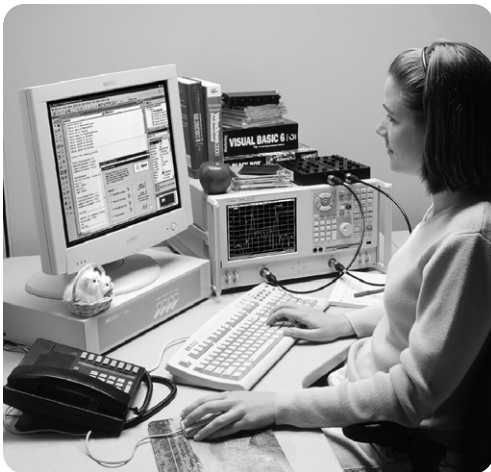
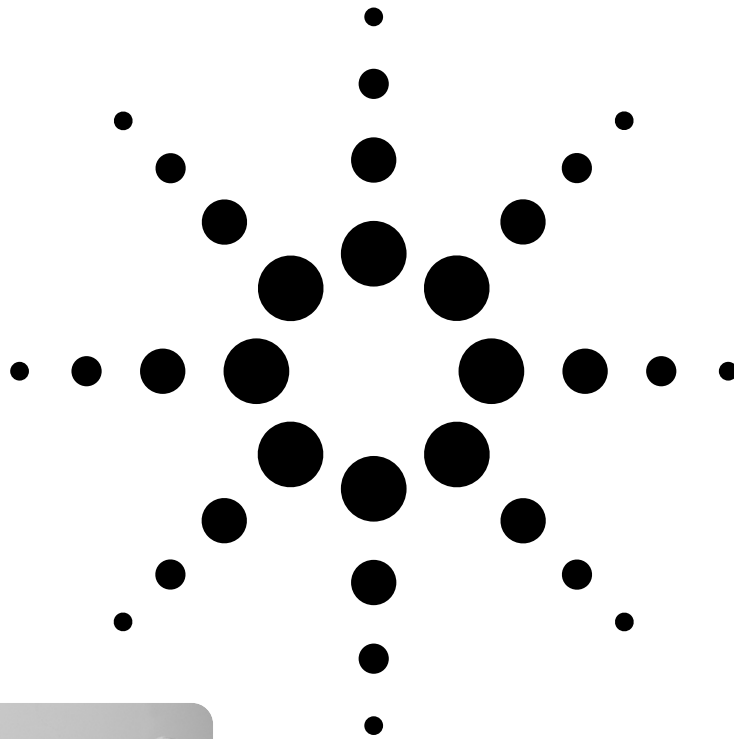


Agilent Introduction to Application Development with the Agilent PNA Series of Network Analyzers

Product Note



Agilent Technologies

Innovating the HP Way

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1.0 Introduction

This product note provides a step-by-step guide to system administration, software installation, and COM/DCOM setup on a PNA Series network analyzer (E8356A, E8357A, and E8358A). After reading this product note, you will be able to:

- 1) Add user profiles to your network analyzer
- 2) Share drives between your network analyzer and PC running Windows® 95, 98, NT 4.0 or higher
- 3) Load software on your network analyzer over the LAN or from an external CD drive
- 4) Configure your network analyzer and PC for COM/DCOM communications

Additionally, this product note provides a simple programming example in seven common languages (Microsoft® Visual Basic, Visual Basic Script, Word, and Excel, Agilent VEE, Visual C++, and National Instruments™ LabVIEW) that demonstrate the differences between development platforms.

The procedures listed in this product note are valid for a PC with Windows 95, 98, NT 4.0 or higher operating systems. This product note was developed on a PC with Windows NT version 4.0 with service pack 5. The PNA Series network analyzer's operating system was Windows 2000 Professional. However, the steps will be similar for Windows 95 and 98.

2.0 Basic Administration

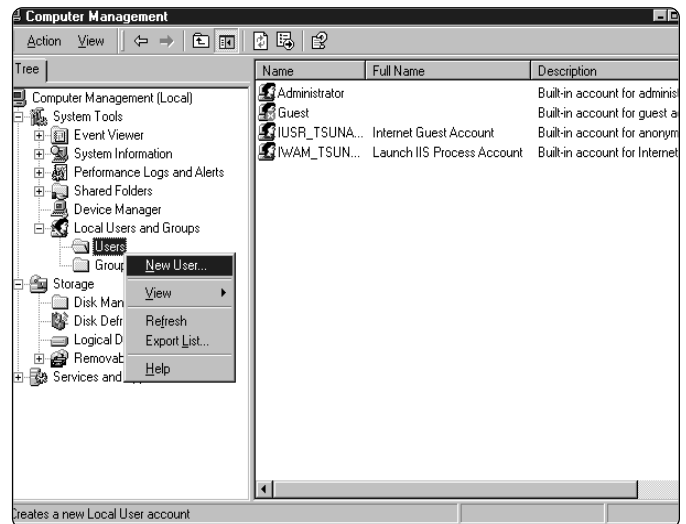
To obtain access to the PNA Series network analyzer for COM/DCOM, a user must be registered on the network analyzer. (**NOTE:** This is the same procedure a system administrator must use to grant multiple users permission to log on to the network analyzer and maintain their user profile.)

This section also contains the steps to share drives between the network analyzer and a PC. Any drive can be shared between the network analyzer and PC including a CD drive for software installation over the LAN (described in further detail in step 3.1). To enable COM/DCOM communications to and from the PC and network analyzer, share the network analyzer's C drive with your PC.

2.1 A system administrator grants log on access to the PNA Series network analyzer for specific users:

From the PNA Series network analyzer:

- 1) The system administrator must log on to the PNA Series analyzer using the administrator username and password.
- 2) Once logged on to the network analyzer, right-click on **My Computer**. Clicking on **Manage** will launch the **Computer Management** utility.
- 3) In the **Computer Management** window, expand **Local Users and Groups**. Left-click on **Users**. The list of Users will appear in the right half of the window. Right-click on **Users**, and click on **New User** in the pop-up menu. This launches the **New User** window.



- 4) In the **User name** input box, enter the user name which the user logs in to his/her PC with. The **Full name** and **Description** boxes are optional and so can remain empty. In the **Password** input box, enter the password, which the user logs in to his/her PC with, and enter the same password for **Confirm password**. The **User must change password at next log on** check box is checked by default. In most cases, it is recommended to check **Password never expires**. Click the **Create** button to finish setting up the user.

- 5) The **New User** window remains active, but the input boxes are cleared and the check boxes returned to their default settings. Click the **Close** button to close the **New User** window. Notice that the user has been added to the list in the **Computer Management** window. Close the **Computer Management** window. The user now has access to the PNA network analyzer.

2.2 Sharing drives between a PC and PNA

Both the PC and network analyzer must be connected to the LAN.

Determine the **Full Computer Name** of the device's drive you want to share. To access the network analyzer from your PC, find the **Full Computer Name** of the network analyzer. To access your PC from the network analyzer, locate the **Full Computer Name** of your PC. The following are steps to find this information from either your PC or network analyzer:

From the PNA Series network analyzer:

- 1) Click the Windows **Start** button, select **Settings**, and **Control Panel**.
- 2) In the **Control Panel** window, double click the **System** icon.
- 3) From the **System Properties** window, click the **Network Identification** tab. Record the analyzer's Full Computer Name:_____.
- 4) Click **OK** to close the **System Properties** window.
- 5) Close the **Control Panel** window.

From your PC:

- 1) Single right click on the **Network Neighborhood** desktop icon. Select **Properties**. Record the **Computer Name**_____. Close the dialog box.

Next, share drives between the network analyzer and your PC. This procedure is required to configure COM/DCOM access between your PC and PNA Series network analyzer. The following steps demonstrate how to share the PNA's C drive with your PC. You can also access your PC's C drive from the analyzer. To do this, reverse **Analyzer** and **PC** throughout the following procedure.

From the PNA network analyzer:

- 1) Double click on the **My Computer** desktop icon to determine if the C drive is “shared”.
- 2) Single right click the C drive. Select **Sharing**.
- 3) Under the **Sharing** tab, select the **Share as...** radio button.
- 4) Type a share name (or use the default C\$). Record the share name here_____.
- 5) Close the dialog box.

