

Keysight Logic Analyzers Isolated Network Setup

White Paper

Notices

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1 Configuring a Logic Analyzer for Transparent DCOM Access in an Isolated Test Station

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2 Introduction

A common installation for a 1680/90- or 16900-series logic analyzer is as part of a test system, being controlled by a test controller PC that is using the DCOM programming interface.

A good practice for constructing the LAN connections within this test system is to isolate it from the organization's LAN, in order to:

- Prevent unauthorized access to the test system instruments.
- Ensure that the test system will function independently of any congestion or failure that might occur on the organization's LAN.

While using DCOM and an isolated LAN for the test system are both best practices, unless this is done in a certain way, the logic analyzer will be not be able to be added to the organization's domain (and therefore must be in a workgroup instead), which leads to the following problems:

- As each operator logs into the test controller PC, the test application inherits its access rights from the operator. Even if these operators are part of the domain, each operator must be added as a Windows user on the logic analyzer if the test application that runs while that operator is logged in is to access the logic analyzer using DCOM.
- "dcomcnfg" must be run to give each operator access to the DCOM programming interface.
- Any test results files that the logic analyzer may create cannot be logged onto computers on the domain that are set up for that purpose, since the logic analyzer does not have LAN access to the computer.

If the logic analyzer could be isolated from unauthorized access by computers on the organization's LAN, yet be part of the organization's domain and be able to save files onto a network share on one of those logging computers on the organization's domain, these problems would be solved. This white paper describes how to configure a test system's LAN to accomplish this.

3 Solution Overview

A LAN component, called a “router”, is a key part of the solution. These inexpensive units are available from a number of vendors and can be purchased at local computer stores such as Best Buy, Fry’s, Office Depot, etc., or from various vendors on the World Wide Web.

This procedure was developed and validated on a D-Link DI-704 four-port cable modem router, and a Linksys BEFSR41 four-port “Etherfast Cable/DSL Router”, but would work equally well with any similar router that is

mass-marketed for home users to connect their computers on their home LANs to the Internet via a cable or DSL modem.

Devices connected to the isolated LAN created by the router are said to be “behind” the router. Devices on the organization’s LAN are said to be “outside” the router. Such a router must have the following features:

- Network Address Translation, or NAT, which provides a way for network devices “behind” the router to connect to network nodes “outside” the router, while blocking unexpected and unauthorized connections from “outside” the router to devices “behind” the router.
- DMZ (or “DeMilitarized Zone”) capability, which allows configuration of one device “behind” the router to be fully accessible from “outside” the router. The test controller PC would be configured to be this “DMZ” node, so that any computers on the organization’s LAN can continue to access this test controller PC as before.

The router SHOULD also have the following features:

- A LAN port (not counting an “uplink” or “WAN” port) for each device in the test system, including the test controller PC and each instrument or component that must be controlled by the test controller PC. If it does not, a hub or switch may be employed to expand the number of ports available.
- 100 Mbits per second (“Megabits per second”) data rate on each of the LAN ports (not counting the “WAN” port which is normally 10 Mbits per second).

- A built-in DHCP (“Dynamic Host Configuration Protocol”) server that can provide LAN configuration values to each device on the isolated LAN it creates. This is especially useful if you can configure the DHCP server to provide the same IP address to each device every time it boots up. This feature is also called “Fixed Mapping”, “MAC Address to IP Mapping” or something similar. Without this feature, devices can get different IP addresses every time they are restarted or when the IP address “lease” expires, making location of the device difficult or unreliable.

