Tech Note 866
Monitoring and Tracking SuiteLink

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Introduction

Many Wonderware applications communicate to each other via the SuiteLink protocol. Monitoring the **SuiteLink** process is useful, especially if there are issues with communication.

This *Tech Note* describes how you can monitor SuiteLink performance counters by using Performance Monitor (Perfmon), and it outlines how you can generate a Counter Log (file) for further analysis. It also shows creating a .CSV file with information about SuiteLink.

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About SuiteLink

SuiteLink is a Wonderware communications protocol that uses a TCP/IP based communication protocol. SuiteLink is designed specifically to meet industrial needs, such as data integrity, high throughput, and easier diagnostics. This protocol standard is supported on Microsoft Windows.

SuiteLink has a unique way of detecting the client overload condition. At the client side, SuiteLink probes the depth of the Windows message queue of the client process at a particular interval. If the depth of the Windows message queue is above a certain level called **High Water**, SuiteLink understands that the client is overloaded and it will not be able to process the data at that rate. At that point, it will generate a **Suspend** event and request the server to stop sending the data. Based on the Suspend request, the server will stop sending the data.

For a particular SuiteLink probe, if the depth of the Windows message queue is *below* a certain level called **Low Water**, SuiteLink understands that the client has come out of the overload condition and it will be able to process the data. It will generate a **RESUME** event and request the server to resume sending the data. When the Server processes the RESUME request, the Server will resume sending the data.

Note: SuiteLink is not a replacement for DDE, FastDDE, or NetDDE. Each connection between a client and a server depends on your network situation.

Using SuiteLink Performance Counters

Performance Counters are used to provide information about how well the operating system or an application, service, or driver is performing. Applications use counter data to determine how much system resources to consume.

Note: You can see the SuiteLink counters in Performance Monitor on Windows XP SP3, Windows 2003 R2 and Windows 2008 SP2 32-bit Operating Systems after running WindowViewer. On Windows 64 bit you have to type the command **mmc /32 perfmon.msc** in order to display the SuiteLink counters. The screenshots in this section are taken from a machine with Windows 2008 SP2.

Monitoring SuiteLink Performance

SL Local Applications

Use **SL Local Applications** to monitor the local running applications that use SuiteLink.

1. Type **Perfmon** in the **Run** field. The **Reliability and Performance Monitor** window appears (Figure 1 below).
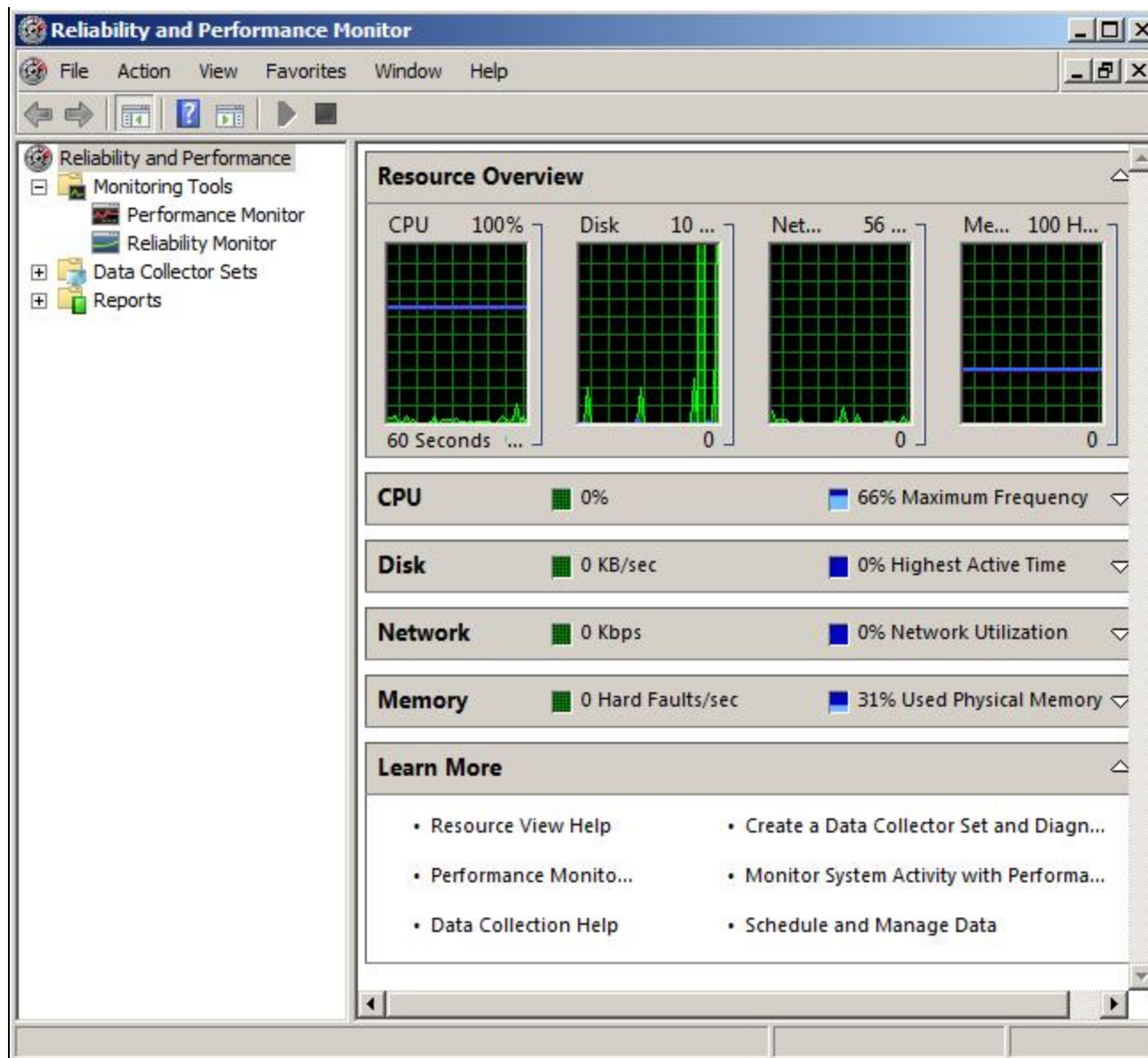
FIGURE 1: RELIABILITY AND PERFORMANCE MONITOR WINDOW
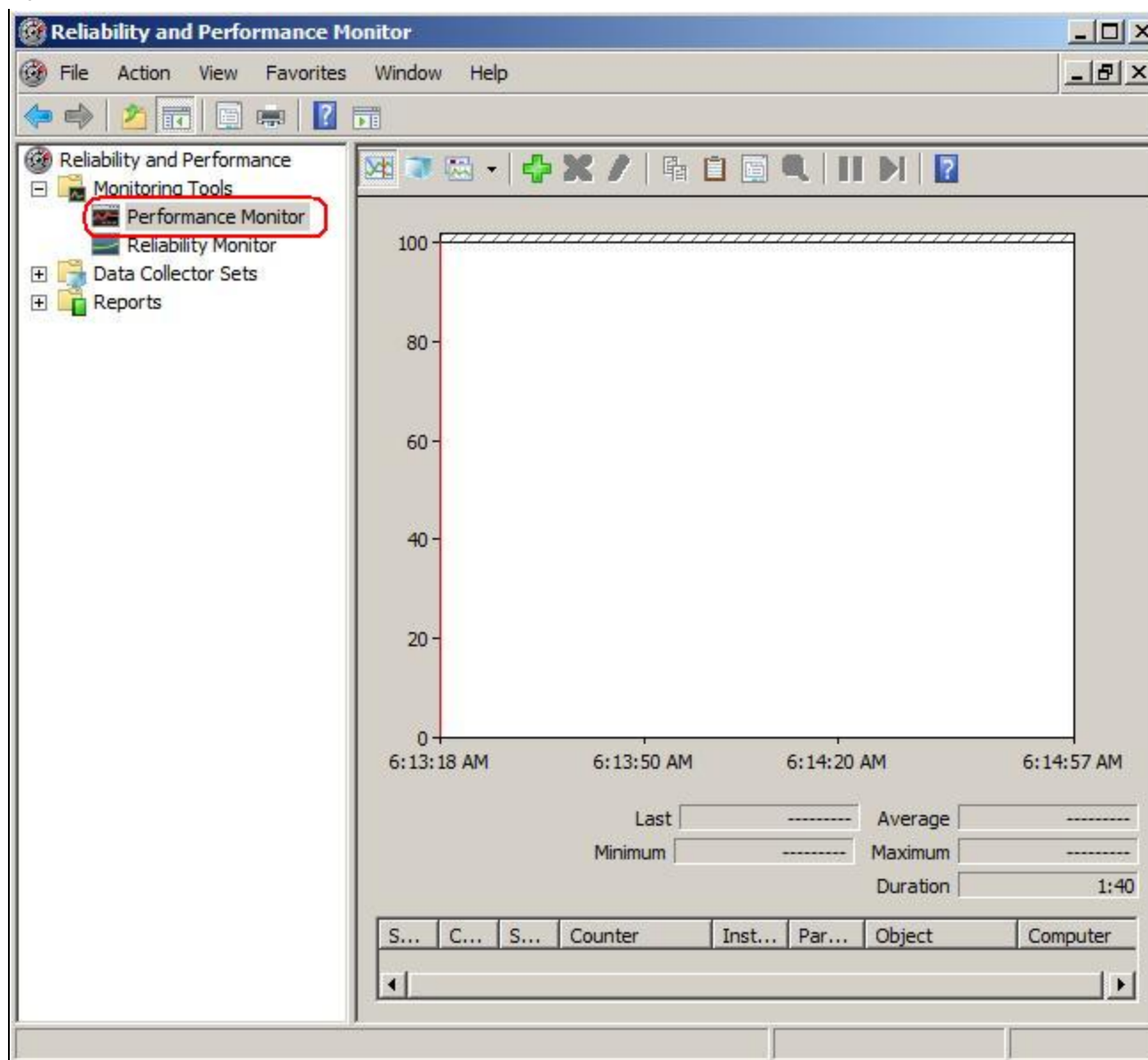
2. Click **Performance Monitor** (Figure 2 below).

