Application Note

envision : ensure

Basic of Remote Control over Ethernet with Windows Instrument

Signal Analyzer MS2840A/MS269xA

Signal Generator MG3710A/MG3740A

Contents

1 Introduction

Recently, the trend has been towards control via LAN/Ethernet offering faster speeds and easier configuration than GPIB. In addition, more instruments are running embedded versions of Microsoft Windows supporting intuitive file sharing with PCs and easier remote control using screen sharing to the PC from the remote measuring instrument.

The key advantages of remote control are listed below.

① Control of measuring instrument located elsewhere (remote controllability)

② Faster and more accurate repeated measurements than possible under manual control (automation)

③ Integrated control of multiple measuring instruments and measurement systems (efficiency)

④ Expansion of measurement functions using computer (expandability)

When using RF/microwave-related measuring instruments such as signal analyzers, signal generators, etc., the main fields using remote control are automatic collection of test data for R&D of electronic and radio equipment, automated inspection on production lines, automated maintenance, remote monitoring of radio-wave conditions, etc. Understanding the principles of remote control of measuring instruments increases the efficiency of measurement-related processes, leading ultimately to shorter development periods, better product quality, lower manufacturing and maintenance costs, etc.

This document uses examples of an Anritsu bench-top signal analyzer and signal generator running embedded Windows to explain the principles of remote control of measuring instruments over Ethernet.

<Abbreviations in Manual>

Unless specified otherwise, the abbreviations in this manual have the following meanings.

PC	Windows PC performing remote control
SA	Anritsu Signal Analyzer MS2840A (Windows 7)
SG	Anritsu Vector Signal Generator MG3710A (Windows7)
VISA	National Instruments NI-VISA
Windows	Microsoft Windows 7 (version depends on PC and measuring instrument)

2 Types of Remote Control Interface

Measuring instruments typically use three types of interface for remote control. The features of each are explained below.

GPIB (General Purpose Interface Bus)
This typical interface originated with the Hewlett Packard (now Keysight Technologies) HP-IB in-house interfaced and now standardized by IEEE488.2. One controller PC can simultaneously control up to 14 connected measuring instruments. If a measuring instrument itself has a controller function, up to 15 instruments can be connected. The maximum length of a cable connecting measuring instrument peers is 4 m. The cables use shielded connectors to resist noise. Up to 8 MB of 8-bit parallel data can be transferred. A Service Request (SRQ) allocation function handles notifications, such as abnormal instrument status, operation completion, etc., to the controller. The main functions of GPIB are compatible with USB and Ethernet; when using GPIB with a PC, it is necessary to install either a USB or PCI card with GPIB port/controller functions in the PC.

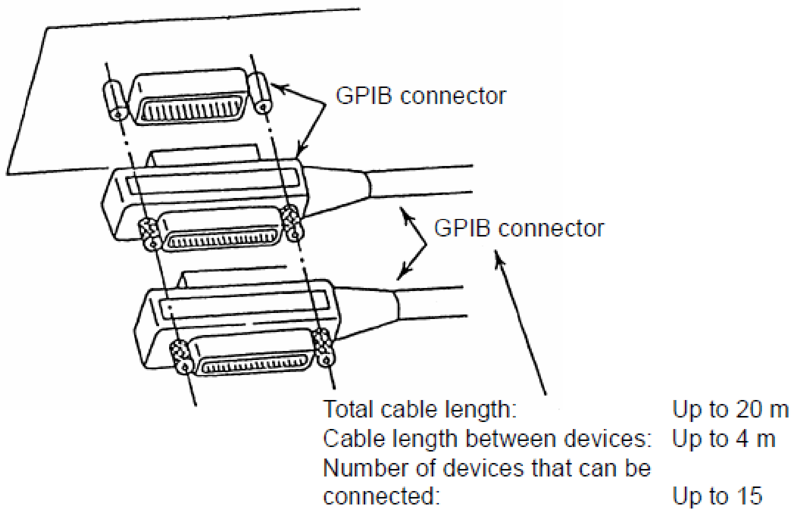


Figure 1 GPIB Cable Connections

USB (Universal Serial Bus)
USB is standard on nearly all PCs and offers the easiest form of one-to-one remote control between a PC and measuring instrument. The USB2.0 standard supports speeds of up to 480 Mbps with a maximum of 127 connected devices. The maximum distance between the controller and devices is 30 meters. One weakness is the relative susceptibility of cables to noise interference. If the measuring instrument supports the USBTMC-USB488 protocol, the control functions are the same as GPIB.

Ethernet
It is not an exaggeration to say that Ethernet has become the recent mainstream in remote control and is commonly used for controlling measuring instruments with a LAN interface port. It can support the same controls as GPIB using the TCP/IP VXI-11 protocol. In addition, control can also be implemented using the so-called raw socket. Using the common PC 100Base-T and 1000Base-T standards, is supports extremely fast speeds of 100 Mbps and 1000 Mbps and cable lengths of up to 100 m. The data transmission speeds and flexible network configuration are superior to both GPIB an USB. In addition, measuring instruments running embedded Windows support various applications, such as command-based control, file sharing, and remote desktop via a single interface and cable. However, assuring reliability, security, and high data throughput requires high-level skills and experience as well as continuing maintenance.

The Anritsu Signal Analyzer MS2840A/MS2830A/MS269xA, and Signal Generator MG3710A/MG3740A series all have GPIB (IEEE488.2), USB (USBTMC-USB488), and Ethernet (VXI-11 and raw socket) as standard built-in interfaces on the back panel.

Figure 2 Measuring Instrument Built-in Remote Control Interfaces

3 Security Precautions

Measuring instruments with built-in PC functions such as Windows, USB, Ethernet, etc., can actually be used as PCs, which although convenient, carries the same security risks as any Windows PC. Consequently, when using a measuring instrument running embedded Windows, it is necessary to appoint both equipment and network administrators with responsibility for deciding security policy. In particular, it is important to realize that measuring instruments running Windows are at risk of virus infections and unauthorized access, etc., so countermeasures must be taken.

Some form of storage device such as a USB memory stick is commonly used when loading data to and from a measuring instrument. Be sure to check the USB storage for virus infections before inserting it into the measuring instrument. Before connecting a storage device to a measuring instrument, use another external PC with anti-virus software to scan for viruses first. Anritsu runs anti-virus checks on all its measuring instruments running Windows before factory shipment.

Anritsu customers are free to install any third-party anti-virus software in measuring instruments running Windows. (There will be no problems with Microsoft licenses.) However, the processing speed may be reduced and remote control may be impossible, depending on the anti-virus operation (file scanning, firewall function, etc.). Consequently, Anritsu does not guarantee the operation of its measuring instruments in which anti-virus software has been installed. In addition, with the exception of anti-virus software and other software explicitly permitted by Anritsu, installation of other software by customers is prohibited.

4 Configuring Ethernet LAN

This section explains how to configure an Ethernet LAN connection between a PC and measuring instrument. Connecting a USB keyboard and USB mouse to a measuring instrument running Windows facilitates operation.