NOTE

The D-Link DI-704 router has all these features

The router is inserted between the test system devices and the organization's LAN. By configuring the router and logic analyzer appropriately, the test system can be isolated by the router from the organization's LAN, yet the logic analyzer can be added to the organization's domain. In this configuration, the logic analyzer will accept DCOM connections from any domain member without having to have first added them as users to the logic analyzer and without having to have run "dcomcnfg". Here is a diagram of the test system LAN and how it is connected through the router to the organization's LAN:

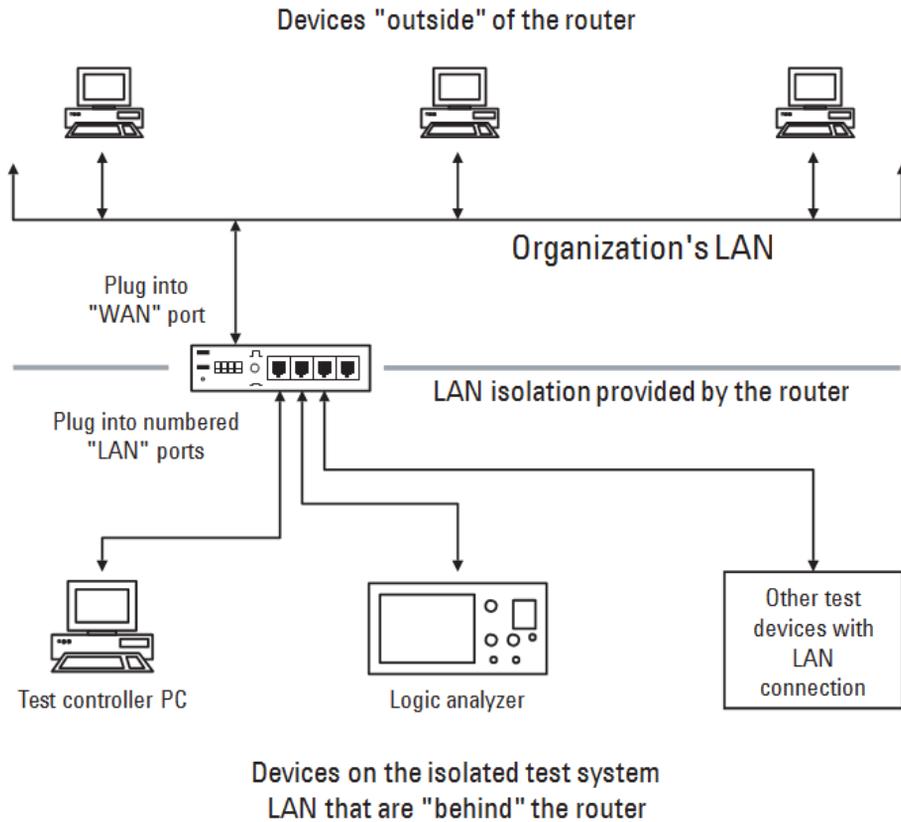


Figure 1 Test System Lan

4 Instructions Overview

The [Chapter 5](#), “Detailed Instructions,” starting on page 9 show you how to:

- 1 Connect the test controller PC to the router and configure its Network Connection settings.
- 2 Configure the router to participate as a network device on the organization’s LAN.
- 3 Connect the router to the organization’s LAN.
- 4 Configure the Network Connection settings for devices (instruments, etc.) in the test system and connect them to the router.
- 5 Add the logic analyzer to the organization’s domain.
- 6 Make a DCOM connection from the test controller PC to the logic analyzer.

5 Detailed Instructions

Follow these steps in sequence, and make sure to complete each validation task before moving on to the next step.

In these instructions, a notation such as “Start | Control Panel” will be used to indicate that you should click on the “Start” button on your computer or instrument, then click “Control Panel”. These “click” sequences may be lengthy, so follow them carefully.

6 Assumptions

This procedure assumes the following:

- 1 The test controller PC has already been added to the organization's domain, and has a working LAN connection.
- 2 You have acquired:
 - A suitable router.
 - LAN cables to connect each device and test controller PC to the router.
 - A LAN cable to connect the router to the organization's LAN.
- 3 You have a network administrator that can answer questions about your network configuration or help you troubleshoot problems if needed.