FIGURE 2: PERFORMANCE MONITOR

3. Right-click anywhere in the right panel and click **Add Counters**. The **Add Counters** window appears (Figure 3 below).
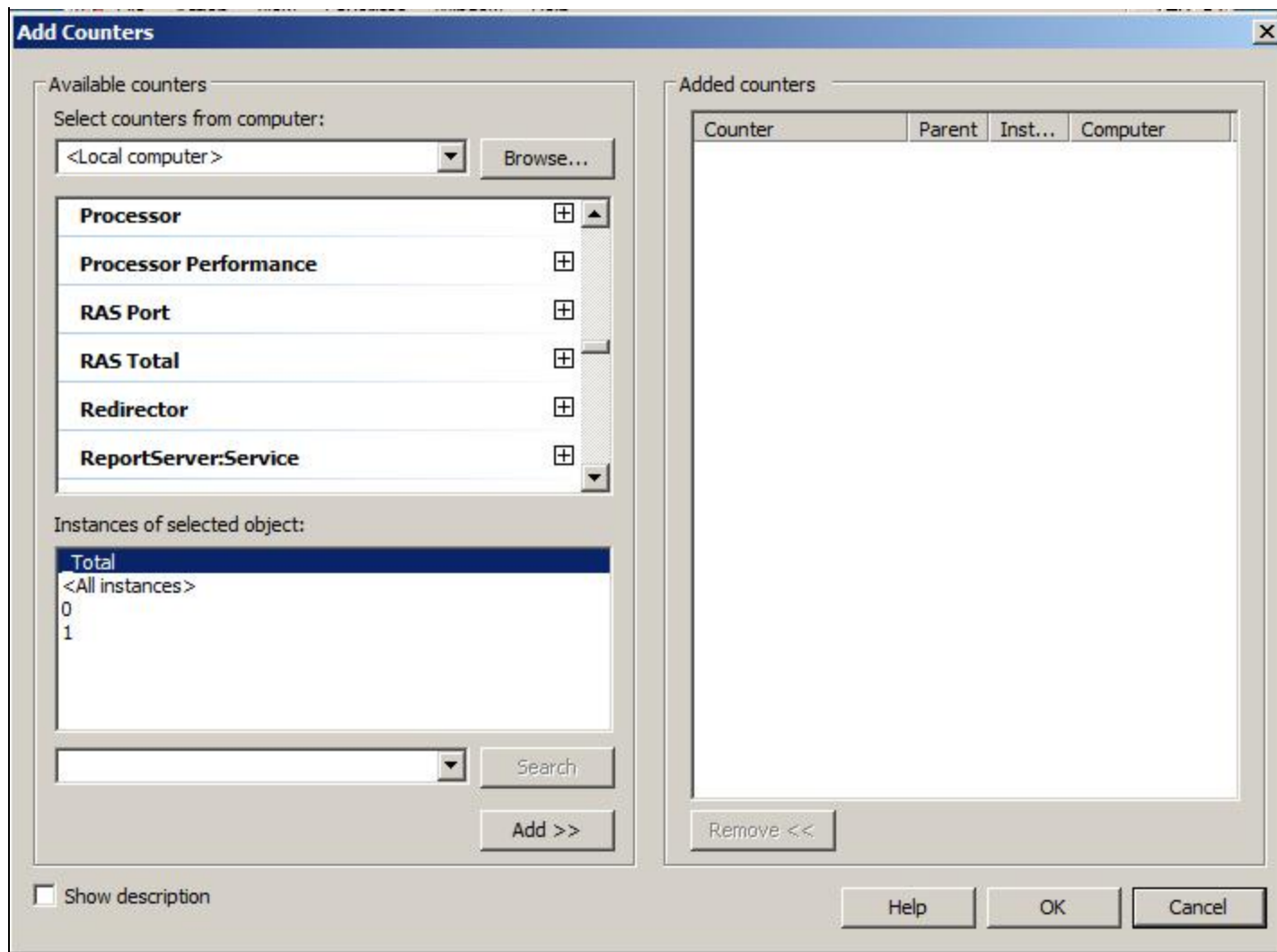
FIGURE 3: ADD COUNTERS WINDOW

4. Go to **SL local applications** and expand it, then select some or all of the counters under it. Refer to **Appendix** for the definition of each counter.

5. Click one or more of the instances below.

6. Click **Add** (Figure 4 below).
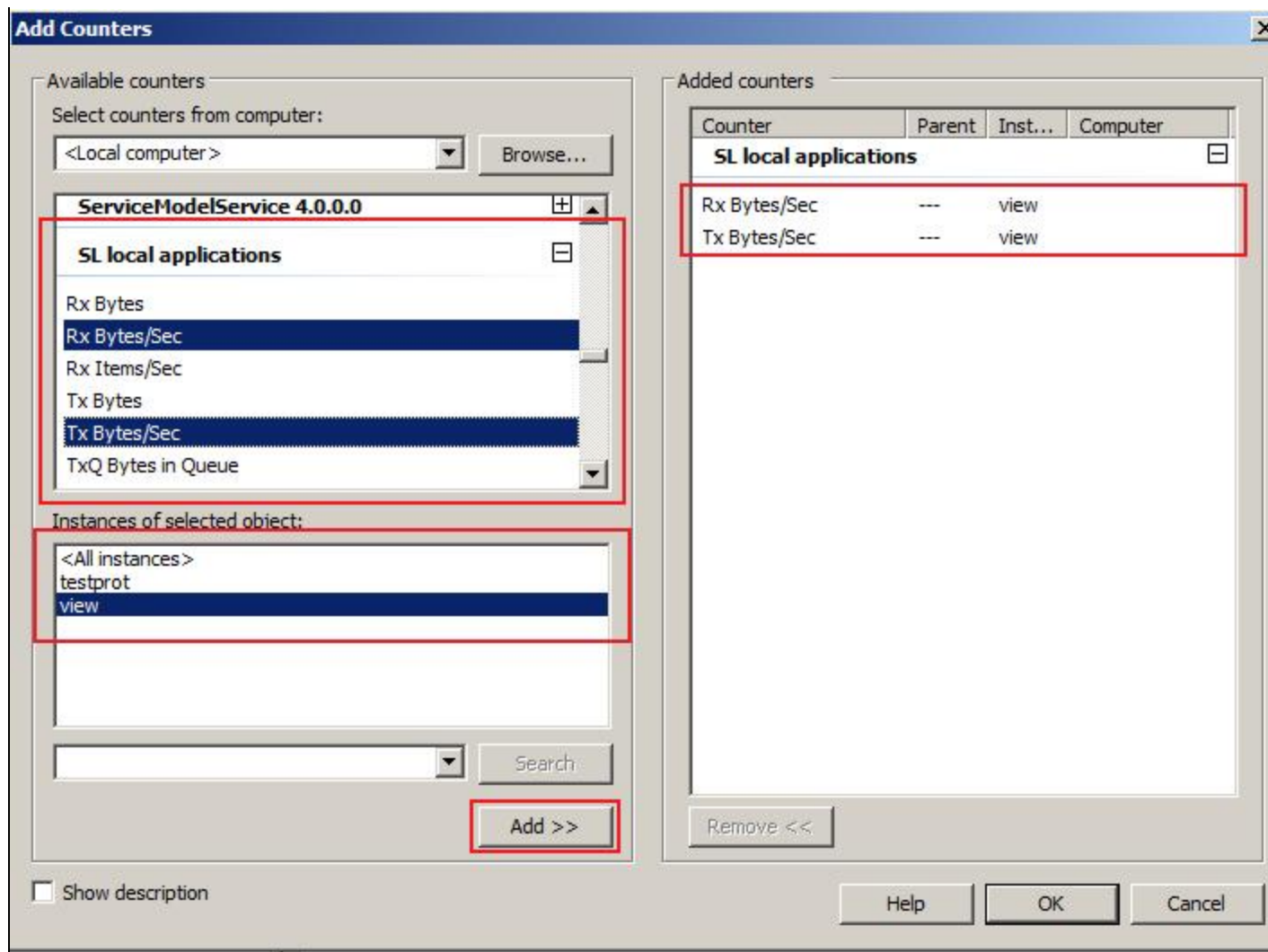
FIGURE 4: SELECT SL LOCAL APPLICATIONS TO ADD

7. Click **OK**. The counters are added to the Performance Monitor window (Figure 5 below).
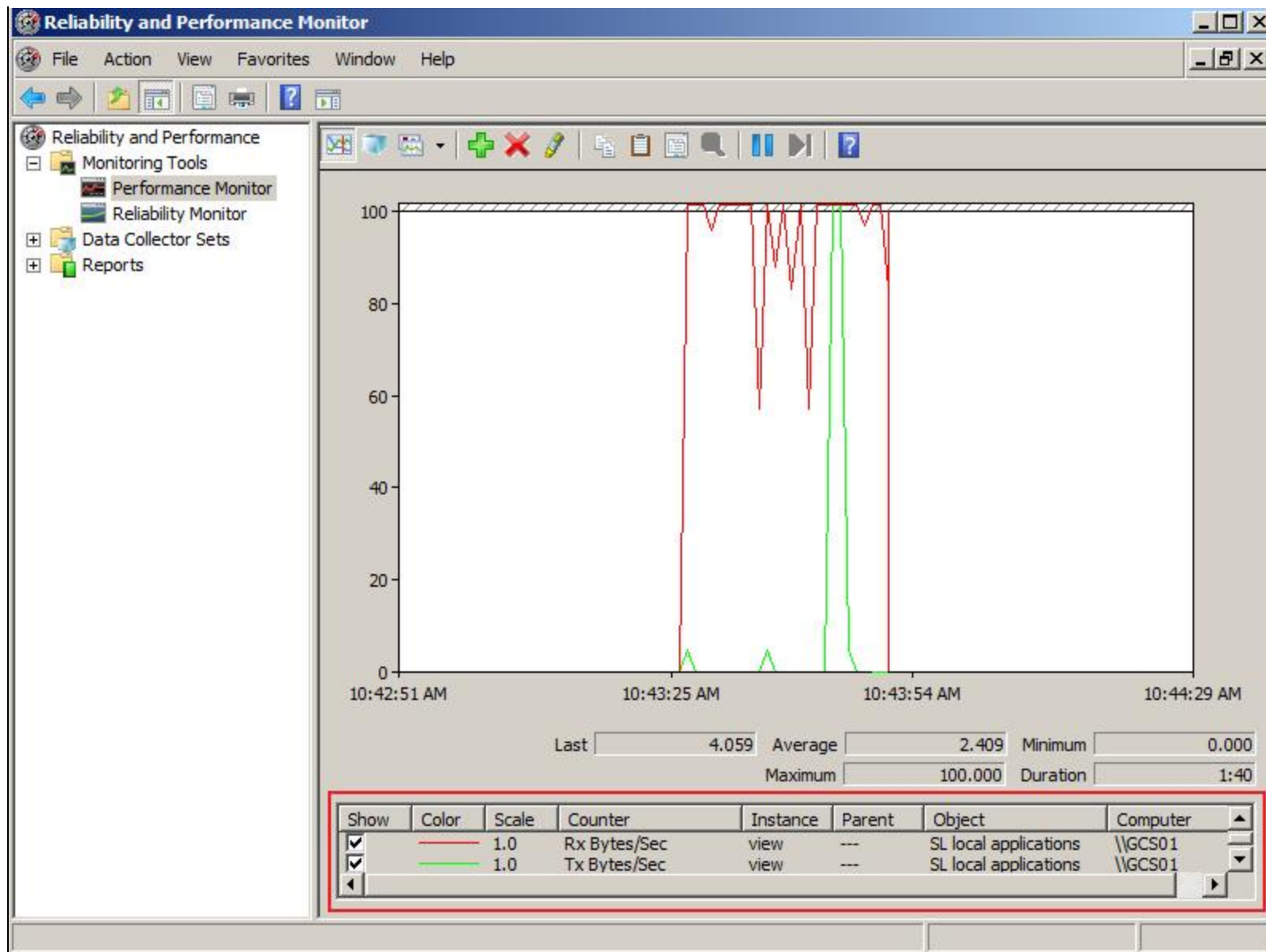
FIGURE 5: SL COUNTERS ADDED TO PERFORMANCE MONITOR

SL Local Apps by Connected App

Use **SL Local apps by connected App** to monitor the communication between a local running application that uses SuiteLink, and a specific application running on a specific machine.

For example, if you have a SuiteLink server application and many SuiteLink client applications running on different machines, you can monitor the communication to each client individually.

