Keysight N437x Series Lightwave Component Analyzer

Programmer’s Guide

KEYSIGHT
TECHNOLOGIES

Notices

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Keysight Technologies Deutschland GmbH
Herrenberger Strasse 130,
71034 Böblingen, Germany

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1 Remote Operation

Overview

This programming guide supports LCA models beginning with the B generation. These now include: the 43.5GHz to 67 GHz single-mode fiber models N4373E, N4373D, N4373C and N4373B, the 4.5 GHz single-mode fiber model N4374B, the 26.5 GHz single-mode fiber models N4375E, N4375D and N4375B, as well as the 26.5 GHz multi-mode fiber 850 nm models N4376E, N4376D and N4376B.

This chapter will help you control an LCA from your own computer. The chapter covers how to write your own applications. The next chapter explains examples based on VBA/Excel in more detail. Note that applications for remote control can also be run on the LCA itself, which is useful for automated measurement procedures.

The LCA is a remoting enabled, Microsoft .NET instrument that can be controlled across any LAN that can relay an http web page. The provided remote control client has an Active X interface and a .NET interface, so you can program the LCA from COM and .NET enabled programming environments such as C# and VBA.

Beginning with the LCA software version 3.00.03 for Windows XP systems or 3.01.00 with Window 7, an SCPI interface is also available, which may be more comfortable for other environments like Labview. The SCPI interface can be used over either a LAN or USB port.

The LCA uses .NET remoting as the foundation for its external communications. Remoting is the process of programs or distributed components interacting across different processes or machines.

In .NET remoting, the server program publishes an object on a network channel and the client program subscribes to that channel when loading or connecting to that object. In the case of the LCA, a RemoteObject object is published to an http channel and the subscribing client program is the LCA RemoteClient. A Remoting server is embedded in the LCA Server application.

The LCA RemoteClient is a layer of abstraction, which provides an easy to use interface with methods to control the LCA. The LCA Remote Client layer consists of 3 files, named "RemoteClient.dll", "RemoteObjects.dll" and "RemoteClient.tlb".

These files are installed as part of the the LCA Remote Client installation package, together with a number of programming examples.

Since the LCA interface does not provide any methods to set network analyzer related parameters or to retrieve measurement data from the network analyzer, most applications also need to program the network analyzer. The network analyzer's native functions can be controlled either

using SCPI or COM. We recommend using the COM interface. This is reflected in the programming examples.

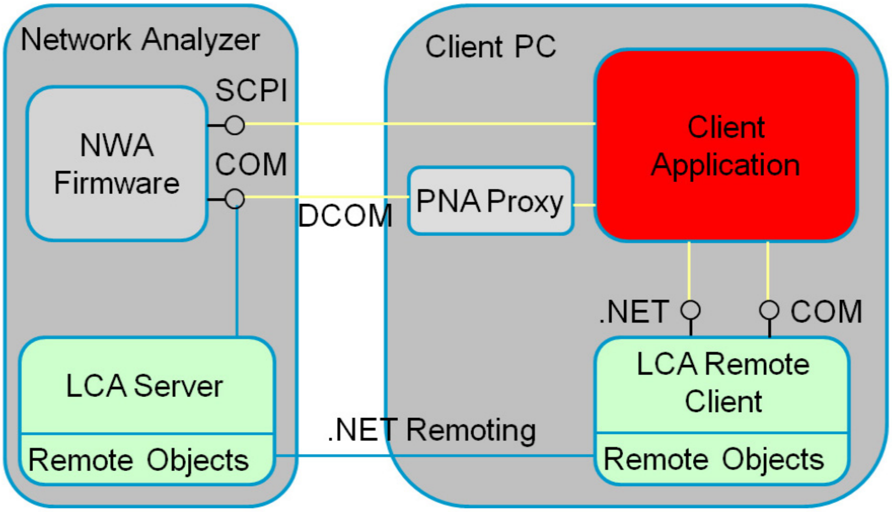


Figure 1 LCA Remoting Architecture

While this chapter assumes you are familiar with your programming environment, it does not assume familiarity with controlling remote objects from within that environment.

Examples are provided for VB.NET, C#, VBA and Keysight VEE, which can be extrapolated to most environments for controlling the LCA. After installing the LCA Remote Client on your computer, you can find these examples in the folder:

`C:\Program Files\Agilent\Agilent LCA Remote Client`
(on 32-bit systems)

`C:\Program Files (x86)\Agilent\Agilent LCA Remote Client`
(on 64-bit systems)

The location on your computer depends on the folder in which you installed the LCA Remote Client.

The Excel-VBA example pulls data directly from the LCA into Excel. This is very useful if you are setting up measurements manually, but want to analyze the results on your own computer.

Transferring code from the 8703A/B to the Keysight N437x Series Lightwave Component Analyzer

Tools are available to migrate code from the 8720 network analyzer to the new PNA network analyzer platform at
www.keysight.com/find/nadisco

The 8703A/B Lightwave Component Analyzers are based on the 8720 network analyzers, so you can use these code conversion tools to migrate existing code to the N437x Series LCA based on the PNA platform.

Most of the code in a typical application for the 8703 LCA controls the functionality of the network analyzer. This part of the application can be migrated with these tools.

The code related to LCA specific functionality has to be migrated by hand.

LCA System Configuration

How to configure the LCA for networking

Remote programming of the LCA with the .NET interface is only possible if the LCA is connected to a local area network (LAN) via the built-in LAN connector. When the LCA is connected to a network, it is also possible to connect it to network printers and remote servers, with access to shared folders and files.

NOTE Using the SCPI interface, the LCA can also be controlled from a USB port.

How to connect the LCA to your network

The LCA comes configured for DHCP networking, and has a default machine name. In many cases, connecting the LCA to your LAN is simply a case of registering the machine name with your IT department.

NOTE Do not connect the LCA to a network that is configured to automatically install software on network devices. Installing or overwriting files on the LCA computer system may impact the operation of the instrument. Please contact your network administrator or IT department to find out if you have this type of network.

NOTE The LCA LAN connector supports 10 Base-T and 100 Base-T Ethernet networks using TCP/IP and other Microsoft supported networking protocols. The LCA uses Microsoft Windows 7 or XP.

How to change network settings

You can change the LCA network settings as needed so that it connects properly to your specific network.

NOTE

Because your network settings are unique to your IT infrastructure, Keysight Technologies will not be able to assist you with connecting your instrument to your network. Please contact your network administrator or IT department for assistance. For more information, refer to the MS Windows resource kit (available from Microsoft) that is appropriate for your computer system. You can also refer to the online Help for Windows (Start > Help).

NOTE

By default, as the instrument starts up, you are logged on as an administrator. On N52xxA PNAs, the default administrator name is "pna-admin", password "pna". On N52xxB PNAs, the default administrator name is "Instrument", password "measure4u".

Keysight only recommends using the LCA application while you are logged on as an administrator.

You can change network settings by using the standard Microsoft Windows functions.

To view or change the computer machine name

1. On the Task bar, click Start, point to Settings, and then click Control Panel.
2. Double-click the System icon and click on the Computer Name tab. From here you can view or change the machine name.
3. When you have finished making changes, restart the instrument.

To configure TCP/IP to use DNS or WINS

NOTE

If using a protocol other than TCP/IP, please contact your IT department for assistance.

NOTE

Editing your instrument's protocols and file access permissions can result in unwanted behaviors that are difficult to reverse. Ensure that your changes are valid!

NOTE

Please consult with your network administrator concerning advanced TCP/IP and multi-protocol configuration settings to support your network.

NOTE

Please contact your network administrator or IT department if you have any problems connecting the LCA to your network.

4 On the Task bar, click Start, point to Settings, and then click Network and Dial-up Connections.

5 Then click Local Area ConnectionProperties.

6 On the General tab (for a local area connection) or the Networking tab (all other connections), click Internet Protocol (TCP/IP), and then click Properties. From here, you can make all desired changes.

7 When you have finished making changes, restart the instrument.

NOTE

For more information, click Start > Help > Index, and search for “DNS” or “WINS” or “static” or “dynamic.”

To configure TCP/IP for static or dynamic addressing

- To get started, follow the same steps listed above.

Install the LCA Remote Client

The LCA Remote Client is described in Overview on page -6.

NOTE

This installation is not for the LCA itself. (Applications using the remote programming commands can be run on the LCA itself without installing the remote client package.)

1 1 If not already installed, install the .NET Framework Version 2.0 from Microsoft. Go to www.microsoft.com and search for 'How to get the Microsoft .NET framework'. Be sure to get the framework and all the service packs. Make sure that you get the framework, not the SDK (software development kit.)

2 The LCA CD shipped with the LCA contains the Remote Client Installation Package to install the LCA specific DLLs and the programming examples. The most recent version of the LCA Remote Client Installation Package is available from the Keysight web site (www.keysight.com/find/lca).

   - Insert the CD into the CD drive, use Windows Explorer to find LCA Remote Client Installer Folder, or
   - Start the downloaded installer.

3 If you want to program the network analyzer via its COM interface you need to install the PNAProxy. The installation executable "PNAProxy.exe" can be found on the network analyzer in the folder:

   `C:\Program Files\Agilent\Network Analyzer\Automation` (on 32-bit systems)

   `C:\Program Files (x86)\Agilent\Network Analyzer\Automation` (on 64-bit systems)

   Install the PNA Proxy by running the installation program "PNAProxy.exe" on your client machine.

   When asked to type in the host name or IP address of the remote network analyzer during installation, you do not need to type in anything.

   You can specify the host name or IP address during program development or execution.

How to use the LCA Remote Client

Here you can see the basic steps required to write an LCA client application.

The code sequences presented here are in VB.NET syntax. For sequences in other languages like C#, VBA or C++ refer to the different programming examples. You can find these examples in the “Examples” folder, in the “Keysight LCA Remote Client” installation folder.

Since most client applications will also control the network analyzer for setting measurement parameters like start- and stop-frequency and for reading out the measurement data, we also show the basic steps required to control the network analyzer using its COM interface over LAN (DCOM).

The network analyzer can also be programmed using its SCPI interface, but this is not covered here. For details about programming the network analyzer, please refer to the relevant network analyzer documentation.

Adding references to your project

In .NET and COM projects, you have to add references to the LCA Remote Client Library and to the PNAProxy type library (the network analyzer proxy, assuming you also want to program the network analyzer).

The LCA Remote Client implements two different interface technologies.

- In environments which support .NET assemblies, we recommend using the LCA Remote Client .NET assembly directly.
- If your programming environment does not support .NET assemblies, use the LCA Remote Client over its COM interface.

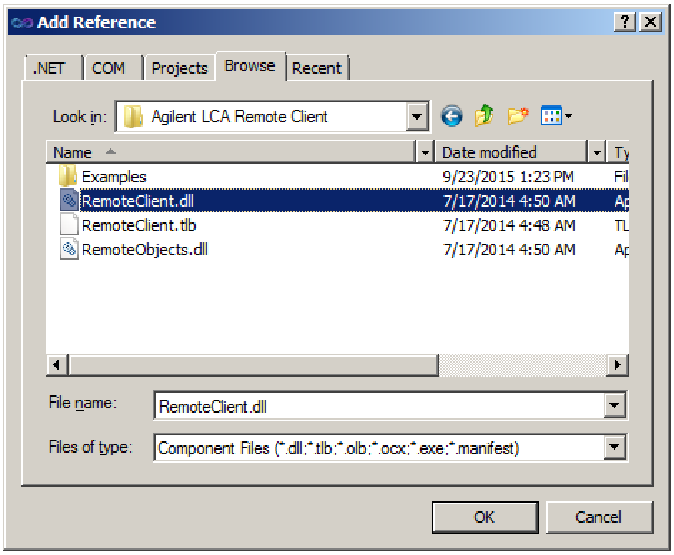
Here we show how this is done in Microsoft Visual Studio 2005 using the LCA Remote Client .NET assembly directly. When using the COM interface, the basic structure is the same.

For the differences, please check the VBA and C++ example projects, installed with the LCA Remote Client.