From your PC:

- 1) Map the network analyzer’s drive to the PC. Launch **Windows Explorer to begin this procedure**.
- 2) On the main menu bar, click **Tools**. From the menu, click **Map Network Drive**. Your PC will choose the next available drive letter. It is also possible to assign other available drives. Record this drive letter:_____.
- 3) From the **Map Network Drive** window, click the **Path** box (this is the **Folder** box on the network analyzer). Type (or select if available) the path (\\computername\sharename). The computer name and the share name were recorded in the preceding steps. To connect to the shared drive automatically each time you log on, check **Reconnect at Logon**.

NOTE:

For PC’s running Windows NT 4.0 or higher:

If you are logged onto the analyzer using the same logon as your PC, it is not necessary to enter “Connect As”. However, if you want to connect under a different user name, type the name in Connect As (to do this on the network analyzer, select “Connect using a different user name”). If the user name is in a different domain, use the format: domain\username.

If your PC is running Windows 95 or 98:

It is necessary to connect to the analyzer using the same login and password as those used to log on to your PC. Click OK to close the **Map Network Drive** window.

- 4) The analyzer’s C drive should be visible on your PC’s **Windows Explorer** as the drive letter assigned in step 3.

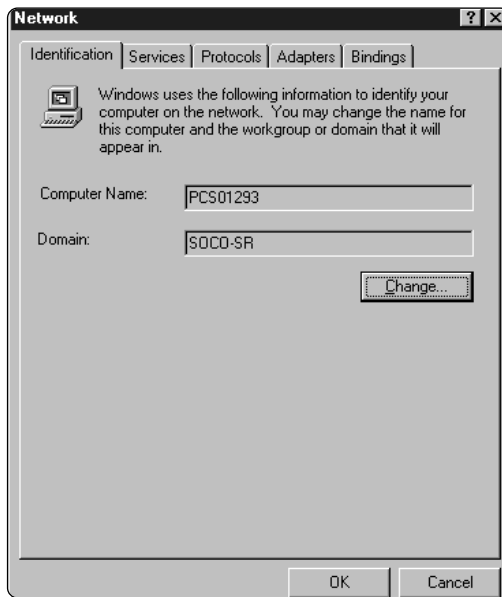
3.0 Software Installation

3.1 Set-up for software installation over LAN

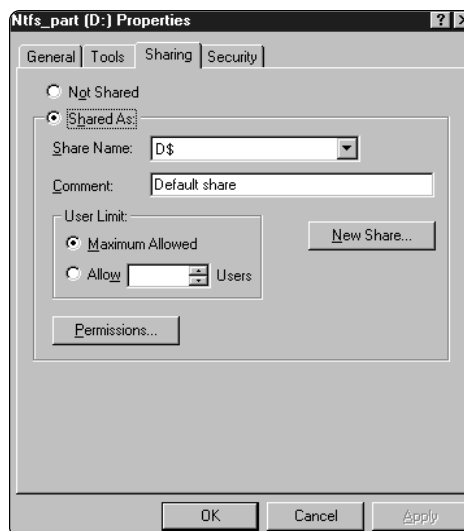
If you do not have access to a USB external CD drive, it is possible to map your PC’s CD drive to the PNA Series analyzer. Both your PC and network analyzer must be connected to the LAN. The software can then be installed from your PC’s CD drive.

From your PC:

- 1) Place the software CD-ROM in the CD drive.
- 2) Single right click on the **Network Neighborhood** desktop icon. Select **Properties**. Record the **Computer Name** here:_____.

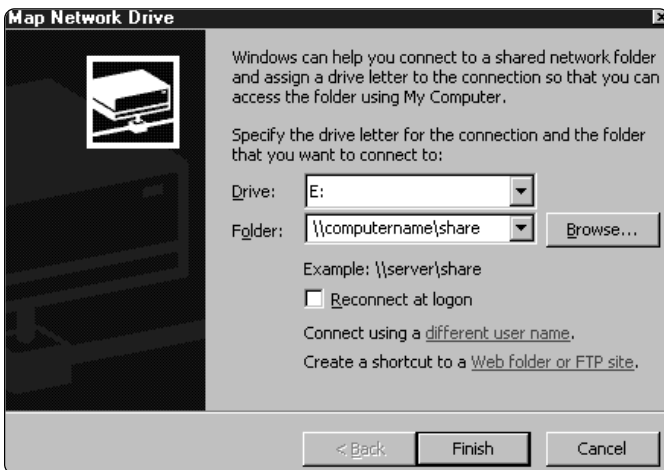


- 3) Make sure the CD drive has been “shared” by double clicking on the **My Computer** desktop icon. Single right click the CD drive. Select **Sharing**. Under the **Sharing** tab, select the **Share as...** radio button. Record the share name here:_____.



From your PNA Series Network Analyzer:

- 4) Next, map your PC's CD drive to the network analyzer. Launch **Windows® Explorer** to begin this procedure.
- 5) On the main menu bar, click **Tools**. From the menu, click **Map Network Drive**. The network analyzer will choose the next available drive letter. It is also possible to assign other available drives. Record this drive letter: _____.
- 6) From the **Map Network Drive** window, click the **Folder** box. Type (or select if available) the path (\computername\share). You learned the computer name in step 2 and the share name in step 3. **NOTE:** If you are logged onto the analyzer using the same logon as your PC, it is not necessary to enter "Connect Using a Different User Name". However, if you prefer to connect under a different user name, click the hyperlink "different user name" and type the user name and password. If the user name is in a different domain, use the format: domain\username.



- 7) To connect to the shared drive automatically each time you log on, check **Reconnect at Logon**.
- 8) Click **Finish** to close the **Map Network Drive** window.
- 9) The PC's CD drive will now be visible on the network analyzer's **Windows Explorer** as the drive letter you used in step 5.
- 10) A window will popup with the contents of the CD drive on the PC.
- 11) Proceed to the Software Installation Section 3.3.

3.2 Set-up for software installation from external USB CD Drive

This procedure has been verified for the HP CDR-Writer Plus 8200 series CD drive. The following procedure has not been verified with other USB CD drives.

From your PNA Series Network Analyzer:

- 1) Exit all applications, including the network analyzer application.
- 2) Plug your CD drive's USB cable into a USB port located on the network analyzer.
- 3) Turn on your external CD drive.
- 4) Wait until Windows recognizes the CD drive. The **Add/Remove Hardware Wizard** will automatically launch.
- 5) Follow the steps to install the drivers for your CD drive.
- 6) You may have to re-start the network analyzer to finish the installment of the drivers, which will allow read/write permission from/to the external CD drive. Proceed to the Software Installation Section 3.3.

3.3 Software installation

This procedure is general, and has been verified on Microsoft Visual Basic 6.0, Visual C++ 6.0, and Office 2000, National Instruments™ LabVIEW, and Agilent VEE 6.0. If you have mapped your PC's CD drive, perform the following procedure from your PC. If you have an external USB CD drive set up, perform the following procedure from your network analyzer.

- 1) Insert the software CD into your CD drive.
- 2) If installation does not immediately start, double click **My Computer**. Then, double click the CD. Run the setup application as outlined in the software's documentation. Select the network analyzer's drive as the destination for the files to be installed.

4.0 Configuring COM/DCOM

When configuring COM/DCOM, the first issue to consider in this topic is Windows® NT/Windows® 2000 **Domains** versus **Workgroups**.

- A **domain** is a typically large organizational group of computers that network administrators maintain and control which machines have membership.
- A **workgroup**, on the other hand, does not require a network administrator to create it or control membership. It just requires a person who is an administrator of the PNA Series network analyzer to declare the workgroup name and to declare the analyzer a member of the workgroup. The PNA Series analyzers are shipped from Agilent configured as members of a workgroup named WORKGROUP.