1. Open Performance Monitor to add counters using the previous steps.

2. Go to **SL local apps by connected App** and expand it.

3. Select some, or all, of the counters under it. Refer to the **Appendix** for the definition of each counter.

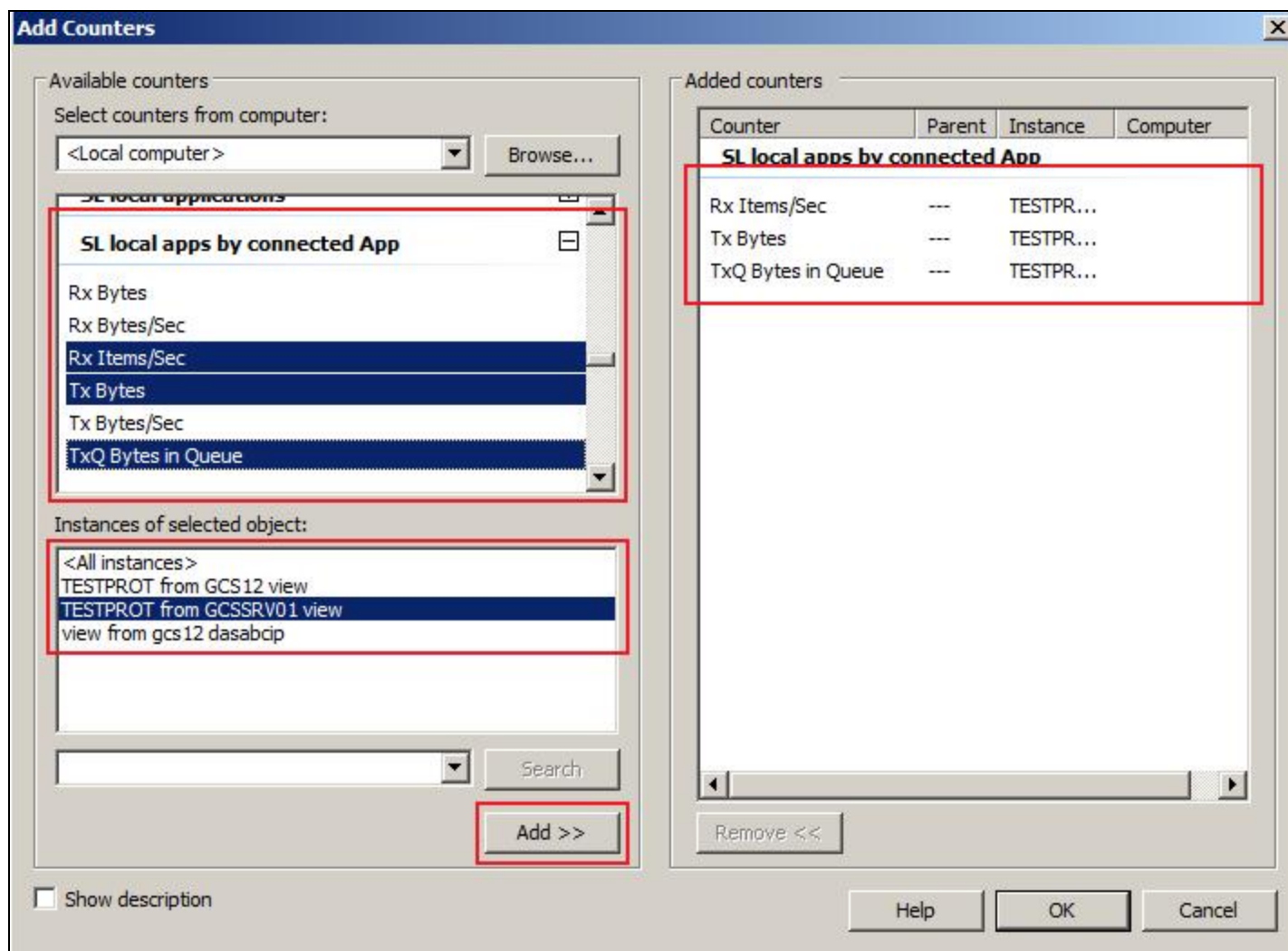4. Select one or more of the instances.

5. Click **Add** (Figure 6 below).

FIGURE 6: ADD SELECTED COUNTERS

Note: In this example, there are two instances of TESTPROT: One to the View application on the GCS12 machine and one to the View application on **GCSSRV01**.

6. Click **OK**. The counters are added to the Performance Monitor window.

SL Local Apps by Connected Machine

Use **SL Local apps by connected Machine** to monitor the communication between a local running application that uses SuiteLink and a specific machine that has some running SuiteLink applications.

SL Local Clients by Topic

Use **SL Local clients by Topic** to monitor the communication between a local SuiteLink client application and each topic of the SuiteLink server application.

For example, if **View** is running on the local machine, and is connected to some items from a DAServer, like DASABCIP, you can monitor the communication to each topic individually.

1. Open Performance Monitor to add counters using the previous steps.

2. Go to **SL local clients by Topic** and expand it.

3. Select some, or all, of the counters under it. Refer to **Appendix** for the definition of each counter.

4. Select one or more of the instances.
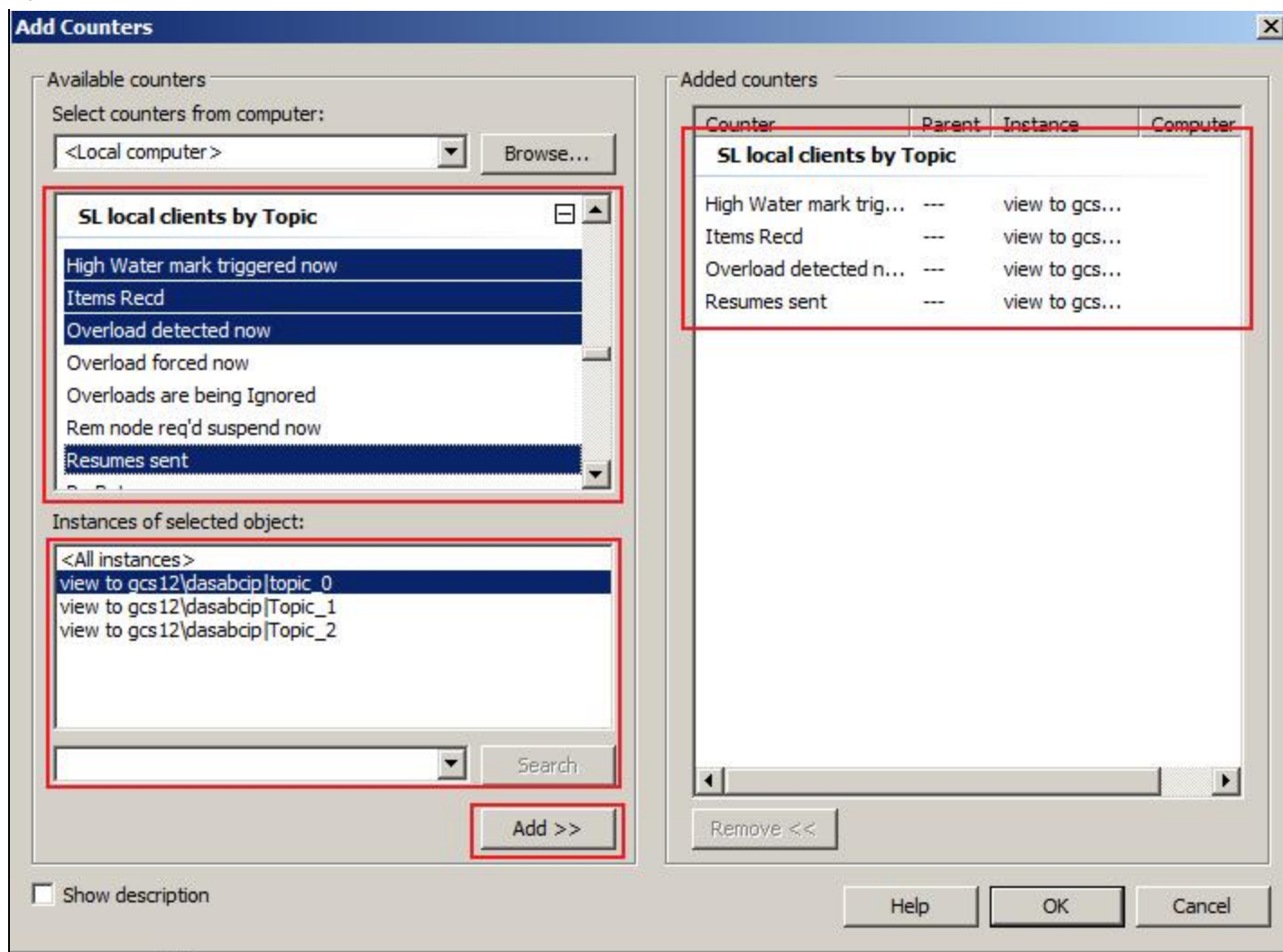
5. Click **Add** (Figure 7 below).

FIGURE 7: ADDING TOPIC COUNTERS

Note: There are three instances for **View**, one for each topic in **DASABCIP**.

6. Click **OK**. The counters are added to the Performance Monitor window.

SL Local Servers by Topic

Using **SL Local servers by Topic** to monitor the communication between a local SuiteLink server application and one or more of its SuiteLink client applications per topic.

1. Open Performance Monitor to add counters using the previous steps.

2. Go to **SL local server by Topic** and expand it.

3. Select some, or all, of the counters under it. Refer to the **Appendix** for the definition of each counter.

4. Select one or more of the instances.

5. Click **Add** (Figure 8 below).
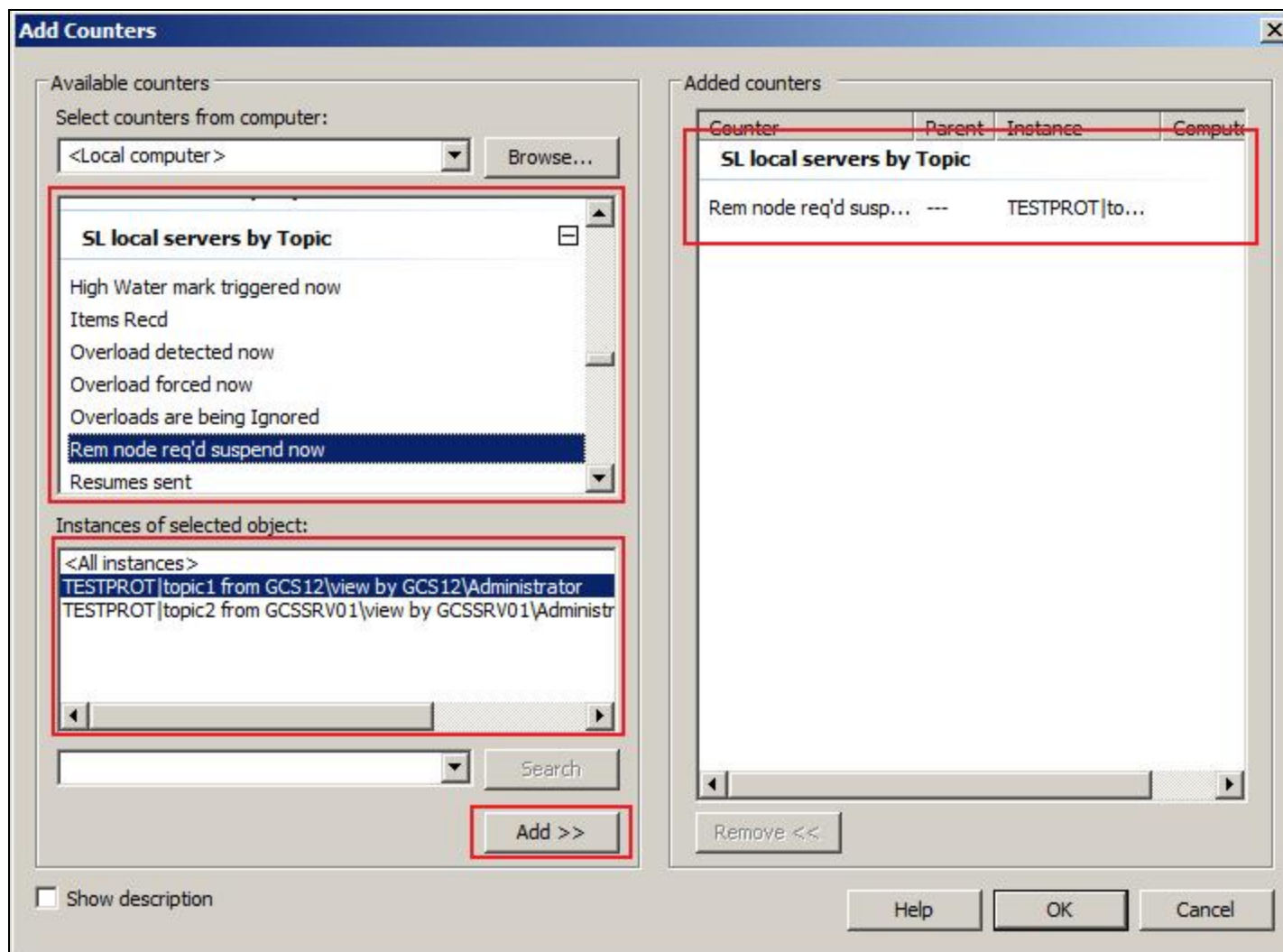
FIGURE 8: SL LOCAL SERVERS BY TOPIC

6. Click **OK**. The counters are added to the Performance Monitor window.

SLS Users

SuiteLink applications appear under **SLS Users** with their full path. One of the important SLS Users counters is **Open Connections**.