The basic Ethernet LAN configuration requires one PC and one measuring instrument as listed below:

● PC	1 pc
● Measuring Instrument (SA/SG)	1 pc
● Ethernet Cable	2 pcs
● Switching Hub	1 pc

Use Ethernet cables to connect the PC and measuring instrument to the switching hub as shown in the following diagram. If several measuring instruments are connected to the switching hub, one PC can control all the connected measuring instruments. Up to 255 instruments can be connected to the network using a Class-C IP address in the format 192.168.000.xxx with Subnet Mask 255.255.255.0.

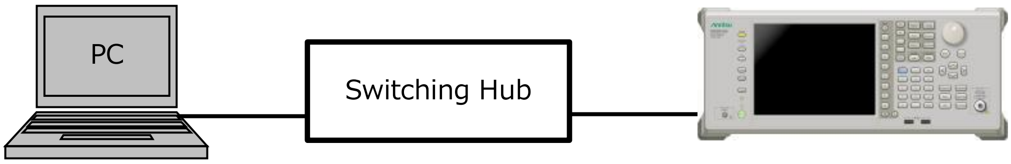


Figure 3 Local Area Network Minimum Configuration Example

The PC controller should be as new as possible with a fast CPU and a large amount of RAM and free disk storage. The choice PC and memory will have a large impact on the processing speed, especially when handling large amounts of data, such as trace and digitized data.

The Ethernet standard supports various theoretical communications speeds such as 10 Mbps (10Base-T), 100 Mbps (100Base-T), and 1000 Mbps (1000Base-T). Since 1000Base-T cables and switching hubs are relatively low cost now, we recommend using a 1000Base-T network to achieve the best possible data communications speeds. The LAN connector on the Anritsu SA back panel supports the 10Base-T/100Base-T/1000Base-T standards.

Setting IP Address of PC and Measuring Instrument

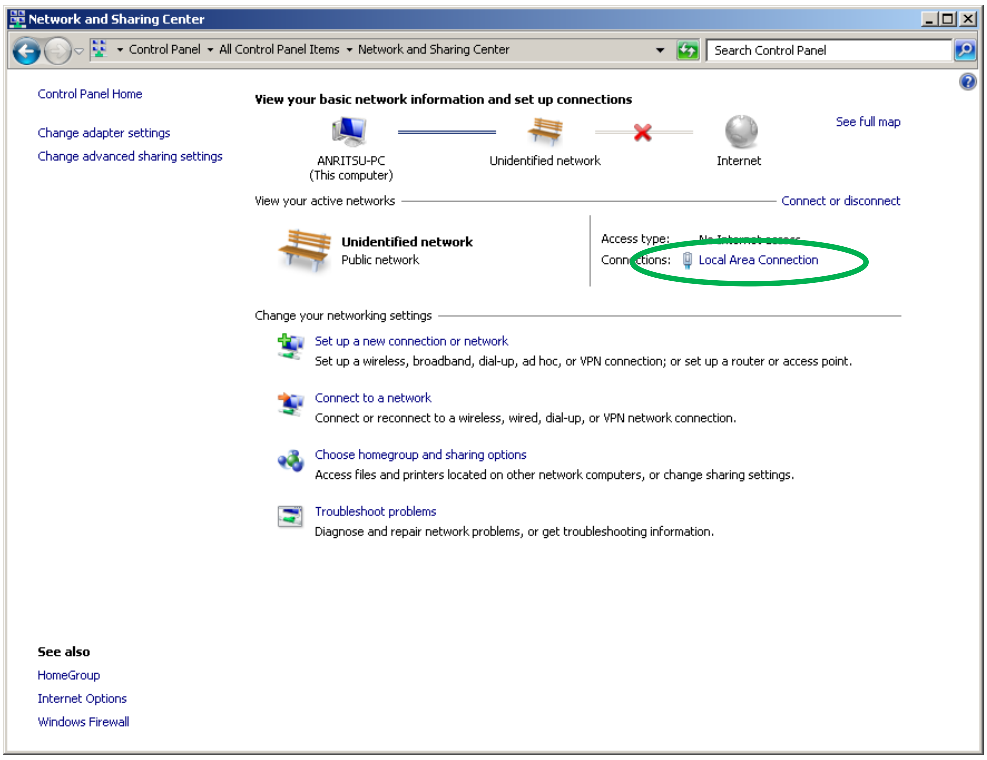
This example uses the following address settings:

PC	IP Address: 192.168.0.1	Subnet Mask: 255.255.255.0
SA	IP Address: 192.168.0.10	Subnet Mask: 255.255.255.0

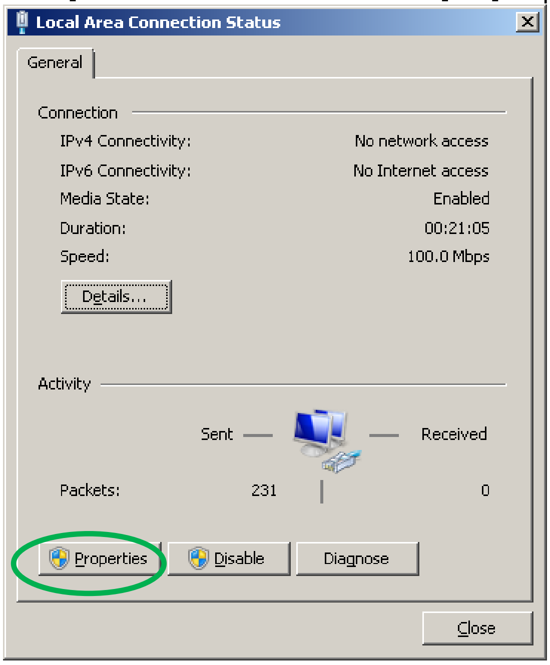
Since both the PC and SA are running Windows 7, both are set using the same method described below. To display the Windows desktop on the SA or SG, right-click and select [Show the Desktop] from the Context Menu.

<Procedure>

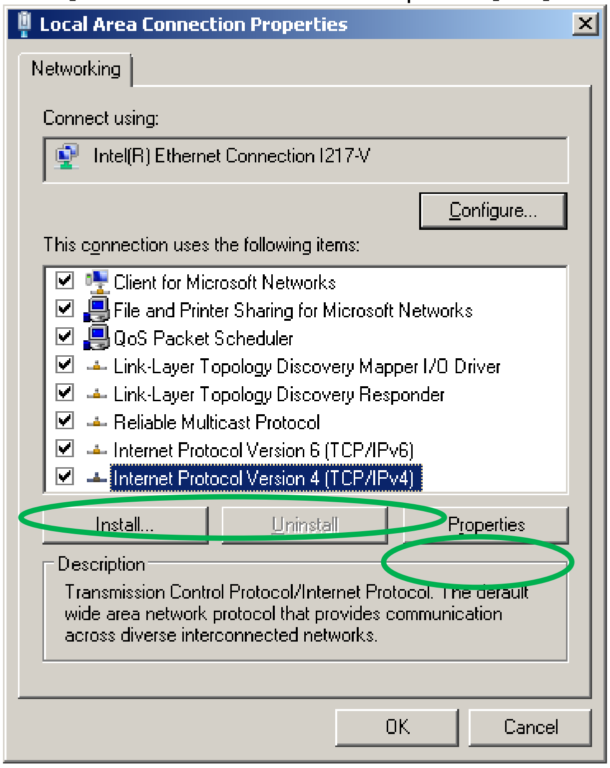
1. Click the [Start] → [Control Panel] → [Network and Sharing Center].
2. Click [Local Area Connection].