The analyzer cannot be configured as both a domain member and workgroup member; it must be one or the other. By default, PNA Series analyzers are shipped from Agilent such that **everyone** has permission to launch and access the PNA Series application via COM/DCOM. The term **everyone** refers to a different range of users depending upon which type of group (domain or workgroup) the network analyzer is a member of. For a workgroup, **Everyone** includes only those users who have been given logon accounts on the analyzer. For a domain, **Everyone** includes that same group of users, and also includes those people who have permissions to logon to the domain but perhaps do not have a logon account on the analyzer. In general, once a PNA Series analyzer has joined a domain with permission from a network administrator, it tends to make network connections to the network analyzer easier for those people who have domain logon accounts. For example, with the Agilent default setting of **everyone** having permission to launch/access the PNA Series application, anyone who is logged into the domain from their PC will then automatically have the necessary permissions to connect to the analyzer using DCOM. Recall that when the network analyzer is a member of a workgroup instead of a domain, only those people who have logon accounts on the analyzer can connect using DCOM from a PC.

4.1 Procedure

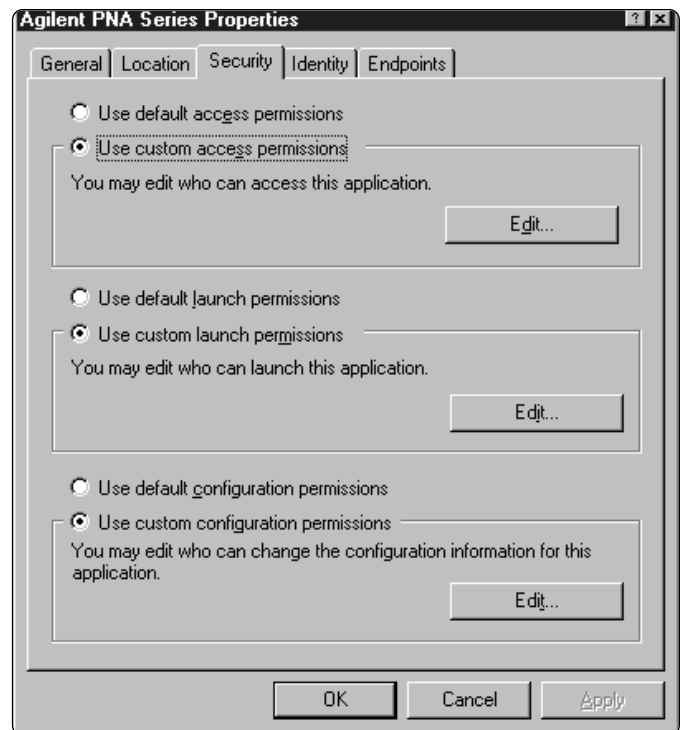
4.1.1 Configure the PNA Series network analyzer to provide COM/DCOM access to the PNA application for the user

From the PNA Series Network Analyzer:

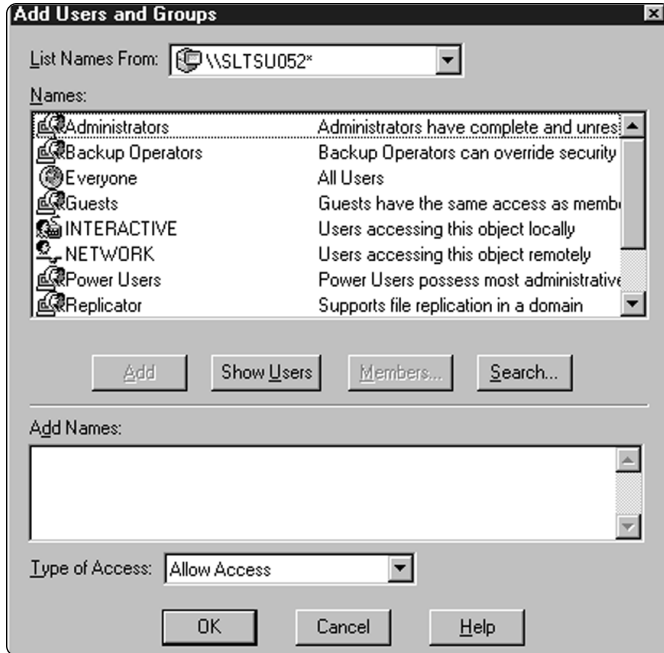
NOTE: The following steps need to be performed when it is desired to give specific users (not **Everyone**) COM/DCOM permissions.

Remember, both your PC and the analyzer must be connected via the LAN. Additionally, the network analyzer's C drive must be mapped to your PC as shown in section 2.2.

- 1) Click the Windows **Start** button, select **Run**, type **dcomcnfg** into the input box, and click **OK**.
- 2) The **Distributed COM Configuration Properties** window should now be displayed. Click on **Agilent PNA Series** in the Applications list, then click the **Properties** button.
- 3) In the **Agilent PNA Series Properties** window, click the **Location** tab. The **Run application on this computer** checkbox should be checked.
- 4) Click the **Security** tab. Click the **Use custom access permissions** and **Use custom launch permissions** radio buttons to select those options. Click the **Edit...** button next to **Use custom access permissions**.

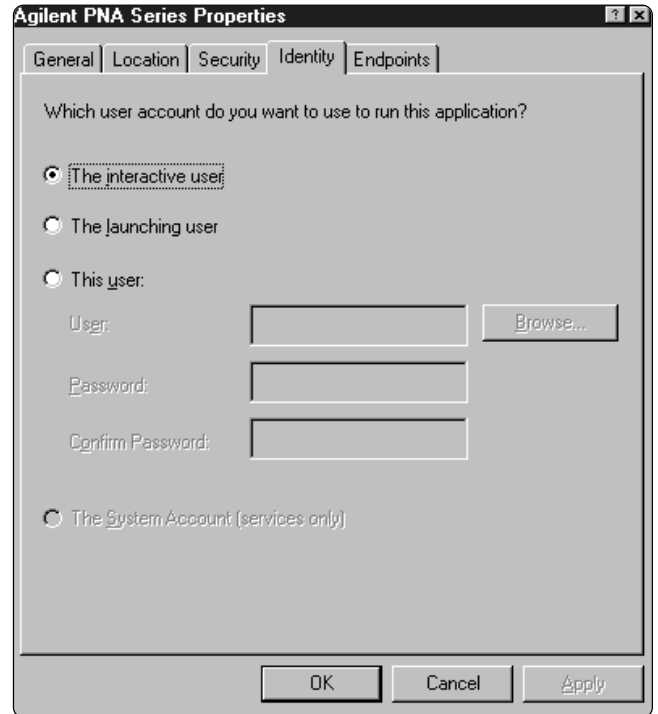


- 5) The **Registry Value Permissions** dialog box for Registry Value: Access Permission should now be visible. Click the **Add...** Button.
- 6) The **Add Users and Groups** window should now be visible. The list of names visible are the Groups of people given permission by the system administrator to access the network analyzer.



- 7) Select one or more of these groups to give access to the Agilent PNA Series application. Click the **Show Users** button. Now scroll down the list, select the user you wish to add and click the **Add** button.
- 8) The user is now in the **Add Names** list. Click **OK** to close the **Add Users and Groups** window. **NOTE:** The user is now listed as having access permission in the **Registry Value Permissions** window. Click **OK** to close that window.

- 9) In the **Agilent PNA Series Properties** window click the **Identity** tab. Ensure **The interactive user** option button is selected. Click the **OK** button.

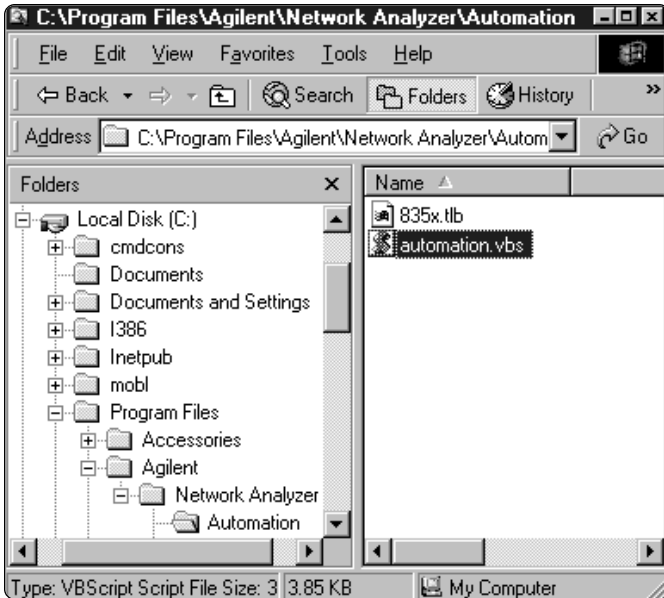


- 10) In the **Distributed COM Configuration Properties** window click the **OK** button to close it. The PNA is now configured to give the user access permission as well as launch permission for the Agilent PNA Series application.