1 From the “Project” menu, select “Add Reference”.

2 Switch to the “Browse” tab.

3 Browse to your LCA Remote Client installation folder.



Look in: Agilent LCA Remote Client

Name	Date modified	Ty
Examples	9/23/2015 1:23 PM	Fil
RemoteClient.dll	7/17/2014 4:50 AM	Ap
RemoteClient.tlb	7/17/2014 4:48 AM	TL
RemoteObjects.dll	7/17/2014 4:50 AM	Ap

File name: RemoteClient.dll

Files of type: Component Files (*.dll;*.tlb;*.olb;*.ocx;*.exe;*.manifest)

4 Select “RemoteClient.dll” and press OK.

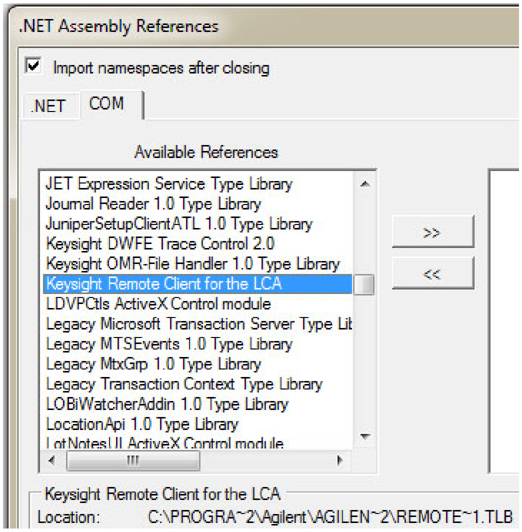
5 If you also want to use the network analyzer COM interface, please refer to the network analyzer documentation, including:

http://na.support.keysight.com/pna/programming/

In environments which cannot work directly with .NET assemblies, you have to use the COM interface of the LCA Remote Client.

1 In VBA, open the “Tools” menu and select “References”.

You will see a dialog like the following:



☑ Import namespaces after closing

Available References

JET Expression Service Type Library
Journal Reader 1.0 Type Library
JuniperSetupClientATL 1.0 Type Library
Keysight DWFE Trace Control 2.0
Keysight OMR-File Handler 1.0 Type Library
Keysight Remote Client for the LCA
LDVPCtls ActiveX Control module
Legacy Microsoft Transaction Server Type Lit
Legacy MTSEvents 1.0 Type Library
Legacy MtxGrp 1.0 Type Library
Legacy Transaction Context Type Library
LOBiWatcherAddin 1.0 Type Library
LocationApi 1.0 Type Library
LotNotesUI ActiveX Control module

Keysight Remote Client for the LCA
Location: C:\PROGRA~2\Agilent\AGILEN~2\REMOTE~1.TLB

2 Select “Keysight Remote Client for the LCA”.

Declare and create the required objects

The LCA Remote Client defines

- three interfaces ILCARemoteClient3, ILCAMeasParams2, ILCAProperties4 and
- three classes, LCARemoteClient, LCAMeasParams and LCAProperties.

Each of these classes implements the corresponding interface. To be able to use the LCA Remote Client, you have to create objects from these classes.

```
‘ Declare the objects

Private lcaClient As
Agilent.LCA.RemoteClient.LCARemoteClient

Private lcaMeasParams As
Agilent.LCA.RemoteClient.LCAMeasParams

Private lcaProperties As
Agilent.LCA.RemoteClient.LCAProperties

….

‘Create the objects

lcaClient = New Agilent.LCA.RemoteClient.LCARemoteClient()
```

```
lcaMeasParams = New Agilent.LCA.RemoteClient.LCAMeasParams()

lcaProperties = New Agilent.LCA.RemoteClient.LCAProperties()
```

If you also want to use the network analyzer, you have to declare and create a network analyzer application object.

This is quite different to the LCA. When working with the LCA you are creating a local LCA Remote Client object. The connection to the remote LCA server is done with the “Connect” command on the LCA Remote Client interface.

When using the network analyzer over its COM interface, you are using DCOM and have to remotely activate the network analyzer interface. For examples on how this is done in different programming environments, see the programming examples installed with the LCA Remote Client.

Here we show how this is done in VB.NET:

```
‘ Declare the object

Private pnaClient As AgilentPNA835x.Application

…

Public Sub Open(ByVal serverName As String)

‘ the class-id of the AgilentPNA835x.Application class

Dim clsID As System.Guid = New Guid(

"16D3C697-5F97- 11D2-BC1F-0060B0B52EA7")

Dim srvtype As System.Type =

System.Type.GetTypeFromCLSID(

clsID, serverName, True)

‘ now we connect to the remote PNA

pnaClient =

CType(System.Activator.CreateInstance(srvtype),

AgilentPNA835x.IApplication9)

End Sub
```

For further details on programming the network analyzer, please refer to the relevant network analyzer documentation.

Basic structure of an LCA client application

When programming the LCA you have to follow this basic structure:

1. (optional) Set a time-out value

   ```
   lcaClient.SetTimeout(timout_ms)
   ```

2. Connect to the LCA server.

   ```
   lcaClient.Connect(serverName)
   ```

   now you could call commands which do not require an open session. In the case of the LCA client, this is the GetLCAProperties command.

   ```
   lcaClient.GetLCAProperties(lcaProperties)
   ```

3. Open a session on the LCA, and check the return value of the Open() command. A return value False indicates that the Open() command has failed.

   ```
   lcaClient.Open()
   ```

4. All commands that change the state of the LCA require an active session opened on the LCA. All these commands have to be enclosed by Open() and Close() commands.

   Commands which do not change the state of the LCA, like reading properties, only require a passive session on the LCA.

5. When finished with working on the LCA, close the session

   ```
   lcaClient.Close()
   ```

6. Before leaving the application, make sure to call the Disconnect() command. This prevents unnecessary processing overhead on the LCA, needed to monitor and close inactive sessions.

   ```
   lcaClient.Disconnect()
   ```

Synchronous vs. Asynchronous Method Calls

A traditional remote control application consists of a list of actions that you send to the instrument, expecting it to execute them in that order and to tell you when it is done. This makes programming easy - you can do your whole measurement in a single function or sub-routine.

In this approach you send the actions to the instrument in synchronous mode. This means that an action you send to the instrument blocks the program flow of the calling thread until it finishes. The advantage is that your program structure is very simple. The drawback is that you have to wait for the instrument to finish the action. For example this could lead to an unresponsive user interface.

This can be solved using multi threading. Run the measurement sequence in a new thread while the main thread handles other things like running the user interface.

A third possibility is to call potentially time consuming actions asynchronously. The LCA Remote Client lets you call some commands in asynchronous mode. This means that the call returns immediately, even before the action on the instrument has finished execution.

In such cases you need an additional method to determine, when an action finishes. The LCA Remote Client offers two different methods to accomplish this.

- The first is the property OperationComplete().
  This property value is True, when the last asynchronously called operation on the LCA has finished execution.
  Otherwise the property value is False.
- The other method is named WaitForOPC(). This method blocks program execution on the calling thread until the operation on the instrument finishes.

Here are two short examples in VB.NET syntax, showing the usage of asynchronous calls:

Using the OperationComplete() Property in a loop:

```
oLCAClient.Init_OO(params, False)
Do
' let the application handle events
Application.DoEvents()
System.Threading.Thread.Sleep(200)
While oLCAClient.OperationComplete = False
```

Using the WaitForOPC() command:

```
oLCAClient.Init_OO(params, False)
DoMyActionsAfterCallingInit() ' doing some other stuff
' When we are done with our own stuff,
' we need to wait for Init_OO to finish
oLCAClient.WaitForOPC()
```

Troubleshooting

During application development you may encounter situations where the Open() call fails.

This happens when a session on the LCA is already open. If there are no other applications using the LCA, the most likely reason is that an application finished without closing its session, for example when running an application in the debugger and you terminate it by stopping the debugger.

The LCA and the LCA Remote Client have a heartbeat mechanism to detect abandoned sessions. The LCA checks for 60 seconds of inactivity. If nothing happens in this time, the LCA assumes the session has been abandoned and it closes this session, so that other clients are able to open a session.

You may want to workaround this behavior during application development. There are two cases here.

- If your client application halts on a breakpoint, the heartbeat is suspended, so if your application is suspended for more than 60 seconds, the server closes the session. When you try to continue execution, you get an error telling you that no session is open.

  To keep sessions open, start the LCA server on the network analyzer with the command-line parameter “NOAUTOCLOSE”.
- If you are running into problems restarting your application because aborted sessions are still open, call CloseAll() before the Open() call.

NOTE

We recommend you only use these workarounds during development.

Only use CloseAll() in environments where you are sure no other client could have a session opened. CloseAll() will close sessions from all the LCA clients.

LCA Remote Programming

The LCA remote programming interface uses Microsoft.NET Remoting technology. It is controlled by manipulating the properties and methods exposed by the server object. The list of properties and methods in this section describe the interface that is available to a programmer wanting to program the LCA system in other applications.

LCA remote control DLLs

The LCA RemoteClient DLL provides a communication link with the LCA server. The DLLs are comprised of a set of properties, and methods that together provide a basic set of remote LCA capabilities. The two DLLs of interest are: RemoteClient.dll and RemoteObjects.dll. By default these two DLLs are installed to:

`C:\Program Files\Agilent\Agilent LCA Remote Control\`
(on 32-bit systems)

`C:\Program Files (x86)\Agilent\Agilent LCA Remote Control\`
(on 64-bit systems)

NOTE

From version 3.1.4 onwards, remote control DLLs are generally installed in C:\Program Files (x86)\Agilent\Agilent LCA Remote Control\ Independent from that, they can be used within 32-bit and 64-bit processes.

Specific Commands

Interface structure

There are three classes to control the LCA: the LCAMeasParams, the LCAProperties and the LCARemoteClient.

- The class LCAMeasParams summarizes all possible parameters of your measurement.
- The class LCAProperties provides read-only properties, which give you some information about the network analyzer and the LCA.
- The class LCARemoteClient provides the methods to connect to the LCA, perform measurements and change hardware settings.

Enumeration

This is the list of enumeration names, with their possible values.

Enumeration	Description	Possible values
ELaserState	Enumerates the possible laser states, on or off.	NotSet LaserOff LaserOn
ELaserWvl	Enumerates the possible laser wavelengths.	NotSet Wvl_850nm Wvl_1310nm Wvl_1550nm
EMeasMode	Specify if you are doing single ended or differential measurements. Note: differential measurements require a 4-port network analyzer.	NotSet SingleEnded Differential
EMeasType	Enumerates the different LCA measurement types	NotSet EE EO OE OO
EModBiasOpt	Specify how often a modulator bias voltage optimization has to be performed. Once: only once when the laser is switched on. EverySweep: prior to each measurement started by the LCA. Continuous: the optimization loop runs continuously.	NotSet Once EverySweep Continuous
EOpticalInput	Enumerates the optical inputs on the optical test head's front panel. High power input is comparable to input 2 and standard to input 1.	NotSet Standard HighPower

Enumeration	Description	Possible values
ERFSwitch	Enumerates the RF switches in a switched LCA system	NotSet Source Receiver
ERFSwitchState	Enumerates the possible settings of the RF switches	UnKnown Thru Intern
ETestHeadType	Enumerates the possible testhead types	Tx Rx TxRx

Class LCAMeasParams

These are common properties of the LCA measurement parameters.