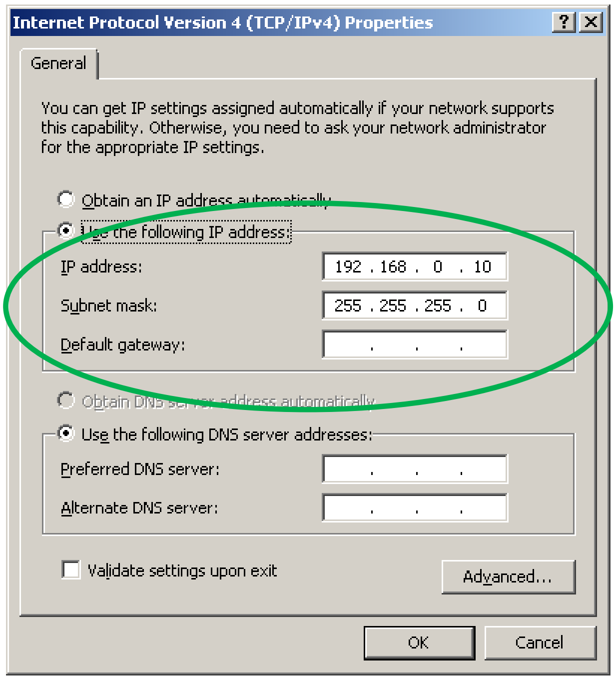
3. Click [Local Area Connection Status] → [Properties].



4. Click [Local Area Connection Properties] → [Internet Protocol Version 4 (TCP/IPv4)] → [Properties].



5. Set IP address: to 192.168.0.1 for the PC and 192.168.0.10 for the measuring instrument; set Subnet mask: to 255.255.255.0 for both the PC and measuring instrument.



6. Click the [Close] button of [Local Area Connection Properties].
7. Click the [Close] button at the [Local Area Connection Status] dialog.

Confirming Connection Status

Use the ping command to check that the settings and connection between the PC and measuring instrument are correct. The following describes how to send a ping from the PC.

<Procedure>

1. Click [Start] → [All Programs] → [Accessories] → [Command Prompt] to display the Command Prompt window.
2. Input the text string ‘ping’ (no quotes) and the IP address of the controlled measuring instrument as ping 192.168.0.10 and click [Enter].

A response indicates the settings and connection are OK. If the response is [no reply]:

- Check the cable connections are correct.
- Check the IP address settings are correct.
- Check there is no firewall setting at the PC or measuring instrument preventing communications between them.

5 Setting Windows User Account Password

To use Windows Remote Desktop and share files, a password must be set for the account used at log-in. If a password has not been set for the account, set it as described below. If a password has already been set, confirm it as described in the measuring instrument operation manual or speak with the administrator.

The user name and password at factory shipment of the Anritsu SA and SG are as follows:

MS2840A	User Name: ANRITSU	Password: (not set)
MS2830A/MS269xA	User Name: ANRITSU	Password: (not set)
MG3710A/MG3740A	User Name: ANRITSU	Password: Anritsu

<Procedure>

1. Click [Start] → [Control Panel] → [User Accounts] to display the user accounts. (If there is more than one user account, choose Anritsu.)
2. Click [Create Password] and set the password (anritsu for example).

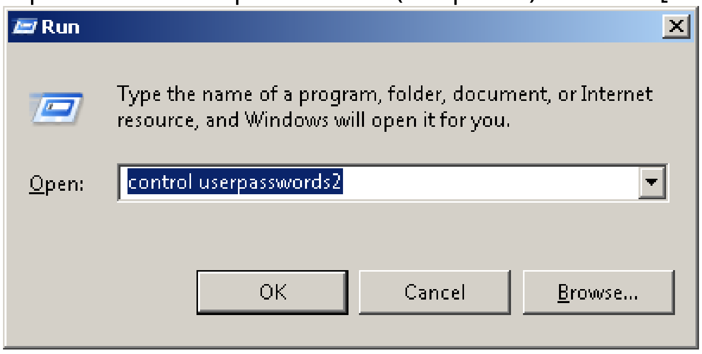
Log-in to Windows Without Password Input

When setting a password after logging-in without a password, it is necessary to input the set password at every subsequent log-in, or in other words, each time the measuring instrument is powered-up. To shorten the password input procedure, make the following setting.

<Procedure>

1 Click [Start] → [All Programs] → [Accessories] → [Run].

2 Input ‘control userpasswords2’ (no quotes) and click [OK].



3 Uncheck the [Users must enter a user name and password to user this computer.] checkbox.

4 Click [OK] to close the [User Accounts] dialog.

5 Input the set password (Example; anritsu) and click [OK].

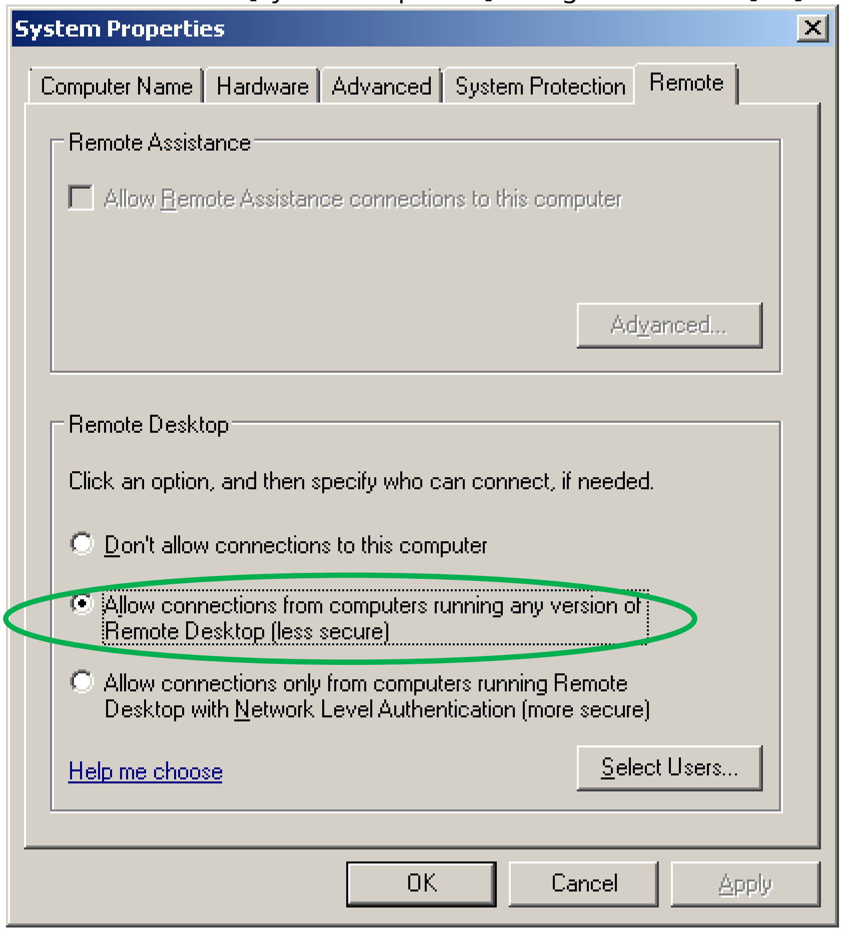
6 Monitoring Measuring Instrument Screen from PC (Remote Desktop)

By using the Windows Remote Desktop function, the screen of the measuring instrument connected to the same network as the PC can be displayed on the PC. For example, the screen of the measuring instrument at a remote location can be observed and the instrument can be operated using the PC mouse and keyboard as if sitting in front of the instrument. To start the Windows Remote Desktop function, the measuring instrument must be preset by manual operation.