Use it to monitor all the connections of a SuiteLink application.

1. Open Performance Monitor to add counters using the previous steps.

2. Go to **SL Users** and expand it.

3. Select some, or all, of the counters under it. Refer to the **Appendix** for the definition of each counter.

4. Select one or more of the instances.

5. Click **Add** (Figure 9 below).
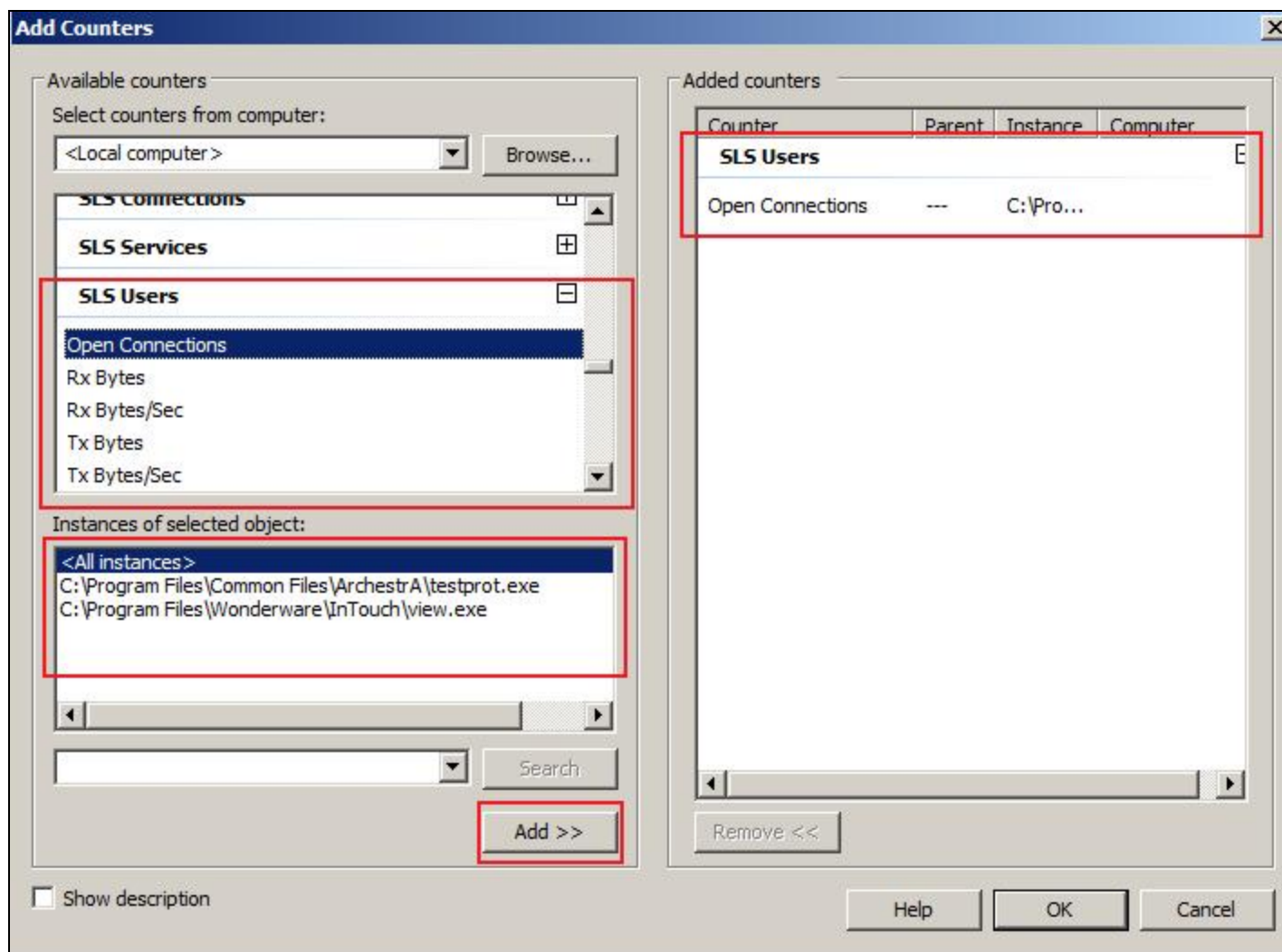
FIGURE 9: ADD SLS USERS COUNTERS

6. Click **OK**. The counters are added to the Performance Monitor window.

Generating a Counter Log (File) for the SuiteLink Performance Counters

You can create a Log file for later analysis for any of the counters used in the previous sections. Creating a Log file helps with troubleshooting.

1. In the **Reliability and Performance Monitor** window, expand **Data Collector Sets**.

2. Right-click **User Defined**, then click **New Data Collector Set** (Figure 10 below).
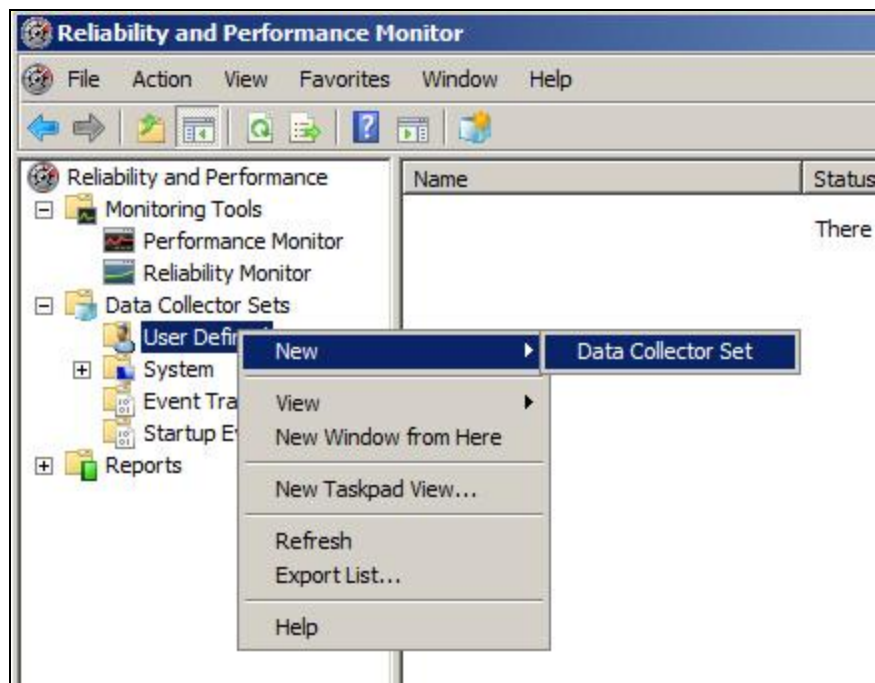
FIGURE 10: CREATE A NEW DATA COLLECTOR SET

3. In the **Create New Data Collector Set** window, type a name for the set and click **Create manually** (Figure 11 below).
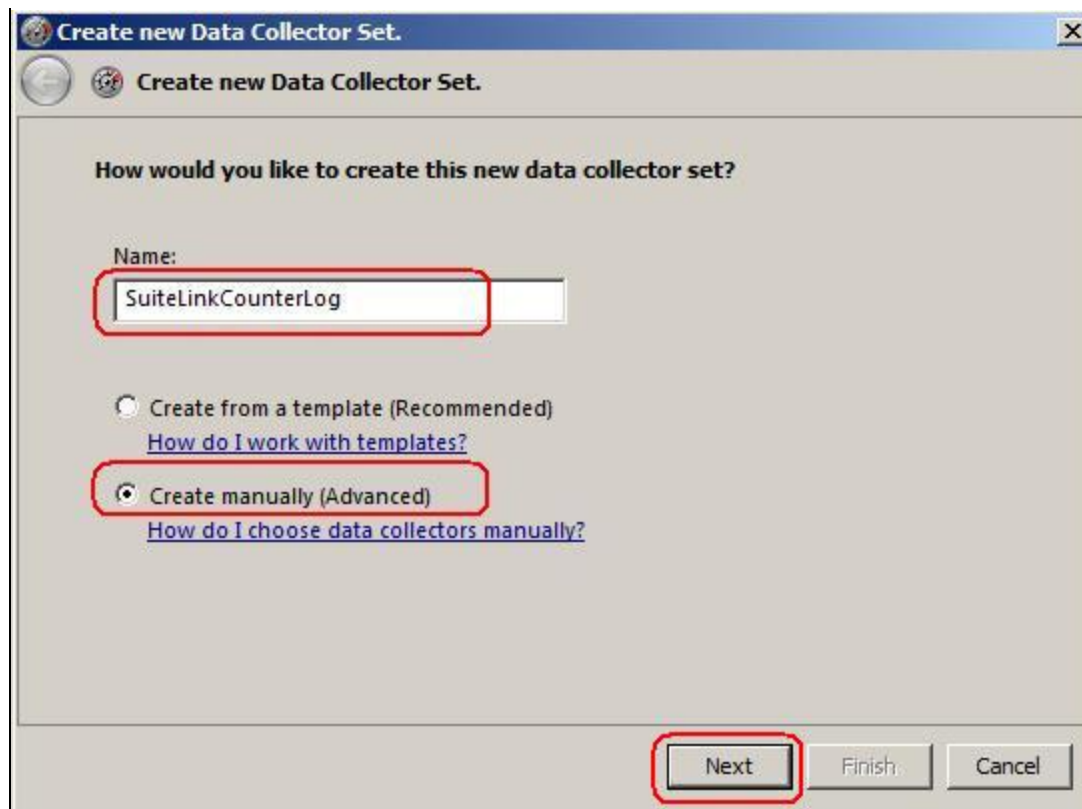
FIGURE 11: CREATE SUITELINK COUNTER LOG

4. Click **Next**.

5. Click the **Performance counter** checkbox (Figure 12 below).
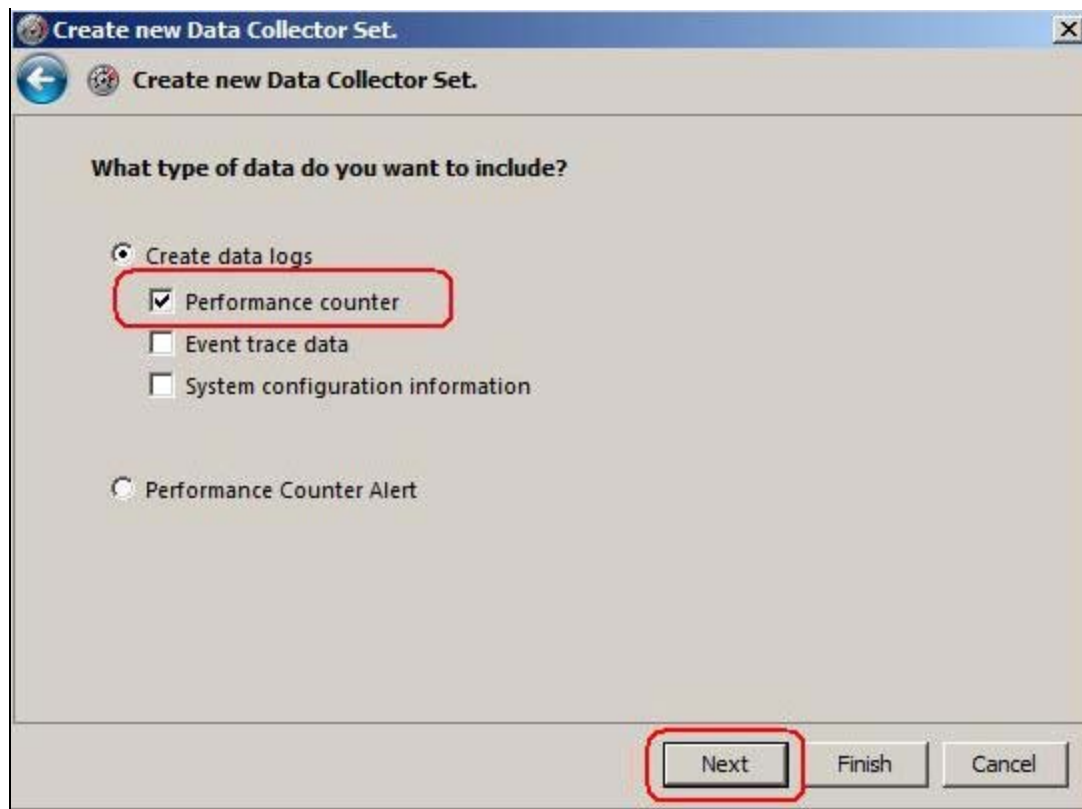
FIGURE 12: CREATE DATA LOGS/PERFORMANCE COUNTER