Step 1. Connect the test controller PC to the router, and configure its Network Connection settings

- 1 Open a Command Prompt window (Start | Programs | Accessories | Command Prompt).
- 2 At the prompt ("C:\>") type "ipconfig /all". Look for and write down the IP addresses that are shown for the Primary and Secondary WINS servers; you will need them later.

The lines in the "ipconfig /all" report will look like:

Primary WINS Server : 130.29.152.23

Secondary WINS Server : 130.29.154.21

Also look for and write down ALL the IP addresses that are shown for the DNS server(s), which look like this:

DNS Servers. :156.140.113.8
156.140.2.12

- 3 Click "Start | Settings | Network and Dial-Up Connections | Local Area Connection | Properties | Internet Protocol (TCP/IP) | Properties".
- 4 Ensure that both "Obtain an IP address automatically" and "Obtain DNS server address automatically" are selected.

Here is a screen shot of this dialog window from Windows 2000; other versions of Windows should show a dialog window very similar to this:

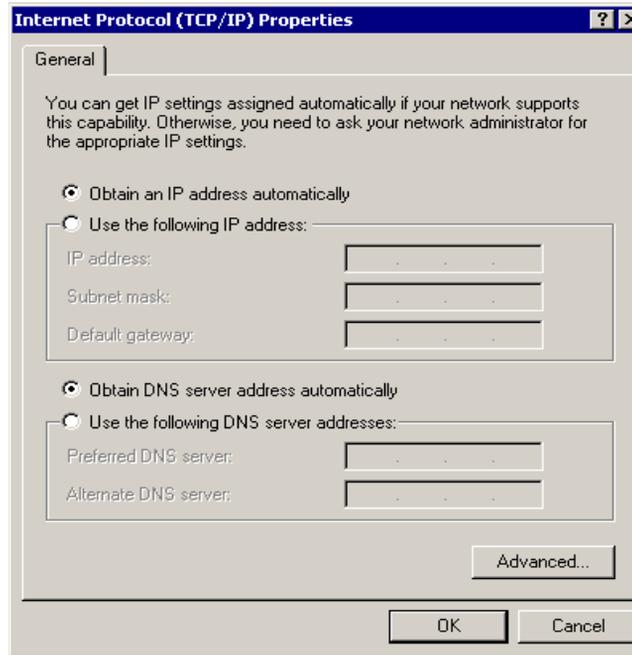


Figure 2 Internet Protocol (TCP/IP) Properties

- 5 To close these dialog windows and save your settings, click “OK” on the each dialog window you have just opened. This prepares your computer to get its network configuration settings from the router in the next step.
- 6 Either type “ipconfig /release” in a Command Prompt window (and ensure that it successfully releases its configuration), or shut down your test controller PC.
- 7 Disconnect the test controller PC from your organization LAN (if it is connected), and use a LAN cable to connect its LAN connector to one of the router’s LAN ports (these are normally numbered, do NOT connect the computer to either the port labeled “WAN” or “Uplink”).

Step 2. Configure the router to participate as a network device on the organization's LAN

- 1 Boot up your computer (if you had just shut it down).
- 2 Ensure that the "Link" indicator LED on the router for the port into which you connected your computer lights up.
If it is also an "activity" LED, it may blink, or a separate "activity" LED may blink. The LED indicating a 100 Mbit connection on that port should also light.
If they do not, try another port, and ensure that your LAN connection to your computer is OK.
- 3 Familiarize yourself with the router's manual, at least enough to learn its administrator user name (probably none) and password (often this is "admin") and the router's IP address.
- 4 Open Internet Explorer on your computer, and type in the IP address of the router as the address, using this format:
http://<192.168.1.1>
where <192.168.1.1> is the IP address of the router (it is very likely to be "192.168.1.1", but can probably be changed).
- 5 If a login or configuration page served by the router does not shortly appear on IE, click "Tools | Internet Options | Connections | LAN Settings", and observe whether "Use a proxy server for your LAN" is checked.