Setting Measuring Instrument

<Procedure>

1. Right-click to display [Show the Desktop] from the Context Menu.
2. Click [Start] and right-click [Computer] to select [Properties] from the Context Menu.
3. Click [Remote] at the menu displayed at the left of the System window.
4. Click the [Allow connections from computers running any version of Remote Desktop (less secure)] radio button in the [System Properties] dialog and click the [OK] button.



Using Remote Desktop to Connect from PC to Measuring Instrument

<Procedure>

1. Click [Start] → [All Programs] → [Accessories] → [Remote Desktop Connection].
2. Input the user name password (anritsu in this example) and click the [OK] button.
3. If a warning dialog is displayed, click [OK/Yes] to continue the connection.

Setting Screen Resolution

The PC and measuring instrument screens should be set to the same resolution for easy viewing. If the screen resolutions are different, the measuring instrument screen may sometimes go black. The Anritsu SA and SG are designed with an optimum screen resolution of 1024 x 768 for the applications.

During Remote Desktop operation, the measuring instrument screen is displayed on the PC screen and the instrument can be operated from the PC. A password input screen is displayed at the measuring instrument, which cannot be operated (local operation lockout).

The Anritsu SA and SG are operated via Remote Desktop as described below while the Remote Desktop window is active.

Measuring Instrument Local Operation	Remote Desktop PC Operation
Function Menu	Mouse click or F1 to F8 keys on keyboard
Single/Continuous/Preset/Local/Cal/Save/Recall	Right-click and select from Context Menu
Alphanumeric Input	Keyboard input
Application Switching	Right-click and select Application Switch/System Config from Context Menu
Cursor Keys	Cursor key on keyboard
Encoder Operation	Clockwise as mouse wheel up and counterclockwise as mouse wheel down

To quit Remote Desktop operation, close the Remote Desktop window. To start local operation of the measuring instrument, input the password (anritsu in this example) at the password input screen and click [Enter].

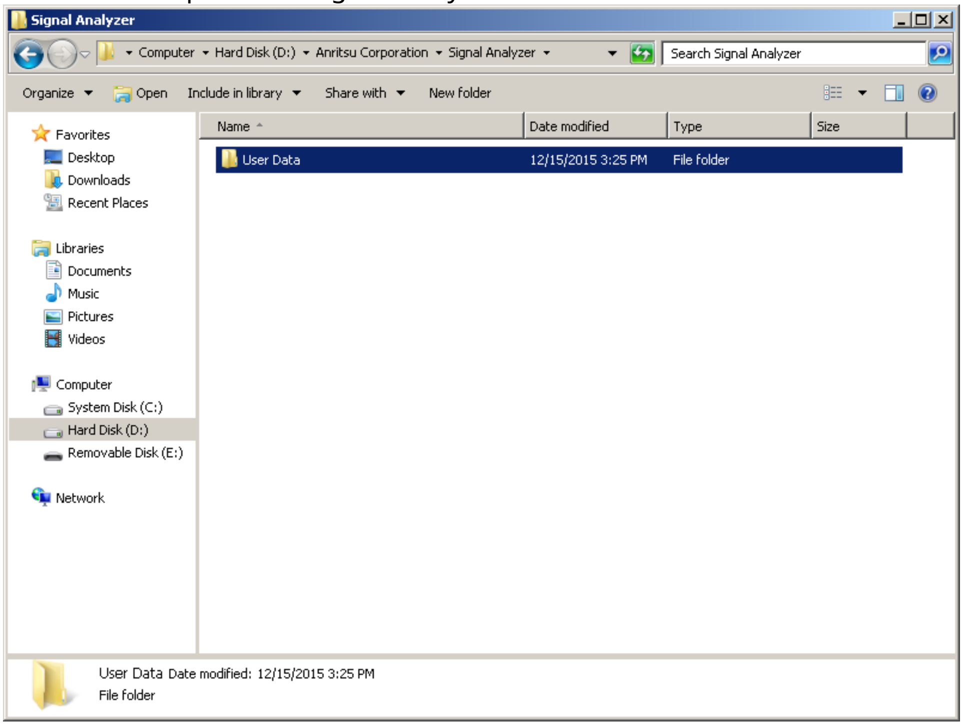
Remote Desktop does not support the following operations:

- Powering measuring instrument on and off
- Release of local operation lockout

7 Sharing Files between Measuring Instrument and PC

The measuring instrument can save various data, such as parameter settings, cable corrections, screenshots, spectrum waveforms, vector signal generator arbitrary waveform data, etc., as a file that can also be loaded to the instrument. This file can be moved between the PC and instrument via LAN or using a USB memory stick. However, using the Windows File Sharing function eliminates the need to move files manually between the PC and instrument and also prevents duplicated files and lost files. There are two methods for moving files between the PC and instrument over LAN: 1. Using the Windows File Sharing function, and 2. Using FTP.

This section explains how to use the Windows File Sharing function using the Signal Analyzer MS2840A as an example. The MS2840A outputs user data to the following location by default. Sharing this folder on the MS2840A with the PC is an easy method for reading data at the PC.
D:¥Anritsu Corporation¥Signal Analyzer¥User Data

