

Introduction:

The following questions and answers are from the Understanding OPC: Basic Overview Web Presentation.

Q: Subscription works from the server and asynch from the client - is this correct?

A: A subscription works as follows...The Client will send a single message to the Server requesting that the OPC Server poll the device for specific tags, and to report any changes in the tags value. Each time the value changes the Client receives a message from the OPC Server. Yes is it Asynch. To further clarify, a subscription is simply a special type of Asynch transaction. Subscriptions will continually send changes as they happen, until the OPC Client indicates that it is no longer interested in receiving updates. The other type of Asynch transaction is a "one-shot" asynch transaction that only reports the change once.

Q: Can I get "bad" and "good" values at the same time from the same PLC?

A: Yes it is possible, for instance if you have two tags defined; one with a valid address and one with an invalid address. The invalid address would show bad quality. It is also possible to get one good read from a PLC then the next message to not be valid, so some tags might return good quality while others don't. Usually if one tag has good quality in your PLC they all will. But that is not always the case. Using the special communication status tag some OPC Servers can let you know if the communications between the device and the OPC Server has returned an error or not as a supplemental indication to the OPC Quality on each tag/item.

Follow up question: But, what if both Tags are correctly defined?

A: If they are both correctly defined you will most likely have good quality on both tags. If you have a very large configuration, and the PLC cannot keep up with the update rate requested, it is possible that some requests could time out while other requests are processing if you are simply asking too much of the PLC. By very large usually we mean tens of thousands of tags at very fast, sub second update rate. This can become very PLC protocol dependent - some PLC protocols are very efficient. Others are not so efficient. The OPC server can only move as fast as the PLC protocol will allow it to! So that's how you could end up with validly defined tags with some good, some bad - overloading your PLC communications network.

Q: Are there any tag limitations on an OPC Group?

A: There is not a limit defined by the OPC specifications for practical purposes. For the technically detailed oriented reader, there is a limit on the # of items in an OPC add item call because the AddItems OPC function under the hood passes a



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parameter of # of items to add as a Double Word, so that would limit you to about 2 billion tags in one group, far more than ever recommended for any OPC server!. That does not mean that a specific OPC server vendor might choose to put a limit on themselves. We have not seen any OPC Server do this in our experiences, but it could exist out there. Normally limitations of this type are due to a lack of PC resources.

Q: How does the OPC Server detect that a data change happened in the PLC? Is it by comparing the cached data value with the value read from the PLC

A: Yes. The Server will poll the PLC at the rate specified by the OPC Client. It will then compare the old value it previously cached, with the new read value and will only send data to the client if those values OR qualities are different.

Q: How I can be sure that the data I have written on the server is well received on my PLC ?

A: The PLC protocol itself usually involves an acknowledgement back to the OPC server that the write was successful. If the OPC server does not get that acknowledgement, then the write will fail. Also, if you are subscribed to the same item you are writing to, you will see a data-change, and a call back to the client, so you will see the value change. A good practice is to subscribe to a downstream item that would show a change indicating a success, e.g. Turn a pump on, you should see a flow meter indicate some kind of change. We've seen only a very few devices whose protocol does NOT acknowledge a write.

Q: Do old values = cached value?

A: Yes, the cached value will contain the last value and timestamp from when the OPC Server last polled the PLC. This can result in a newer timestamp, but the same value. For subscribed items, OPC Clients are not sent any update notifications just because the timestamp changed. A "change" is a change in the Value or Quality only.

Q: I heard that there are a lot of COM/DCOM problems, how to deal with them?

A: COM and DCOM do have their challenges especially in very tight security environments. It's important know how to configure DCOM properly, and we have tutorials and videos that help a lot with that. Other is to use what is called Tunneling, which we cover in some of our other webcasts. Here are some URLs for more help:

DCOM Configuration: www.softwaretoolbox.com/dcom

Tunneling: www.softwaretoolbox.com/opcdatahub



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Q: Will there be a difference between a cache read and a device read value/quality in case of a break between PLC and the server communication?

A: If the OPC server's communications goes down then the cache should be updated and the Quality set to Bad. There should not be a difference between the Device and Cached values. That is as long as the server has polled the device since it lost communications with the device. If a server reads a new value from the device and does NOT update its cache, then that server is probably not behaving well.

Q: I also heard about tunneling, and I was about to ask about it also...

A: We have a webcast on tunneling available for download at <http://www.softwaretoolbox.com/opcdatahub/html/webinarrecordings.shtml>

Q: If my OPC client connected to the OPC server and data coming back shows as bad quality, what is happening? Does DCOM on the server need to be configured?

