Introduction to TOP Server Troubleshooting and Best Practices

Software Toolbox
International Corporate
Headquarters, USA

148A East Charles Street
Matthews, NC 28105 USA
www.softwaretoolbox.com

TOLL FREE: 888-665-3678
GLOBAL: 704-849-2773
FAX: 704-849-6388

Table of Contents

Introduction

The purpose of this paper is to give the user of the TOP Server a better understanding of our many resources to find answers to questions, error messages, and other issues. The point is NOT for you to know the TOP Server inside and out, but rather, where to find the information you need to troubleshoot an issue. Some best practices for optimizing communication using TOP Server will also be covered.

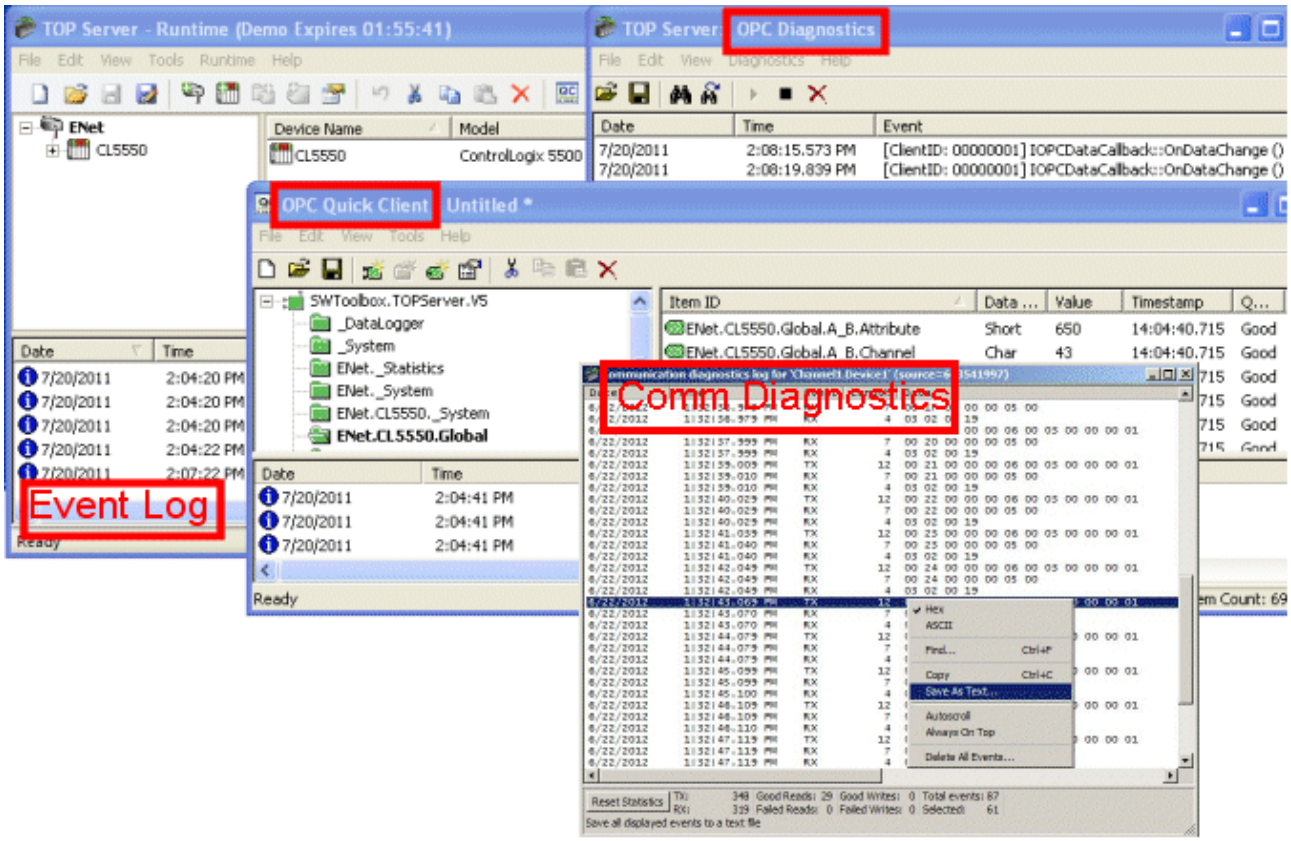
The screenshots in this paper were made with TOP Server V5.x; however, there are not significant differences for TOP Server V6.x and this document and the tips remain relevant.

Overview

The TOP Server has a variety of diagnostic tools that can be used for testing and troubleshooting. These include the TOP Server Event Log, Server and Driver specific help files, the OPC Quick Client, Communication Diagnostics, and OPC Diagnostics. There are also a few important aspects to consider when designing your project. These may be based on the number of devices you are communicating with, the number of tags you are polling, etc.

The TOP Server's built-in Startup and Testing features set it apart. The TOP Server lets you test the communications to your device using the OPC Quick Client and the Protocol Diagnostics for the Channel. The Event Log shows detailed messages when you are having a problem and the Help file for each driver covers the meaning of the errors to point you in the right direction.