Property	Description	Type	Default value
Wavelength_nm	Specify with which laser wavelength the LCA will measure.	Enum ELaserWvl	NotSet
WavelengthInt_nm	Specify with which laser wavelength the LCA will measure. Use this method when using ExternalInput and the wavelength does not match any of the internal wavelengths of the test head.	Integer	
OpticalPower_dBm	Specify the optical output power of the LCA in dBm	Double	0.0
HighPower_Input	If you are using the high power optical input you have to set the HighPower_Input property to true.	Boolean	False
MeasMode	Specify if you want to do single ended or differential measurements	Enum EMeasMode	SingleEnded
ModBiasOptimization	Specify how often a modulator bias voltage optimization has to be performed	Enum EModBiasOpt	EverySweep
Advanced	Enable the possibility to overwrite some of the default behavior of the LCA. In advanced mode you can force the LCA to switch the laser on or off independently of the measurement type. You also have additional Optical- and RF- path deembedding possibilities, or can apply additional deembedding on the receiver and the source side, independent of the measurement type.	Boolean – if true, advanced features are active	False

Property	Description	Type	Default value
Laser_On	Switch the intern laser on or off. Note: The value of this property is only evaluated in advanced mode. In default mode the laser is switched on or off according to the measurement type.	Boolean – if true, the laser is on	True
SkipUserCal	If set to True, factory calibration data are used, no additional user calibration is used.	Boolean	False
NRUserCal	If set to True, IF-BW is reduced to reduce the noise on the user calibration data. The default bandwidth reduction factor is defined in the LCAConfig.xml file.	Boolean	False
Imp75_Ohm	Set to True to measure components with 75 Ohm impedance.	Boolean	False
ForwardRFPower_dBm	Sets the RF power level for the source port(s). For balanced measurements (on 4-port network analyzers), Ports 2 and 3 of the network analyzer are forward for EO measurements and reverse for OE measurements. Increasing the forward RF power for OE measurements increases the optical modulation amplitude.	Double	Double.NaN
ReverseRFPower_dBm	Sets the RF power level for the receiver port(s). We recommend the factory calibrated default value for the best results. To reset to the factory default, leave the text box empty or enter a value less than -200 dBm.	Double	Double.NaN
ExternalInput	Set to True to use a laser source connected to the optional external input (on the rear of the optical test set. Set to False to use the laser source in the optical test set.	Boolean	False

The following properties control additional optical path deembedding.

Property	Description	Type	Default value
UseOpticalConnData	With this property you could switch the whole optical path deembedding on or off.	Boolean	False
SrcAttOpt_dB	Specify the optical attenuation on the source path in dB. In default mode only evaluated for O/E and O/O measurements.	Double	0.0
RcvAttOpt_dB	Specify the optical attenuation on the receiver path in dB In default mode only evaluated for E/O and O/O measurements.	Double	0.0
SrcRefIdx	Specify the refractive index of the source path in dB. In default mode only evaluated for O/E and O/O measurements.	Double	0.0
RcvRefIdx	Specify the refractive index of the receiver path in dB. In default mode only evaluated for E/O and O/O measurements.	Double	0.0
SrcLengthOpt_m	Specify the geometrical length of the source path in m. In default mode only evaluated for O/E and O/O measurements.	Double	0.0
RcvLengthOpt_m	Specify the geometrical length of the receiver path in m. In default mode only evaluated for E/O and O/O measurements.	Double	0.0
UseOpticalS2PFile	Specify if you want to describe the optical paths by the parameters above or by transmission data stored in a s2p file. Only the S21 transmission data is used.	Boolean	False
OptRcvFile	The name of the s2p file to use for additional adaptor deembedding on the receiver side In default mode only evaluated for E/O and O/O measurements.	String	Empty string
OptSrcFile	The name of the s2p file to use for additional adaptor deembedding on the source side. In default mode only evaluated for O/E and O/O measurements.	String	Empty string

Property	Description	Type	Default value
UseElAdaptor	With this property you could switch the whole electrical path deembedding on or off.	Boolean	False
ElRcv1File	The name of the s2p file to use for electrical adaptor deembedding. This property has to be used for receiver side deembedding in single ended measurements or for the receiver port with the lower number in differential measurements.	String	Empty string
ElRcv2File	The name of the s2p file to use for electrical adaptor deembedding. This property has to be used only for the receiver port with the higher number in differential measurements.	String	Empty string

Property	Description	Type	Default value
ElSrc1File	The name of the s2p file to use for electrical adaptor deembedding. This property has to be used for source side deembedding in single ended measurements or for the source port with the lower number in differential measurements.	String	Empty string
ElSrc2File	The name of the s2p file to use for electrical adaptor deembedding. This property has to be used only for the source port with the higher number in differential measurements.	String	Empty string
CalSetUserCal	Name a Calset on the network analyzer which has to be used for the user calibration measurement. If an empty string is passed, the current calset is used. If “NONE” is passed, no calset is applied for the user calibration measurement.	String	Empty string

Class LCAProperties

NOTE

These properties are all read-only.

Property	Description	Type	Default value
NWAModel	The model number of the network analyzer	String	
NumNWAPorts	The number of ports of the network analyzer	Integer	
NumOpticalInputs	The number of optical inputs of the LCA test head	Integer	
ProductNumber	The product number of the LCA system	String	
SerialNumber	The serial number of the LCA system	String	
SwitchedArchitecture	True: LCA test head has a switched architecture, False: non switched architecture	Boolean	
SoftwareVersion	The version of the LCA server software	String	
SourceWvl	An array showing all available wavelengths of the LCA test head	array ELaserWvl	
MaxPower_dBm	An array holding the maximum optical output power values in dB. These values are correlated to the wavelength values in “SourceWvl” at the same position.	array double	
MinPower_dBm	An array holding the minimum optical output power values in dB. These values are correlated to the wavelength values in “SourceWvl” at the same position.	array double	
HasExternalInput	True: LCA test head has external laser input False: LCA test head has no external input	Boolean	
TestHeadType	The type of the LCA testhead: Tx only, Rx only or Tx and Rx	ETestHeadType	
Manufacturer	The manufacturer of the LCA testhead	String	

Interface ILCARemoteClient

General commands

Sub Connect (ByVal server As String)

Create a connection to an LCA server application.

An LCA client application can only have one open connection to an LCA server at any time.

The LCA server could handle several open connections concurrently.

Parameters ByVal server As String

Host name or IP address of the network analyzer where the LCA server is running.

Return value No return value.

Sub Disconnect ()

Closes the connection to the LCA server application.

Parameters No parameters.

Return value No return value.

Function IsConnected() As Boolean

Checks if a connection to an LCA server already exists.

Parameters No parameters.

Return value Boolean

True: a connection to an LCA server exists False: no connection exists.

False: no connection exists

Function Open () As Boolean

Opens an active session on the LCA.

All commands that change the state of the LCA require an active session.

The LCA server allows only one active session at any time.

All actions allowed in a passive session are also allowed in an active session.

Parameters No parameters.

Return value

Boolean True: A session has been opened

False: Opening a session failed

Function OpenPassive () As Boolean

Opens an passive session on the LCA.

All commands that just read settings from the LCA require at least an open passive session.

Several passive sessions could be opened concurrently.

Parameters No parameters.

Return value Boolean

True: A session has been opened

False: Opening a session failed

Sub Close ()

Closes active session on the LCA.

Parameters No parameters.

Return value No return value.

Sub ClosePassive ()

Closes passive session on the LCA.

Parameters No parameters.

Return value No return value.

Sub CloseAll ()

Closes the active sessions on the LCA. Any measurements that are currently running are aborted.

This can be useful if an abandoned, open session prevents a successful Open() command. However, be careful not to disturb any other connected client applications.

The LCA automatically closes abandoned sessions after some time (>60s) of inactivity.

Parameters No parameters.

Return value No return value.

Sub ResetLCASystem ()

Restarts the LCA server. Open sessions are closed and running measurements are aborted.

A restart is necessary, when the network analyzer application has been restarted or when the LCA testhead has been switched off while the LCA server was running.

Parameters No parameters.

Return value No return value.

Sub GetLCAProperties (ByVal properties As RemoteClient.ILCAProperties4)

Read out the properties of the LCA system.

Parameters ByVal properties As RemoteClient.ILCAProperties4

The properties are written to this LCAProperties object

Return value No return value.

Sub SetTimeout (ByVal timeout_ms As Integer)

Set the timeout value for the .NET remoting.

A value of 0 or -1 indicates an infinite timeout period, which is also the default value.

The timeout value is set in the .NET remoting layer during execution of the “Connect” command. If you want to set a timeout value, you have to do this before calling the “Connect” command.

If you are using the LCA Remote Client .NET assembly directly, you can also specify the timeout value in the LCARemoteClient constructor.

When using the COM interface you could only use the default constructor, so you have to use this command to specify a nondefault timeout value.

Parameters ByVal timeout_ms As Integer

An integer that specifies the number of milliseconds to wait before a .NET remoting request times out

Return value No return value.

Sub SetSystemPersonaManufacturer (ByVal manufacturer As String)

This command allows you to set the manufacturer name returned in the LCA properties and the instrument's *IDN query response on the SCPI interface. This is intended to be used for Agilent backward identity compatibility.

Allowed manufacturer names are: "Agilent Technologies" or "Keysight Technologies.

The change to the manufacturer string will not take effect until after a restart of the LCA software.

Parameters ByVal manufacturer As String

The new manufacturer. If empty, the default manufacturer is set.

Return value No return value.

Function GetSystemPersonaManufacturer (ByVal _default As Boolean) As String

This command allows you to query the current manufacturer name.

Parameters ByVal _default As Boolean

True: get the default manufacturer

False: get the current manufacturer

Return value String The manufacturer

Sub SetSystemPersonaModel (ByVal model As String)

This command allows you to set the product model returned in the LCA properties and the instrument's *IDN query response on the SCPI interface. This is intended to be used for model compatibility.

The change to the model string will not take effect until after a restart of the LCA software.

It is only allowed to change the last character of the product model string.

Parameters ByVal model As String

The new product model. If empty, the default product model is set.

Return value No return value.

Function GetSystemPersonaModel (ByVal _default As Boolean) As String

This command allows you to query the current product model.

Parameters ByVal _default As Boolean

True: get the default product model

False: get the current product model

Return value String The product model

Sub SaveSetup (ByVal fileName As String, ByVal addNwaState As Boolean, ByRef measParam As ILCAMeasParams2)

This command allows you to write the given measurement parameters to a file.

Parameters ByVal fileName As String

The full path of the file to write. Only ".xml" or ".lca" extensions are allowed. With ".xml" a human readable xml file is written. With ".lca" a compressed file is written.

ByVal addNwaState As Boolean

True: the network analyzer state is also saved with the file.

False: the network analyzer state is not saved.

ByRef measParam as ILCAMeasParams2

The measurement parameters to be saved.

Return value No return value

Function RecallSetup (ByVal fileName As String, ByVal nwaState As Boolean) As ILCAMeasParams2

This command allows you to read a previously stored LCA measurement parameter file.

Parameters

ByVal fileName As String

The full path of the file to read.

ByVal addNwaState As Boolean

True: the network analyzer state should be restored if the file contains network analyzer state data.

False: the network analyzer state should be ignored.

Return value

ILCAMeasParams2 The measurement parameters.

Sub SetPortConfiguration (ByVal measType As EMeasType, ByVal TxPort As Integer, ByVal RxPort As Integer, ByVal Optional OeDiffUserCalRxPort As Integer = -1)

Sets the network analyzer port configuration for the given measurement type (EO, OE or OO). Tx and Rx ports are specified. For 4-port network analyzers and differential measurements, the two remaining ports are used for the differential side.

See the Users Guide for more information about port configuration.

Parameters

ByVal measType As EMeasType

The measurement type for which the port configuration should be set.

ByVal TxPort As Integer

The port number to use for the transmitter side.

ByVal RxPort As Integer

The port number to use for the receiver side.

ByVal Optional OeDiffUserCalRxPort As Integer

The port number to use for the receiver side on differential OE user calibration measurements.

If omitted the RxPort is used

Return value

No return value

Sub GetPortConfiguration (ByVal measType As EMeasType, ByRef TxPort As Integer, ByRef RxPort As Integer, ByRef OeDiffUserCalRxPort As Integer)

Query the current port configuration for the given measurement type. Tx and Rx ports are returned. For 4-port network analyzers and differential measurements, the two remaining ports are used for the differential side.

Parameters

ByVal measType As EMeasType

The measurement type for which the port configuration is queried.

ByRef TxPort As Integer.

The port number used for the transmitter side.

ByRef RxPort As Integer

The port number used for the receiver side.

ByRef OeDiffUserCalRxPort As Integer

The port number used for the receiver side on differential OE user calibration measurements.

