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Performance Optimization when Calling Screens/Faceplates

SIMATIC PCS 7

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1 Overview

When the CPU is heavily loaded and you select screens or faceplates of a WinCC visualization, it might happen that you have to wait a certain time before the corresponding object is built up completely. The waiting times vary between a few seconds and several minutes. In the following we diagnose possible causes and explain the measures you can take to shorten any waiting times.

2 Diagnostics

2.1 WinCC Channel Diagnosis

1. Open the WinCC Channel Diagnosis on an OS master server which communicates with the AS that contains the measuring points concerned.

2. In the Start menu, under the SIMATIC programs you select "WinCC > Tools > Channel Diagnosis".

3. Your AS is connected to the Operator System via a channel. In this channel you check the "Request Queue Size" counter. This gives you information about a possible waiting list and its length. If the value is permanently above 0, the AS cannot process the waiting communication jobs in the desired time.

Note	Check all the channels to recognize and exclude any delays in good time.

Figure 2-1
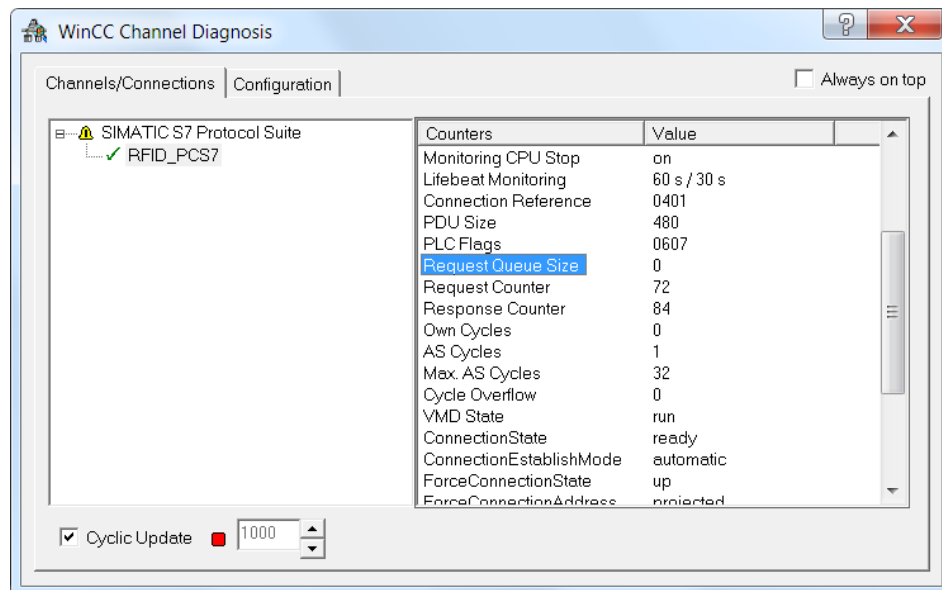
Note	The view of WinCC Channel Diagnosis is limited if the connections are realised with asiatic characters (cryptic characters).

4. If you cannot find any AS channel with a high communication load, make a Support Request to Technical Support:
https://support.industry.siemens.com/My/ww/en/requests#createRequest

2.2 Test in Solo Mode (only for H Systems)

For later comparison you must measure (with a stopwatch, for example) and document the waiting times for opening and updating the OS screens/faceplates. The screen/faceplate must take the data from the AS concerned to achieve measuring results which can be evaluated.

1. Measure the waiting times for various screens/faceplates during operation.

2. Time a CPU of the H system.

3. Measure and document the waiting times in this state again.

4. When the time measurements have been completed, start the CPU of the H system to restore redundant operation.

If the waiting times are significantly shorter in Solo mode, this is further proof that there must be a bottleneck of the CPU's communication resources.

2.3 Wireshark Analysis

Using a tool you can analyze the communication volume in the entire network. Wireshark is a suitable tool for this which can be downloaded free of charge from the internet: https://www.wireshark.org/#download

1. Download Wireshark and install it on the PC which is to be used for making the measurements.

2. To record the communication volume with Wireshark you must connect the computer to a free port (Port X) of the switch with which the corresponding AS (Port Y) is also connected.

