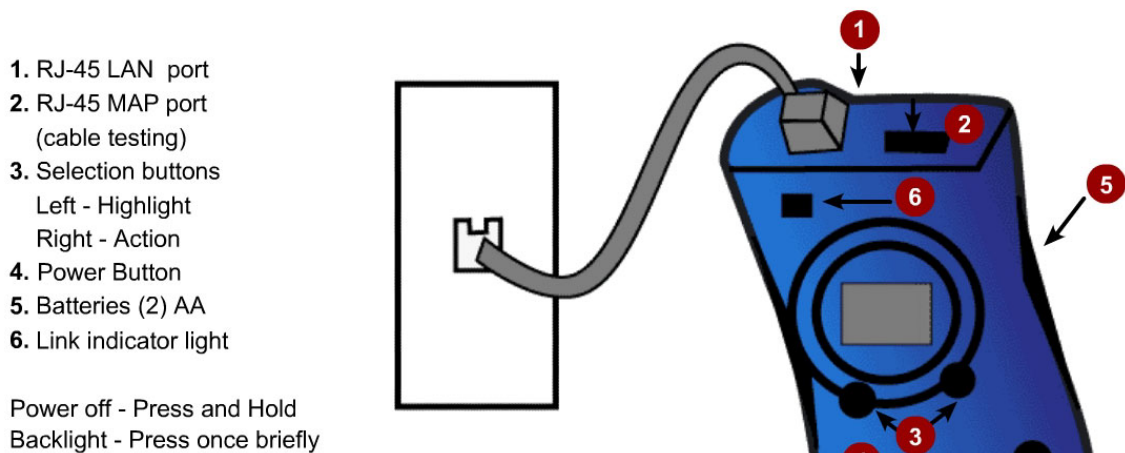http://www.flukenetworks.com/us/LAN/Handheld+Testers/LinkRunner/_see+it+live.htm

http://www.flukenetworks.com/us/LAN/Handheld+Testers/LinkRunner/_manuals.htm

Step 1 Become familiar with the capabilities of the Fluke LinkRunner

Access the virtual demo of the LinkRunner using the first URL listed above. Try different tests to become familiar with its capabilities.

Step 2 Obtain access to the LinkRunner Quick Reference Guide

Access the Quick Reference Guide online directly, or download it to a PC using the link provided above. The instructor may also have a copy of the Quick Reference Guide available. Selected pages of the Quick Reference Guide have been reproduced in this lab. The illustration below shows the connectors and buttons on the LinkRunner.

1. RJ-45 LAN port
2. RJ-45 MAP port
   (cable testing)
3. Selection buttons
   Left - Highlight
   Right - Action
4. Power Button
5. Batteries (2) AA
6. Link indicator light

Power off - Press and Hold
Backlight - Press once briefly

Step 3 Configure the LinkRunner

a. From any screen, access the main configuration by pressing both buttons simultaneously. There is the option to configure LinkRunner or go into Ping configuration.

b. Pressing the left button goes to LinkRunner configuration where there is the MAC address of the LinkRunner and the display can be toggled between feet and meters.

   What is the Layer 2 media access control (MAC) address? _____

c. Pressing the right button goes to ping configuration.

Step 4 Test active workstation links to a switch

a. LinkRunner allows the determination of what type of service users are connected to, such as Ethernet, Token Ring, or Telco. On Ethernet segments it can be determined whether the drop is active, identify its speed, duplex capabilities, and auto negotiation settings.

b. This test will determine if the cable drop is active while identifying its speed, duplex, and service type (10 or 10/100 indicates Ethernet).

c. Turn on the LinkRunner by pressing the small button in the lower right corner.

d. Disconnect a functioning LAN patch cable from a workstation and plug it into the RJ-45 LAN port on the LinkRunner. This is a nondestructive test in that it can be performed on a live network.
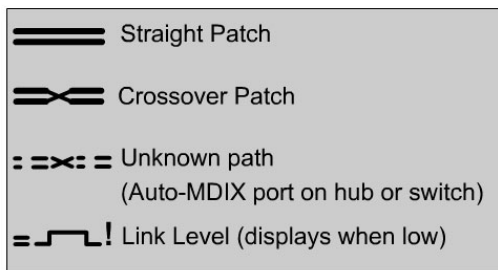
The cable should be attached to a wall plate, which then attaches to a switch through a patch panel in a wiring closet. Cabling should be in accordance with current structured cabling standards.

e. Observe the display on the LinkRunner and record the information for Drop #1 in the following table. A sample display from the quick reference guide is shown below the table.

f. Obtain another patch cable of any length, and plug one end directly into the switch. Plug the other end into the LinkRunner LAN port. Record the information for Drop #2 in the following table.

|	Link Active ?	Cable Type / Link Status	Advertised speed / duplex	Actual link speed / duplex	Network utilization
Drop #1					
Drop #2					

Is this an active Ethernet Port?