4.1.2 Configure the user's PC for DCOM access to the PNA application

From your PC:

1. Using your PC's Windows Explorer, find the analyzer's mapped local hard drive and click the **Program Files/Agilent/Network Analyzer/Automation** folder.



2. Double-click **Automation.vbs** and follow the instructions. After this procedure is completed, a **Network Analyzer Setup** icon is setup on your PC desktop.

NOTE: Your PC's operating system may require a Visual Basic Scripting engine to run the .vbs file. To download a free copy of a Visual Basic Scripting engine, visit Microsoft's® web site.

Problems?

When the network analyzer application is installed on the instrument, the application and all the objects it serves are registered on that machine. The instrument should be ready to perform as a remote server.

If the analyzer is not working properly, try re-registering the application and associated libraries through the following steps:

NOTE: The following must be done in the listed order

From the PNA network analyzer:

Find E835x.exe in C:\Program Files\Agilent\Network Analyzer

1. Select and right-click **835x.exe**
2. Select **Register COM Server** to register the application.
3. Select and right-click **835xps.DLL**
4. Select **Register COM Server**

DCOM settings

5. Click **Start**
6. Select **RUN** and type **dcomcnfg**
7. From the application list, find and select **835X**
8. Click **Properties**
9. Select the **Identity** tab.
10. Select **INTERACTIVE USER**
11. Select the **Security** tab
12. Set permissions and access to **CUSTOM**
13. Edit the lists to specify the remote user

5.0 Introduction to Application Examples

The analyzer's support for DCOM (Distributed Component Object Model) over the LAN provides control of the network analyzer using a variety of platforms. DCOM acts as an interface to the analyzer for external applications. With DCOM, the programmer can develop an application on an external computer. During development, the application will interface to the analyzer over the LAN through the DCOM interface. Once the developer has finished the application, it can be distributed to the analyzer. After, it has been distributed to the analyzer, the application will interface with the analyzer using COM.

The example applications in this product note were developed in a number of different programming languages to show the differences between development platforms. The application was first developed on a PC and then transferred to the analyzer once development was complete.

The table below outlines the setup parameters that the applications will use to configure the PNA network analyzer for a measurement.

Parameter	Value
Start Frequency	1 GHz
Stop Frequency	2 GHz
Number of Points	11
Measurement	S ₁₁
Data Storage Area	Uncorrected (Raw Data)
Data Format	Log Magnitude
Trigger Mode	Single

The device tested was a 50 ohm standard load on port 1 of the analyzer

Download the example programs and obtain more detailed information for each development environment from http://agilent.com/find/pna_applications

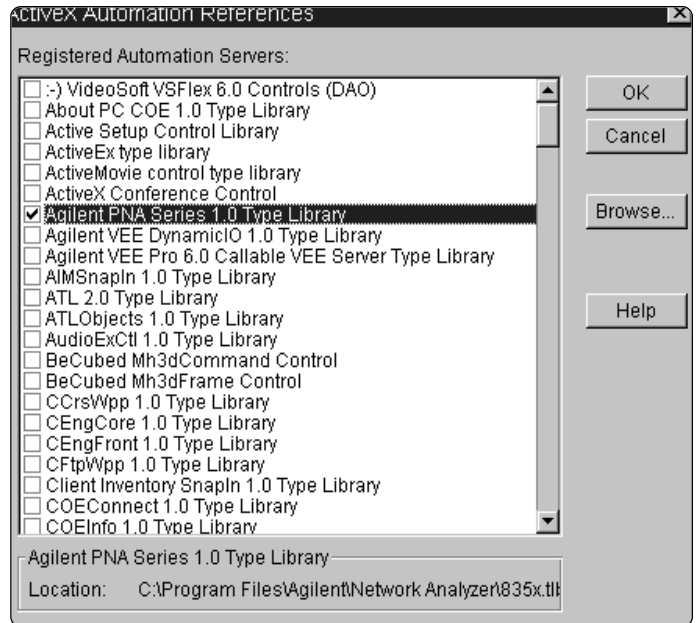
The development environment should reference the type library associated with the PNA Series. For example, in Visual Basic, add the Agilent PNA 835x type library as a reference. This will allow the program to “see” the various classes and methods for use with the PNA Series network analyzer during development (see the individual programming examples for more information).

5.1 Application examples

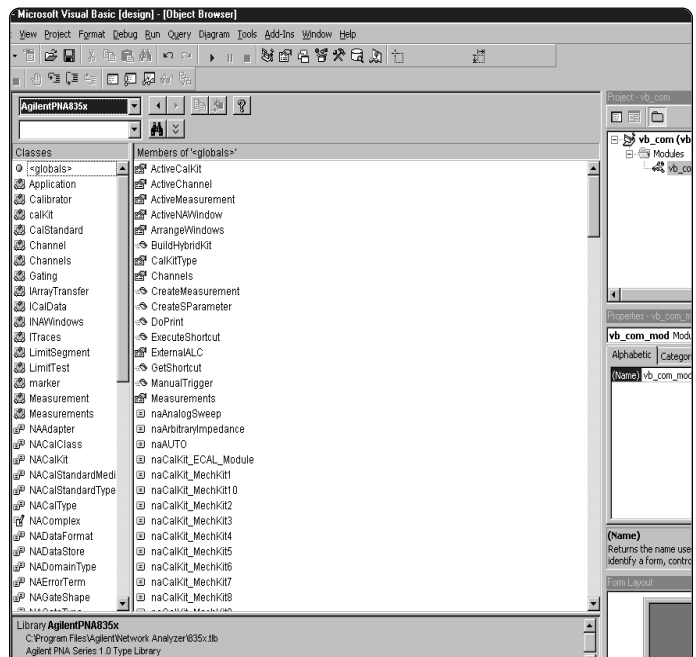
5.1.1 Microsoft Visual Basic Example

5.1.1.1 Application Configuration

The type library for the PNA should be referenced in the Visual Basic development environment. The following figure illustrates the reference.



Using the Visual Basic Object Browser the developer can see what classes and methods are available for development of applications for the analyzer (see figure below).



5.1.1.2 Application Code

The application code is contained below. To run the application, first generate the executable file. Once this is complete, it can be copied and executed on the analyzer or run on the PC. The application can also be run from the development environment.