3. Mirror Port Y to Port X so that Wireshark can record communication via this port. The port mirroring is required, to filter the packets, which are send via COTP protocol ("cotp.type")

Note	The procedure for mirroring ports is described in section 4.5.1 "Switch Configuration" in the configuration manual entitled "Industrial Ethernet Switches - Scalance X 300/400". https://support.industry.siemens.com/cs/en/en/view/109478046

4. Open Wireshark and via "Capture > Interfaces" you set the interface via which the communication volume is to be recorded. For this you select the local network card via which the PC is connected to the switch.

5. Start the recording via "Capture > Start" and let this run for a good amount of time (10 minutes, for example).

6. Stop the recording and save it in the PCAP or PCAPNG format.

7. Switch the display of the data volume to a trend form via "Statistics > IO Graph". The graph displays the communication volume (number of messages per time unit) that ran via the mirrored port during the recording.

8. Since only specific messages of the AS concerned are relevant, the protocol has to be filtered. Enter the following filter criterion next to "Graph 1"; here you replace the MAC address xx:xx:xx:xx:xx:xx with the address of the Ethernet interface of the AS: cotp.type == 0x0f && eth.addr == xx:xx:xx:xx:xx:xx

9. Set the "Tick interval" to "1 sec" to see the trend of the message volume per second on the AS. With an increasing amount of telegrams per interval, the communication load increases. Recommended measures against a high degree of communication load can be found in the following chapter.

Figure 2-2
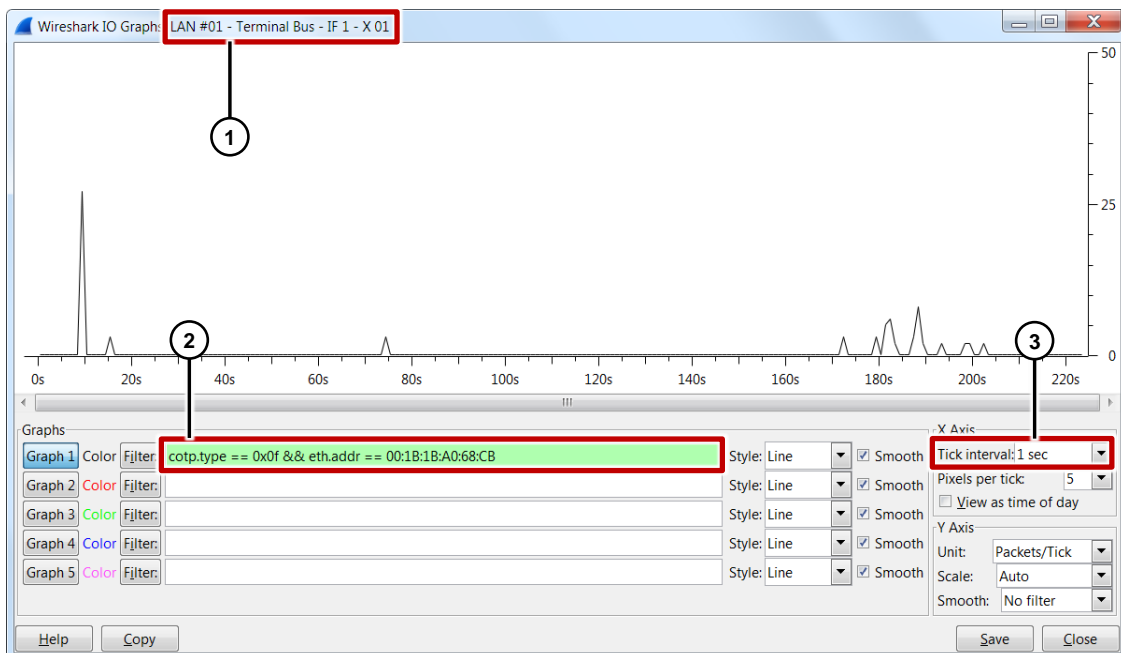
| 1 | LAN Interface |
| 2 | Filter |
| 3 | Tick interval |

3 Measures

Increase acquisition cycles

In Tag Logging you check the tags to be archived with regard to their acquisition cycles. If the cycles are set to low, this causes increased communication load. If you increase the acquisition cycles (for example from "1 second" to "5 seconds"), you can achieve a lower communication volume.

