



Connectivity Guide

Benchmarking ThingWorx Kepware Server Project Performance

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1. Overview

Members of the ThingWorx and Kepware Technical Support teams are frequently asked about methods for improving the rate at which data is acquired from a device or devices in a process. The answer is not simple, as there are many parameters that can impact performance. The list includes (but is not limited to) the following:

- Media connection type (serial, Ethernet, and so forth)
- Connection bandwidth
- Number of devices dropped off the media connection
- Length of time it takes the device to process its ladder and respond to data requests
- Number of connections to the device
- Amount of data being requested
- Rate at which data is requested

• For more information on optimizing ThingWorx® Kepware® Server, refer to the server help file.

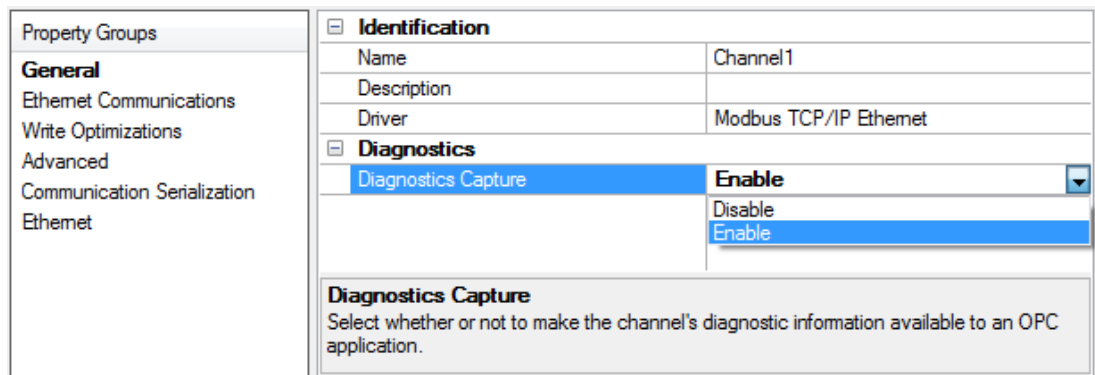
Before attempting to improve performance, users should establish a baseline. This document intends to show users how to utilize ThingWorx Kepware Server built-in diagnostics to benchmark the communications process between the server and devices.

2. Benchmarking Project Performance

2.1 Preparing the Server Project

Channel Diagnostics must be enabled in order to capture benchmark data.

1. Double-click the channel to view and edit channel properties. In this example, the channel name is "Channel1".
2. Select **Enable** from the Diagnostics Capture dropdown menu in the General property group. Click **OK**.




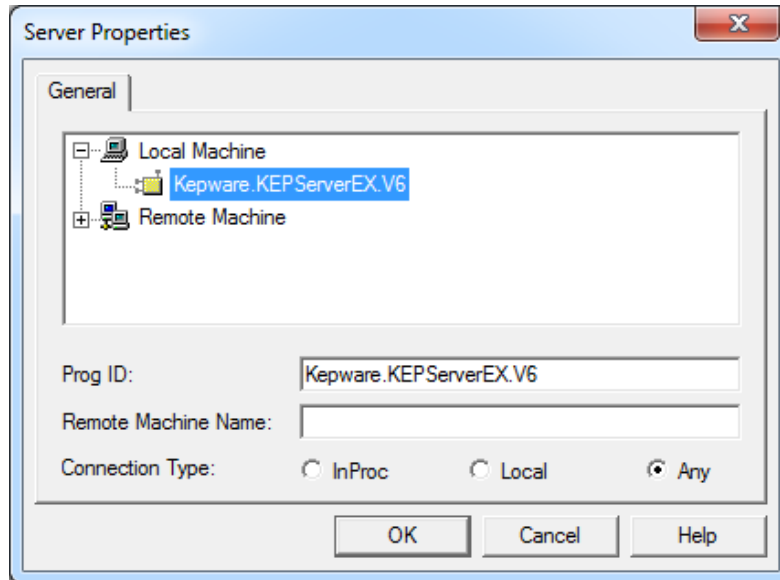
3. At this point, nothing else needs to be done in the server.