Option Explicit

```
Dim app As AgilentPNA835x.Application
Dim chan As AgilentPNA835x.Channel
Dim meas As AgilentPNA835x.Measurement
Dim result As Variant
Dim i As Integer
Dim num_points As Integer
Dim message As String

Private Sub Main()

    ' Connect to the PNA application on machine SLTSU044
    Set app = CreateObject("AgilentPNA835x.Application",
    "SLTSU044")

    ' Reset the analyzer to instrument preset
    app.Reset

    ' Create S11 measurement
    app.CreateMeasurement 1, "S11", 1

    ' Set chan variable to point to the active channel
    Set chan = app.ActiveChannel

    ' Set meas variable to point to the active measurement
    Set meas = app.ActiveMeasurement

    ' Setup the channel for a single trigger
    chan.Hold True
    app.TriggerSignal = naTriggerManual
    chan.TriggerMode = naTriggerModeMeasurement

    ' Make the PNA application visible
    app.Visible = True
```

```
' Set channel parameters
chan.NumberOfPoints = 11
chan.StartFrequency = (1000000000#)
chan.StopFrequency = (20000000000#)

' Send a manual trigger to initiate a single sweep
chan.Single True

' Store the data in the "result" variable
result = meas.GetData(naRawData,
naDataFormat_LogMag)

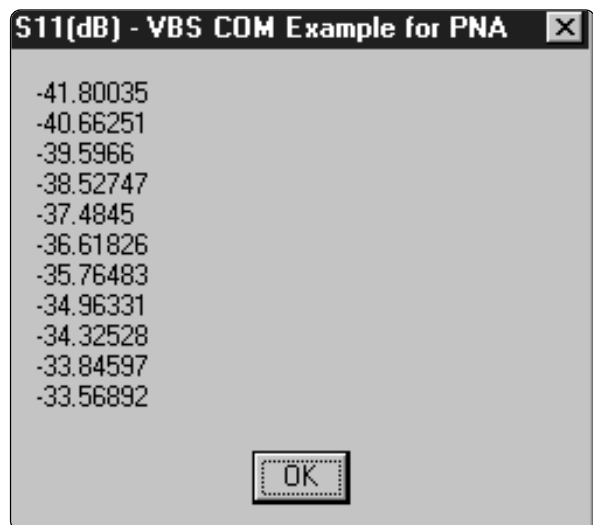
' Display the result
num_points = chan.NumberOfPoints
For i = 0 To num_points - 1
    message = message & result(i) & vbCrLf
Next

If MsgBox(message, vbOKOnly, "S11(dB) - VBS COM
Example for PNA") Then
    Set chan = Nothing
    app.Quit
End If

End Sub
```

5.1.1.3 Application Output

The figure below shows the displayed results when the application is executed.



5.1.2 Microsoft Visual Basic Script Example

5.1.2.1 Application Configuration

Some operating systems may require that the Visual Basic Scripting engine be installed before running the application on a PC. To download a free copy of a Visual Basic Scripting engine, visit the following web site:
<http://msdn.microsoft.com/scripting/>

5.1.2.2 Application Code

The application code is contained below. The developer must save the file in a text file (i.e. using notepad) and save it with the “.vbs” extension. The “.vbs” extension will tell the operating system to execute the code using the Visual Basic Scripting engine.

In order to run the application, double-click on the saved .vbs file. The application can be run on a PC or copied and run on the PNA Series network analyzer.

Option Explicit

```
' Shell objects
Dim app
Dim chan
Dim meas
Dim result
Dim message
Dim num_points
Dim i

' Connect to the PNA application on machine SLTSU044
Set app = CreateObject("AgilentPNA835x.Application",
"SLTSU044")

' Reset the analyzer to instrument preset
app.Reset

' Create S11 measurement
app.CreateMeasurement 1, "S11", 1

' Set chan variable to point to the active channel
Set chan = app.ActiveChannel

' Set meas variable to point to the active measurement
Set meas = app.ActiveMeasurement

' Setup the channel for a single trigger
chan.Hold True
app.TriggerSignal = 3
chan.TriggerMode = 1
```

```
' Make the PNA application visible
app.Visible = True
' Set channel parameters
chan.NumberOfPoints = 11
chan.StartFrequency = (1000000000)
chan.StopFrequency = (2000000000)

' Send a manual trigger to initiate a single sweep
chan.Single True

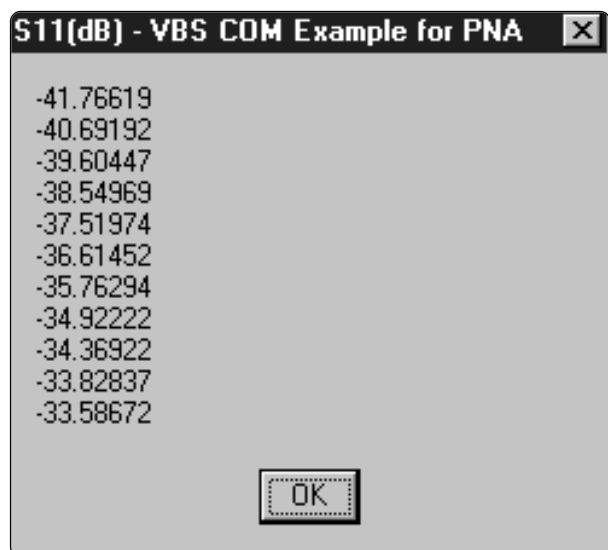
' Store the data in the "result" variable
result = meas.GetData(0, 1)

' Display the result
num_points = chan.NumberOfPoints
For i = 0 To num_points - 1
    message = message & result(i) & vbCRLF
Next

if MsgBox(message, vbOKOnly, "S11(dB) - VBS COM
Example for PNA") then
    Set chan = Nothing
    app.quit
end if
```

5.1.2.3 Application Output

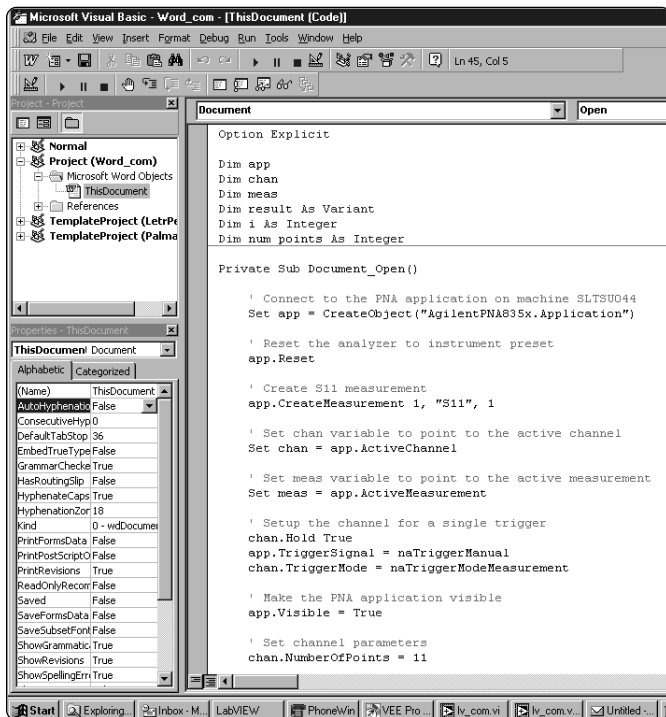
The figure below shows the displayed results when the application is executed.



5.1.3 Microsoft Word Example

5.1.3.1 Application Configuration

Microsoft® Office 2000 was used for this example. This version of Office contains Visual Basic for Applications (VBA) which allows developers to attach Visual Basic Macros to Word documents. The type library for the PNA Series network analyzer should be referenced in the Visual Basic development environment. The following figure illustrates the reference. In this example the "CreateObject" method will look at the configuration of DCOM to see what machine to connect to. The code below must be copied and placed in the Visual Basic editor for the Word document object as shown below.



5.1.3.2 Application Code

The application code is contained below. The program inserts the data retrieved from the analyzer into a table in a Word document. To run the application, open the document using Microsoft Word. Enable the macros when prompted. Once this is complete, the application will execute and update the document. The application can be run on a PC or the analyzer.