Return value

No return value

Sub SetDefaultPortConfiguration()

Reset the port configuration to the default settings.

Parameters

No parameters

Return value

No return value

Sub GetDefaultPortConfiguration(ByRef TxPort As Integer, ByRef RxPort As Integer, ByRef OeDiffUserCalRxPort As Integer)

Query the default port configuration. Tx and Rx ports are returned. For 4-port network analyzers and differential measurements, the two remaining ports are used for the differential side. The measurement type could not be specified since the default setting has the same configuration for all measurement types.

Parameters

ByRef TxPort As Integer

The port number used for the transmitter side.

ByRef RxPort As Integer

The port number used for the receiver side.

ByRef OeDiffUserCalRxPort As Integer

The port number used for the receiver side on differential OE user calibration measurements.

Return value

No return value

Measurement commands

Sub Init_EE
(ByVal parameters As RemoteClient.ILCAMeasParams2, ByVal sync As Boolean)

Initializes the LCA for a EE measurement.

Parameters:

ByVal parameters As RemoteClient.ILCAMeasParams2

The measurement parameters for initialization Optional ByVal sync As Boolean

True (default): the call is blocked until initialization is complete

False: the call returns immediately.

For synchronization use the synchronization methods WaitForOPC or OperationComplete

Return value

No return value.

Sub Init_EO (ByVal parameters As RemoteClient.ILCAMeasParams2, ByVal sync As Boolean)

Initializes the LCA for an EO measurement.

Parameters

ByVal parameters As RemoteClient.ILCAMeasParams2

The measurement parameters for initialization Optional ByVal sync As Boolean

True (default): the call is blocked until initialization is complete

False: the call returns immediately. For synchronization use the synchronization methods WaitForOPC or OperationComplete

Return value

No return value.

Sub Init_OE (ByVal parameters As RemoteClient.ILCAMeasParams2, ByVal sync As Boolean)

Initializes the LCA for an OE measurement.

Parameters

ByVal parameters As RemoteClient.ILCAMeasParams2

The measurement parameters for initialization Optional ByVal sync As Boolean

True (default): the call is blocked until initialization is complete

False: the call returns immediately.

For synchronization use the synchronization methods WaitForOPC or OperationComplete

Return value

No return value.

Sub Init_OO (ByVal parameters As RemoteClient.ILCAMeasParams2, ByVal sync As Boolean)

Initializes the LCA for an OO measurement.

Parameters

ByVal parameters As RemoteClient.ILCAMeasParams2

The measurement parameters for initialization Optional ByVal sync As Boolean

True (default): the call is blocked until initialization is complete

False: the call returns immediately.

For synchronization use the synchronization methods WaitForOPC or OperationComplete

Return value No return value.

Sub LoadOOTxCalData (ByVal parameters As RemoteClient.ILCAMeasParams2, ByVal filename As String, ByVal sync As Boolean)

Use this command instead of Init_OE if you want the LCA to load and use previously saved user calibration data.

The loaded user calibration data will be used by the LCA until the next initialization command is called.

See also SaveUserCalData

Parameters ByVal parameters As RemoteClient.ILCAMeasParams2

The measurement parameters for initialization ByVal filename As String

The name of the file containing the user calibration data Optional ByVal sync As Boolean

True (default): the call is blocked until initialization is complete

False: the call returns immediately.

For synchronization use the synchronization methods WaitForOPC or OperationComplete

Return value No return value.

Sub LoadOETxCalData (ByVal parameters As RemoteClient.ILCAMeasParams2, ByVal filename As String, ByVal sync As Boolean)

Use this command instead of Init_OE if you want the LCA to load and use previously saved user calibration data.

The loaded user calibration data will be used by the LCA until the next initialization command is called.

See also SaveUserCalData

Parameters ByVal parameters As RemoteClient.ILCAMeasParams2

The measurement parameters for initialization ByVal filename As String

The name of the file containing the user calibration data Optional ByVal sync As Boolean

True (default): the call is blocked until initialization is complete

False: the call returns immediately. For synchronization use the synchronization methods WaitForOPC or OperationComplete

Return value

No return value.

Sub Measure (ByVal continuous As Boolean, ByVal sync As Boolean)

NOTE

Be careful when calling a continuous measurement in synchronous mode. Since the synchronous call blocks the program execution of the calling thread, you can't stop this measurement from the calling thread. It can only be stopped from another thread.

Triggers a measurement on the LCA.

If you call a continuous measurement while another measurement is running, the original measurement is stopped without starting a new measurement.

If you call a single measurement while another measurement is running, this measurement is stopped and a new single measurement is started.

It requires that one of the initialization routines above has been called. If no measurement type has been initialized, an “InvalidOperationException” is thrown. The type of the measurement is the one initialized by the last “Init_XX” or “LoadXXTxCalData” call.

You should trigger your DUT measurements with this routine, as it takes care of optical DC power dependent deembedding and modulator bias voltage optimization.

For synchronization use the synchronization methods WaitForOPC or OperationComplete.

Parameters

ByVal continuous As Boolean

True: measurements are done continuously

False (default): a single measurement is triggered

Optional ByVal sync As Boolean

True (default): the call is blocked until initialization is complete

False: the call returns immediately.

Return value No return value.

Sub SaveUserCalData (ByVal filename As String)

Save the measured user calibration data into a s2p-file.

If no user calibration data has been measured during last OE or OO initialization, default values are stored.

This command is only allowed when OE or OO measurement mode is inititalized.

Parameters ByVal filename As String

The filename, where the data should be stored.

Return value No return value.

Sub Abort ()

Aborts a currently running measurement or initialization.

Parameters No parameters.

Return value No return value.

Sub WaitForOPC ()

Waits until the last asynchronously called command has finished execution. Exceptions thrown during execution of an asynchronously called command could be caught when calling WaitForOPC() or OperationComplete().

Se also property OperationComplete()

Parameters No parameters.

Return value No return value.

Properties

Reading these properties requires only a passive session, while setting these properties requires an active session.

LaserWvl_nm As RemoteClient.ELaserWvl

Get or set the current wavelength of the LCA optical output in nanometers.

Parameters No parameters.

LaserPower_dBm As Double

Get or set the current power of the LCA optical output in dBm

Parameters No parameters.

LaserState As RemoteClient.ELaserState

Get or set the current state of the LCA optical output

Parameters No parameters.

OpticalInput As RemoteClient.EOpticalInput

Get or set the current optical input of the LCA testhead

Parameters No parameters.

RFSwitchState

(ByVal RFSwitch As RemoteClient.ERFSwitch)

Setting the RF switches in the LCA testhead. With a non switched LCA system, setting this property has no effect. Trying to set this property to UnKnown, is ignored. Reading this property from a non switched system will always return UnKnown.

Parameters ByVak RFSwich As RemoteClient.ERFSwitch The switch you want to read from or you want to set.

RFPowerFwd_dBm As Double

Gets or sets the RF power on the network analyzer ports for forward measurements. To set this property back to the factory defined default value, set it to Double.NaN or a value < - 200dBm.

Parameters No parameters.

RFPowerRev_dBm As Double

Gets or sets the RF power on the network analyzer ports for reverse measurements. To set this property back to the factory defined default value, set it to Double.NaN or a value < - 200dBm.

Parameters No parameters.

ReadOnly OpticalDCPower_dBm As Double

Get the actual optical DC power, measured by the optical powermeter built into the LCA testhead

Parameters No parameters.

ReadOnly LCAProperties As RemoteClient.ILCAProperties4

See the command GetLCAProperties

Parameters No parameters.

ReadOnly CurrentMeasType As RemoteClient.EMeasType

Get the measurement type which has been initialized by the last call to one of the Init_XX commands or by one of the LoadXXTxCalData commands.

Parameters No parameters.

ReadOnly OperationComplete As Boolean

Get the operation status of the last asynchronously called command. Exceptions thrown during execution of an asynchronously called command could be caught when calling WaitForOPC() or OperationComplete().

Parameters No parameters.

The LCA SCPI Interface

Overview

The LCA instrument is a combined instrument. It is a network analyzer with additional hardware and software to become the LCA. The network analyzer already offers a SCPI interface on different ports. Now the new LCA SCPI interface extends the existing LCA application. It is implemented with the Keysight Translator Framework and the LCA Remote Server. Each SCPI command is intercepted and linked to an LCA Remote Interface method. The LCA SCPI interface is not completely IEEE compliant. It only implements the most necessary common commands besides the application specific commands.

Port Types

The LCA SCPI interface is available either on a network socket or on the device USB port. Other ports like GPIB are not supported. You may select and configure one of the available types. Using both ports in parallel is not supported.

Socket Port

The LCA SCPI talker/listener runs on port 5026. The network analyzer SCPI interface runs on port 5025. You may run both SCPI interfaces for the

LCA and the network analyzer application in parallel, since they take different socket ports.

USB Port

The LCA system is an integrated system. The system has only one USB device port which can be used to control the application from a remote PC. Therefore you can use the USB port to control either the network analyzer via SCPI or the LCA application via SCPI. You can’t control both applications over the USB port at the same time.

You always have to run the network analyzer application to get the LCA functionality. Therefore if you only run the network analyzer and NOT the LCA SCPI interface, the USB device port is taken by the network analyzer SCPI talker/listener. When you first connect your PC with a USB cable to the LCA (combined instrument), you get the Network Analyzer identification string if you send the *IDN? query.

If you start the LCA SCPI interface and configure it to run on the USB device port, you will get the identification string for the LCA instrument when you send the *IDN? SCPI query.

However, if you run the LCA SCPI interface on the socket port and have connected your PC via USB with the LCA instrument, the network analyzer identification string will still be returned.

After a system reboot, the USB device port is always taken by the network analyzer SCPI interface by default. The LCA SCPI interface has to be started manually. If you run the LCA SCPI interface on the USB device port and want to switch to the socket port, you have to stop the LCA SCPI interface first, then change the configuration to socket port and save it. This action will restart the network analyzer application automatically, to reclaim the USB device port for the network analyzer. Now the LCA SCPI interface can be restarted with the new configuration.

GPIB port

The LCA SCPI interface doesn’t support the GPIB port. However you may control the network analyzer application through SCPI over the GPIB port.

This gives you the possibility to control the instrument independent of LAN by controlling the LCA application through SCPI over USB and the network analyzer application through SCPI over GPIB.

Configuration

Select the communication port for your LCA SCPI interface, either the LAN socket port 5026 or the USB device port. Run the Agilent.LCA.SCPI.Config.exe program or click on the LCA SCPI Configuration shortcut on the network analyzer macro list to select the preferred port. The LCA SCPI talker/listener runs on the socket port 5026 by default. The port is not selectable to avoid conflicts with the network analyzer SCPI interface, which runs on port 5025.

For support purposes, you may turn the logging on or off. The logging stores all program outputs into a file. Note: it may fill up your hard disk if you run the SCPI interface in logging mode for a long time.

When done with configuration, click the “Save Config” button to store all settings. After saving the settings, the LCA SCPI module will adopt the modified configuration when you click on the “Start SCPI” button.

Start/Stop the LCA SCPI Module

All LCA modules require the network analyzer application. It should always start after a system reboot automatically. If the network analyzer is not running, please start it manually.

Like all other LCA modules, the LCA SCPI module does not start automatically. You have to start it manually. Use the Agilent.LCA.SCPI.Conf.exe program to start or stop the LCA SCPI interface. To launch this program, you may either use the LCA SCPI link in the network analyzer GUI macro list under utilities, or the shortcut LCA SCPI Interface on the desktop or in the program menu.

The LCA SCPI interface is implemented on the LCA Remote Interface methods and the Agilent Translator Framework. Therefore the LCA Server starts automatically when you start the LCA SCPI interface. When you click on the “Start SCPI” button on the SCPI configuration form, the Agilent

Translator Framework starts and loads the Agilent.LCA.SCPI.Module. The LCA Server cannot handle more than one session. Therefor you can run either the LCA Measurement Setup application or the LCA SCPI

interface, but not both in parallel. This is the same for the LCA Remote Client. It also connects to the LCA Server and therefore the SCPI interface cannot run at the same time.