Here's a screen shot of this dialog window from Internet Explorer 6.0 (other versions should appear similarly):

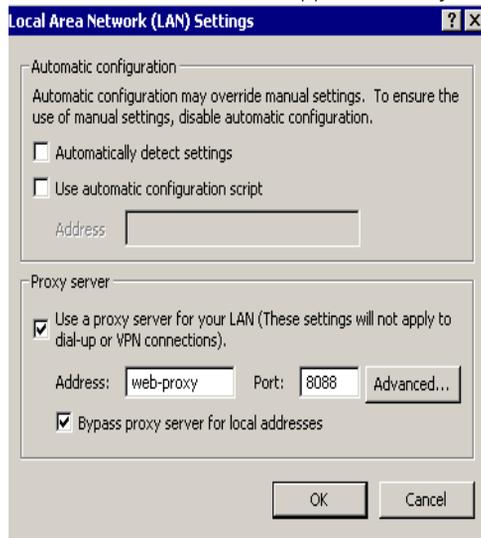


Figure 3 Local Area Network (LAN) Settings

If “Use a proxy server for your LAN” is not checked, consult your router’s manual to troubleshoot why you cannot make a browser connection to the router.

If “Use a proxy server for your LAN” is checked, check “Bypass proxy server for local addresses” if it is not already checked. Click the “Advanced” button and add “192.168.*” to the “Exceptions” box (be sure to heed the notice there to separate entries with a “;” if there are already entries to which you are adding this):

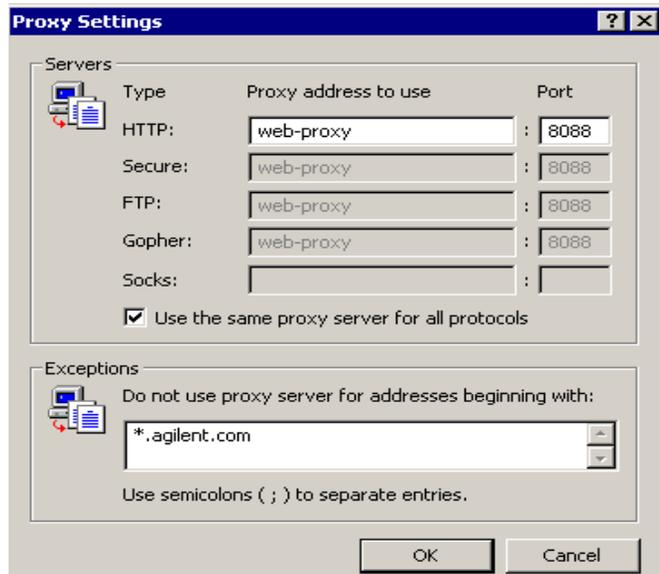


Figure 4 Proxy Settings

- 6 Click “OK” to close the dialog windows you have just opened, and try going to <http://192.168.1.1> again. If a login or configuration page does not shortly appear, consult your router’s manual to troubleshoot this problem.
- 7 Enter the router’s login password (and user name if any), and locate the “Hostname” entry under “Setup” or “Configuration”.
 - a Enter the hostname of your test computer’s PC (remember that we’ll have the router transparently forward all incoming connections to the test computer PC, so it will now “stand in” for the test computer PC on your organization’s LAN).
 - b Click “Apply” or “OK” to save this entry.

- 8 Find the “DMZ” settings page (it may be a tab or link from an “Advanced” page).
 - a Enter the test controller PC’s IP address as the “DMZ host”.
 - b Click “Enable” if needed.
 - c Click “Apply” or “OK”. This will ensure that the test controller PC, while connected via the router, is fully accessible to and from the organization’s LAN.