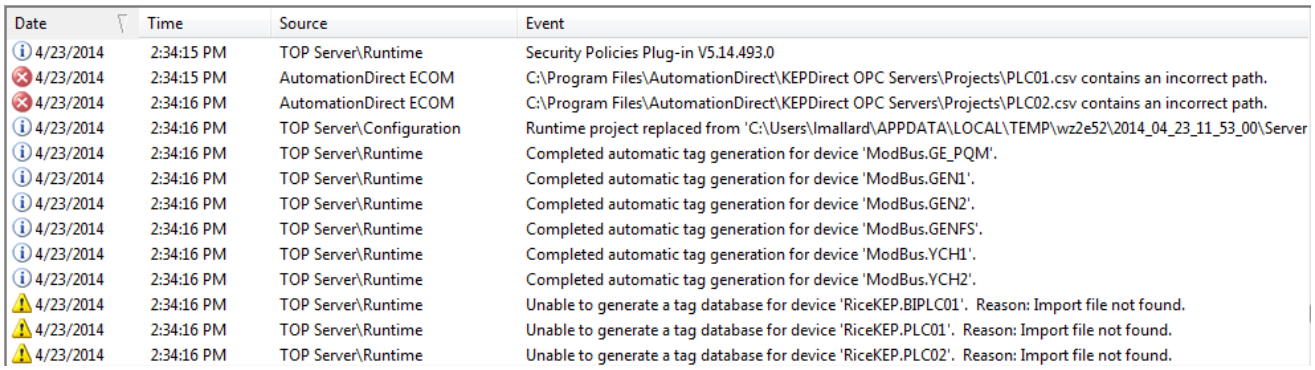
The OPC Diagnostics can help when you are seeing issues related to your OPC Client application connecting to the TOP Server. The OPC Options also overcome many OPC Client connection issues. Add to these features the simulation abilities and system tags and you will see why so many companies have standardized on the TOP Server.


TOP Server - Runtime (Demo Expires 01:55:41)
TOP Server OPC Diagnostics
OPC Quick Client
Untitled *
Event Log
Comm Diagnostics

Troubleshooting Features

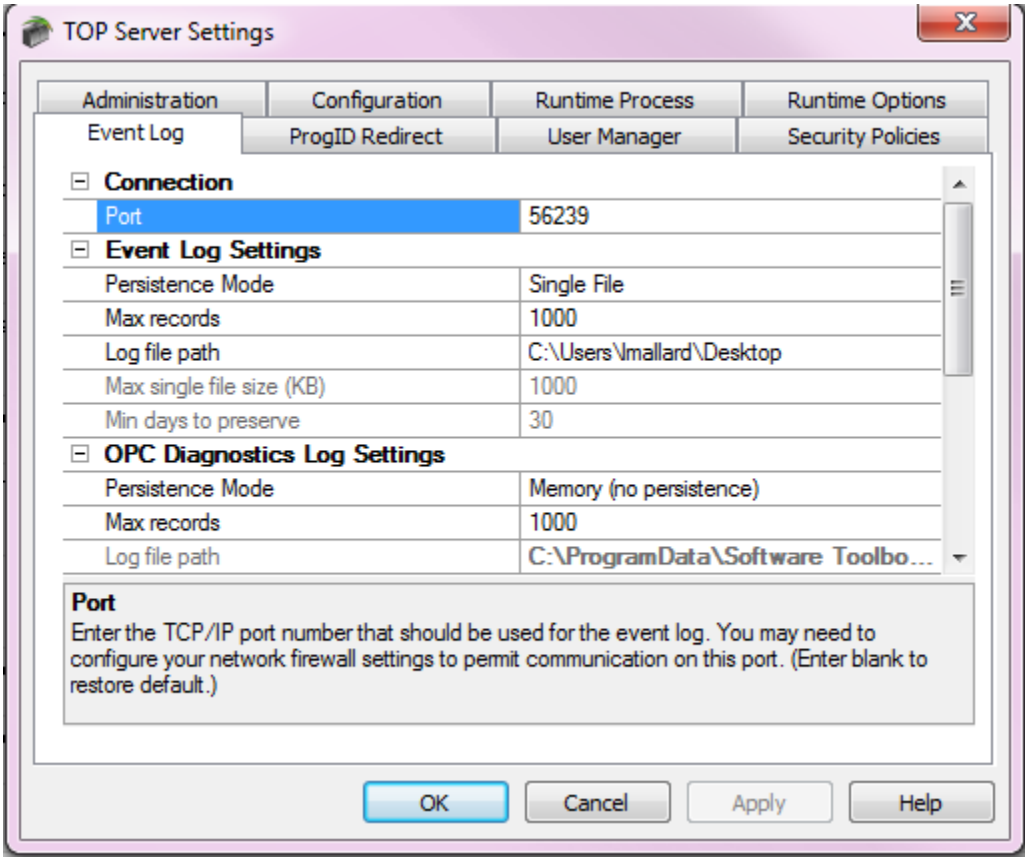
Event Log

The Event log includes messages for any communication errors between the server and the device as well as informational messages, such as drivers that are loaded on start-up, starting and stopping the runtime service, and information on the user session if you have a user account configured. There are 4 types of messages that the TOP Server will display. Security messages are indicated with a blue shield icon. Informational messages are indicated with a blue "i" icon. Warning messages are indicated with a yellow "!" icon. These messages are not necessarily errors, but if you are receiving a lot of them, you do want to pay attention. Error messages are shown with a red "x" icon. These messages indicate that something in the functionality of the TOP Server is incorrect.