2.2 Configuring the OPC Quick Client to Request Data

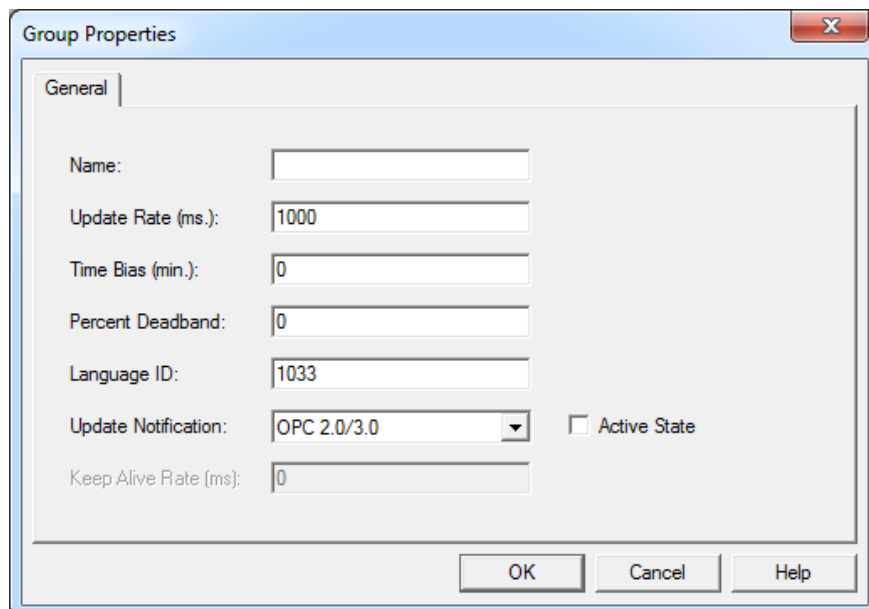
In order to sample a set of data, the client must request that data from the server. Most clients are configured to continually update data by periodically issuing new data requests to the server. For this benchmark measurement, clients must only request data once. A single request for a set of data usually consists of multiple read requests


and associated read responses. For this benchmark, the time from the first read request to the time of the last read response will be determined. OPC Quick Client is used in the following example.

1. From the Configuration window, navigate to **Tools | Launch OPC Quick Client**.
2. To add a new server connection, click the **New Server** icon ()
3. Select the server from which the benchmark data will be captured and click **OK**. In this example, the server is "Kepware.KEPServerEX.V6".