1. Activity Indicator
2. Cable/Link Status:

═══	Straight Patch
⊃⊂	Crossover Patch
⁚═⋈⁚═	Unknown path (Auto-MDIX port on hub or switch)
═⌐‾⌐!	Link Level (displays when low)

3. Advertised speed/duplex
4. Actual link speed/duplex
5. Softkeys (correspond to L/R selection buttons).
6. Network utilization

▮ **Battery Low Indicator: display when low.**
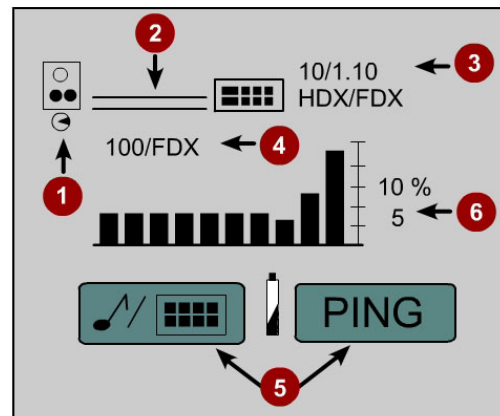
g. Disconnect the end of the cable from the switch and observe the display. What was the result?

_____

Step 5 Test a direct link to a hub

a. Obtain another patch cable of any length, and plug one end directly into an active regular hub port. Plug the other end into the LinkRunner LAN port. Describe the results.

_____

b. How does this display differ from that of a cable drop attached to a switch?

_____

c. Disconnect the power from the hub and described the display now.

_____

d. Plug the hub back in.

e. Move the cable from one of the regular of ports on the hub to the uplink port on the hub. Make sure the uplink is not active, so the button should not be pushed in. Describe the results.

_____

f. Activate the uplink port by pushing in the button. What happened to the wires in the display?

_____

g. Why did this occur?

_____

Step 6 Use the DHCP Ping function to verify network layer connectivity

If the LAN port in a DHCP network environment is connected, LinkRunner will act as a DHCP client. It will acquire an IP address and verify basic connectivity to key devices by pinging the default gateway or router and DNS server. See the diagram below for a sample of the screen display.

a. Turn on the LinkRunner by pressing the small button in the lower right corner.

b. Obtain a patch cable of any length and plug one end directly into the switch on a LAN with a DHCP server available. Plug the other end into the LinkRunner LAN port.

c. The LinkRunner must be in DHCP mode in order to perform this test. Press the right softkey (Ping) once to see if the DHCP magnifying glass is displayed. If not, press the left softkey twice and place a checkmark in the DHCP option box.

Allow time for the LinkRunner to obtain an IP address from the DHCP server, and then press the right softkey, which is the ping.

Note: If the LinkRunner fails to obtain an IP address, verify that the DHCP option box is checked and that there is a DHCP server active on the network.

d. What was the IP address that the LinkRunner obtained? _____

e. Press the left Softkey or magnifying glass button, which provides ping details.

f. What is the IP address of the default router or gateway?

g. What is the round-trip time for the ping to the default router? _____

h. What is the IP address of the DNS server?

i. What is the round-trip time for the ping to the DNS server? _____

j. If one response time is slower than the other, why is that?