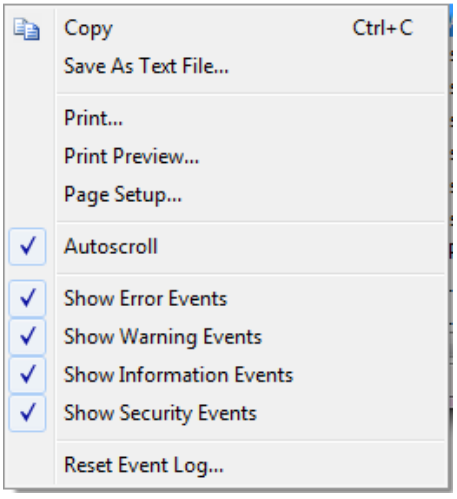


Date	Time	Source	Event
4/23/2014	2:34:15 PM	TOP Server\Runtime	Security Policies Plug-in V5.14.493.0
4/23/2014	2:34:15 PM	AutomationDirect ECOM	C:\Program Files\AutomationDirect\KEPDirect OPC Servers\Projects\PLC01.csv contains an incorrect path.
4/23/2014	2:34:16 PM	AutomationDirect ECOM	C:\Program Files\AutomationDirect\KEPDirect OPC Servers\Projects\PLC02.csv contains an incorrect path.
4/23/2014	2:34:16 PM	TOP Server\Configuration	Runtime project replaced from 'C:\Users\lmallard\APPDATA\LOCAL\TEMP\wz2e52\2014_04_23_11_53_00\Server
4/23/2014	2:34:16 PM	TOP Server\Runtime	Completed automatic tag generation for device 'ModBus.GE_PQM'.
4/23/2014	2:34:16 PM	TOP Server\Runtime	Completed automatic tag generation for device 'ModBus.GEN1'.
4/23/2014	2:34:16 PM	TOP Server\Runtime	Completed automatic tag generation for device 'ModBus.GEN2'.
4/23/2014	2:34:16 PM	TOP Server\Runtime	Completed automatic tag generation for device 'ModBus.GENFS'.
4/23/2014	2:34:16 PM	TOP Server\Runtime	Completed automatic tag generation for device 'ModBus.YCH1'.
4/23/2014	2:34:16 PM	TOP Server\Runtime	Completed automatic tag generation for device 'ModBus.YCH2'.
4/23/2014	2:34:16 PM	TOP Server\Runtime	Unable to generate a tag database for device 'RiceKEP.BIPLC01'. Reason: Import file not found.
4/23/2014	2:34:16 PM	TOP Server\Runtime	Unable to generate a tag database for device 'RiceKEP.PLC01'. Reason: Import file not found.
4/23/2014	2:34:16 PM	TOP Server\Runtime	Unable to generate a tag database for device 'RiceKEP.PLC02'. Reason: Import file not found.

You can adjust the properties of the Event log by going to the TOP Server settings window. You can access the TOP Server settings by right clicking on the Administration icon that runs in the system tray and going to Settings. If the administration icon is not showing up in the system tray, you can launch it manually by going to Start | All Programs | Software Toolbox | TOP Server 6 | TOP Server 6- Administration. When you open the settings window you'll want to go to the Event log tab. Here you can change the communication port for the event log if you need to. In most cases the default it fine. You can also change the maximum number of events to log to this location. The default is set to 1000. Be aware of course that you are limited by disk space to the number of events you would want to log. Generally the default settings will be fine.

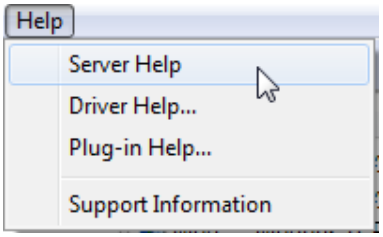


You can also choose what types of messages you want to include in the event log by right- clicking on the event log and unchecking particular message types. By default we show all events, but you can set it to show just error events or warning events to help locate errors in the event log. The event log can also be saved as a text file by clicking on "Save As Text File..."