6. Click **Next**.
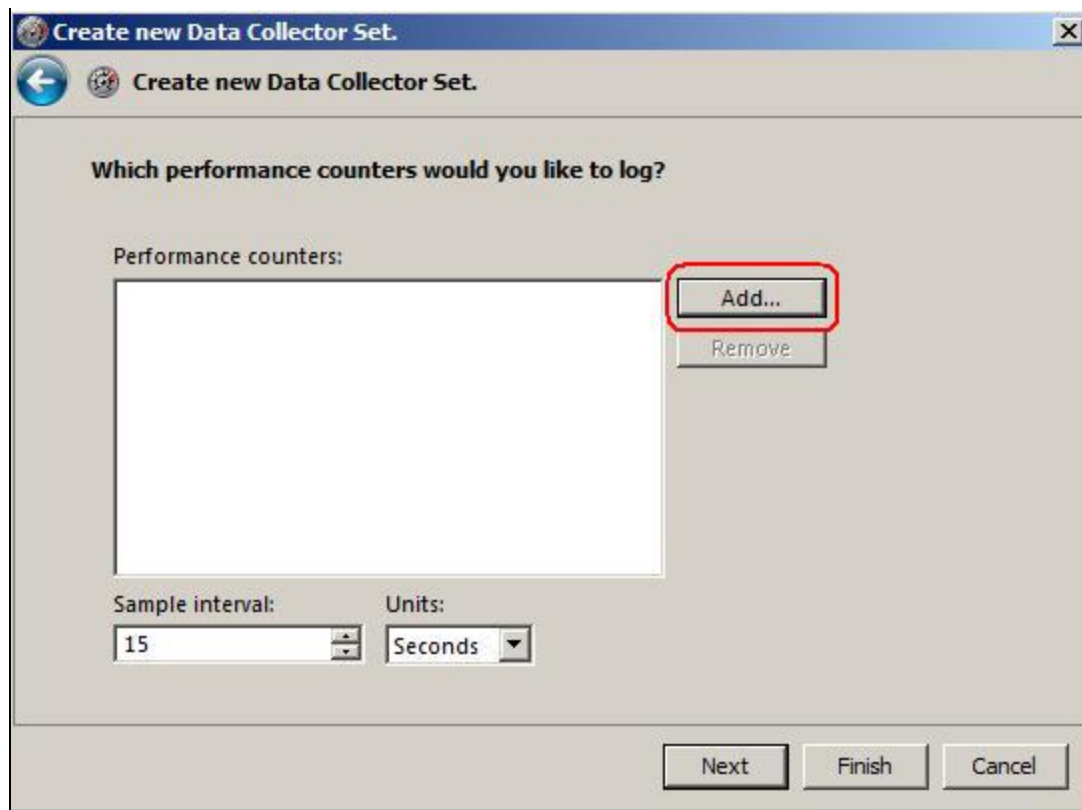
FIGURE 13: ADD PERFORMANCE COUNTERS

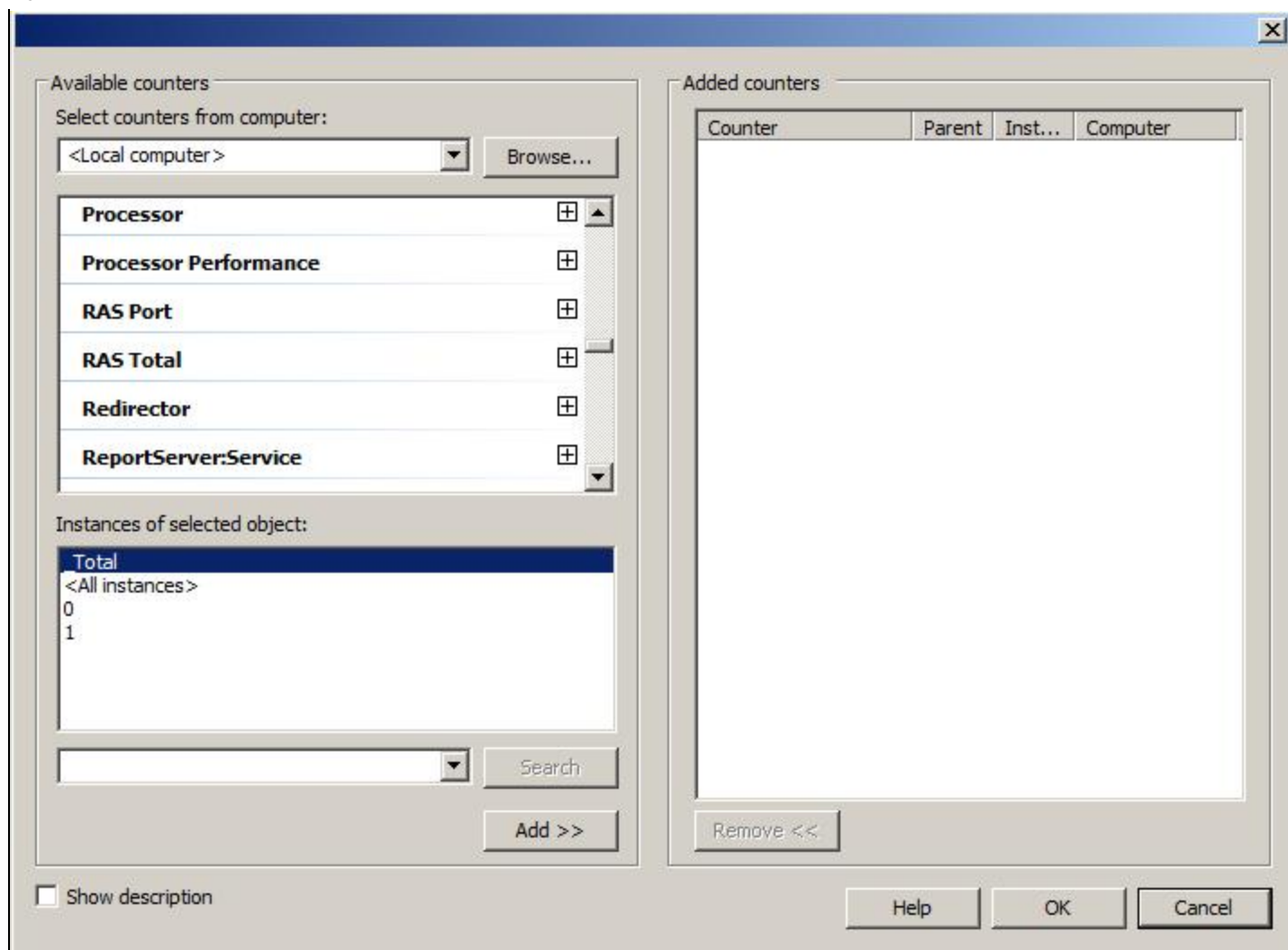7. Click **Add**. The following window appears (Figure 14 below).

FIGURE 14: SELECT COUNTERS FROM THE LOCAL COMPUTER

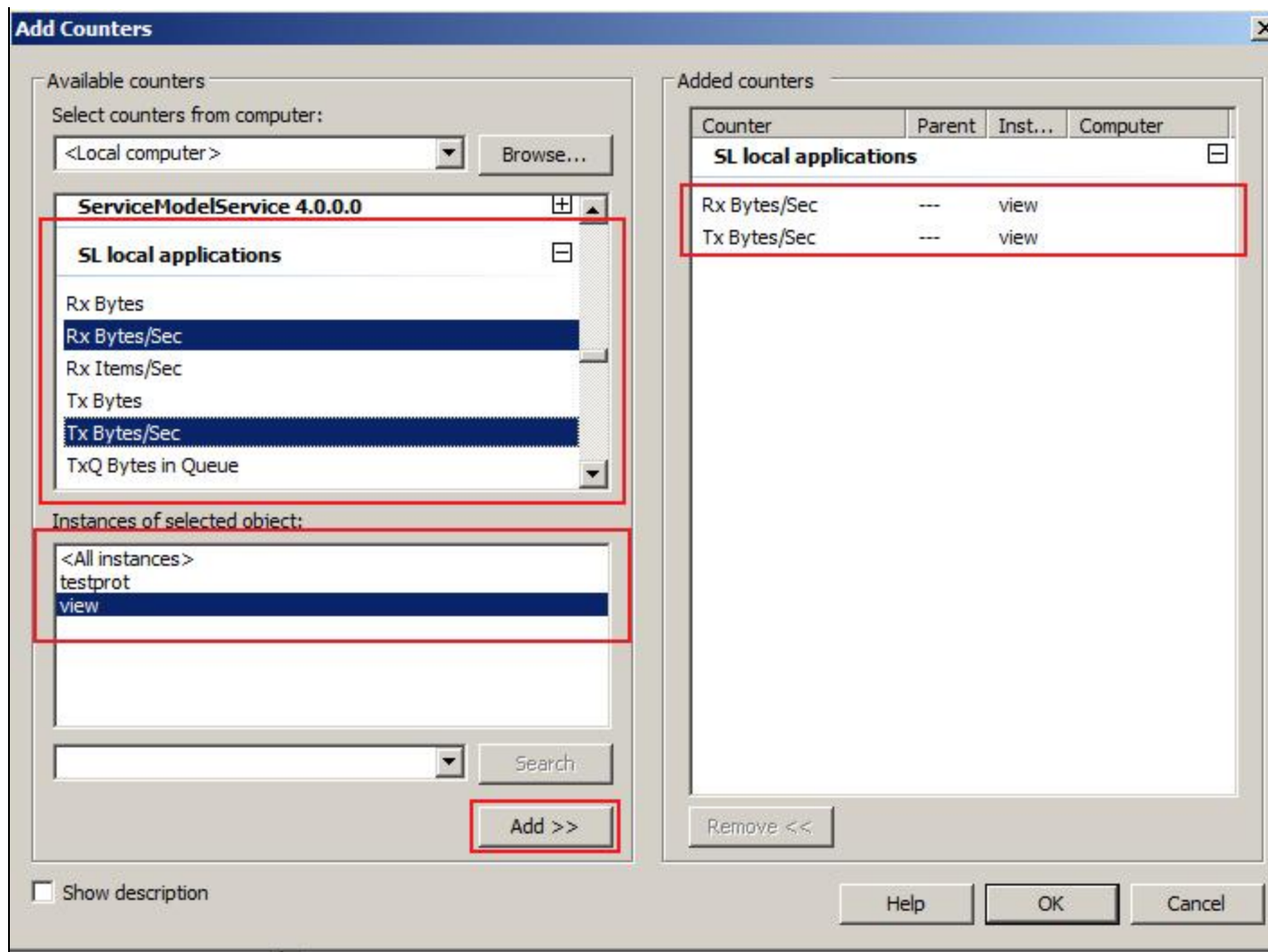8. Add some of the **SL** counters shown in the previous examples (Figure 15 below).