LCA SCPI Commands

Overview

The LCA SCPI commands do not fulfill the IEEE standard. They just offer a simple way to control the LCA application on a LAN dependent socket port or on a USB port.

Except for the *IDN? and :SYST:ERR? Commands, there is always a direct relation between a SCPI command and a method or property of the LCA.Net Remote Interface.

Command Tree

```
*CLS

[:LCA]:PNUMber? -> <string> [:LCA]:SNUMber? -> <string>
[:LCA]:SOFTware:VERSion? -> <string>

:LOAD:OO:CALibration:NAME noquery “<string>”

:LOAD:OE:CALibration:NAME noquery “<string>”

:MEASurement:ABORt

:MEASurement:CALData:SAVE noquery “<string>”

:MEASurement:CURRent:TYPE?  ->  <string>

:MEASurement:INITialize:EE

:MEASurement:INITialize:EO

:MEASurement:INITialize:OE

:MEASurement:INITialize:OO

:MEASurement:STARt    <SINGle|CONTinuous>

:NWA:MODel? -> <string>

:NWA:PORT:NUMBer? -> <integer>

:NWA:PORT:CONFig <EO|OE|OO>,<integer>,<integer>[,<integer>]

:NWA:PORT:CONFig? <EO|OE|OO> -> <string>

:NWA:PORT:CONFig:DEFault /? -> <string>

*OPC? -> <0|1> as string

:PARameter:ADVAnced:MODE /? -> <0|1> as string

:PARameter:ELECtrical:PATH:DEEMbedding /? -> <0|1> as string

:PARameter:ELECtrical:PATH:DEEMbedding:75Ohm /? ->
<0|1|ON|OFF> as string
```

```
:PARameter:ELECtrical:RECeiver:S2PFile[n] /? <string> (index n = 1|2)

:PARameter:ELECtrical:SOURce:S2PFile[n] /? -> <string > (index n = 1|2)

:PARameter:MEASurement:MODE /? -> <SINGel|DIFFerential >

:PARameter:MODUlator:BIAS:MODE  /?  <CONTinuous|EVERysweep|ONCE>

:PARameter:OPTical:INPut:POWer:HIGH /? -> <0|1> as string

:PARameter:OPTical:OUTput:POWer /? -> <double>

:PARameter:OPTical:PATH:DEEMbedding /? -> <0|1> as string

:PARameter:OPTical:RECeiver:S2PFile /? -> <string >

:PARameter:OPTical:S2PFile:USE /? -> <0|1> as string

:PARameter:OPTical:SOURce:S2PFile /? -> <string >

:PARameter:RECeiver:ATTenuation /? -> <double>

:PARameter:RECeiver:PATH:LENGth /? -> <double>

:PARameter:RECeiver:REFR:INDex /? -> <double>

:PARameter:RF:POWer:FWD /? -> <double>

:PARameter:RF:POWer:REVerse /? -> <double>

:PARameter:SOURce:ATTenuation /? -> <double>

:PARameter:SOURce:EXTernal /? -> <0|1|ON|OFF> as string

:PARameter:SOURce:POWer:STATe /? -> <0|1|off|on >

:PARameter:SOURce:PATH:LENGth /? -> <double>

:PARameter:SOURce:REFR:INDex /? -> <double>

:PARameter:USER:CALIbration:CALSet /? -> <string>

:PARameter:USER:CALIbration:NREDuction /? -> <bool>

:PARameter:WAVelength /? -> <string>

:RF:POWer:FWD /? -> <double> unit is dBm

:RF:POWer:REVerse /? -> <double> unit is dBm

:RF:SWITch:STATe /? <RECeiver|SOURce >,<INTern|THRu >

:SOURce{n}:MAXPower? qonly -> <string>, n = index of array

:SOURce{n}:MINPower? qonly -> <string>, n = index of array

:SOURce:POWer /? -> <double> {dBm}

:SOURce:STATe /? <ON|OFF|0|1>

:SOURce:WAVelength /? -> <1310|1550> as string
```

```
:SOURce:WAVelength:ALL? qonly -> <string>
:SYSTem:MMEMory:STORe[:SETup] noquery “<string>”[,<bool>]
:SYSTem:MMEMory:LOAD[:SETup] noquery “<string>”[,<bool>]
:SYSTem:PERSona:MANufacturer /? <string>
:SYSTem:PERSona:MANufacturer:DEFault /? <string>
:SYSTem:PERSona:MODel /? <string>
:SYSTem:PERSona:MODel:DEFault /? <string>
:THEAd:INPut:MODe /? ->< STD|HIGH>
:THEAd:INPut:POWer? qonly <double> unit is dBm
:THEAd:INPut:NUMBers? qonly -> <integer>
:THEAd:SWITched:ARCHitecture? qonly -> <0|1>
```

Command Details

Command	: ***CLS**
Syntax	*CLS
Description	Clears the system error queue.
Parameters	none
Response	none
Example	*cls

Command	**[:LCA]:PNUMber?**
Syntax	[:LCA]:PNUMber?
Description	The product number of the LCA system
Parameters	none
Response	string
C#	(property) ProductNumber
Example	:PNUM? -> N4373B

Command	**[:LCA]:SNUMber?**
Syntax	[:LCA]:SNUMber?
Description	The serial number of the LCA system
Parameters	none
Response	string
	C
C#	(property) SerialNumber
Example	:SNUMber? ->,MY49151038

Command	**[:LCA]:SOFTware:VERSion?**
Syntax	:[:LCA]:SOFTware:VERSion?
Description	The version of the LCA server software parameters:none

Response	string
C#	(property)
Example	SOFT:VERS? -> 2.3.10.2

Command	**:LOAD:OO:CALibration:NAME**
Syntax	:LOAD:OO:CALibration:NAME<wsp>”<path string>”
Description	Use this command instead of Init_OO if you want the LCA to load and use previously saved user calibration data
Parameters	“<string>” path and filename enclosed in double quotes
Response	none
C#	(method) LoadOOTxCalData
Example	:LOAD:OO:CAL:NAME “c:\temp\test.s2p”

Command	**:LOAD:OE:CALibration:NAME**
Syntax	:LOAD:OE:CALibration:NAME<wsp>”<path string>”
Description	Use this command instead of Init_OE if you want the LCA to load and use previously saved user calibration data
Parameters	“<string>” path and file name enclosed in double quotes
Response	none
C#	(method) LoadOETxCalData
Example	:LOAD:OE:CAL:NAME “c:\temp\test.snp”

Command	**:MEASurement:ABORt**
Syntax	:MEASurement:ABORt
Description	Aborts a currently running measurement or initialization.
Parameters	none
Response	none
C#	(method) Abort()
Example	:MEAS:ABOR

Command	**:MEASurement:CALData:SAVE**
Syntax	:MEASurement:CALData:SAVE<wsp>”<path string>”
Description	Save the measured user calibration data into a s2p-file. parameters: “<string>” path and file name enclosed in double quotes response: none
C#	(method) SaveUserCalData()
Example	:MEAS:CALD:SAVE “c:\temp\test.s2p”

Command	**:MEASurement:CURRent:TYPE?**
Syntax	:MEASurement:CURRent:TYPE?
Description	Get the measurement type that has been initialized by the last call to one of the :MEAS:INIT XX commands or by one of the.:LOAD:XX: commands.
Parameters	none
Response	<string> NotSet | EE | EO | OE | OO
C#	(method) CurrentMeasType()
Example	:MEAS:CURR:TYPE? -> OO

Command	**:MEASurement:INITialize:EE**
Syntax	:MEASurement:INITialize:EE
Description	Initializes the LCA for an EE measurement
Parameters	none
Response	none
C#	(method) Init_EE()
Example	:MEAS:INIT:EE

Command	**:MEASurement:INITialize:EO**
Syntax	:MEASurement:INITialize:EO
Description	Initializes the LCA for an EO measurement. parameters:none
Response	none
C#	(method) Init_EO()
Example	:MEAS:INIT:EO

Command	**:MEASurement:INITialize:OE**
Syntax	:MEASurement:INITialize:OE
Description	Initializes the LCA for an OE measurement parameters:none
Response	none
C#	(method) Init_OE
Example	:MEAS:INIT:OE

Command	**:MEASurement:INITialize:OO**
Syntax	:MEASurement:INITialize:OO
Description	Initializes the LCA for an OO measurement parameters:none
Response	none
C#	(method) Init_OO()
Example	:MEAS:INIT:OO

Command	**:MEASurement:STARt**
Syntax	MEASurement:STARt<wsp>[SINGle|CONTinuous]
Description	Triggers a measurement on the LCA. If you call a continuous measurement while another measurement is running, the original measurement is stopped without starting a new measurement
Parameters	<string> SINGle | CONTinuous none
Response	none
C#	(method) Measure()
Example	:MEAS:STAR CONT

Command	**:NWA:MODel?**
Syntax	:NWA:MODel?
Description	The model number of the network analyzer
Parameters	none
Response	string
C#	(property) NWAModel

Example	:NWA:MOD? -> N5245A

Command	**:NWA:PORT:CONFig?**
Syntax	:NWA:PORT:CONFig? <EO|OE|OO>
Description	Query the current port configuration for the given measurement type. Tx and Rx ports are returned. For 4-port network analyzers and differential measurements, the two remaining ports are used for the differential side. See the Users Guide for more information about port configuration.
Parameters	measurement type: <EO|OE|OO>
Response	string <tx port>,<rx port>,<oe usercal rx port>
C#	GetPortConfiguration
Example	:NWA:PORT:CONF? OE -> 1,4,4

Command	**:NWA:PORT:CONFig**
Syntax	:NWA:PORT:CONFig <EO|OE|OO>,<Tx port>,<Rx port>[,<OE usercal Rx port>]
Description	Set the network analyzer port configuration for the given measurement type (EO, OE or OO). Tx and Rx ports are specified. For 4-port network analyzers and differential measurements, the two remaining ports are used for the differential side. The 'OE usercal Rx port' parameter allows to set a different Rx port to be used for differential OE user calibration measurements. If omitted the Rx port of the OE configuration will be used. See the Users Guide for more information about port configuration.
Parameters	measurement type: <EO|OE|OO> Tx port: integer Rx port: integer OE usercal Rx port: integer
Response	none
C#	SetPortConfiguration
Example	:NWA:PORT:CONF OE,1,4

Command	**:NWA:PORT:CONFig:DEFault?**
Syntax	:NWA:PORT:CONFig:DEFault?
Description	Query the default port configuration. Tx and Rx ports are returned. For 4-port network analyzers and differential measurements, the two remaining ports are used for the differential side. The measurement type could not be specified since the default setting has the same configuration for all measurement types. See the Users Guide for more information about port configuration.
Parameters	none
Response	string <tx port>,<rx port>,<oe usercal rx port>
C#	GetDefaultPortConfiguration
Example	:NWA:PORT:CONF:DEF? -> 1,4,4

Command	**:NWA:PORT:CONFig:DEFault**
Syntax	:NWA:PORT:CONFig:DEFault
Description	Reset the port configuration to the default settings. See the Users Guide for more information about port configuration.
Parameters	none
Response	none
C#	SetDefaultPortConfiguration
Example	:NWA:PORT:CONF:DEF

Command	**:NWA:PORT:NUMBer?**
Syntax	:NWA:PORT:NUMBer?
Description	The number of network analyzer ports
Parameters	none
Response	integer
C#	(property) NumNWAPorts
Example	:NWA:PORT:NUMBer? -> 4

Command	***OPC?**
Syntax	*OPC?
Description	Retrieves the operation complete state
Parameters	none
Response	<string> 0 | 1
C#	(method) OperationComplete()
Example	*OPC? -> 1

NOTE

All commands in the :PARameter subtree do not directly change anything on the LCA. With this command you are just setting the parameters to be used at the next call of