Step 3. Connect the router to the organization's LAN

- 1 Using a LAN cable, connect the "WAN" port on the router to your organization's LAN.
- 2 In Internet Explorer on your test computer PC, click on the "Status" tab in the router's configuration web pages to observe in the "WAN" settings that the router has obtained an IP address, subnet mask, default gateway, and DNS server addresses from your organization's DHCP server.

If this has not occurred, click "DHCP renew" or "Refresh".

If the "WAN" settings still do not show that the router has obtained these values, try turning the router off, then on.

If all this fails, consult your network administrator to see if these values must be manually entered into the router, or to troubleshoot the problem.

- 3 Verify that the DNS server IP addresses shown in the router's "Status" tab show ALL the DNS server IP addresses that you wrote down in **step 2** above.

If not, your router may not be capable of showing all of the DNS server IP addresses; use the "ipconfig /all" command in a Command Prompt window (as in **step 2**) to verify that your test computer PC has all the DNS server IP addresses that it did before. If any are missing, you must manually add them to the TCP/IP configuration of every device "behind" the router that will be added to your organization's domain (which includes at least your test controller PC and the logic analyzer). To prepare for this, write down any missing DNS server IP addresses.

- 4 You should now be able to use Internet Explorer on your test computer PC as before to connect to web servers in your organization or on the Internet through this router. Try this now – if you are unsuccessful, ask your network administrator to help you troubleshoot your connection.

Step 4. Configure the Network Connection settings for devices (instruments, etc.) on the test system LAN, and connect them to the router

- 1 Choose IP addresses for each device that is on the test system LAN.

If your router is a DHCP server, the “DHCP” page should indicate that it will start assigning IP addresses going upward from a particular number (the default on Linksys routers is usually 192.168.1.100).

If you intend to use the DHCP server to provide IP addresses to your devices, you should configure it now to provide your assigned IP address to each device every time. If your router is not capable of this “static” IP assignment, you should choose addresses that are below the threshold IP address from which the DHCP server will start assigning addresses, and write these down as IP addresses that must be manually configured in those devices.

- 2 The DHCP server in your router may allow you to input the Primary and Secondary WINS server IP addresses, which it will in turn provide to all devices that get their network configuration from it. Enter these addresses into the DHCP configuration page in your router if you can (the latest firmware version for the Linksys router mentioned above allows this).

If you can configure the router to provide the WINS IP addresses, you will not have to enter them manually (in the next paragraph) into those devices that can get their network configuration from the router.

Using the procedure provided by the equipment vendor for each device (including the test controller PC and logic analyzer) that will be in the test system, do one of the following two steps.

- IF a device is NOT capable of getting an IP address from the DHCP server in the router, or your router does not contain a DHCP server that has been configured to provide the same IP address to a device every time:

Manually configure each device in the test system with an IP address, subnet mask of “255.255.255.0”, a default gateway of “192.168.1.1”, and DNS server IP address(es) that you wrote down in **step 2**. If a device is to be added to your organization’s domain, also enter the Primary and Secondary WINS addresses.

- ELSE if the device is capable of getting its IP address and other network configuration parameters from the DHCP server in the router, AND you have configured the router to provide the same IP address to devices every time:

Configure each device in the test system to automatically get its IP address and other network configuration parameters from the DHCP server. If a device is to be added to your organization's domain, AND your router's DHCP server cannot provide WINS addresses, Manually enter the Primary and Secondary WINS addresses, along with any DNS server IP address(es) that your test controller PC had at the beginning, but were not obtainable through the router (as written down in **step 3**).

- 3 You may configure some devices to get their network configuration parameters from the DHCP server, and manually configure others. The goal is to ensure that each device will be fully configured with an IP address that will always be the same for that device. In any case, ensure that the test controller PC and logic analyzer have been configured with the Primary and Secondary WINS IP addresses.
- 4 Verify that each node is properly configured by using a Command Prompt window to "ping" the router (type "ping 192.168.1.1") as well as some node on the organization's LAN that is not behind the router ("ping mycomputer"). If a particular device is not capable of doing a "ping", use your test controller PC to "ping" its IP address.