FIGURE 15: ADDING SL COUNTERS

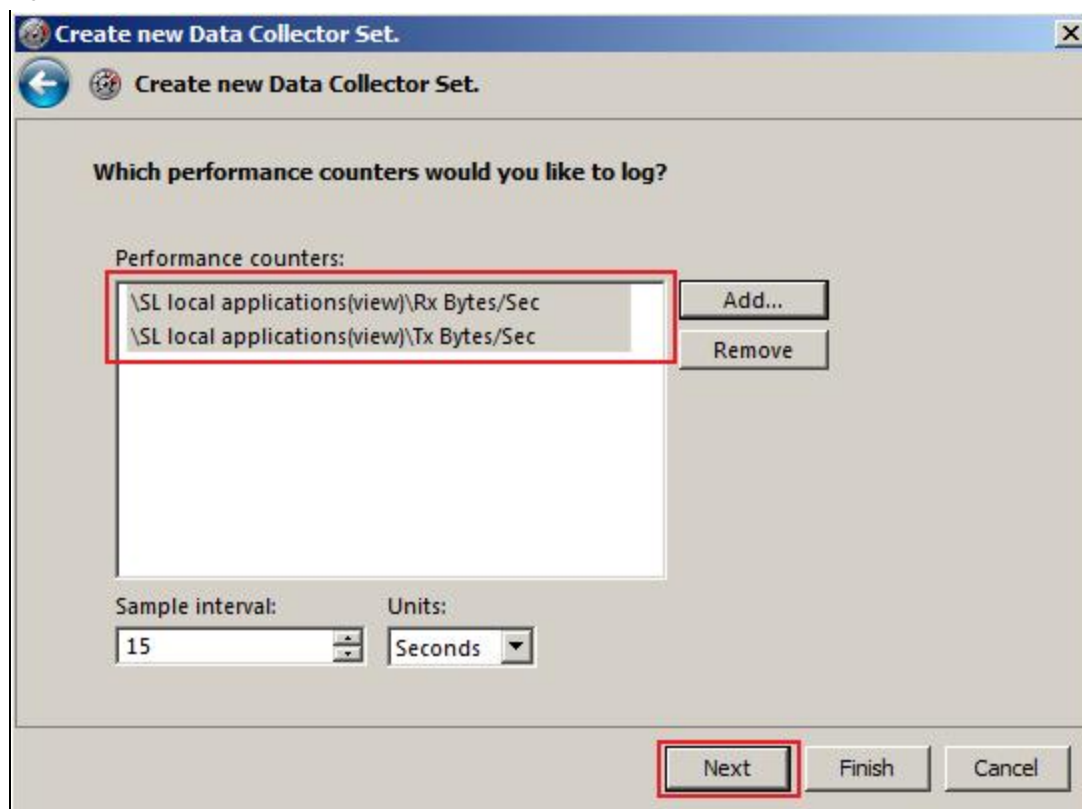9. Click **OK**. The counters appear in the **Performance counters** panel (Figure 16 below).

FIGURE 16: PERFORMANCE COUNTERS FOR THE DATA COLLECTOR SET

10. Click **Next**.

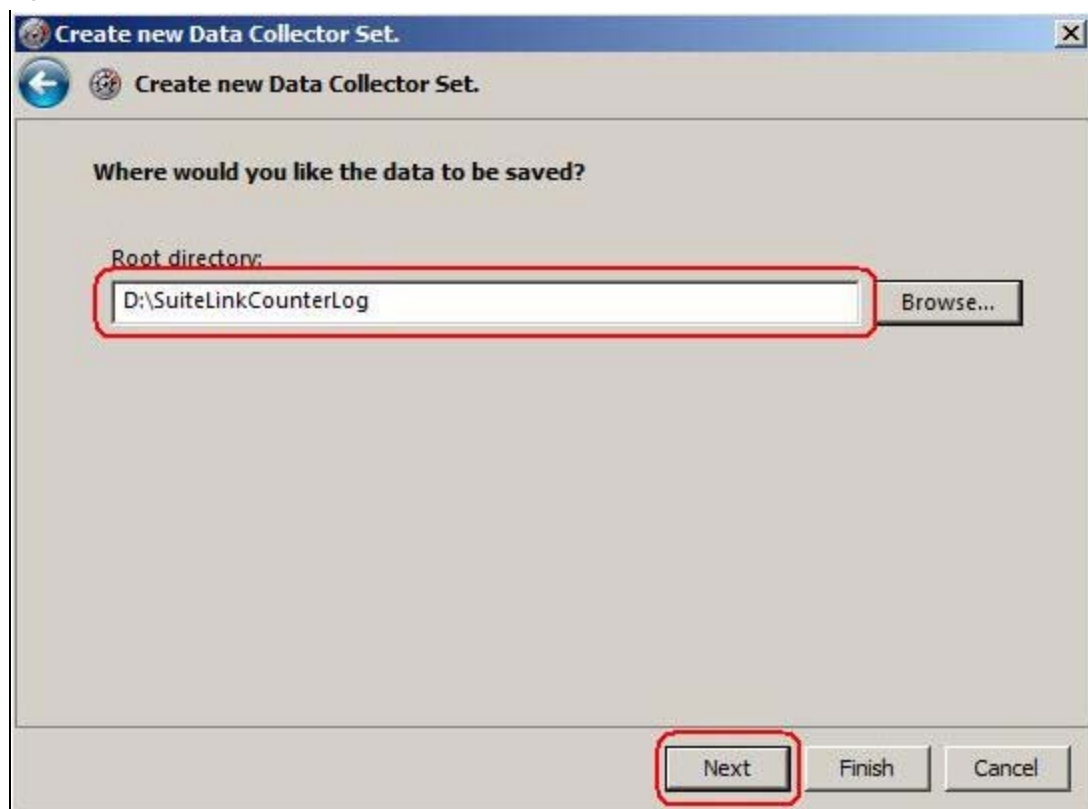11. Type the directory where you would like to save the Log files (Figure 17 below).

FIGURE 17: LOG FILE PATH

12. Click **Next**.

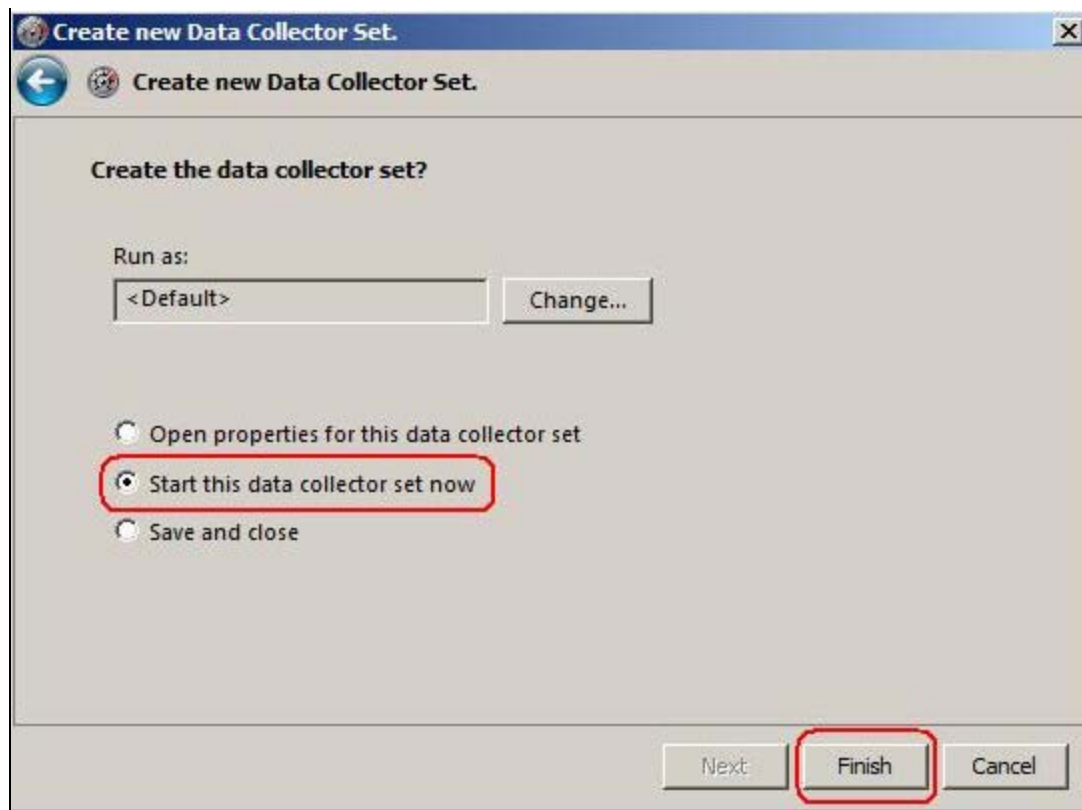13. Click **Start this data collector set now**, then click **Finish** (Figure 18 below).

FIGURE 18: START THE DATA COLLECTOR SET

Note: On Windows 2003, the **Performance Logs and Alerts** service should Log on as a Local System account (Figure 19 below).
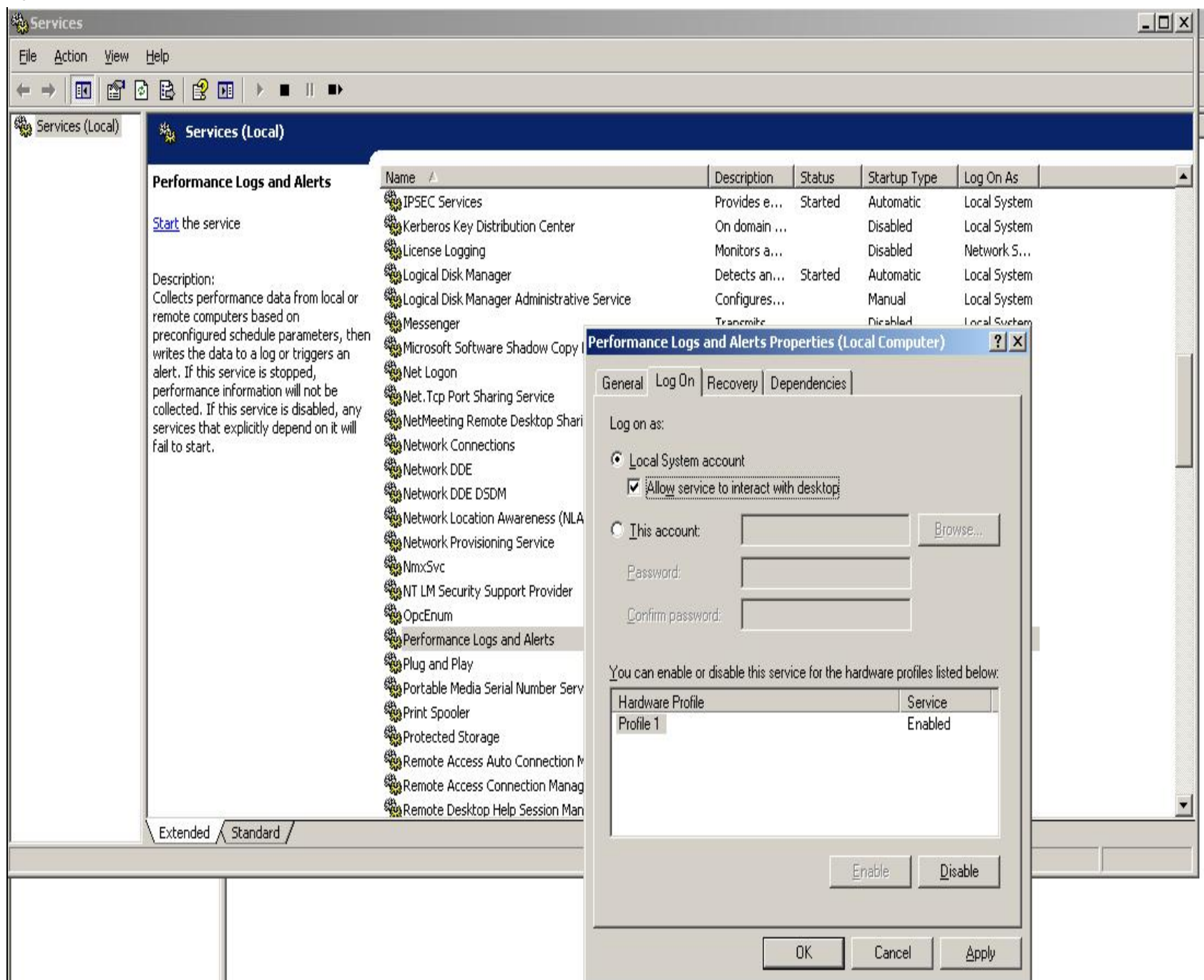
FIGURE 19: PERFORMANCE LOGS AND ALERTS PROPERTIES WINDOW

SuiteLink Flow Control Logging

For InTouch 10.5, you can use SuiteLink Flow Control Logging to troubleshoot communication issues.