:MEASurement:INITialize:EE or

:MEASurement:INITialize:EO or

:MEASurement:INITialize:OE or

:MEASurement:INITialize:OO or

:LOAD:OO:CALibration:NAME or

:LOAD:OE:CALibration:NAME

Command	**:PARameter:ADVAnced:MODE?**
Syntax	:PARameter:ADVAnced:MODE?
Description	Returns 1 if advanced mode is enabled. In advanced mode you can force the LCA to switch the laser on or off, independent of the measurement type. You also have additional optical- and RF- path de-embedding possibilities, or can apply additional de- embedding on the receiver and the source side, independent of the measurement type.
Parameters	none
Response	C#
	<string> 0 | 1 (property) Advanced
Example	:PAR:ADVA:MODE? -> 0

Command	**:PARameter:ADVAnced:MODE**
Syntax	:PARameter:ADVAnced:MODE<wsp>ON | OFF | 1 | 0
Description	Enables or disables advance mode, which allows changing some default settings. In advanced mode you can force the LCA to switch the laser on or off, independent of the measurement type. You also have additional optical- and RF-path de-embedding possibilities, or can apply additional de-embedding on the receiver and the source side, independent of the measurement type.
Parameters	<string> ON | OFF | 1 | 0 none
Response	none
C#	(property) Advanced
Example	:PAR:ADVA:MODE ON

Command	**:PARameter:ELECtrical:PATH:DEEMbedding?**
Syntax	:PARameter:ELECtrical:PATH:DEEMbedding?
Description	Retrieves the property which shows whether the whole electrical path de-embedding is switched on or off.
Parameters	none
Response	<string> 1 | 0
C#	(property)UseElAdaptor
Example	:PAR:ELEC:PATH:DEEM? -> 0

Command	**:PARameter:ELECtrical:PATH:DEEMbedding**
Syntax	:PARameter:ELECtrical:PATH:DEEMbedding<wsp>ON|OFF|1|0
Description	Sets the property which enables or disables the whole electrical path de-embedding.
Parameters	<string> ON | OFF | 1 | 0
Response	none
C#	(property)UseElAdaptor
Example	:PAR:ELEC:PATH:DEEM OFF

Command	**:PARameter:ELECtrical:PATH:DEEMbedding:75OHm**
Syntax	:PARameter:ELECtrical:PATH:DEEMbedding:75OHm
Description	Specifies if components with 75 Ohm impedance are to be measured.
Parameters	<string> 0 | 1 | ON | OFF
Response	none
C#	(property) LCAMeasParams.Imp75_Ohm
Example	:PAR:ELEC:PATH:DEEM:75OH ON

Command	**:PARameter:ELECtrical:PATH:DEEMbedding:75OHm?**
Syntax	:PARameter:ELECtrical:PATH:DEEMbedding:75OHm?
Description	Retrieves the property which defines whether components with 75 Ohm impedance are to be measured.
Parameters	none
Response	<string> 0 | 1
C#	(property) LCAMeasParams.Imp75_Ohm
Example	:PAR:ELEC:PATH:DEEM:75OH? ? 1

Command	**:PARameter:ELECtrical:RECeiver:S2PFile[1 - 2]?**
Syntax	:PARameter:ELECtrical:RECeiver:S2P:FILE[1 - 2]:NAME?
Description	Gets the name of the s2p file to use for electrical adaptor de-embedding. File index 1 has to be used for receiver side de-embedding in single-ended measurements or for the receiver port with the lower number in differential measurements. Index 2 has to be used only for the receiver port with the higher number in differential measurements
Parameters	none
Response	<string>
C#	(property) ElRcv1File / ElRcv2File
Example	:PAR:ELEC:REC:S2PFile? -> c:\temp\test.s2p

Command	**:PARameter:ELECtrical:RECeiver:S2PFile[1 - 2]**
Syntax	:PARameter:ELECtrical:RECeiver:S2P:FILE[1 - 2]:NAME<wsp>"<path string>"
Description	Sets the name of the s2p file to use for electrical adaptor de-embedding. File index 1 has to be used for receiver side de-embedding in single-ended measurements or for the receiver port with the lower number in differential measurements. Index 2 has to be used only for the receiver port with the higher number in differential measurements
Parameters	"<string>" path and file name
Response	none
C#	(property) ElRcv1File / ElRcv2File
Example	:PAR:ELEC:REC:S2PFile"c:\temp\test.s2p"

Command:	**PARameter:ELECtrical:SOURce:S2PFile[1 - 2]?**
Syntax	:PARameter:ELECtrical:SOURce:S2PFile[[1- 2]:NAME?
Description	Gets the name of the s2p file to use for electrical adaptor de-embedding. This property has to be used with file index 1 for source side de-embedding in single-ended measurements or for the source port with the lower number in differential measurements. Index 2 is the file for the source port with the higher number in differential measurements.
Parameters	none
Response	<string> path and file name
C#	(property) ElSrc1File / ElSrc2File
Example	:PARameter:ELECtrical:SOURce:S2PFile1? -> c:\temp\test.s2p

Command:	**PARameter:ELECtrical:SOURce:S2PFile[1 - 2]**
Syntax	:PARameter:ELECtrical:SOURce:S2PFile[[1- 2]<wsp>"<path string>"
Description	Sets the name of the s2p file to use for electrical adaptor de- embedding. This property has to be used with file index 1 for source side de-embedding in single-ended measurements or for the source port with the lower number in differential measurements. Index 2 is the file for the source port with the higher number in differential measurements
Parameters	"<string>" path and file name
Response	none

C#	(property) ElSrc1File / ElSrc2File
Example	:PARameter:ELECtrical:SOURce:S2PFile1 “c:\temp\test.s2p”

Command	**:PARameter:MEASurement:MODE?**
Syntax	:PARameter:MEASurement:MODE?
Description	Returns setting for selecting single-ended or differential measurements
Parameters	none
Response	<string> DIFFerential|SINGleended | NOTSet
C#	(property) MeasMode
Example	:PAR:MEAS:MODE? -> NotSet

Command	**:PARameter:MEASurement:MODE**
Syntax	:PARameter:MEASurement:MODE<wsp>DIFFerential|SINGleended|NOTSet
Description	Specify single ended or differential measurements
Parameters	<string> DIFFerential|SINGleended | NOTSet
Response	none
C#	(property) MeasMode
Example	:PAR:MEAS:MODE SING

Command	**:PARameter:MODUlator:BIAS:MODE?**
Syntax	:PARameter:MODUlator:BIAS:MODE?
Description	Returns how often a modulator bias voltage optimization will be performed
Parameters	<string> Continuous|EverySweep|Once
Response	none
C#	(property) ModBiasOptimization
Example	:PAR:MODU:BIAS:MODE? -> EverySweep

Command	**:PARameter:MODUlator:BIAS:MODE**
Syntax	:PARameter:MODUlator:BIAS:MODE<wsp>CONT|EVER|ONCE description: Specify how often a modulator bias voltage optimization will be performed
Parameters	<string> CONTinuous|EVERysweep|ONCE
Response	none
C#	(property) ModBiasOptimization
Example	:PAR:MODU:BIAS:MODE EVER

Command	**:PARameter:OPTical:INPut:POWer:HIGH?**
Syntax	:PARameter:OPTical:INPut:POWer:HIGH? description:Returns the state of the high power input property.
Parameters	none
Response	<string> 1 | 0, input power high true = 1, false = 0
C#	(property) HighPower_Input
Example	:PAR:OPT:INP:POWer:HIGH? -> 0

Ccommand	**:PARameter:OPTical:INPut:POWer:HIGH**
Syntax	:PARameter
	OPTical:INPut:POWer:HIGH<wsp>ON|OFF|1|0
Description	Gets the state of the high power input property.
Parameters	<string> ON | 1 enables high power input, OFF | 0 disables high power input
Response	none
C#	(property) HighPower_Input
Example	:PAR:OPT:INP:POWer:HIGH ON

Command	**:PARameter:OPTical:OUTput:POWer?**
Syntax	:PARameter:OPTical:OUTput:POWer?
Description	Returns the optical output power of the LCA in dBm.
Parameters	none
Response	<double> power value, the default unit is dBm.
C#	(property) OpticalPower_dBm
Example	:PAR:OPT:OUT:POWer -> -1

Command	**:PARameter:OPTical:OUTput:POWer**
Syntax	:PARameter:OPTical:OUTput:POWer<ws><power> description:Specify the optical output power of the LCA in dBm.
Parameters	power <double>, power value in dBm
Response	none
C#	(property) OpticalPower_dBm
Example	:PAR:OPT:OUT:POWer -1

Command	**:PARameter:OPTical:PATH:DEEMbedding?**
Syntax	:PARameter:OPTical:PATH:DEEMbedding?
Description	Returns whether the whole optical path de-embedding is set on or off.
Parameters	none
Response	<string> 1 = optical path de-embedding is enabled, 0 = disabled
C#	(property) UseOpticalConnData
Example	:PAR:OPT:PATH:DEEM? -> 1

Command **:PARameter:OPTical:PATH:DEEMbedding**

Syntax :PARameter:OPTical:PATH:DEEMbedding<wsp>ON|1|OFF|0

Description Switches the whole optical path de-embedding on or off.

Parameters <string> ON | 1 = enabled optical path de-embedding, OFF | 0 = disable

Response None

C# (property) UseOpticalConnData

Example :PAR:OPT:PATH:DEEM? -> 1

Command **:PARameter:OPTical:RECeiver:S2PFile?**

Syntax :PARameter:OPTical:RECeiver:S2PFile?

Description Returns the name of the s2p file to use for additional adaptor de-embedding on the receiver side. In default mode, only evaluated for E/O and O/O measurements.

Parameters none

Response <string> path and file name

C# (property) OptRcvFile

Example :PAR:OPT:REC:S2PF? -> c:\temp\test1.s2p

Command **:PARameter:OPTical:RECeiver:S2PFile**

Syntax :PARameter:OPTical:RECeiver:S2PFile<wsp>”<path string>”

Description Sets the name of the s2p file which is used for additional adaptor de-embedding on the receiver side. In default mode only evaluated for E/O and O/O measurements.

Parameters “<string>” file name and path enclosed in double quotes

Response none

C# (property) OptRcvFile

Example :PAR:OPT:REC:S2PF “c:\temp\test1.s2p”

Command	**:PARameter:OPTical:S2PFile:USE?**
Syntax	:PARameter:OPTical:S2PFile:USE?
Description	Returns whether the optical paths are described by transmission data stored in an s2p file. Only the S21 transmission data is used.
Parameters	none
Response	<string> 1 = s2p file use enabled, 0 = disabled
C#	(property) UseIOpticalS2PFile
Example	:PAR:OPT:S2PF:USE? -> 0

Command	**:PARameter:OPTical:S2PFile:USE**
Syntax	:PARameter:OPTical:S2PFile:USE<wsp>ON|1|OFF|0
Description	enables or disables description of the optical paths by transmission data stored in an s2p file. Only the S21 transmission data is used
Parameters	<string> ON | 1 = s2p file use enabled, OFF | 0 = disabled
Response	none
C#	(property) UseIOpticalS2PFile
Example	:PAR:OPT:S2PF:USE ON

Command	**:PARameter:OPTical:SOURce:S2PFile?**
Syntax	:PARameter:OPTical:SOURce:S2PFile?
Description	Retrieves the name of the s2p file to use for additional adaptor de-embedding on the source side. In default mode only evaluated for O/E and O/O measurements.
Parameters	none
Response	<string> file name and path of the s2p file on the LCA system.
C#	(property) OptSrcFile
Example	:PAR:OPT:SOUR:S2PF? -> c:\temp\test1.s2p

Command	**:PARameter:OPTical:SOURce:S2PFile**
Syntax	:PARameter:OPTical:SOURce:S2PFile<wsp>“<path string>”
Description	Specifies the name of the s2p file to use for additional adaptor de-embedding on the source side. In default mode only evaluated for O/E and O/O measurements.
Parameters	“<string>” the file name and path enclosed in double quotes.
Response	<string> file name and path of the s2p file on the LCA system.
C#	(property) OptSrcFile
Example	:PAR:OPT:SOUR:S2PF “c:\temp\test1.s2p”