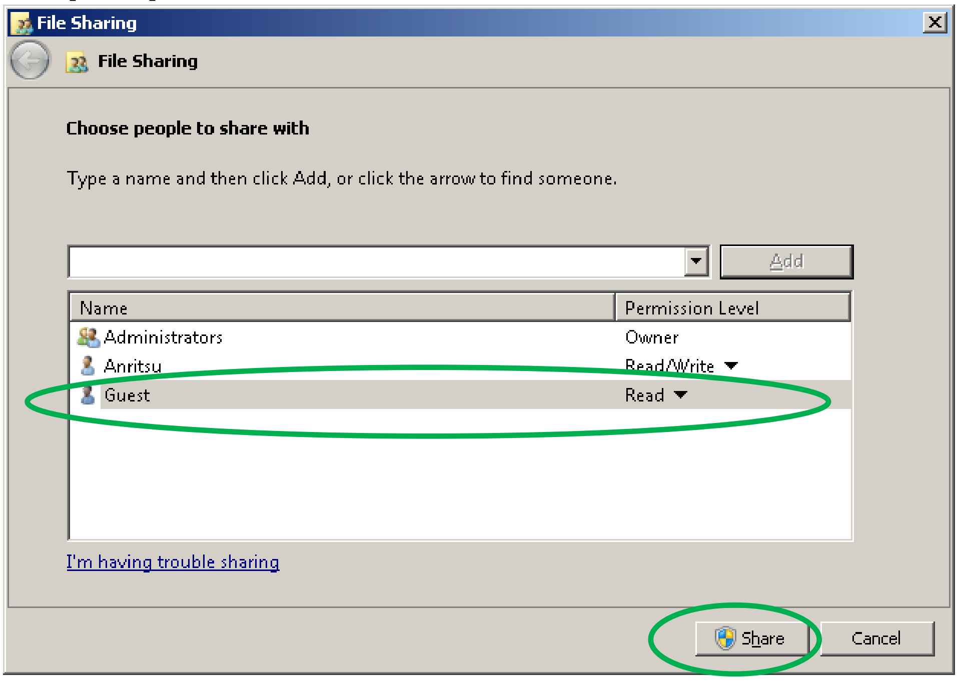


Setting File Sharing+

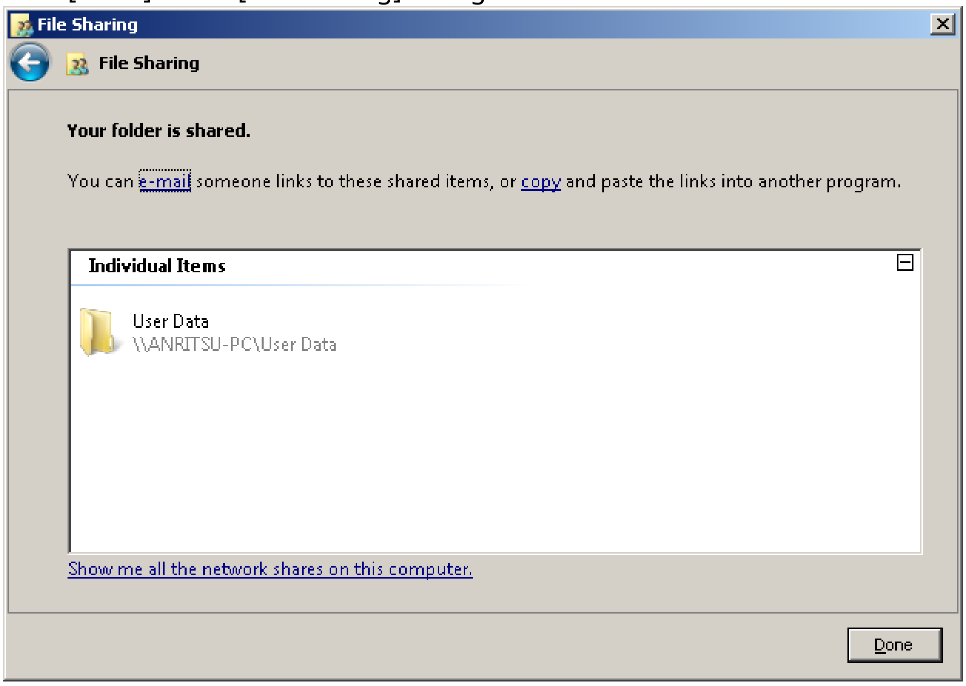
<Procedure>

1. Start Windows Explorer to display the folder to be shared.
2. Right-click and select [Properties].
3. Click the [Sharing] tab at the [User Data Properties] dialog.
4. Click [Share...].
5. Click [Guest] → [Add].
6. Enable the [Read] or [Write] permissions, or both the [Read] and [Write] permissions.

7. Click [Share].



8. Click [Done] in the [File Sharing] dialog.

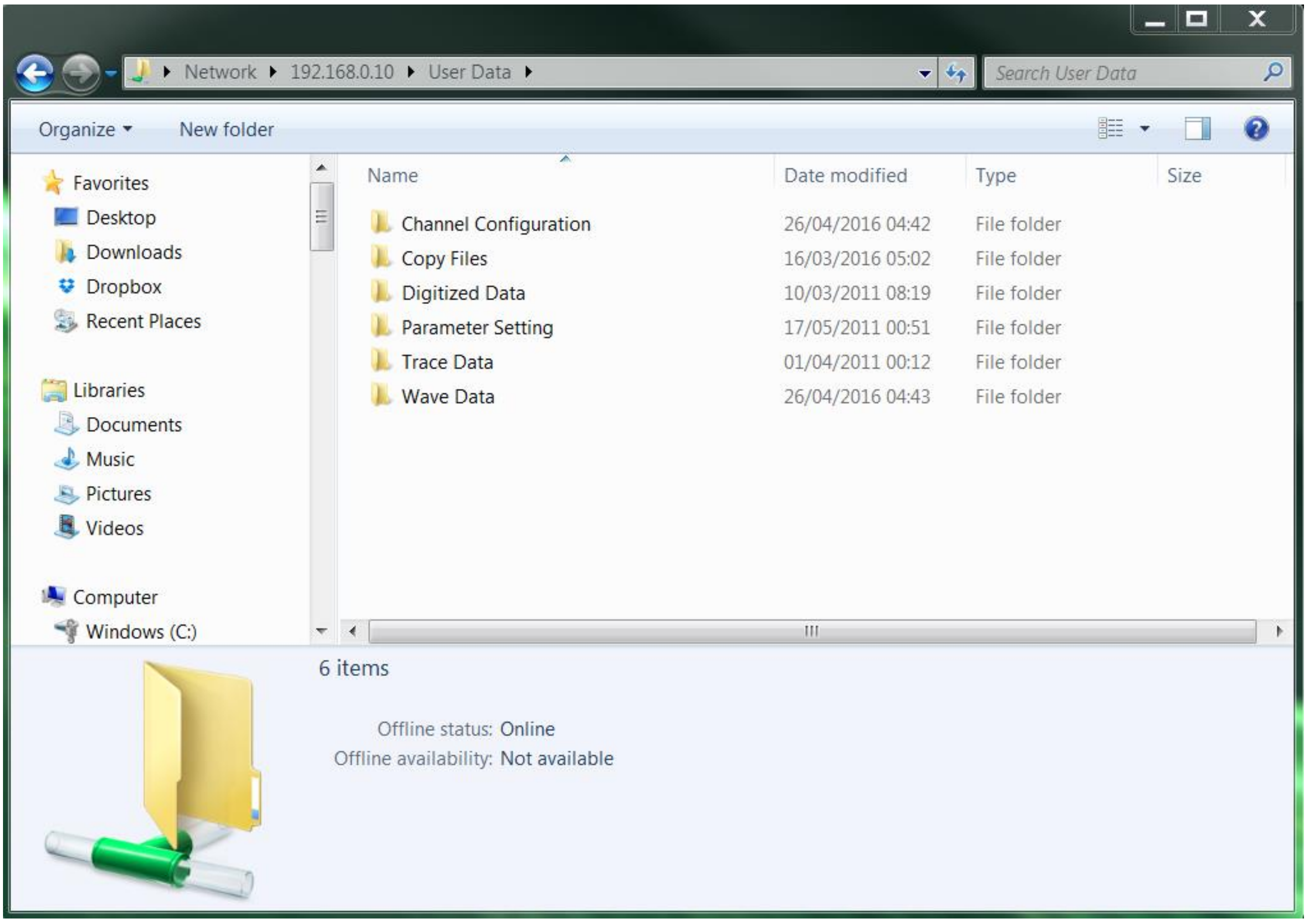


9. Click [Close].

Accessing Measuring Instrument Files from PC

<Procedure>

1. Open Explorer.
2. Input the measuring instrument IP address (¥¥192.168.0.10 for example) at [Address] and click [Enter].
3. The shared folders on the measuring instrument are displayed and and can be opened and read (depending on set shared access permissions).