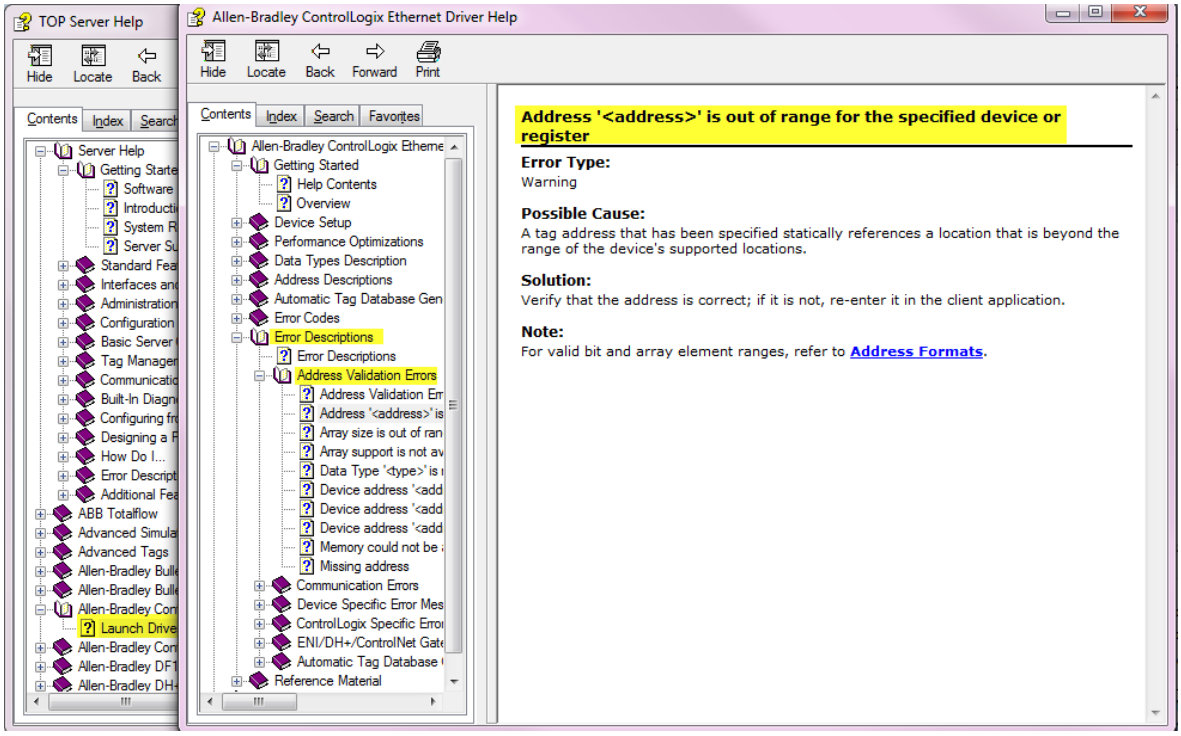


Help Files

The TOP Server installs two different types of help files- the server help file and the specific driver help files. You can launch the server help file by opening the TOP Server interface and clicking on Help | Server Help. You can also launch the server help file by right-clicking on the Administration icon and going to help.



The TOP Server help file includes information on the TOP Server in general, such as features, options, project property settings and error descriptions. If you are looking for specific information on the behavior of a particular driver or driver specific error messages you need to look at the driver help file. Expanding any of these specific driver help books will display a link that will launch the specific driver help file if you click on it. Many times an error you receive in the event log is explained in here.



OPC Quick Client

The OPC Quick Client is a sample client that can help you test your connectivity to your devices. This is important because it can be used to help isolate problems with the TOP Server configuration, versus problems in the client configuration. For instance, if you are getting incorrect data in your client application, or aren't getting any data at all, one of the first things you can do is connect with the Quick Client. If you can connect and see values changing with good quality in the Quick Client, we can rule out the TOP Server configuration as the issue.

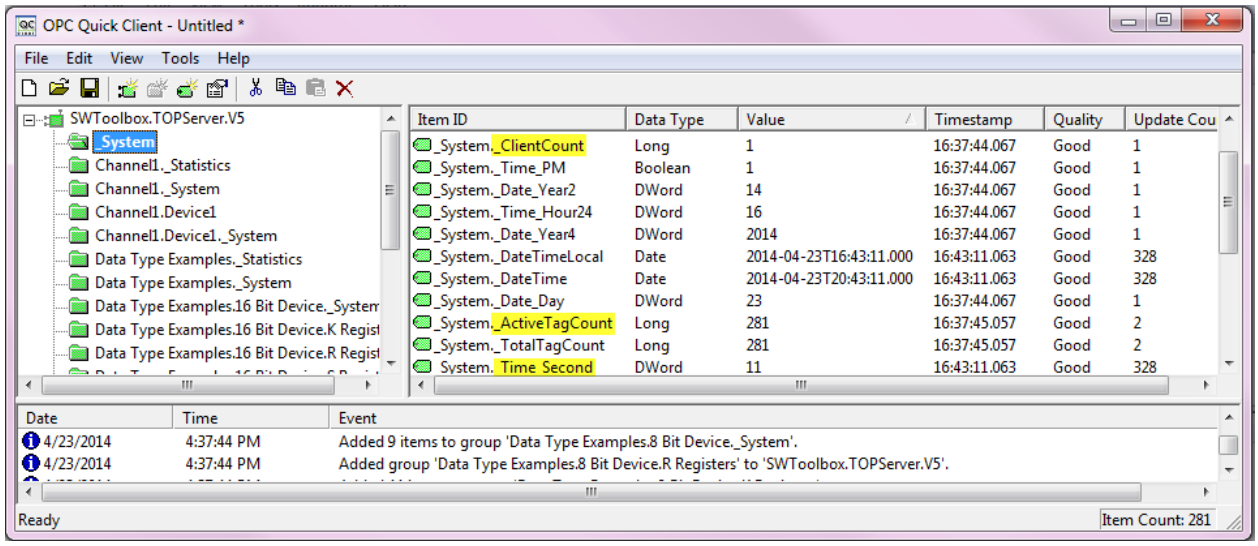
The Quick client can be launched from both the server and the start menu. To launch the Quick client from the Server, just click on the icon in the toolbar ( .) To launch the Quick Client from the Start menu, go to Start | All Programs | Software Toolbox | TOP Server 6 | OPC Quick Client. If you launch the OPC Quick client directly from the TOP Server, the application will auto-build a project with all of the TOP Server tags that are currently configured, and subscribe to them.

The OPC Quick client is divided into three sections. In the left hand pane you have the tag database that you can browse through. The main window in the center shows the detail for each tag. If you launch the Quick Client from the start menu, it will not create a connection to the TOP Server, or start subscribing to all of the tags. You will have to do this manually.

System Tags

System Tags are OPC tags that are internal to TOP Server. They do not read any other data from a device or PLC. They simply provide various indicators such as the date, time, client count, etc. There are also many functional system tags that are not only readable but also writeable, allowing you to access these system tags and make runtime changes to the configuration- such as the network adapter being used for a channel, the device ID of the device being communicated with, or the Enabled state of the device.

System Tags give the user flexible control over communications, all from the convenience of the client window, without having to access the TOP Server interface. There are 3 different levels of system tags in the TOP Server following the general architecture of configuring a project in TOP Server- Application or Server Level System Tags, Channel Level System Tags and Device Level System Tags. There will be a group of System Tags for every channel and device configured in a TOP Server project.