_____

Can I Ping?
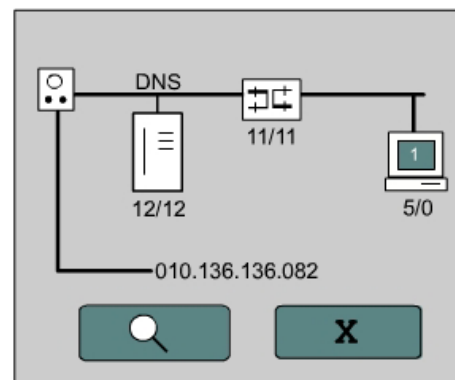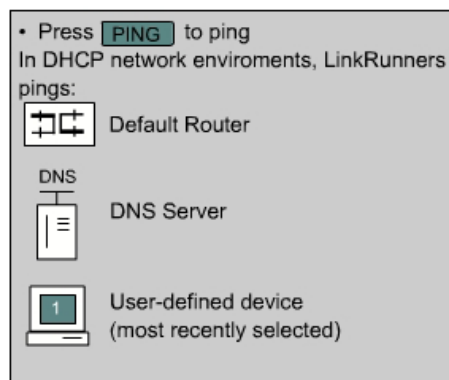
Step 7 Ping user-defined IP address

The LinkRunner can be used to ping user-defined IP addresses for up to 4 common IP address ping targets. See the diagram below for a sample of the screen display used to edit the IP address for computer target 1. This test assumes that the LinkRunner has obtained a compatible IP address, subnet mask and default gateway as a DHCP client in the prior step. If not see the note in step 7j below.

a. Turn on the LinkRunner by pressing the small button in the lower right corner.

b. Disconnect any cables from the LinkRunner.

c. Press the right SoftKey (wrench) to access configuration options.

d. Press the right SoftKey again (ping and wrench). When working on a network with a DHCP server, turn off the LinkRunner DHCP client by removing the checkmark from the DHCP check box. Press the right SoftKey (checkmark) to uncheck it.

e. Press the left SoftKey (down arrow) to get to the computer icon. Then press the right SoftKey (computer, IP, and wrench) to access the IP address configuration function.

f. Press the right SoftKey (down arrow and computer) to cycle through the four IP targets. Zero indicates no ping for the computer target. Select IP target number 1.

g. Press the left SoftKey (down arrow) to access the IP address, and press the right SoftKey (IP x.x.x.x) to begin configuring the IP address for target computer 1. See figure below.

h. Identify the IP address of a lab server or a partner workstation and record it here.

_____

i. Press the left SoftKey (right arrow) to advance the cursor from one number to the next in the IP address. Press the right to SoftKey (IP and Up arrow) to change the value of the number. All 12 decimal digits including zeros must be accounted for. While working with the first digit of any of the 4 octets, press the up arrow four or five times. What is the maximum number that the LinkRunner will allow to set the first number of an octet to? _____

j. When finished with the last digit, the left SoftKey will become a down arrow. Press the left SoftKey until there is the X (exit), and then press the right SoftKey (X). Press the left SoftKey (down arrow again until you get to the X and press the right SoftKey again to exit the configuration function.

Note: If the LinkRunner did not obtain a compatible IP address and subnet mask from DHCP in prior Step 6, configure them before going on. Instead of selecting the computer icon to configure, select the LinkRunner icon and follow the same basic procedure as described above to set its IP address and subnet mask. The IP address of the default gateway for the LinkRunner should also be set at this point.

k. After the IP address is set to be pinged, connect a patch cable from the LAN port on the LinkRunner to a wall plate jack, hub or switch on the network will be pinged. What does the cable display look like? _____

l. Press the right SoftKey (ping) to start the ping function. There should be a workstation icon with a target number 1 on the screen. Does the workstation have a solid lines or dashed lines?

_____

What does this mean?

_____

m. Press the left SoftKey (magnifying glass) to see the IP addresses of all devices being pinged and the round-trip time for each in milliseconds.

n. Which devices were being pinged and what were the round-trip times for each?

_____

o. Press the right SoftKey (X) twice to exit the detailed view and ping function.
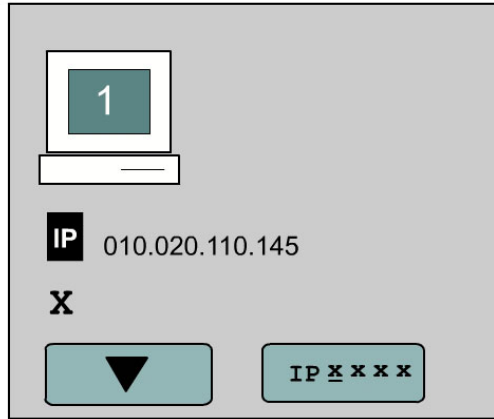
Step 8 Disconnect the equipment and store the cabling and devices