Command	**:PARameter:RECeiver:ATTenuation?**
Syntax	:PARameter:RECeiver:ATTenuation?
Description	Retrieves the optical attenuation on the receiver path. In default mode only evaluated for E/O and O/O measurements
Parameters	none
Response	<double> attenuation value, default unit is dB
C#	(property) RcvAttOpt_dB
Example	:PAR:REC:ATT? -> 3

Command	**:PARameter:RECeiver:ATTenuation**
Syntax	:PARameter:RECeiver:ATTenuation <wsp><attenuation>
Description	Specifies the optical attenuation on the receiver path. In default mode only evaluated for E/O and O/O measurements
Parameters	attenuation <double> attenuation value, default unit is dB
Response	none
C#	(property) RcvAttOpt_dB
Example	:PAR:REC:ATT 2

Command	**:PARameter:RECeiver:PATH:LENGth?**
Syntax	:PARameter:RECeiver:PATH:LENGth?
Description	Retrieves the geometrical length of the receiver path in m. In default mode only evaluated for E/O and O/O measurements
Parameters	none
Response	<double> The path length value, default unit is meter. (property)
C#	RcvLengthOpt_m
Example	:PAR:REC:PATH:LENG? -> 0.3

Command	**:PARameter:RECeiver:PATH:LENGth**
Syntax	:PARameter:RECeiver:PATH:LENGth<wsp> <length>
Description	Specifies the geometrical length of the receiver path in m. In default mode only evaluated for E/O and O/O measurements
Parameters	length <double> path length value, default unit is meter.
Response	none.
C#	(property) RcvLengthOpt_m
Example	:PAR:REC:PATH:LENG 0.45

Command	**:PARameter:RECeiver:REFR:INDex?**
Syntax	:PARameter:RECeiver:REFR:INDex?
Description	Retrieves the refractive index of the receiver path in dB. In default mode only evaluated for E/O and O/O measurements.
Parameters	none
Response	<double> the refractive index value, unit is dB.
C#	(property) RcvRefIdx
Example	:PAR:REC:REFR:IND? -> 0

Command	**:PARameter:RECeiver:REFR:INDex**
Syntax	:PARameter:RECeiver:REFR:INDex<wsp><index>
Description	Specifies the refractive index of the receiver path in dB. In default mode only evaluated for E/O and O/O measurements.
Parameters	index <double> the receiver refractive value, unit id dB.
Response	none
C#	(property) RcvRefIdx
Example	:PAR:REC:REFR:IND 1.3

Command	**:PARameter:RF:POWer:FWD?**
Syntax	:PARameter:RF:POWer:FWD?
Description	This command allows you to query the RF power for the source ports in dBm. For balanced measurements (on 4-port network analyzers), Ports 2 and 3 of the network analyzer are forward for EO measurements and reverse for OE measurements.
Parameters	none
Response	<double> the RF power on the source ports in dBm
C#	(property) ForwardRFPower_dBm
Example	:PAR:RF:POW:FWD? -> -3.0

Command	**:PARameter:RF:POWer:FWD**
Syntax	:PARameter:RF:POWer:FWD
Description	Sets the RF power level for the source port(s) in dBm. For balanced measurements (on 4-port network analyzers), Ports 2 and 3 of the network analyzer are forward for EO measurements and reverse for OE measurements. Increasing the forward RF power for OE or OO measurements increases the optical modulation amplitude.
Parameters	none
Response	none
C#	(property) ForwardRFPower_dBm
Example	:PAR:RF:POW:FWD -3.0

Command	**:PARameter:RF:POWer:REVerse?**
Syntax	:PARameter:RF:POWer:REVerse?
Description	This command allows you to query the RF power for the receiver ports in dBm. For balanced measurements (on 4-port network analyzers), Ports 2 and 3 of the network analyzer are forward for EO measurements and reverse for OE measurements.
Parameters	none
Response	<double> the RF power on the receiver ports in dBm
C#	(property) ReverseRFPower_dBm
Example	:PAR:RF:POW:REV? -> -3.0

Command	**:PARameter:RF:POWer:REVerse**
Syntax	:PARameter:RF:POWer:REVerse
Description	Sets the RF power level for the receiver port(s) in dBm. For balanced measurements (on 4-port network analyzers), Ports 2 and 3 of the network analyzer are forward for EO measurements and reverse for OE measurements.
Parameters	none
Response	none
C#	(property) ReverseRFPower_dBm
Example	:PAR:RF:POW:REV -3.0

Command	**:PARameter:SOURce:ATTenuation?**
Syntax	:PARameter:SOURce:ATTenuation?
Description	Retrieves the optical attenuation on the source path. In default mode only evaluated for O/E and O/O measurements.
Parameters	none
Response	<double> attenuation value in dB
C#	(property) SrcAttOpt_dB
Example	:PAR:SOUR:ATT? -> 0

Command	**:PARameter:SOURce:ATTenuation**
Syntax	:PARameter:SOURce:ATTenuation<wsp><attenuation>
Description	Specifies the optical attenuation on the source path. In default mode only evaluated for O/E and O/O measurements.
Parameters	attenuation <double> attenuation value in dB
Response	none
C#	(property) SrcAttOpt_dB
Example	:PAR:SOUR:ATT 0.4

Command	**:PARameter:SOURce:EXTernal**
Syntax	:PARameter:SOURce:EXTernal
Description	Specifies whether to use the optional external input or the internal laser of the optical test set.
Parameters	<string> 0 | 1 | ON | OFF
Response	none
C#	(property) LCAMeasParams.ExternalInput
Example	:PAR:SOUR:EXT ON

Command	**:PARameter:SOURce:EXTernal?**
Syntax	:PARameter:SOURce:EXTernal?
Description	Retrieves the property which defines whether the optional external input is used or the internal laser of the optical test set is used.
Parameters	None
Response	<string> 0 | 1
C#	(property) LCAMeasParams.ExternalInput
Example	:PAR:SOUR:EXT? ? 1

Command **:PARameter:SOURce:POWer:STATe?**

Syntax :PARameter:SOURce:POWer:STATe?

Description Retrieves the internal laser state, on or off. Note: the value of this property is only evaluated in advanced mode. In default mode the laser is switched on or off according to the measurement type.

Parameters none

Response <string> 1 = internal laser is on, 0 = internal laser is off

C# (property) Laser_On

Example :PAR:SOUR:POW:STAT? -> 1

Command **:PARameter:SOURce:POWer:STATe**

Syntax :PARameter:SOURce:POWer:STATe<wsp>ON|1|OFF|0

Description Switches the internal laser on or off. Note: The value of this property is only evaluated in advanced mode. In default mode the laser is switched on or off according to the measurement type

Parameters <string> ON | 1 to switch the laser on, OFF | 0 to switch the laser off

Response none

C# (property) Laser_On

Example :PAR:SOUR:POW:STAT ON

Command **:PARameter:SOURce:PATH:LENGth?**

Syntax :PARameter:SOURce:PATH:LENGth?

Description Retrieves the geometrical length of the source path in m . In default mode only evaluated for O/E and O/O measurements

Parameters none

Response <double> the path length in meter

C# SrcLengthOpt_m

Example :PAR:SOUR:PATH:LENG? -> 0.27

Command	**:PARameter:SOURce:PATH:LENGth**
Syntax	:PARameter:SOURce:PATH:LENGth<wsp><length>
Description	Specifies the geometrical length of the source path in m. In default mode only evaluated for O/E and O/O measurements
Parameters	length <double> the path length value, default unit is meter.
Response	none
C#	SrcLengthOpt_m
Example	:PAR:SOUR:PATH:LENG 0.42

Command	**:PARameter:SOURce:REFR:INDex?**
Syntax	:PARameter:SOURce:REFR:INDex?
Description	Retrieves the refractive index of the source path in dB. In default mode only evaluated for O/E and O/O measurements.
Parameters	none
Response	<double> the refractive index
C#	(property) SrcRefIdx
Example	:PAR:SOUR:REFR:IND? -> 0

Command	**:PARameter:SOURce:REFR:INDex**
Syntax	:PARameter:SOURce:REFR:INDex<wsp><index>
Description	Specifies the refractive index of the source path in dB. In default mode only evaluated for O/E and O/O measurements.
Parameters	index <double> the refractive index value in dB
Response	none
C#	(property) SrcRefIdx
Example	:PAR:SOUR:REFR:IND 0.13

Command **:PARameter:USER:CALIbration:CALSet?**

Syntax :PARameter:USER:CALIbration:CALSet?

Description Retrieves the name of a Calset on the network analyzer to be used for the user calibration measurement. If an empty string is returned, the current Calset is used. If “NONE” is returned, no Calset is applied for the user calibration measurement.

Parameters none

Response <string> NONE | path and file name

C# (property) CalSetUserCal

Example :PAR:USER:CAL:CALS? -> c:\temp\calset1.s2p

Command **:PARameter:USER:CALIbration:CALSet**

Syntax :PARameter:USER:CALIbration:CALSet<wsp>[NONE | “<path string>”]

Description Specifies the name of a Calset on the network analyzer to be used for the user calibration measurement. If an empty string is passed, the current Calset is used. If “NONE” is passed, no Calset is applied for the user calibration measurement.

Parameters NONE| <string> |No argument, None or the path and file name surrounded by double quotes.

Response none

C# (property) CalSetUserCal

Example :PAR:USER:CAL:CALS “c:\temp\calset1.s2p”

Command **:PARameter:USER:CALIbration:NREDuction?**

Syntax :PARameter:USER:CALIbration:NREDuction?

Description This command allows you to query the noise recuction status for the user calibration measurement.

Parameters none

Response <bool> 1 if reduced IF-BW for user calibration measurement is active, 0 otherwise

C# (property) ReverseRFPower_dBm

Example :PAR:USER:CALI:NRED? -> 1

Command	**:PARameter:USER:CALIbration:NREDuction**
Syntax	:PARameter:USER:CALIbration:NREDuction
Description	If set to 1, IF-BW is reduced for the user calibration measurement to reduce the noise on the user calibration data. The default bandwidth reduction factor is defined in the LCAConfig.xml file.
Parameters	none
Response	none
C#	(property) ReverseRFPower_dBm
Example	:PAR:USER:CALI:NRED 1

Command	**:PARameter:WAVelength?**
Syntax	:PARameter:WAVelength?
Description	Returns the laser wavelength set on the LCA.
Parameters	none
Response	<string> The wavelength and unit as a string.
C#	(property) Wavelength_nm
Example	:PAR:WAV? -> Wvl_1550nm

Command	**:PARameter:WAVelength**
Syntax	:PARameter:WAVelength
:PARameter	WAVelength<wsp>850|1310|1550
Description	Specifies with which laser wavelength the LCA will measure parameters: <string> 850 | 1310 | 1550
Response	none
C#	(property) Wavelength_nm
Example	:PAR:WAV 1550

Command	**:RF:POWer:FWD?**
Syntax	:RF:POWer:FWD?
Description	Gets the RF power on the network analyzer ports for forward measurements
Parameters	none
Response	<double> forward power value in dBm
C#	(property) RFPowerFwd_dBm
Example	:RF:POWer:FWD? -> -8

Command	**:RF:POWer:FWD**
Syntax	:RF:POWer:FWD<wsp><power>
Description	Sets the RF power on the network analyzer ports for forward measurements
Parameters	power <double> forward power value in dBm
Response	none
C#	(property) RFPowerFwd_dBm
Example	:RF:POWer:FWD -1

Command	**:RF:POWer:REVerse?**
Syntax	:RF:POWer:REVerse?
Description	Gets the RF power on the network analyzer ports for reverse measurements.
Parameters	none
Response	<double> RF reverse power value in dBm.
C#	(property) RFPowerRev_dBm
Example	:RF:POW:REV? -> -8

Command	**:RF:POWer:REVerse**
Syntax	:RF:POWer:REVerse<wsp><power>
Description	Sets the RF power on the network analyzer ports for reverse measurements. To set this property back to the factory defined default value, set it to Double.NaN or a value < -200dBm.
Parameters	power <double> RF reverse power value in dBm.
Response	none
C#	(property) RFPowerRev_dBm
Example	:RF:POW:REV -4

Command	**:RF:SWITch:STATe?**
Syntax	:RF:SWITch:STATe?
Description	Retrieves the RF switch settings in the LCA test-head. With a non-switched LCA system, setting this property has no effect.. Reading this property from a non-switched system will always return Unknown.
Parameters	none
Response	<string> NotSet | Receiver | Source , Intern | Thru | Unknown
C#	(property) RFSwitchState
Example	:RF:SWIT:STAT? -> NotSet, Unknown

Command	**:RF:SWITch:STATe**
Syntax	:RF:SWITch:STATe<wsp>REC|SOUR,INT|THRU
Description	Setting the RF switches in the LCA testhead. With a non switched LCA system, setting this property has no effect. Trying to set this property to UnKnown, is ignored. Setting this property for a non switched system will stay UnKnown.
Parameters	<string> RECeiver | SOURce , INTern, THRU
Response	none
C#	(property) RFSwitchState
Example	:RF:SWIT:STAT REC,INT

Command **:SOURce[1 – n]:MAXPower?**

Syntax :SOURce[1 – n]:MAXPower?