The Server Level system tags provide the types of information you would expect at an overall application level. They are all read-only access, so these tags don't correspond to actual settings in TOP Server and are informational only. Some of the Server level tags used the most are:

- The _ActiveTagCount tag, which is useful for knowing how many TOP Server tags are actively being requested from all connected clients.

- The _ClientCount tag, which gives you the total number of clients connected to TOP Server at a given time.

- The _Time_Second tag, which displays the current second of the system time. Many customers monitor this tag in their HMI as a sort of "heartbeat" that can be used to indicate healthy communications between the client and TOP Server.

With channel level tags, the options are different depending on whether the channel is using an Ethernet driver or a Serial driver for communications. Some of the more useful Channel level Ethernet tags are:

- The _AvailableNetworkAdapters tag, which is useful for knowing what network adapters exist on the machine and can be associated with a channel, as well as the proper syntax.

- The _NetworkAdapter tag. This tag is writeable and can be used to actually change the network adapter being used for communications on a channel, which is where the proper syntax comes in for writing to this tag. This is really useful if you wish to have redundant NICs in the TOP Server machine and handle that through scripting in the client.

Again, the options for Channel Level tags are different with a Serial driver for communications. Some of the more useful Channel level Serial tags are:

- Any of the COM parameters system tags, which can be used to alter those parameters directly from the client.

- The _ComId tag, which can be used to change the COM port used for communications by the channel. This can be used for handling redundant COM/Serial ports via scripting in the client.

- The "Network Adapter" tags will still be here, even though this is a Serial Channel. This will be true of any serial driver that supports Ethernet Encapsulation.

The Device Level system tags allow changes to parameters for the individual devices from the client application. There are some slight differences in tag availability between Serial and Ethernet devices, but they are mostly the same parameters. Some of the more useful Device level System tags are going to be:

- Any of the Timeout based settings such as the Request Timeout and the number of retries, since this makes it simple to change those directly from the client as needed.

- The _Error and _NoError tags, which are very useful because they indicate when TOP Server to device communications is unresponsive. Both tags are Boolean.

    - The _Error tag will be False when communications are good and will go True if the Device stops responding, corresponding to a "Device Not Responding" error in the TOP Server event log.

    - The _NoError tag will be True when communications are good and will go False if the Device stops responding.

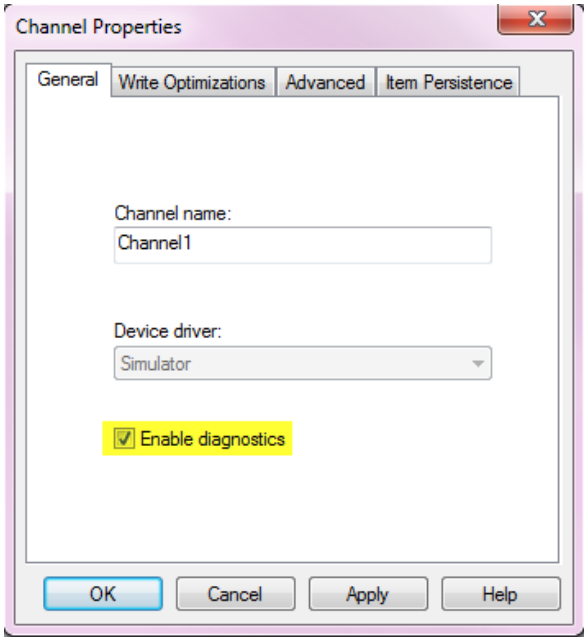
- The _Enabled tag, which allows you to enable or disable a particular device for communications directly from a client application, which could be useful if you know a particular device is down for some reason, such as maintenance.

- The _DeviceID tag. This tag allows you to change the Device ID used by a configured device from the client. This will be the IP Address for an Ethernet device or the node ID for a serial device.

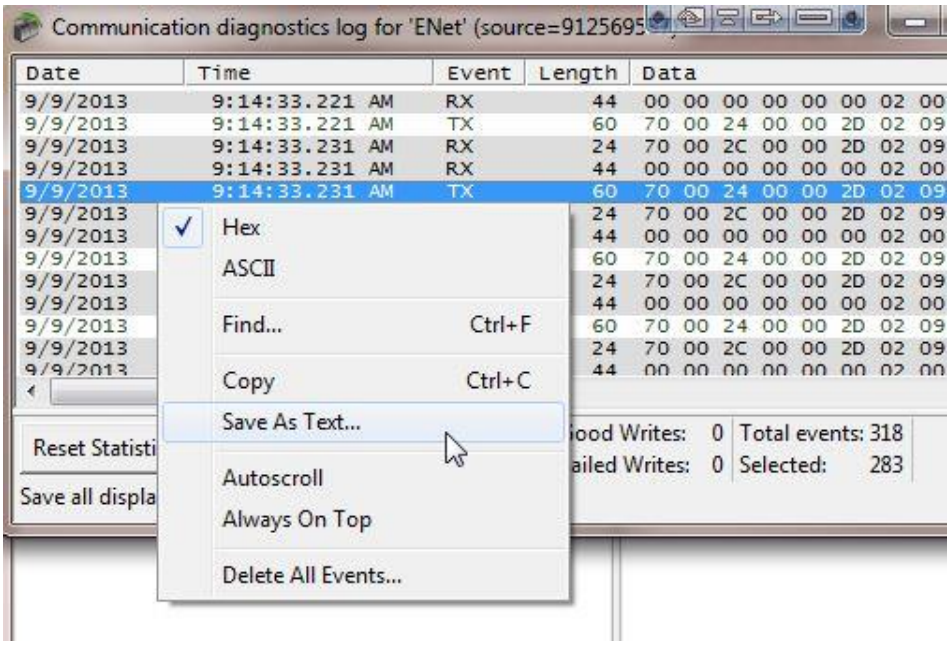
Communication Diagnostics

The TOP Server communication diagnostics allows you to capture the protocol packets that are being transmitted and received between the server and the device. This allows us to verify that the expected sends and receives are occurring for a particular protocol.