Option Explicit

Dim app

Dim chan

Dim meas

Dim result As Variant

Dim i As Integer

Dim num_points As Integer

Private Sub Document_Open()

' Connect to the PNA application on machine SLTSU044
Set app = CreateObject("AgilentPNA835x.Application")

' Reset the analyzer to instrument preset
app.Reset

' Create S11 measurement
app.CreateMeasurement 1, "S11", 1

' Set chan variable to point to the active channel
Set chan = app.ActiveChannel

' Set meas variable to point to the active measurement
Set meas = app.ActiveMeasurement

' Setup the channel for a single trigger
chan.Hold True
app.TriggerSignal = naTriggerManual
chan.TriggerMode = naTriggerModeMeasurement

' Make the PNA application visible
app.Visible = True

' Set channel parameters
chan.NumberOfPoints = 11
chan.StartFrequency = (1000000000#)
chan.StopFrequency = (2000000000#)

' Send a manual trigger to initiate a single sweep
chan.Single True

' Store the data in the "result" variable
result = meas.GetData(naRawData,
naDataFormat_LogMag)

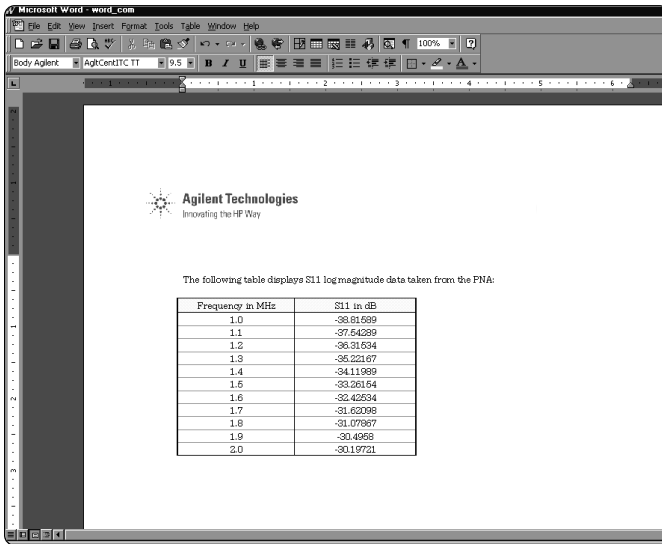
' Display the result
num_points = chan.NumberOfPoints
For i = 0 To num_points - 1
 ThisDocument.Tables(1).Cell(i + 2, 2).Range = result(i)
Next

Set chan = Nothing
app.Quit

End Sub

5.1.3.3 Application Output

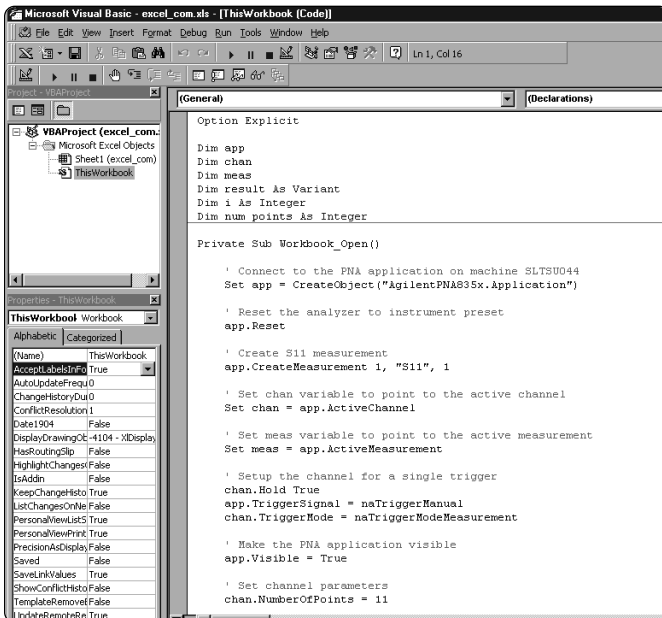
The figure below shows the displayed results when the application is executed.



5.1.4 Microsoft Excel Example

5.1.4.1 Application Configuration

Microsoft Office 2000 was used for this example. This version of Office contains Visual Basic for Applications (VBA) which allows developers to attach Visual Basic Macros to Excel documents. The type library for the PNA network analyzer should be referenced in the Visual Basic development environment. The following figure illustrates the reference. In this example the "Create Object" method will look at the configuration of DCOM to see what network analyzer to connect to. The code below must be copied and placed in the Visual Basic editor for the Excel worksheet object as shown below.



5.1.4.2 Application Code

The application code is contained below. The program inserts the data retrieved from the analyzer into cells in the Excel document. The cells are then used to update a graph in the Excel document. To run the application, open the document using Microsoft Excel. Enable macros when prompted by the application. Once this is complete, the application will execute and update the document. It can be run on a PC or the PNA analyzer.

Option Explicit

```
Dim app
Dim chan
Dim meas
Dim result As Variant
Dim i As Integer
Dim num_points As Integer
```

```
Private Sub Workbook_Open()
```

```
' Connect to the PNA application on machine SLTSU044
Set app = CreateObject("AgilentPNA835x.Application")
```

```
' Reset the analyzer to instrument preset
app.Reset
```

```
' Create S11 measurement
app.CreateMeasurement 1, "S11", 1
```

```
' Set chan variable to point to the active channel
Set chan = app.ActiveChannel
```

```
' Set meas variable to point to the active measurement
Set meas = app.ActiveMeasurement
```

```
' Setup the channel for a single trigger
chan.Hold True
app.TriggerSignal = naTriggerManual
chan.TriggerMode = naTriggerModeMeasurement
```

```
' Make the PNA application visible
app.Visible = True
```

```
' Set channel parameters
chan.NumberOfPoints = 11
chan.StartFrequency = (1000000000#)
chan.StopFrequency = (2000000000#)
```

```
' Send a manual trigger to initiate a single sweep
chan.Single True
```

```
' Store the data in the "result" variable
result = meas.GetData(naRawData,
naDataFormat_LogMag)
```

```
' Display the result
num_points = chan.NumberOfPoints
```

```

For i = 0 To num_points - 1
    Sheet1.Cells(3 + i, 1) = result(i)
Next

```

```

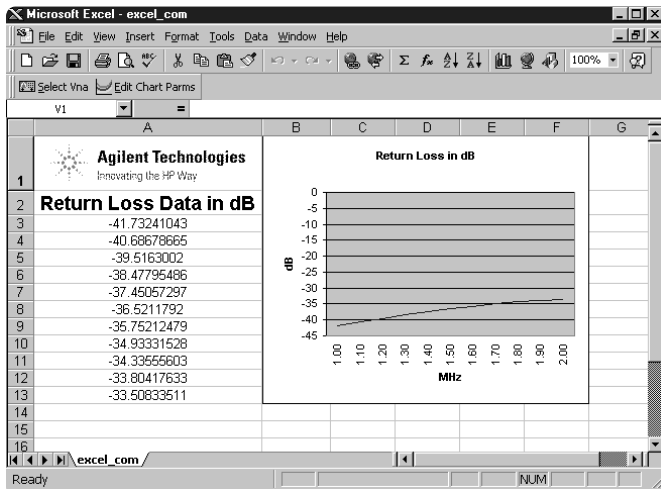
Set chan = Nothing
app.Quit

```

```
End Sub
```

5.1.4.3 Application Output

The figure below shows the displayed results when the application is executed.



5.1.5 Microsoft Visual C++ Example

5.1.5.1 Application Configuration

Microsoft Visual C++ version 6 was used for this example. In order to perform this example, create a new project in Microsoft Visual C++. Add a C++ file to the project and paste the following code into the file. The path for the type library in the code below should be changed to reference its location on the development PC.

5.1.5.2 Application Code

The application can be run on a PC or on the PNA.

```

#include "stdafx.h"

// import the Tsunami type library
//-----
#import "C:\Program Files\Agilent\Network Analyzer\835x.tlb"
no_namespace, named_guids
int main(int argc, char* argv[])
{

```

```

// interface pointers to retrieve COM interfaces
IUnknown* pUnk = 0;
IApplication* pNA = 0;
IChannel* pChan = 0;
IMeasurement* pMeas = 0;
IArrayTransfer* pTrans = 0;
int i, num_points = 0;
float* pScalarData;

```

```
HRESULT hr;
```

```

// Initialize the COM subsystem
CoInitialize(NULL);

```

```

// Create an instance of the network analyzer
// Request the NA's IUnknown interface
hr = CoCreateInstance(CLSID_Application,0,
CLSCCTX_ALL,IID_IUnknown, (void**) &pUnk);
if (!FAILED(hr)) {

```

```

// QueryInterface for the INetworkAnalyzer interface
of the NetworkAnalyzer object
hr = pUnk->QueryInterface(IID_IApplication,
(void**) &pNA);

```

```
if (!FAILED(hr)) {
```

```

// Reset the analyzer to instrument preset
pNA->Reset();

```

```

// Create S11 measurement
pNA->CreateSParameter(1,1,1,1);

```

```

// Set pChan variable to point to the active
channel
pNA->get_ActiveChannel(&pChan);