A SuiteLink client can enable logging to a CSV file. The logging configuration data is stored in the registry, and the information is read one time when the SuiteLink client process starts. The folder where the log file should be generated is specified as well as how large the log file is allowed to become in megabytes.

Registry Key	**HKEY_LOCAL_MACHINE\Software\Wonderware\SuiteLink\<Module Name>**
String Value	**QueueProbeLogFolder**
Module Support	Yes – Module Only – No Global Setting.
Default	None
Minimum	None
Maximum	None
Constraints	Folder must exist. Do not end folder specification with a backslash.
Purpose	If this entry exists in the registration database for the specified module, then a log file will be created in the folder when SuiteLink is connected to the module, and that log file will begin filling with text indicating the status of the flow control handler for that client.

Registry Key	**HKEY_LOCAL_MACHINE\Software\Wonderware\SuiteLink\<Module Name>**
DWORD Value	**QueueProbeLogSizeMax**
Module Support	Yes – Module Only – No Global Setting.
Default	512MB
Minimum	0

Maximum	2^32
Constraints	None
Purpose	Control how large the queue probe log file will become. Once the maximum log file size has been reached, no further messages will be logged to the file. Note that because one last log file message might be pending, the log file maximum size might be exceeded by a few bytes.

The messages indicating that the SuiteLink client has suspended or resumed by default do not appear in the SMC logger for every occurrence. You can configure the number of times SuiteLink must be consecutively suspended before a message appears in the Registry.

If you think that the SuiteLink suspends very briefly, but nothing appears in the SMC logger, you can set this number lower and lower. Setting the number to **1** logs every Suspend event.

Registry Key	**HKEY_LOCAL_MACHINE\Software\Wonderware\SuiteLink\FlowControl**
DWORD Value	**MaxHighWaterCountToLogMessage**
Module Support	Yes
Default	10
Minimum	0
Maximum	2^32
Constraints	None
Purpose	A consecutive MaxHighWaterCountToLogMessages number of SuiteLink Suspend events will cause a message to be sent to the SMC logger, which will indicate that SuiteLink has become suspended. A subsequent message will be posted once SuiteLink resumes. This value can throttle how much activity is reported to the logger. A value of 0 or 1 will potentially result in a log file full of SuiteLink suspend and resume messages.

Flow Control CSV File

If the proper entries have been made to enable the client-side flow control log file, the CSV file appears when logging begins.

The file's name has the following format:

```
QPHLog_App_Exe_PID_DDMMYYYY_HHMMSS_MMM.CSV
```

For example, if the SuiteLink client's program name was **View.Exe** and the program started logging on June 02, 2011, the file name is:

```
QPHLog_View_Exe_2804_02062011_083927_523.CSV
```

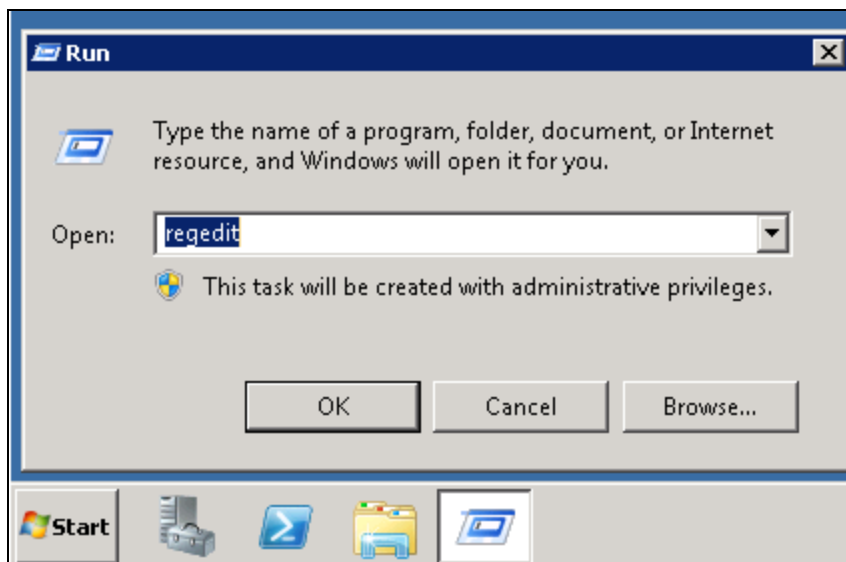## Enabling Logging on Windows 2008 R2 and Windows 7

1. Open **Regedit** (Figure 19 below).

FIGURE 20: RUN/REGEDIT

2. Navigate to **HKEY_LOCAL_MACHINE\Software\Wow6432Node** (this key is generated by default).

3. Under the above key, create the following keys:

- **Wonderware>SuiteLink>FlowControl**
- **Wonderware>SuiteLink>view.exe** (the module you want to log it)
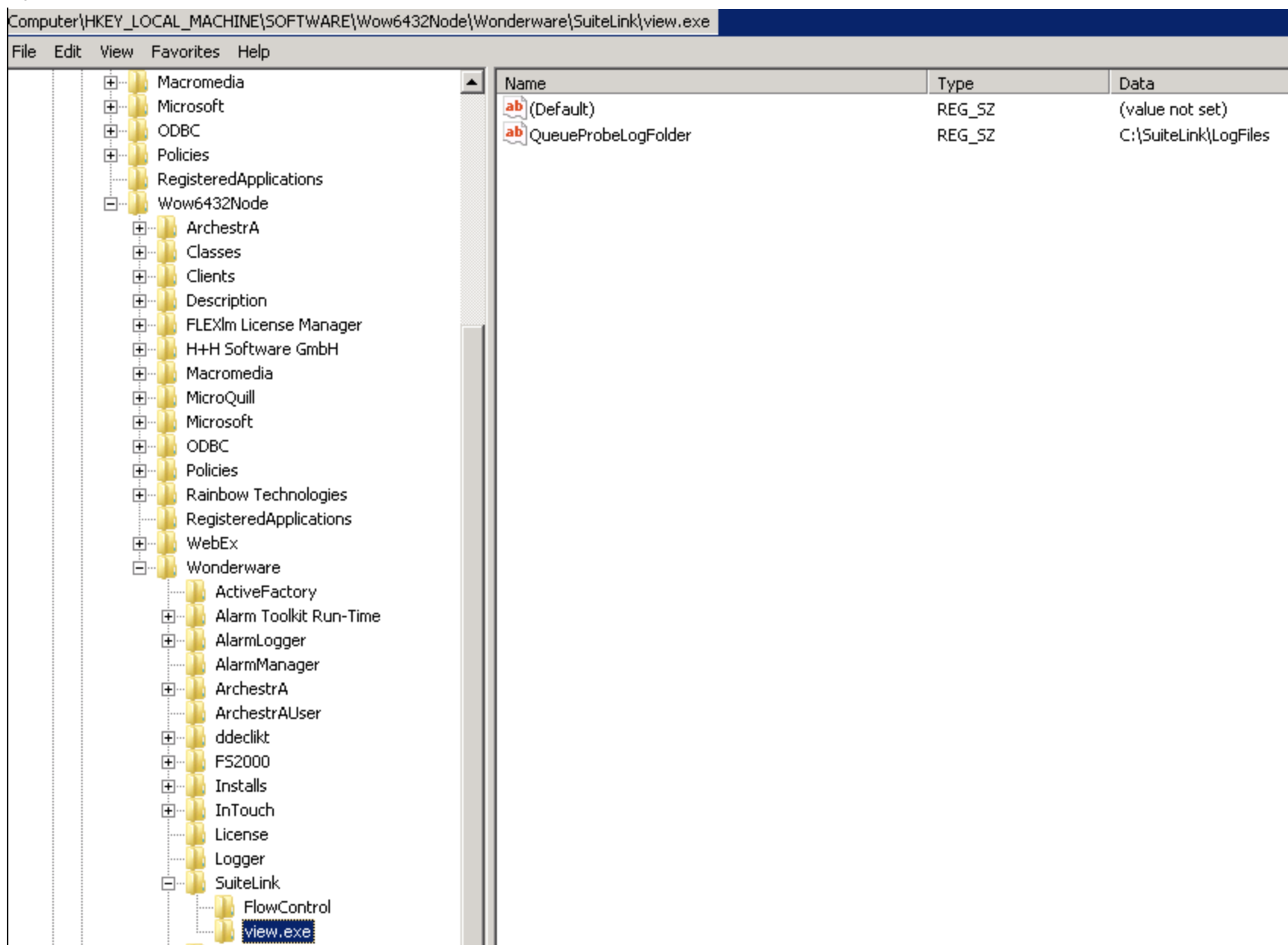
FIGURE 21: CREATE REGISTRY KEYS

4. Under **FlowControl**, create a **DWORD** value and call it **MaxHighWaterCountToLogMessage**, and set its value to **1** (Figure 21 below).
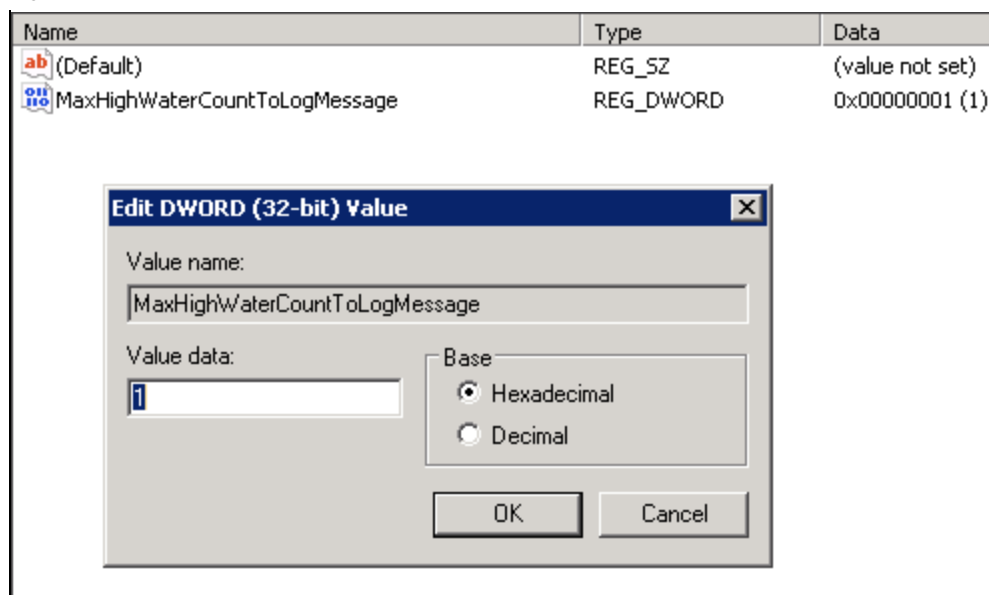
FIGURE 22: EDIT DWORD VALUE

5. Under **view.exe**, create a **String** value and call it **QueueProbeLogFolder**.

6. Set its value to **C:\SuiteLink\LogFiles** (Figure 22 below). This path is manually created to store the log files.
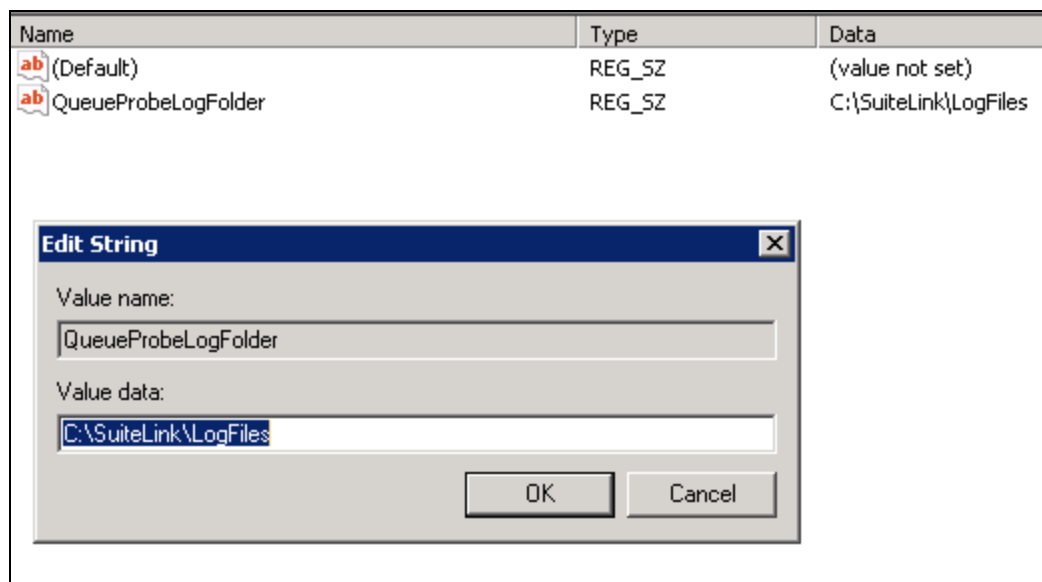