Step 5. Add the logic analyzer to the organization's domain

Ask your network administrator to help you to do this step, or provide you with a domain user name and password that has the capability to add nodes to the organization's domain. This user name does not actually have to log you on to any particular node, but must be set up on your domain controller with the rights to add nodes to the domain.

- 1 At the front panel of the logic analyzer, right-click "My Computer"; then, choose "Properties" from the popup menu.
- 2 In the System Properties dialog, select the "Network Identification" tab; then, click "Properties".
- 3 In the Identification Changes dialog, add the logic analyzer to the domain. Enter the fully-qualified name of your domain (for example, "orgdomain.companydomain.com") into the "Domain:" test box, then click "OK".

Here is an example screen shot:

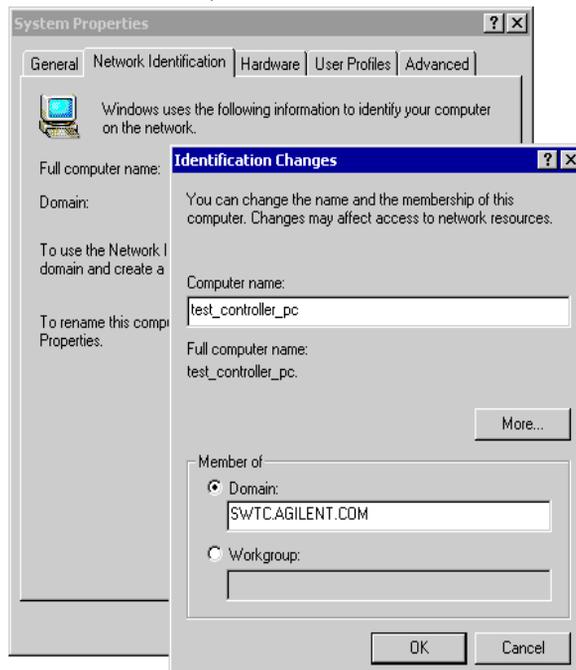


Figure 5 Domain Setting

- 4 After a moderate (up to minute) pause, the logic analyzer should pop up another dialog asking you for the user name and password for an

account that is authorized to add this node to the domain, which you now enter and click OK.

- 5 After another moderate pause, the logic analyzer should pop up a success dialog indicating that this node has been added to the domain, but that the system should be rebooted. Do so now.
- 6 After the logic analyzer is booted up, use its front panel to verify that you can now “Add a Network Place” or “Map Network Drive” from the logic analyzer to a share on a computer out on the organization’s domain.
- 7 Now add your test controller PC to the domain in the same way.

Step 6. Make a DCOM connection from the test controller PC to the logic analyzer

Follow the documentation that is available with your logic analyzer to make a DCOM connection from the test controller PC to the logic analyzer. Refer to the COM Automation online help's "Getting Started" topic.

7

Success

Congratulations! You should now be able to copy files from the logic analyzer to any server on the domain to which its logged-on user account has access. Also, any operator of the test controller PC that logs in as a user on the domain should be able to run test programs that can make DCOM connections to the logic analyzer without security restrictions. All this is done while isolating the logic analyzer and other devices on your test LAN from the organization's LAN, and not using up IP addresses on the organization's LAN.

On each node on the test system LAN, you may want to add entries to the "hosts" file to assign hostnames to IP addresses, or at least add those entries to the "hosts" file on the test controller PC so that it can connect to each device by hostname rather than IP address. The "hosts" file is found on Windows NT and Windows 2000 in the "C:\WINNT\system32\drivers\etc" folder (look in "C:\WINDOWS\system32\drivers\etc" for other versions of Windows). As long as these IP addresses do not change, this hostname mapping will work fine.

This is the reason that arranging for "static" (unchanging) IP addresses has been a high priority for this procedure.