```

```
if (pChan) {
```

```

// Set pMeas variable to point to the active
measurement
pNA->get_ActiveMeasurement(&pMeas);

```

```
if (pMeas) {
```

```

// Setup the channel for a single trigger
pChan->Hold(true);
pNA->TriggerSignal = naTriggerManual;
pChan->TriggerMode =
naTriggerModeMeasurement;

```

```

// Make the PNA application visible
pNA->put_Visible(true);

```

```

// Set channel parameters
pChan->NumberOfPoints = 11;
pChan->StartFrequency = 1e9;
pChan->StopFrequency = 2e9;

```

```
// Send a manual trigger to initiate a single
sweep
pChan->Single(true);

// QueryInterface for the IArrayTransfer
interface of the NetworkAnalyzer object
hr = pMeas->QueryInterface(IID_IArray
Transfer, (void**)&pTrans);
```

```
if (!FAILED(hr)) {

    // Store the data in the "result" variable
    num_points = pChan->NumberOfPoints;
    pScalarData = new float[num_points];
    pTrans->getScalar(naRawData, naData
Format_LogMag, (long *)&num_points,
pScalarData);

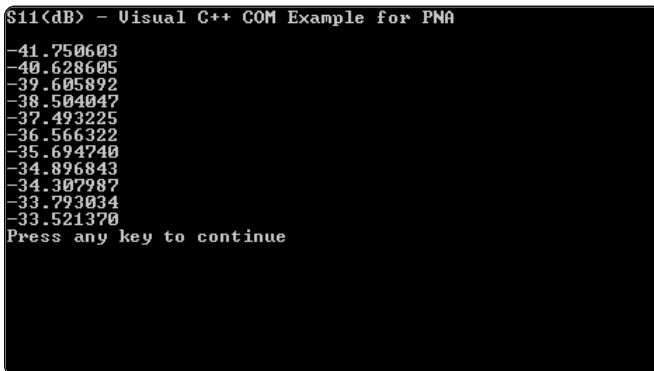
    // Display the result
    printf("S11(dB) - Visual C++ COM
Example for PNA\n\n");
    for (i = 0; i < num_points; i++)
        printf("%f\n",pScalarData[i]);

}
}
}
}
```

```
pUnk->Release();
pMeas->Release();
pChan->Release();
pTrans->Release();
pNA->Release();
}
CoUninitialize();
return 0;
}
```

5.1.5.3 Application Output

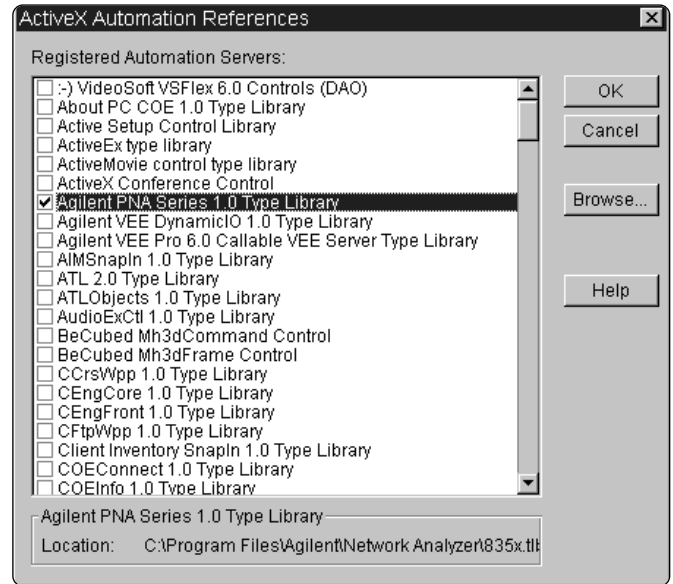
The figure below shows the displayed results when the application is executed.



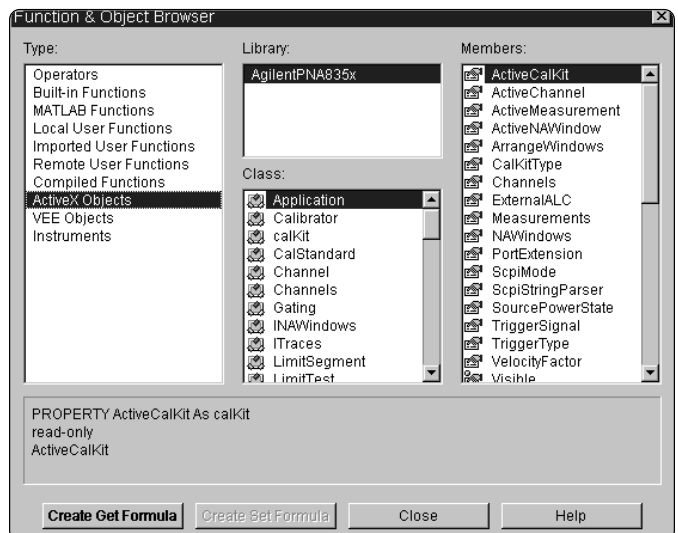
5.1.6 Agilent VEE Example

5.1.6.1 Application Configuration

For this example use Agilent VEE version 6.0 or above which contains the Variant data type used to transfer data from the PNA. The type library for the PNA should be referenced in the Agilent VEE development environment. The following figure illustrates the reference.

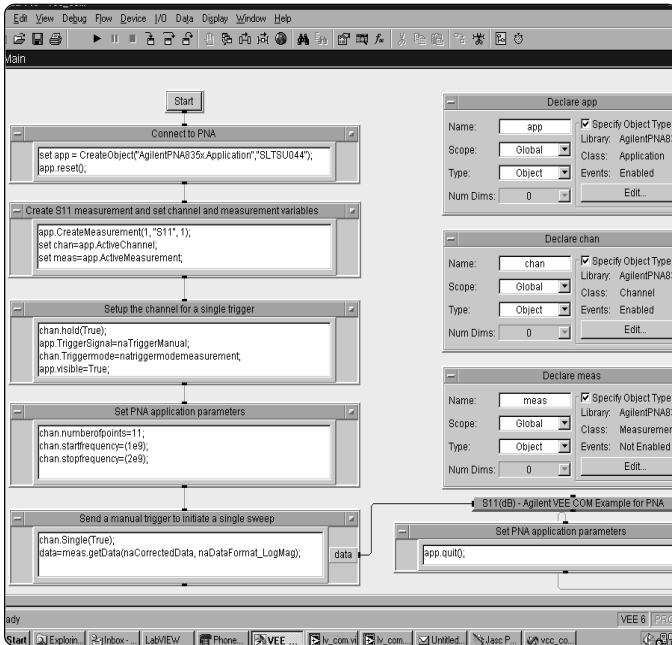


Using the Agilent VEE Object Browser the developer can see what classes and methods are available for development of applications for the PNA Series analyzer (see below figure).



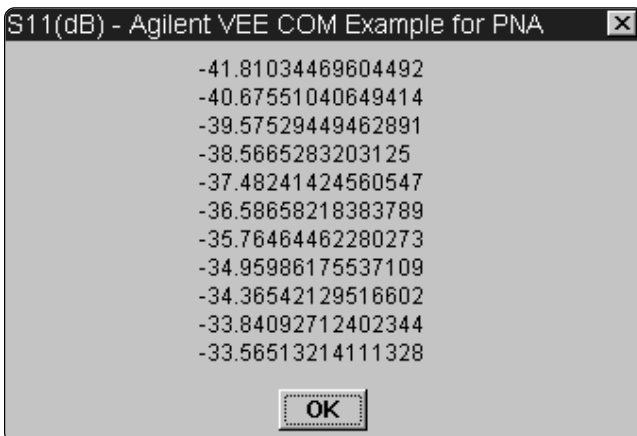
5.1.6.2 Application Code

Agilent VEE version 6.0 or higher must be installed to run the application in this example. There is a runtime version of Agilent VEE that may be used if the application has been saved as “runtime”. A free version of Agilent VEE can be found on the following web site: <http://www.agilent.com/find/vee/>. The application may be run on a PC or on the PNA Series analyzer.