Description Retrieves the maximum optical output power values in dB. The maximum power for an index n corresponds to the wavelength value from :SOUR:WAV:ALL? at position n.

Parameters none

Response <double> The maximum power value in dBm. For an invalid index it returns -200 and there is an entry in the error queue. See :SYST:ERR?.

C# (property) MaxPower_dBm

Example :SOUR:MAXP? -> 6

Command **:SOURce[1 – n]:MINPower?**

Syntax :SOURce[1 – n]:MINPower?

Description Retrieves the minimum optical output power value in dBm. The minimum power for an index n corresponds to the wavelength value from :SOUR:WAV:ALL at position n.

Parameters none

Response <double> The minimum power value in dBm. For an invalid index it returns -200 and there is an entry in the error queue. See :SYST:ERR?.

C# (property) MimPower_dBm

Example :SOUR:MINP? -> -1

Command **:SOURce:POWer?**

Syntax :SOURce:POWer?

Description Gets the current power of the LCA optical output in dBm

Parameters none

Response <double> Laser power value in dBm.

C# (property) LaserPower_dBm

Example :SOUR:POW? -> 5.00375

Command	**:SOURce:POWer**
Syntax	:SOURce:POWer<wsp><power>
Description	Sets the current power of the LCA optical output in dBm
Parameters	power <double> Laser power value in dBm
Response	none
C#	(property) LaserPower_dBm
Example	:SOUR:POW 2.45

Command	**:SOURce:STATe?**
Syntax	:SOURce:STATe?
Description	Gets the current state of the LCA optical output.
Parameters	none
Response	<string> LaserOn | LaserOff
C#	(property) LaserState
Example	:SOUR:STAT? -> LaserOn

Command	**:SOURce:STATe**
Syntax	:SOURce:STATe<wsp>ON|OFF|1|0 description:Sets the current state of the LCA optical output. parameters:<string> ON | 1 | OFF | 0
Response	none
C#	(property) LaserState
Example	:SOUR:STAT ON

Command	**:SOURce:WAVelength?**
Syntax	:SOURce:WAVelength?
Description	Gets the current wavelength of the LCA optical output.
Parameters	none
Response	<string> The wavelength as string together with the unit.
C#	(property) LaserWavelength_nm
Example	:SOUR:WAV? -> <Wvl_1550nm

Command **:SOURce:WAVelength**

Syntax :SOURce:WAVelength<wsp><wavelength>

Description Sets the current wavelength of the LCA optical output. The available wavelengths can be retrieved with :SOUR:WAV:ALL?

Parameters wavelength <string> the wavelength value as string, unit is nm e. g. 1550.

Response none

C# (property) LaserWavelength_nm

Example :SOUR:WAV 1550

Command **:SOURce:WAVelength:ALL?**

Syntax :SOURce:WAVelength:ALL?

Description Retrieves a list showing all available wavelengths of the LCA test head.

Parameters none

Response <string> comma separated list of wavelengths units.

C# (property) SourceWvl

Example :SOUR:WAV:ALL? -> Wvl_1310nm, Wvl_1550nm

Command **:SYSTem:MMEMory:STORe[:SETup]**

Syntax :SYSTem:MMEMory:STORe[:SETup] “<file name>”[,<nwa state>]

Description This command allows you to write current measurement parameter state to a file.

Parameters string the file name, only ".xml" or ".lca" filename extensions are allowed.

xml: a readable xml file is generated

lca: a compressed file is generated

bool 1: add NWA state information to the setup file, 0: do not store NWA state information

Response none

C# SaveSetup

Example :SYST:MMEM:STOR "C:\Temp\test.xml",1

Command	**:SYSTem:MMEMory:LOAD[:SETup]**
Syntax	:SYSTem:MMEMory:LOAD[:SETup] “<file name>”[,<nwa state>]
Description	This command allows you to load LCA measurement parameters from a file.
Parameters	string file name
	bool 1: recall NWA state if the file contains NWA state information, 0: ignore NWA state information.
Response	none
C#	RecallSetup
Example	:SYST:MMEM:LOAD "C:\Temp\test.xml",1

Command	**:SYSTem:PERSona:MANufacturer?**
Syntax	:SYSTem:PERSona:MANufacturer?
Description	This command allows you to query the current manufacturer name.
Parameters	none
Response	<string> manufacturer
C#	GetSystemPersonaManufacturer
Example	:SYST:PERS:MAN? -> Keysight Technologies

Command	**:SYSTem:PERSona:MANufacturer**
Syntax	:SYSTem:PERSona:MANufacturer
Description	This command allows you to set the manufacturer name returned by the instrument's *IDN query response. This is intended to be used for Agilent backward identity compatibility. Allowed manufacturer names are: "Agilent Technologies" or "Keysight Technologies. The change to the manufacturer string will not take effect until after a restart of the LCA software.
Parameters	"<string>" manufacturer
Response	none
C#	SetSystemPersonaManufacturer
Example	:SYST:PERS:MAN "Keysight Technologies"

Command	**:SYSTem:PERSona:MANufacturer:DEFault?**
Syntax	:SYSTem:PERSona:MANufacturer:DEFault?
Description	Returns the instrument's original manufacturer identification name.
Parameters	none
Response	<string> manufacturer
C#	GetSystemPersonaManufacturer
Example	:SYST:PERS:MAN:DEF? -> Keysight Technologies

Command	**:SYSTem:PERSona:MANufacturer:DEFault**
Syntax	:SYSTem:PERSona:MANufacturer:DEFault
Description	Sets the instrument's original manufacturer identification state following the next LCA software restart.
Parameters	none
Response	none
C#	SetSystemPersonaManufacturer
Example	:SYST:PERS:MAN:DEF

Command	**:SYSTem:PERSona:MODel?**
Syntax	:SYSTem:PERSona:MODel?
Description	This command allows you to query the current product model.
Parameters	none
Response	<string> product model
C#	GetSystemPersonaModel
Example	:SYST:PERS:MOD? -> N4373C

Command	**:SYSTem:PERSona:MODel**
Syntax	:SYSTem:PERSona:MODel
Description	This command allows you to set the product model returned by the instrument's *IDN query response. This is intended to be used for model compatibility. It is only allowed to change the last character of the product model string. The change to the product model string will not take effect until after a restart of the LCA software.
Parameters	<string> product model
Response	none
C#	SetSystemPersonaModel
Example	:SYST:PERS:MOD "N4373E"

Command	**:SYSTem:PERSona:MODel:DEFault?**
Syntax	:SYSTem:PERSona:MODel:DEFault?
Description	Returns the instrument's original product model name.
Parameters	none
Response	<string> product model
C#	GetSystemPersonaModel
Example	:SYST:PERS:MOD:DEF? -> N4373E

Command	**:SYSTem:PERSona:MODel:DEFault**
Syntax	:SYSTem:PERSona:MODel:DEFault
Description	Sets the instrument's original product model identification name following the next LCA software restart.
Parameters	none
Response	none
C#	SetSystemPersonaModel
Example	:SYST:PERS:MOD:DEF

Command	**:THEAd:INPut:MODe?**
Syntax	:THEAd:INPut:MODe?
Description	Gets the current optical input of the LCA test-head.
Parameters	none
Response	<string> Standard | HighPower
C#	(property) OpticalInput
Example	THEA:INP:MODE? -> Standard

Command	**:THEAd:INPut:MODe**
Syntax	:THEAd:INPut:MODe<wsp>STAN|HIGH description:Sets the current optical input of the LCA test-head. parameters:<string> HIGH | STANdard
Response	none
C#	(property) OpticalInput
Example	THEA:INP:MODE HIGH

Command	**:THEAd:INPut:POWer?**
Syntax	:THEAd:INPut:POWer?
Description	Gets the actual optical DC power, measured by the optical power meter built into the LCA test-head.
Parameters	none
Response	<double> the power value in dBm.
C#	(property) OpticalDCPower_dBm
Example	:THEA:INP:POW? -> -40.3798

Command	**:THEAd:INPut:NUMBers?**
Syntax	:THEAd:INPut:NUMBers?
Description	Gets the number of optical inputs of the LCA test-head
Parameters	none
Response	<integer> number of optical inputs.
C#	(property) NumOpticalInputs
Example	:THEA:INP:NUMB? -> 2

Command	**:THEAd:SWITched:ARCHitecture?**
Syntax	:THEAd:SWITched:ARCHitecture?
Description	Gets the LCA test-head architecture. True: LCA test head has switched, False: non-switched architecture.
Parameters	none
Response	<string> 0 = false or 1 = true
C#	(property) SwtichedArchitecture
Example	:THEA:SWIT:ARCH? -> 0

2 Programming Examples

.NET and COM programming examples are installed with the LCA Remote Client in the folder:

`C:\Program Files\Agilent\Agilent LCA Remote Client\Examples` (on 32-bit systems)

`C:\Program Files (x86)\Agilent\Agilent LCA Remote Client\Examples` (on 64-bit systems)

The location on your computer depends on the folder in which you installed the LCA Remote Client.

The COM example is written in C++. There are two .NET examples, one written in C# and another one written in Visual Basic. All three examples perform the same measurement steps.

A number of older, unsupported programming examples in VEE, VBA/Excel, VisualBasic 6.0 can be found in the folder:

`C:\Program Files\Agilent\Agilent LCA Remote Client\Examples\Unsupported` (on 32-bit systems)

`C:\Program Files (x86)\Agilent\Agilent LCA Remote Client\Examples\Unsupported` (on 64-bit systems)

3 Warranty Information

Warranty

All system warranties and support agreements are dependent upon the integrity of the Keysight Lightwave Component Analyzer. Any modification of the system software or hardware will terminate any obligation that Keysight Technologies may have to the purchaser. Please contact your local Keysight field engineer before embarking in any changes to the system.

To check the warranty of your product, visit the following web page: www.keysight.com/find/warranty

System

In addition to the warranty, extended warranty periods, on-site troubleshooting, reduced response times and increased coverage hours can be negotiated under a separate support agreement and will be charged at an extra cost.

Remove all doubt

Keysight offers a wide range of additional expert test and measurement services for your equipment, including initial start- up assistance onsite education and training, as well as design, system integration, and project management.

Our repair and calibration services will get your equipment back to you, performing like new, when promised. You will get full value out of your Keysight equipment throughout its lifetime. Your equipment will be serviced by Keysight- trained technicians using the latest factory calibration procedures, automated repair diagnostics and genuine parts. You will always have the utmost confidence in your measurements.For more information on repair and calibration services, go to www.keysight.com/find/removealldoubt

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Canada:

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China:

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(fax) 800 820 2816

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(tel) 31 20 547 2111

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(fax) (080) 769 0900

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(tel) (305) 269 7500

Taiwan:

(tel) 0800 047 866

(fax) 0800 286 331

Other Asia Pacific Countries:

(tel) (65) 6375 8100

(fax) (65) 6755 0042

Email: tm_ap@keysight.com

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