Diagnostics are not enabled by default. They can be enabled when you first go through the process of setting up a channel, but they can also be enabled and disabled through the Channel and Device Properties window. Then you simply need to check the Enable Diagnostics box and click ok.

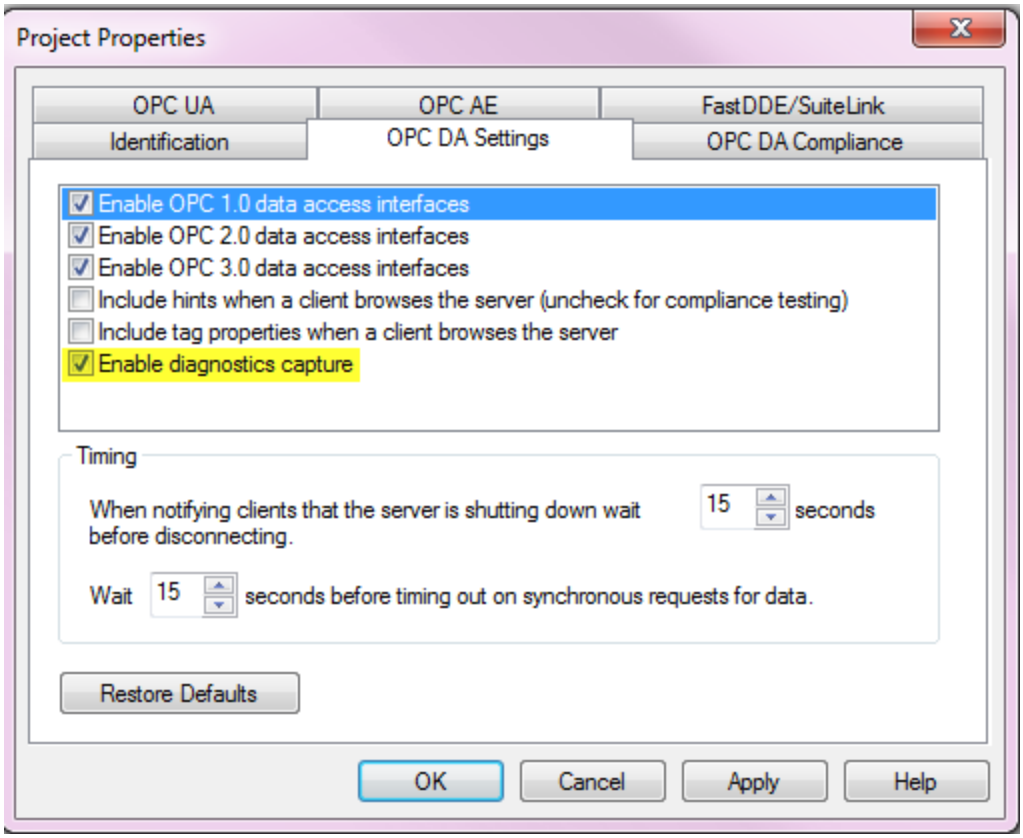


You can launch the actual diagnostics by right clicking on the channel or device and going to Diagnostics. The TOP Server must have a client application connecting to it, requesting information in order for anything to show up in this window. You can save these diagnostics by right clicking in the window, and choosing Save as Text File.