Network ▸ 192.168.0.10 ▸ User Data ▸
Search User Data
Organize
New folder
Favorites
Desktop
Downloads
Dropbox
Recent Places
Libraries
Documents
Music
Pictures
Videos
Computer
Windows (C:)
Name
Date modified
Type
Size
Channel Configuration 26/04/2016 04:42 File folder
Copy Files 16/03/2016 05:02 File folder
Digitized Data 10/03/2011 08:19 File folder
Parameter Setting 17/05/2011 00:51 File folder
Trace Data 01/04/2011 00:12 File folder
Wave Data 26/04/2016 04:43 File folder
6 items
Offline status: Online
Offline availability: Not available

8 Using Remote Control Commands

Outline

The measuring instrument can be remote-controlled from a PC using commands via several interfaces such as GPIB, Ethernet, etc. The term “commands” here means a set of orders for controlling the measuring instrument, such as device messages for controlling functions of the measuring instrument, such as starting measurement and reading results defined by the GPIB and IEEE488.2 standard. Examples are SRQ (Service Request) in the GPIB standard and *RST in the IEEE standard. The IEEE488.2 common commands are defined by IEEE irrespective of the instrument and maker. Device messages have different definitions according to the instrument type and even the same type of instrument may use different device messages according to the maker, excluding basic functions.

When controlling a measuring instrument with the PC, the PC loads the device message for the function to be used to the measuring instrument. When the measuring instrument receives the device message, it executes the appropriate function. When reading the measuring instrument status, a device message matching the query contents with the character "?" appended is loaded to the measuring instrument, which responds by outputting the relevant response to the buffer. The PC reads this from the buffer to determine the measuring instrument status. This process is called querying the status of the measuring instrument. For example, loading *RST to the measuring instrument executes a reset to the default settings. Loading the query *IDN? fetches the measurement results from the instrument.

Generally, most measuring instruments have device messages corresponding to manual operations. With the exception of settings for control interfaces, there is usually a one-to-one correspondence between manual operations and device messages. However, some functions are not supported, depending on the hardware and software configuration, such as power-on/off, Windows operations, switching display screens, results settings, and functions related directly to remote-control. Conversely, some functions may only be offered by remote control.

VISA/NI-VISA

Generally, communications between the PC and measuring instrument use the Virtual Instrument Software Architecture (VISA) Application Programming Interface (API). VISA is a common standard for configuring, programming, and troubleshooting measurement systems with GPIB, USB, and Ethernet interfaces. It accommodates different physical interfaces and is designed to facilitate control of measuring instruments with a common API. Measuring instruments can be controlled by loading and reading device messages using the VISA API. In addition, the VISA API includes APIs used for searching for VISA resources and for opening/closing VISA resources used at control of measurement instruments.

NI-VISA is one typical implementation of VISA developed by National Instruments Corporation. Installing NI-VISA not only in stores the VISA API required for controlling the measuring instrument but also includes applications, such as NI-Spy for recording device message logs and interactive reading/writing of device messages.

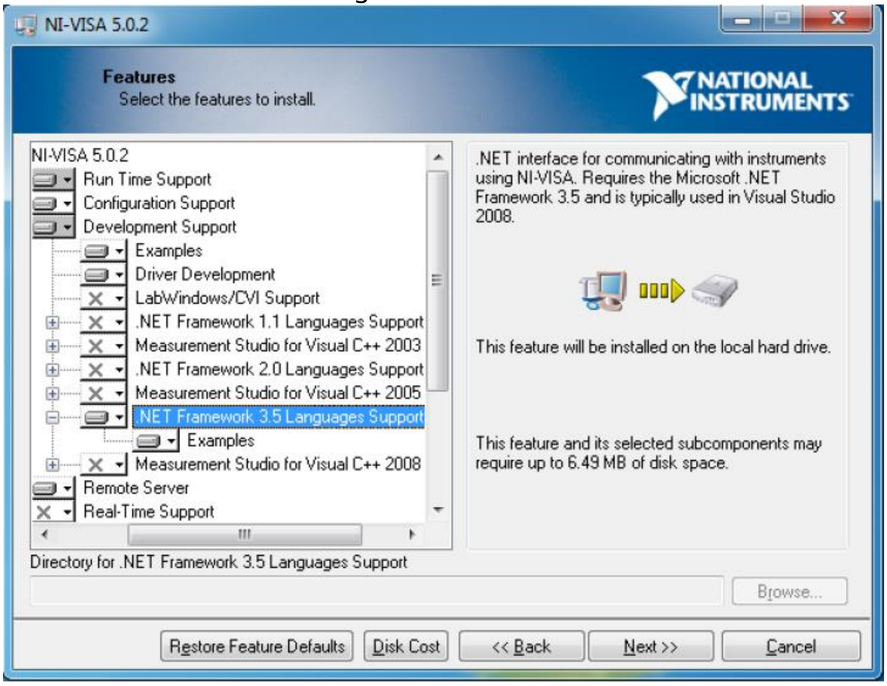
The NI-VISA installer can be downloaded free-of-charge from the National instruments website but note that NI-VISA itself is not a free product. If a National instruments GPIB product or LabVIEW software development environment is purchased, the NI-VISA license is included. Additionally, Anritsu spectrum analyzers and signal generators (MS2840A/MS2830A/MS269xA/MG3710A/MG3740A) include a licensed National Instruments GPIB chip for controlling the GPIB interface, so NI-VISA can be used freely for instrument control. For more details about the NI-VISA license agreement, please visit the National Instruments website.

Installing NI-VISA and Setting Ethernet Devices

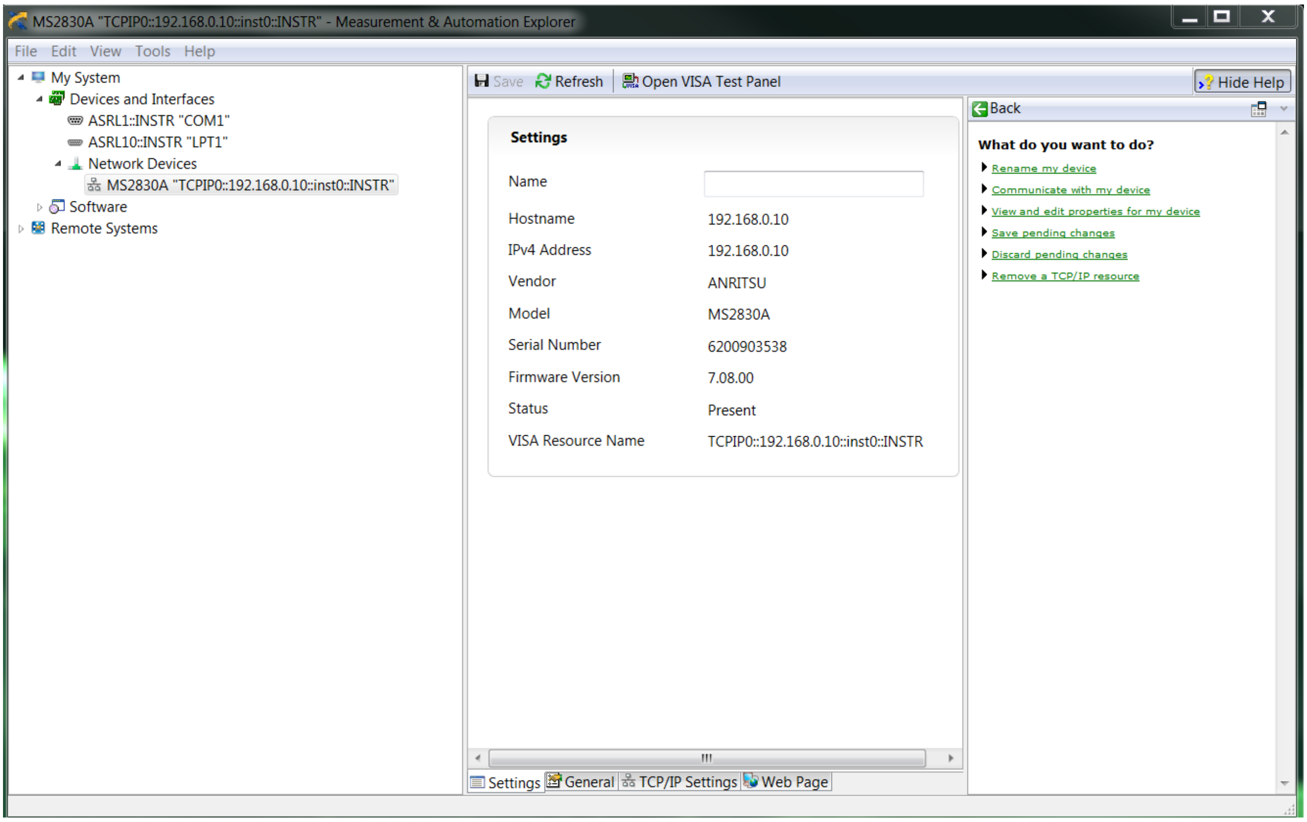
This section explains how to install NI-VISA and configure measuring instrument control over LAN.