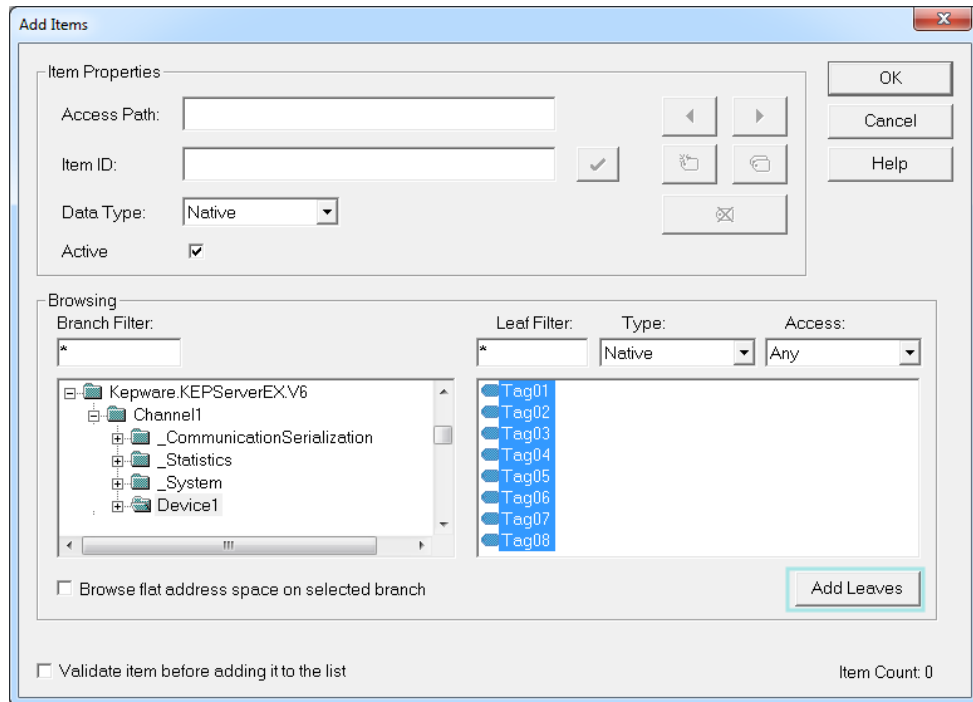


4. To add a new OPC Group, click the New Group icon ()
5. In Group Properties, uncheck Active State. This will prevent the client from polling added OPC items. Leave the Name field blank, and click **OK**.

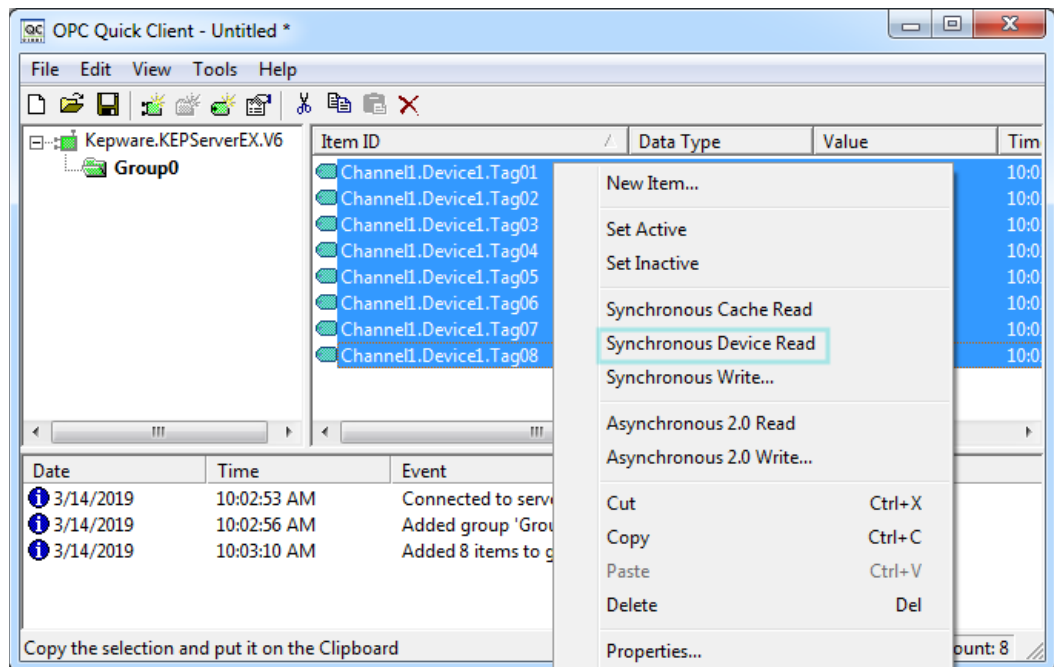


6. To add items, select "Group0" then click the New Item icon ()

- In the Browsing section, expand the server connection tree to select the device. In this example, the device is named "Device1".