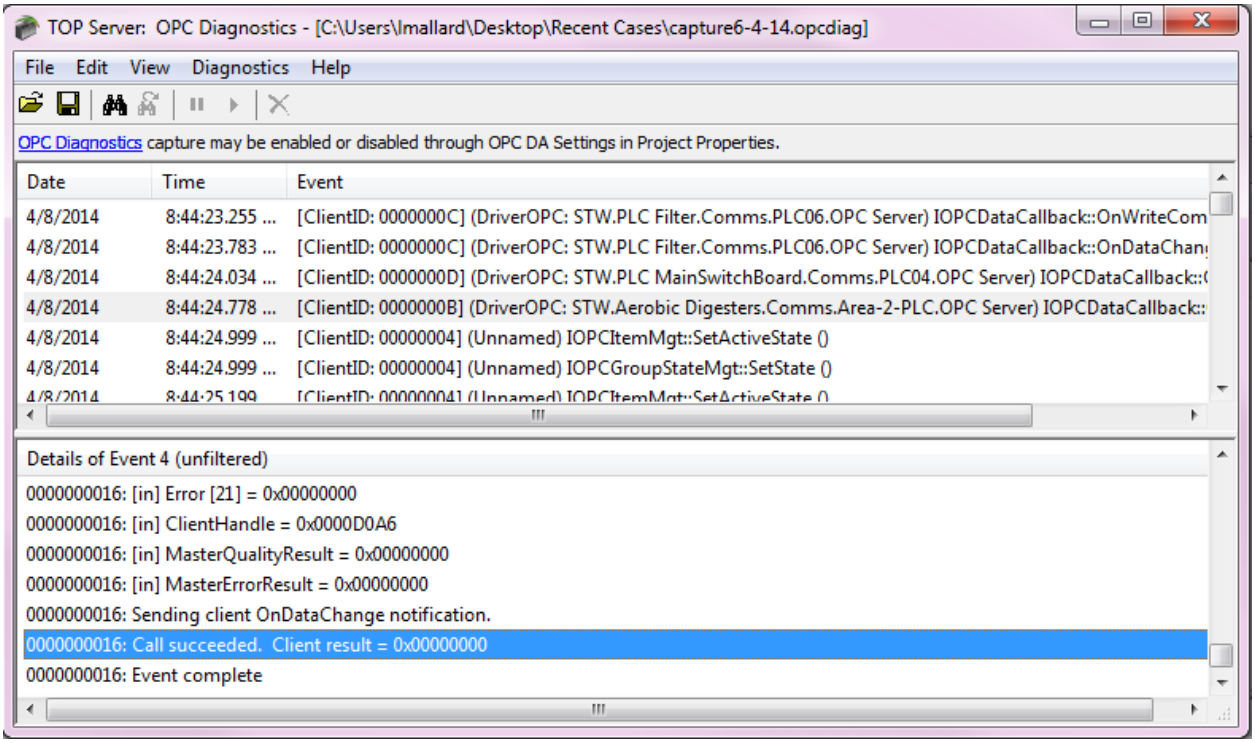

Communication diagnostics log for 'ENet' (source=9125695
Date
Time
Event
Length
Data
9/9/2013 9:14:33.221 AM RX 44 00 00 00 00 00 00 02 00
9/9/2013 9:14:33.221 AM TX 60 70 00 24 00 00 2D 02 09
9/9/2013 9:14:33.231 AM RX 24 70 00 2C 00 00 2D 02 09
9/9/2013 9:14:33.231 AM RX 44 00 00 00 00 00 00 02 00
9/9/2013 9:14:33.231 AM TX 60 70 00 24 00 00 2D 02 09
Hex
ASCII
Find... Ctrl+F
Copy Ctrl+C
Save As Text...
Autoscroll
Always On Top
Delete All Events...
Reset Statisti
Save all displa
ood Writes: 0
ailed Writes: 0
Total events: 318
Selected: 283

OPC Diagnostics

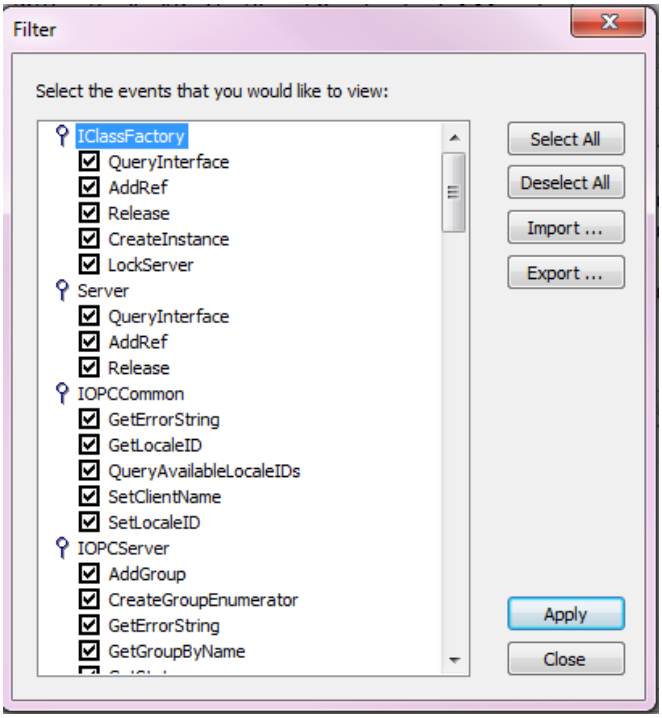
OPC Diagnostics capture the OPC requests and responses between the client and the server to show the OPC calls being made. These must be enabled under the project properties.



You can view the OPC diagnostics by going to View | OPC Diagnostics. You will see this dialog appear. Press the play button to start capturing the diagnostics. What you should see is a bunch of OPC Events being fired. If we highlight an event, the details of that event can be seen in the bottom section of this window. The parts that you want to look for are the value, quality and error codes.



You can also filter the OPC Diagnostics if you need to find certain types of messages more efficiently. Go to Diagnostics | Filter. By default, all of the messages are selected by default.



Best Practices

Large Device Counts

If you are using serial devices and placing multiple devices under a single channel because they are sharing a COM port, then we would recommend you turn on Auto-Demotion. This will prevent a single unresponsive device for interfering with the update rates on the other devices.

If you are using Ethernet devices, we recommend trying to place one device per channel. The TOP Server supports up to a different # of channels, depending on the driver. Some drivers are limited to 256 channels, some go as high as 1024 channels.

If you have so many devices that you need to start adding 3 or 4 per channel, you will want to consider adding a second machine running another instance of TOP Server. If your project requires that you have a device written to frequently, you should consider creating a separate channel to handle the writes to the tags. The easiest way to do this would be to simply copy and paste the whole channel and device configurations.

Large Tag Counts

If you are working on a project with a very large tag count, the first thing you'll want consider is the CSV import and export. This can make creating the tag database a lot faster than manually creating every tag. This point, of course only applies if you are maintaining a tag database in the TOP Server, and not doing dynamic tagging in the client application.