<Procedure>

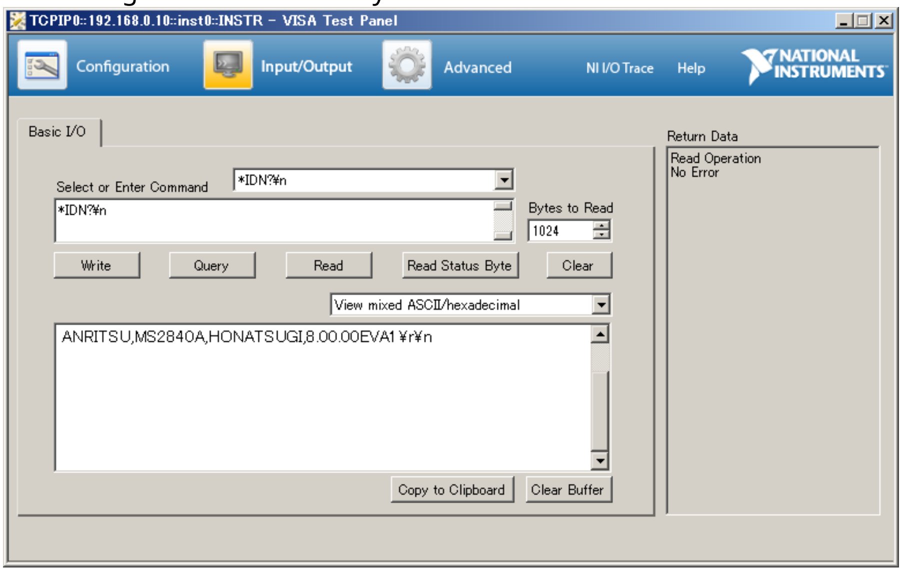
1. Go to the National Instruments website and download the NI-VISA installer.
2. Run the installer to install NI-VISA in the PC for controlling the measuring instrument.
   When programming in C# using a Microsoft .NET Framework or when using a program in C#, also install the optional .NET Framework language support. Select the same language support version as the .NET Framework being used.



3. Reboot the PC after installing NI-VISA.
4. Configure the PC and measuring instrument LAN settings. (Refer to the section on configuring LAN using Ethernet.)
5. Click [Start] → [All Programs] → [NI MAX] to start NI-MAX.
   Select [Devices and Interfaces].
6. Click [Network Devices].
7. Right-click and select [Create New VISA TCP/IP Resource].
8. Click [Manual Entry of LAN Instrument] and click [Next].
9. Input the Host Name or IP address of the measuring instrument in the IP address box (example: 192.168.0.10).
10. Click [Validate]. The test is successful if the Successfully Opened Session dialog is displayed.
11. Click [End].



12. Click [Open VISA Test Panel].
13. Click [Input/Output].
14. Click [Query] with *IDN? in the [Select or Enter Command] field; the test is successful when the measuring instrument identity is returned.



Principles of Measuring Instrument Control using NI-VISA API
The interactive application provided by NI-MAX offers a user interface for inputting and reading/writing one message as a simple way of testing.

The NI-VISA API also includes the following items for ease of use.

viOpenDefaultRM()
This first API is for calling VISA. It initializes the system configuration using VISA and returns the resource manager/session that becomes the viOpen argument.

viOpen()
This is called after viOpenDefaultRM(). It opens the specified resource name session. When successful, the VI Logical ID for the session (controlled measuring instrument) is returned. The resource name is the name of the controlled measuring instrument in the VISA system, represented as "TCPIP0::192.168.0.10::inst0::INSTR" for example. viOpen() can be used to specify the access mode and timeout.

viSetAttribute()
This specifies the VISA communications conditions and options. It can be called for the specified measuring instrument (specified by the VI Logical ID) while the session is open. It is used when adjusting timeout time, etc., according to communication contents.

viWrite()
This writes device messages to the specified measuring instrument. When viWrite is returned, it only indicates that writing of the device message had been complete; it does not indicate completion of execution of the function.

viRead()
This reads queried data from the buffer of the specified measuring instrument. The query functions by calling viWrite and viRead as a set.

viClose()
This closes the session; calling it closes the VISA communications.

Checking API Call Log using NI-Spy/NI IO Trace
The NI-Spy/NI IO Trace applications supported by installing NI-VISA are for logging the NI-VISA API call history. They can be used to observe the NI-VISA API send sequence and corresponding results. They are useful tools for saving logs to troubleshoot problems when the measuring instrument is not controlled as expected. Use these tools to record usage logs when verifying the operation of remote control programs. The logs can be output and saved as files that can be used by remote control program developers and instrument makers to help solve problems quickly.

9 Remote Control Programming Example using C# (VISA .NET API)

The .NET Framework (.NET hereafter) is a Microsoft application development and runtime tool. It supports the Visual C# and Visual Basic, etc., development environments and programming languages. NI-VISA provides an API that can be used by .NET. Remote control programs must be able to process the response character string returned by the measuring instrument, as well as items other than device message communications, such as collecting, transferring and managing measurement data, etc. Using a rich API supporting .NET, makes development of multifunctional programs easier than using a classic programming language and helps shorten the development time. The .NET AP finally also calls the VISA API.

This section explains an example of a remote control program in C# that calls the NI-VIA .NET API.

To use use NI-VISA in the .NET environment, refer to the following .NET objects.
- NationalInstruments.Common
- NationalInstruments.VisaNS

There are many versions of the .NET Framework. Install the NI-VISA .NET object (language support) for the .NET version being used.

The NI-VISA .NET API is defined by the name space “NationalInstruments.VisaNS”. With C#, this namespace should be declared using the Directive.