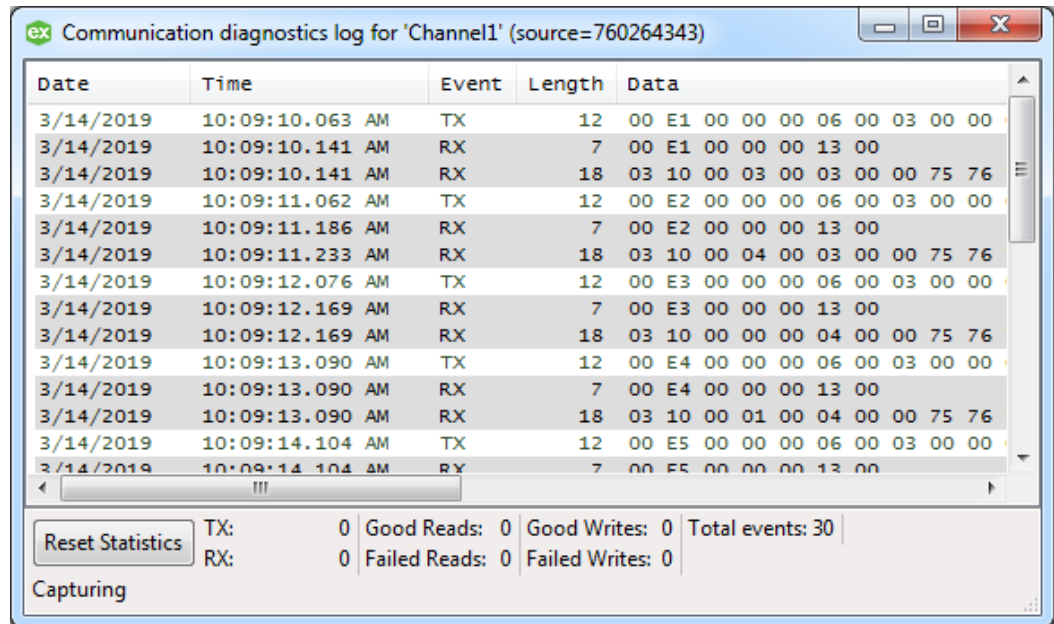
- Select all of the tags and click **Add Leaves** to add the items to Group0.
- Repeat the process until all desired tags are added to the project, then click **OK**.
- In the OPC Quick Client, select all the tags in Group, right-click and select **Synchronous Device Read**.



2.3 Extracting the Benchmark Data from Channel Diagnostics

Communication Diagnostics displays both transmitted and received data. For each transmission, it displays the date and time, event type, length, and data. Data is also color-coded in Communication Diagnostics. Transmitted bytes (TX) are white, and received bytes (RX) are gray. By default the data is displayed in hexadecimal. To display data in ASCII format, right-click the events to access the context menu.

1. In the Configuration, right-click the channel and select **Diagnostics** from the context menu, or select the channel and navigate to **View | Communication Diagnostics**.
2. All transmitted and received data exchanged in the Synchronous Device Read should be displayed.




Date	Time	Event	Length	Data
3/14/2019	10:09:10.063 AM	TX	12	00 E1 00 00 00 06 00 03 00 00
3/14/2019	10:09:10.141 AM	RX	7	00 E1 00 00 00 13 00
3/14/2019	10:09:10.141 AM	RX	18	03 10 00 03 00 03 00 00 75 76
3/14/2019	10:09:11.062 AM	TX	12	00 E2 00 00 00 06 00 03 00 00
3/14/2019	10:09:11.186 AM	RX	7	00 E2 00 00 00 13 00
3/14/2019	10:09:11.233 AM	RX	18	03 10 00 04 00 03 00 00 75 76
3/14/2019	10:09:12.076 AM	TX	12	00 E3 00 00 00 06 00 03 00 00
3/14/2019	10:09:12.169 AM	RX	7	00 E3 00 00 00 13 00
3/14/2019	10:09:12.169 AM	RX	18	03 10 00 00 00 04 00 00 75 76
3/14/2019	10:09:13.090 AM	TX	12	00 E4 00 00 00 06 00 03 00 00
3/14/2019	10:09:13.090 AM	RX	7	00 E4 00 00 00 13 00
3/14/2019	10:09:13.090 AM	RX	18	03 10 00 01 00 04 00 00 75 76
3/14/2019	10:09:14.104 AM	TX	12	00 E5 00 00 00 06 00 03 00 00
3/14/2019	10:09:14.104 AM	RX	7	00 E5 00 00 00 13 00

Reset Statistics TX: 0 Good Reads: 0 Good Writes: 0 Total events: 30
RX: 0 Failed Reads: 0 Failed Writes: 0
Capturing

3. To extract this data, select Save as Text File from the context menu. Alternatively right-click the View Panel and then select Copy to Clipboard.
4. The diagnostics include the date and time for each transaction. To get the amount of time required to complete a single read of all the data from the device, subtract the time of the first transmit from the time of the last received packet.

2.4 Multiple Devices per Channel

When the project has multiple devices on a single channel, the items from the devices will be read in one request, providing the amount of time it would take to read the data from all devices once. When multiple devices are placed on a single channel, the server will read the data from each device in succession.

 For more information on optimizing ThingWorx Kepware Server, refer to the server help file.