5.1.6.3 Application Output

The figure below shows the displayed results when the application is executed.



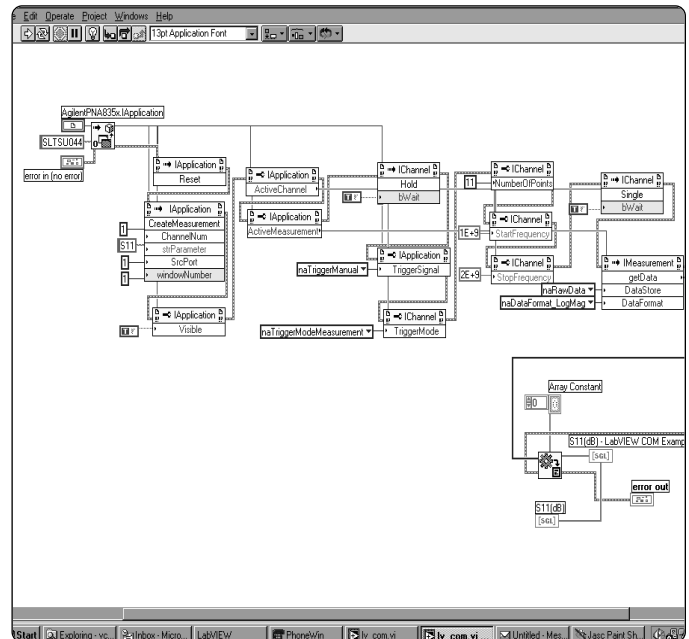
5.1.7 National Instruments™ LabVIEW Example

5.1.7.1 Application Configuration

Use National Instruments™ LabVIEW version 5.0 or above for this example. See the National Instruments™ LabVIEW documentation for information on using ActiveX objects in the LabVIEW development environment.

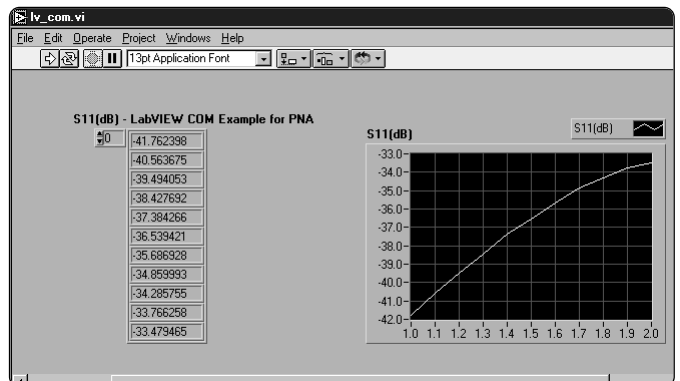
5.1.7.2 Application Code

National Instruments™ LabVIEW 5.0 or higher must be installed to run the application. The application can be run on a PC or on the PNA Series analyzer.



5.1.7.3 Application Output

The figure below shows the displayed results when the application is executed.



Appendix A: Quick Guide

A) A system administrator grants logon access to the PNA Series network analyzer for specific user. This step is also required for COM/DCOM access from your PC:

From the PNA Series Network Analyzer:

- 1) The system administrator must log on to the PNA using the administrator username and password.
- 2) Right-click **My Computer**
- 3) Click **Manage**
- 4) In the **Computer Management** window:
 - Expand **Local Users and Groups**
 - Right-click on **Users**
 - Click on **New User** in the pop-up menu
- 5) In the **New User** window:
 - **User name** input box, enter the user name used to log into your PC with
 - **Password** input box, enter the password used to log into your PC with
 - Re-enter the password for **Confirm password**
 - Click the **Create** button
 - Click the **Close** button
- 6) Close the **Computer Management** window

B) Sharing Drives between a PC and the analyzer.

This procedure shows an example of how to share the C drive of the network analyzer with your PC. This is required for COM/DCOM communication between your PC and network analyzer. This procedure is detailed in the expanded portion of this product note.

From your PNA network analyzer:

- 1) Click **Start / Settings / Control Panel**
- 2) Click the **System** Icon
- 3) Click the **Network Identification Tab**
- 4) Record the analyzer's **Full Computer Name** here: _____.
- 5) Click OK to close the **System Properties** window.
- 6) Close the **Control panel** window.
- 7) Double click the **My Computer** desktop icon.
- 8) Single right click on the local C drive.
- 9) Select **Sharing**.
- 10) Under the **Sharing tab**, select the **Share as...** radio button.
- 11) Type a share name (or use the default **C\$**). Record the share name here: _____.
- 12) Click **OK**
- 13) Close **Windows Explorer**

From your PC:

- 14) Launch **Windows Explorer**
- 15) On the main menu bar, click **Tools / Map Network Drive**

Your PC will choose the next available drive letter or you can assign any available drive. Record this drive letter here _____ .
- 16) Click in the **Path** box
Type (or select if available) the path
(\computername\sharename).
 - 1) You learned your computer name in Step 4.
 - 2) You typed in the share name in step 11.

For example, \\myanalyzer\C\$

NOTE: If you are logged onto the Analyzer using the same logon as your PC, you do not have to enter "Connect As:".

To connect under a different user name, type the name in **Connect As**.

If the user account is in a different domain, use the format: domain\username.

If you want to connect to the shared directory automatically each time you log on, check

Reconnect at Logon.

- 17) Click **OK**. The analyzer's C drive should now be visible on your PC Windows Explorer as the drive letter you used in step 15.

C) Configure the PNA Series network analyzer to provide COM/DCOM access to the PNA application for a registered user on the network analyzer.

If you are not a registered user yet, complete step A) and B) and then return to this step.

From your PNA Series Network Analyzer:

- 1) Click **Start/Run**, type **dcomcnfg** into the input box, and click **OK**.
- 2) Click on **Agilent PNA Series** in the Applications list, then click the **Properties** button.
- 3) In the **Agilent PNA Series Properties** window:
 - Click the **Location** tab. Make sure the **Run application on this computer** checkbox is checked.
 - Click the **Security** tab. Click the **Use custom access permissions** and **Use custom launch permissions** radio buttons.
 - Click the **Edit...** button next to **Use custom access permissions**.
- 4) In the **Registry Value Permissions** window:
 - Click the **Add...** Button.
- 5) In the **Add Users and Groups** window:
 - Click **Show Users**, scroll down and select the user, then click the **Add** button.
 - Click **OK** to close the **Add Users and Groups** window. Click **OK** to close the **Registry Value Permissions** window.
- 6) In the **Agilent PNA Series Properties** window:
 - Click the **Identity** tab. Ensure The interactive user radio button is selected. Click the **OK** button.
- 7) Click the **OK** button to close the **Distributed COM Configuration Properties** window.

From your PC:

1. Using your PC's **Windows Explorer**, find the analyzer's mapped local hard drive (which you found in step B-15).
2. Click **Program Files/Agilent/Network Analyzer/Automation** folder.
3. Double click **Automation.vbs** and follow the instructions.
4. A **Network Analyzer Setup** icon is now setup on your PC desktop.

Note: Your PC's operating system may require a Visual Basic Scripting engine to run the .vbs file. To download a free copy of a Visual Basic Scripting engine, visit Microsoft's® web site:

Problems?

When the network analyzer application is installed on the instrument, the application and all the objects it serves are registered on that machine. The instrument is ready to perform as a remote server.

If the analyzer is not working properly, try re-registering the application and associated libraries through the following steps:

NOTE: The following must be done in the listed order

From your PNA network analyzer:

Find 835x.exe in C:\Program Files\Agilent\Network Analyzer

1. Select and right-click **835x.exe**
2. Select **Register COM Server** to register the application.
3. Select and right-click **835xps.DLL**
4. Select **Register COM Server**

DCOM settings

5. Click **Start**
6. Select **RUN** and type **dcomcnfg**
7. From the application list, find and select **835X**
8. Click **Properties**
9. Select the **Identity** tab.
10. Select **INTERACTIVE USER**
11. Select the **Security** tab
12. Set permissions and access to **CUSTOM**
13. Edit the lists to specify the remote user

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