The program listed below is a simple measurement example using the SA. This sample program includes the basic NI-VISA API. A multifunction program can be created by extending this sample program. To simplify the explanation, this program does not include process exceptions, VISA communication error processes, and processing of responses received from the measuring instrument. To actually use this program, such processes must be added according to the target uses and system environment.

Sample Program:

```
using System;
using System.IO;
using System.Text;
using System.Windows.Forms;
using NationalInstruments.VisaNS;

private void Measure()
{
        MessageBasedSession session =
        (MessageBasedSession)ResourceManager.GetLocalManager().Open("TCPIP0::192.168.0.1
        0::inst0::INSTR");
        session.Timeout = 5000;

        session.Write("FREQ:CENT 1GHZ¥n");      //Set 1GHz to Center Frequency
        string responseFreq = session.Query("FREQ:CENT?¥n");

        session.Write("INIT¥n");                 //Start single measurement
        session.Query("*OPC?¥n");                //Wait operation complete
        string responseState = session.Query("STAT:QUES:MEAS?");       //Check state
        string responseMarkerY = session.Query("CALC:MARK:Y?¥n");      //Get result

        session.Dispose();
}
```

The basic flow for remote measurement control is as follows:

1. Open VISA session.
2. Set communications conditions (timeouts, terminators, etc.).
3. Set measurement conditions (parameters).
4. Start measurement.
5. Wait until measurement completes.
6. Check measurement status (with/without errors)
7. Read measurement results.
8. Close VISA session.

Items 1, 2, and 8 are set at the control interface while items 3 through 7 are controlled by the measuring instrument using device messages.

The key advantages of using the NI-VISA C#/.NET class are as follows. The ResourceManager class manages the VISA resources. Control of the measuring instrument is performed using the Session class and objects of the derived class. The MessageBasedSession class is a derived call of the Session class.

ResourceManager.GetLocalManager+ResourceManager.Open Method

This is the first process for starting control of the measuring instrument. After capturing the VISA resource managed object with the static GetLocalManager method, Open method is used to open the session for the measuring instrument assigned the identifier "TCPIP0::192.168.0.10::inst0::INSTR". Open method returns the controlled measuring instrument object. When controlling multiple measuring instruments, the object for each measuring instrument must be saved.

Session.Timeout Property

This sets the measuring instrument communications conditions. Timeout Property indicates the measuring instrument communications timeout. Since control is not returned until processing of the specified function is completed, set a slightly longer time than the called function processing time.

MessageBasedSession.Write Method
This writes the specified device message.

When this method is returned, it indicates that the device message has been written, or in other words that the measuring instrument has finished receiving the device message (saved to queue). Note that return of this method does not mean that the target function has been completed. For example, when control is returned after calling Write("FREQ:CENT 1GHZ"), it does not necessarily mean that the center frequency has been set to 1 GHz. It means that the measuring instrument has queued the received message and is processing the queued messages sequentially.

MessageBasedSession.Query Method
This writes the specified device message and reads the response returned by the measuring instrument.

When expecting the center frequency setting to become 1 GHz after writing Write("FREQ:CENT 1GHZ"), sending the query ("FREQ:CENT?") and reading the response confirms that the center frequency is 1 GHz. This query has two meanings; first, it confirms the currently set center frequency, and second, it synchronizes the PC and measuring instrument using VISA write and read included in the Query method. If the expected value is not returned when communications are normal, there is a possibility that the parameter setting conditions are incorrect.

Setting errors can be prevented by using Write and Query to confirm that the correct value is set for each parameter. However, the control sequence throughput is relatively lower while obtaining the required synchronization. When prioritizing throughput at program debugging, when pairing parameter settings with Write and Query, it is better to omit Query for confirming parameter settings.

Session.Dispose Method
This closes and discards the session.

10 Summary

There are many cases where measuring instruments can be used effectively by remote control. More measuring instruments running embedded Windows are being remotely controlled using Windows functions.

This document explains the basics of measuring instrument remote control. For more detailed information, refer to the operation manual for the instrument to be remote controlled, the VISA specifications, and the instruction manual for the VISA application to be used.

<Disclaimer>
The contents of this document are provided entirely at the reader’s own risk. This document describes procedures for changing the settings of Windows installed in measuring instruments, but Anritsu does not guarantee the operation of products after changing Windows settings from shipping defaults or installing third-party programs not assured by Anritsu. Furthermore, connecting a measuring instrument to a network requires following the network administrator’s guidelines and security policies. Anritsu will not accept any liability whatsoever for damages and/or losses incurred by following the descriptions in this document.

Specifications are subject to change without notice.

- **United States**
Anritsu Company
1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

- **Canada**
Anritsu Electronics Ltd.
700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

- **Brazil**
Anritsu Eletronica Ltda.
Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - Sao Paulo - SP
Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

- **Mexico**
Anritsu Company, S.A. de C.V.
Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

- **United Kingdom**
Anritsu EMEA Ltd.
200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

- **France**
Anritsu S.A.
12 avenue du Québec, Bâtiment Iris 1- Silic 612,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

- **Germany**
Anritsu GmbH
Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

- **Italy**
Anritsu S.r.l.
Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

- **Sweden**
Anritsu AB
Kistagången 20B, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

- **Finland**
Anritsu AB
Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

- **Denmark**
Anritsu A/S
Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

- **Russia**
Anritsu EMEA Ltd.
Representation Office in Russia
Tverskaya str. 16/2, bld. 1, 7th floor.
Moscow, 125009, Russia
Phone: +7-495-363-1694
Fax: +7-495-935-8962

- **Spain**
Anritsu EMEA Ltd.
Representation Office in Spain
Edificio Cuzco IV, Po. de la Castellana, 141, Pta. 5
28046, Madrid, Spain
Phone: +34-915-726-761
Fax: +34-915-726-621

- **United Arab Emirates**
Anritsu EMEA Ltd.
Dubai Liaison Office
902, Aurora Tower,
P O Box: 500311- Dubai Internet City
Dubai, United Arab Emirates
Phone: +971-4-3758479
Fax: +971-4-4249036

- **India**
Anritsu India Private Limited
2nd & 3rd Floor, #837/1, Binnamangla 1st Stage,
Indiranagar, 100ft Road, Bangalore - 560038, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

- **Singapore**
Anritsu Pte. Ltd.
11 Chang Charn Road, #04-01, Shriro House
Singapore 159640
Phone: +65-6282-2400
Fax: +65-6282-2533

- **P.R. China (Shanghai)**
Anritsu (China) Co., Ltd.
Room 2701-2705, Tower A,
New Caohejing International Business Center
No. 391 Gui Ping Road Shanghai, 200233, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

- **P.R. China (Hong Kong)**
Anritsu Company Ltd.
Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P.R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

- **Japan**
Anritsu Corporation
8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan
Phone: +81-46-296-6509
Fax: +81-46-225-8359

- **Korea**
Anritsu Corporation, Ltd.
5FL, 235 Pangyoyeok-ro, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13494 Korea
Phone: +82-31-696-7750
Fax: +82-31-696-7751

- **Australia**
Anritsu Pty. Ltd.
Unit 20, 21-35 Ricketts Road,
Mount Waverley, Victoria 3149, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

- **Taiwan**
Anritsu Company Inc.
7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

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