Another point is to make sure you are requesting only the tags you need, when you need them. By creating tag groups, you can set different scan rates. By default, the TOP Server sets a scan rate of 100 milliseconds. For many customers, this rate may be much faster than what they actually need. There is no point putting extra stress on the controls, or consuming more network resources than is necessary.

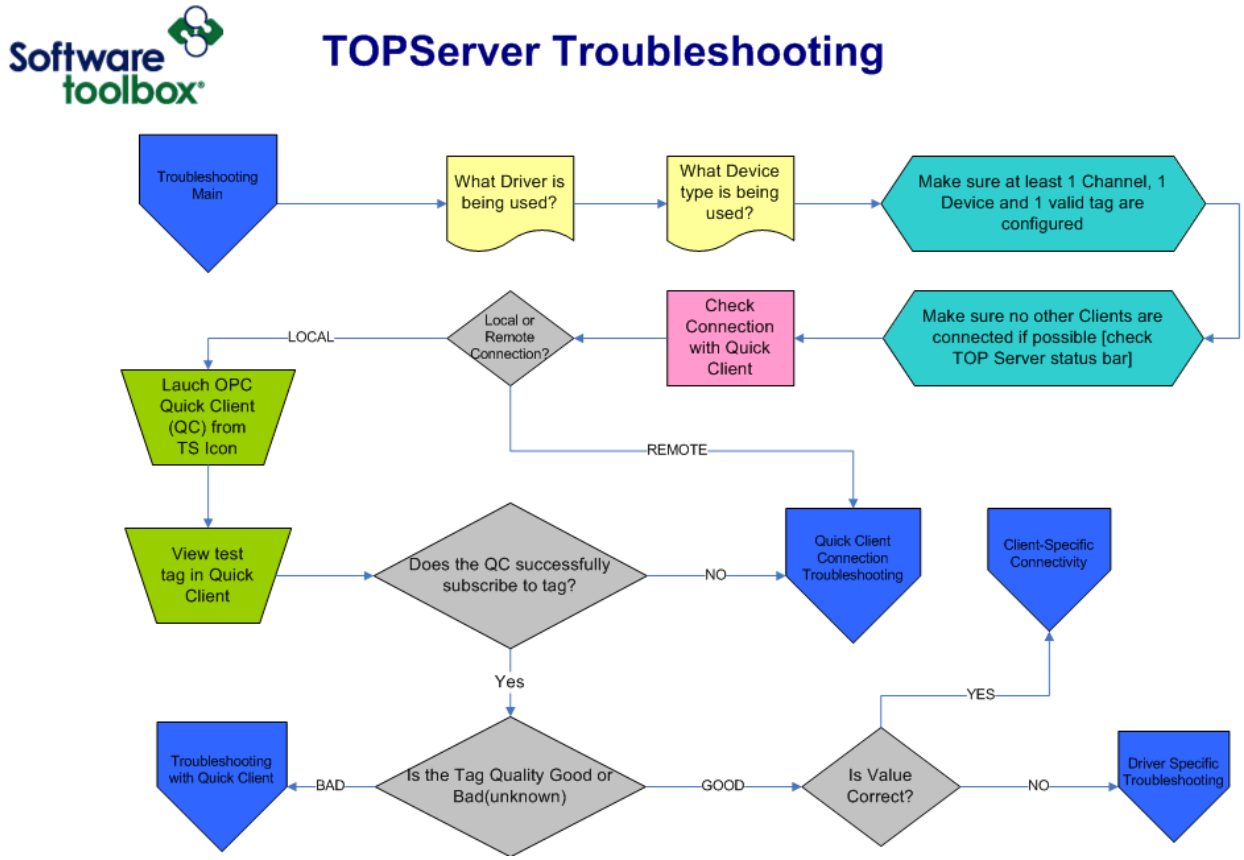
The TOP Server does do a fair amount of optimizing requests, to bundle specific addresses in the most efficient way, but it does help if a customer designs their project to use consecutive memory blocks for a group of tags. This prevents the TOP Server from having to go to a bunch of different locations to get the

requested data. Also, it is recommended that if a customer has a very large tag count, they should be using OPC instead of SuiteLink.

Troubleshooting Flowchart

You can find our TOP Server Troubleshooting flowchart by clicking on the link below and navigating to the TOP Server Troubleshooting tab.

http://www.softwaretoolbox.com/quickfaq.asp?faqid=1429



Summary

Besides the tools we already discussed, there is a lot of information on the TOP Server website to help you find answers to your questions. Whenever we have problems or questions that we see frequently, we try to get the information or solution documented and on our website so users can help themselves. Software Toolbox has customers all over the globe, so sometimes, when they are having a problem on their plant floor, it may be outside of our normal hours of operation. We try to provide as many resources, available 24/7 to help them solve their issue.

On the TOP Server website, toolboxopc.com, there is a section dedicated to this type of information. Here you will see links to our Quick Start Guide, as well as all of our webcasts and training videos. Any application notes we have published can be found from here, and the HMI specific page actually groups them as they relate to connecting to specific HMIs.

You can also search for all of our FAQs by going to support.softwaretoolbox.com. You can search by a particular product, say the TOP Server, and search by drivers under that as well. You can also narrow the search by a category of problem, such as Installation help, receiving an error message, or looking for an application note. You can also simply search by keyword.

They key here is that you are always welcome to access these sources while you are waiting on a response from us.

If you have any additional questions about the TOP Server please send your questions to support@softwaretoolbox.com and we will respond as quickly as possible. We would also welcome any feedback you have regarding this or any of our other papers.