FIGURE 23: CREATE VALUE DATA NAME AND PATH

7. Open WindowViewer. The .csv files should be created at the path you provided (**C:\SuiteLink\LogFiles**).

Note: Each time you restart Viewer, a new .CSV file is created at that location.
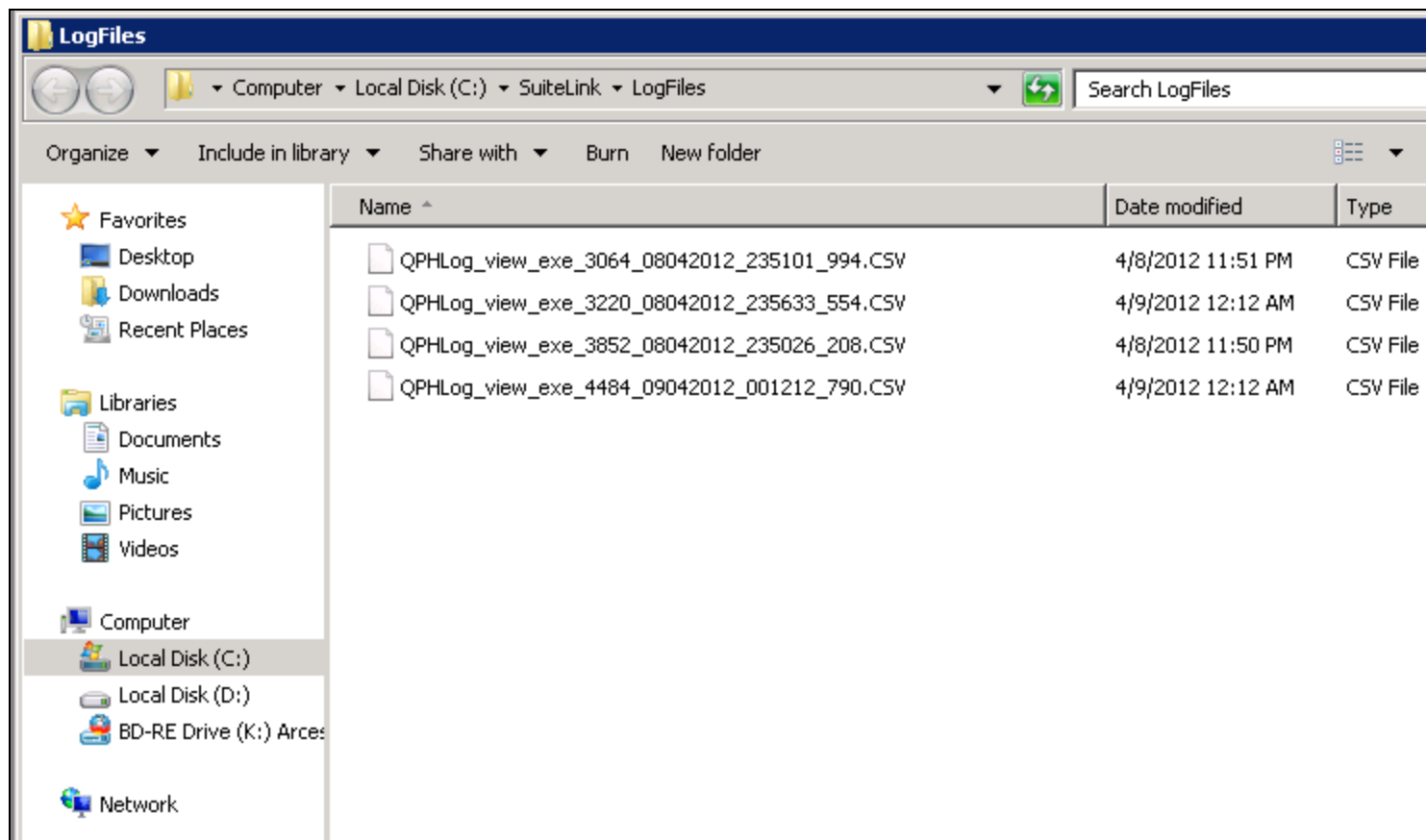
FIGURE 24: CSV FILES AT PRE-CONFIGURED LOCATION

Each Log file will look as follows:

QPHLog_view_exe_2792_08042012_002113_528.CSV - Microsoft Excel

A1 f_x ProbeCount

	ProbeCou	ElapsedTi	CurrentTi	StartTime	Consecuti	Consecuti	Consecuti	TriggerSu	MessageI	OverloadC	QueuePrc	CountToTi	CountToR	CountToR	MaxComf	Mi
1	ProbeCou	ElapsedTi	CurrentTi	StartTime	Consecuti	Consecuti	Consecuti	TriggerSu	MessageI	OverloadC	QueuePrc	CountToTi	CountToR	CountToR	MaxComf	Mi
2	1	372	2069709	2069337	0	0	0	0	1	1	0	1	1	5	100	
3	2	0	2070346	2070346	0	0	0	0	1	0	0	1	1	5	100	
4	3	0	2071355	2071355	0	1	0	0	1	0	0	1	1	5	100	
5	4	0	2072364	2072364	0	2	0	0	1	0	0	1	1	5	100	
6	5	0	2073373	2073373	0	3	0	0	1	0	0	1	1	5	100	
7	6	0	2074382	2074382	0	4	0	0	1	0	0	1	1	5	100	
8	7	0	2075391	2075391	0	0	0	0	1	0	0	1	1	5	100	
9	8	0	2076400	2076400	0	1	0	0	1	0	0	1	1	5	100	
10	9	0	2077409	2077409	0	2	0	0	1	0	0	1	1	5	100	
11	10	0	2078418	2078418	0	3	0	0	1	0	0	1	1	5	100	
12	11	0	2079427	2079427	0	4	0	0	1	0	0	1	1	5	100	
13	12	0	2080436	2080436	0	0	0	0	1	0	0	1	1	5	100	
14	13	0	2081445	2081445	0	1	0	0	1	0	0	1	1	5	100	

QPHLog_view_exe_2792_08042012_0

Ready   100%

FIGURE 25: CSV LOG FILE CONTENTS

Some of the parameters that you will see in the file are:

- **CountToTriggerOverload**: The Suspend event is generated only if the count of consecutive HighWater conditions is greater than this value. Its default value is 1.

- **CountToResetOverload**: The RESUME event is generated only if the count of consecutive LowWater conditions is greater than this value. Its default value is 1.

Enabling the Logging on Windows Server 2003 SP2 and Windows XP SP3

For Windows Server 2003 SP2 and Windows XP SP3, repeat the previous steps above but you will find the Registry key of **Wonderware** under **HKEY_LOCAL_MACHINE\Software** instead of HKEY_LOCAL_MACHINE\Software\Wow6432Node.

FIGURE 26: REGISTRY KEY FOR WINDOWS 2003 AND XP SYSTEMS

SuiteLink Diagnostic Tips

SuiteLink data can be lost for several reasons:

High CPU Utilization

In this case the IOServer may not get any CPU time. As a result, the IOServer doesn't even update itself (it is freezing). This condition is not related to SuiteLink but rather to the fact that there is no CPU allocated to the IOServer (lower thread priority).

Solution

For this scenario the IOServer should be moved on another machine. This way the node with the IOServer will not be affected by a high CPU, for example from using TSE.

InTouch is Busy

The CPU may not be high but InTouch is busy (like a loop or a lot of Synch QF)—client overload.

In this case InTouch sends a Suspend and tells the Server to stop sending data. When InTouch is no longer busy it sends a RESUME and the IOServer starts sending the data. What happens in this case is that the data between the Suspend and RESUME is lost.

Solution

Find out why the InTouch is busy and why it cannot process the data. Check the loop and Synch QF.

The IOServer is Slow

The IOServer is slow (slow device). As a result, several Suspend messages can be posted by the Server. Suspend messages posted by IOServers do not do anything to the system (do not stop the data from being sent or received). They just pile up in the Message queue, which can lead to the IOServer not being able to function.

Solution

For this scenario work needs to be done on the IOServer-side (the protocol specific code), as well as the Device to make sure that it is not so slow. This way fewer Suspend messages will be generated.

SuiteLink Warnings/Error Messages

The following graphics show examples of Suitelink warnings/errors. In this case, InTouch and InControl were used for testing.

FIGURE 27: WWLOGGER FILE AND WARNINGS/ERRORS

FIGURE 28: SUSPEND/RESUME MESSAGES

The **Suspended** and **Resumed** messages do not constitute failure by themselves.

By design, SuiteLink generates the Suspended and Resumed messages automatically in the background. These messages are only an indication of problems when data updates become very sluggish and/or missing (out of synch).

By default, Suitelink Suspend events are not logged unless a Suspend event occurs consecutively for 10 or more times *without* a Resume event. This means that Suspend events can still occur, even though they may not appear in the logger. You can monitor Suspend events more closely by looking at the Performance Counters.

Possible Causes

The following events are possible causes for the Suspend event to be generated.

- **SuiteLink server shutdown**: Closing the InTouch or InControl application, reboot, and so on.

- **Network issue**: Sharing network routers with a large number of nodes with dynamic node addressing assignments; duplicate node IDs, heavy network traffic, etc.

- **Suitelink overload**: Accompanied by Suspended/Resumed SuiteLink Updates messages. Too many items updating too fast sometimes corrupts SuiteLink files or something similar.

- **High CPU utilization**: This is one of the most common cause for Suspend events to be generated.

SuiteLink Notes

- The network transport protocol is TCP/IP using Microsoft's standard WinSock interface.

- SuiteLink is designed specifically for high speed industrial applications.

- SuiteLink does not support multiple Access Names with the same application/topic names. You can configure one of the Access Names to use DDE and the other to use SuiteLink.

- SuiteLink **Suspend** condition can occur when the machine's CPU is highly loaded or all the machine resources are being used on some other processes.

Appendix

This section contains SuiteLink Counter names and their definitions.

Counter Name	Definition
High Water mark triggered now	The transmit queue is now filled to high limit.
Items Recd	Total items received (advised or requested) since app startup.

Open Connections	Total number of times the server accepted a connection from SLSSVC since server startup (includes topics with invalid names).
Overload detected now	The local application has not been responsive to its msg queue.
Overload forced now	The local application has indicated that it is overloaded.
Overloads are being ignored	The local application has disabled reactions to automatic overload detection.
Rem node req'd suspend now	The remote node requested that transmitting be suspended.
Resumes sent	Total resume requests sent.
Rx Bytes	Total number of bytes received.
Rx Bytes/Sec	Bytes received per second.
Rx Items/Sec	Items updated per second.
Rx Packets	Total number of SL packets received.
Suspends sent	Total suspend requests sent.
Tx Bytes	Total number of bytes sent.
Tx Bytes/Sec	Bytes sent per second.
Tx Packets	Total number of SL packets sent.
TxQ Bytes in Queue	Total number of bytes currently in the transmit queue.
TxQ High Water marks	Total number of times the SL transmit queue has filled.
Waiting for write callback	Transmitting is now suspended until a write callback is rec'd.

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