1. Open the WinCC Explorer.

2. Open the Tag Logging.

3. For process tags you choose a higher value for the acquisition cycle.

Figure 3-1
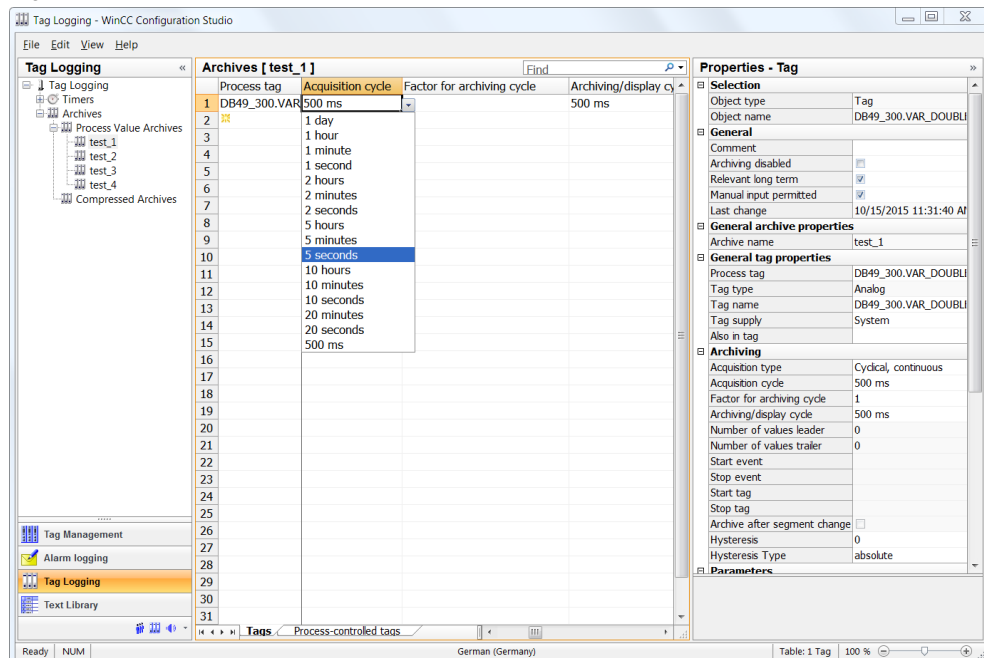
External application

Check to see whether external applications (PI systems, for example) are acquiring data from the AS via the WinCC Tag Management. This data acquisition also has a negative effect on the communication load. It is also useful here to increase the acquisition cycles.

Check cross-AS interconnections

Using an extended filter you can determine whether there is communication between your affected AS and other automation systems. Enter the filter criterion below: "cotp.type == 0x0f && eth.addr == xx:xx:xx:xx:xx:xx && eth.addr == yy:yy:yy:yy:yy:yy". Here yy:yy:yy:yy:yy:yy is the MAC address of the AS with which the affected AS communicates.
Analyze the cross-AS interconnections in the CFC charts and check whether you can move the blocks concerned to runtime groups with bigger cycle times. This can also reduce the communication volume on the affected AS.

Replace the CPU

Find out about CPU types which have a higher communication performance. If you experience this type of delays, it is recommended to replace the CPU with a new one.
Example: A CPU 6ES7417-5HT06-0AB0 can process up to twice as many communication jobs as a CPU 6ES7417-4HT14-0AB0.