A: DCOM can affect local and remote OPC Client/Server connections, and if you are connecting from a remote OPC client to a local OPC Server, then DCOM is more likely to be an issue. Usually when DCOM is an issue, the OPC client will report Quality "Unknown" because it never gets anything back on a subscription.

Before you go chasing DCOM as an issue, I'd first look at diagnostics in the OPC server to try and determine if the OPC server is talking to the device at all.

For example, many OPC servers have a bit that tells you whether the OPC server has had a communications error with the device on its last attempt, and will log failed communications attempts with messages in the OPC Server's event log like "Device not responding".

If you are getting indications that the OPC server isn't talking to the device reliably at the server level from these types of diagnostics, then DCOM isn't your problem. It's OPC Server to device communications.

If all indications at the OPC server are the communications are good, and you were trying to connect with a remote OPC client to the OPC Server, first try a local OPC client. If that works and you get good quality, THEN you can begin to suspect DCOM.

If DCOM is then suspected, if the quality is bad when you first connect and never goes to good, it could be DCOM permissions on the Client PC, which



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may be rejecting the update notification from the OPC Server. (see www.softwaretoolbox.com/dcom for DCOM tutorials)

If Quality is good and then goes bad it's more likely the device going offline unless you know you are having network issues, but usually DCOM problems related to network issues result in much more obvious failures than items going to bad quality.

Q: What is the limit in the scan rate in the OPC client?

A: The scan rate is usually limited by the OPC server. It depends on what OPC server you are using. A common limit is either 50 - 100 ms. The device protocols and Windows operating system can't normally transport request faster than 10ms.

Q: Our experience with OPC connected to a Siemens PLC is that you have 218 bytes reads limit and 200 bytes write limit... Do you know the reason?

A: This was often limited by the Serial communication used when these protocols were first designed. Many device protocols were designed to make sure information was passed. Limiting the size of the packets was one way to verify each piece of information was passed correctly. Limiting packet size also prevents a very large read from allowing a write to get through to the PLC. Since machine operators usually expect to see/hear results at the machine/in the process when they click on something, it's important that writes get a chance to get through. Device protocol packet size is controlled by the hardware manufacturer and there is nothing any OPC server can do to change that limitation. The OPC Server developer can do their best to optimize their reads/writes and be efficient in everything they do, but often the weakest link is found in protocol packet size limits, not the OPC server.

Q: We have had problems if the PLC write rate is very fast. The OPC Server sometimes lost data changes...

A: OPC servers usually will give writes priority over reads. Some (i.e. our TOP Server) lets you lower the priority on writes to the PLC to let more reads through. We may be able to offer some alternative solutions. Email us at support@softwaretoolbox.com and tell us what PLCs you are using and what sort of tag counts, read rates, write rates, HMI used and we will see if we can offer advice.

Q: Sometimes our application receives this error: 0x80004005... Is it a network problem? PLC disconnected?

A: Unfortunately that is an Unspecified COM Error and can happen for any number of reasons. It does not give us enough information to diagnose the problem exactly, but it is a reason to check the DCOM settings. It is less often an



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issue with the PLC being offline. Most often, this error code is returned because no specific error code exists within the Windows COM library, so you would usually look in the OPC Server's log for a more specific description of the actual problem.

Q: From the client, I can see all the available tags at the server but somehow when data requested came back as bad quality.

A: First thing to check is if the device may be offline and that could be why the quality shows Bad. Look in your OPC server for diagnostics that tell you whether there were successful communications with the device or not. If you are on a remote OPC client, then go to a local OPC client on the same PC as the OPC server and try that – if you the PLC is online, no errors in the OPC server, and you get good quality from the local OPC client, then suspect DCOM. If your OPC client can do a Synch Read – try that first. If that works, but subscription updates are failing, then it sounds like the client can not get callbacks from the server. If the Synch Read fails also from a remote client, again look at DCOM. Take a look at the DCOM tutorial: www.softwaretoolbox.com/dcom

Q: What do you think that is better? For example: One OPC group with 3 tags or 3 OPC groups with one tag? I like to know which system will have better performance.

A: This can be very protocol and OPC Server dependent. 3 groups will require more PC memory than 1 group. Many OPC servers allocate memory and threads to each individual group. Now with the use case of 1 tag, we're talking bytes here – nothing significant. If all the tags need the same update rate use one group as this will let the OPC Server optimize any block reads to the device if that is possible. For example, if you did 3 tags to read N7:0, N7:1, N7:2 from an AB PLC 5, and put those in separate groups, you'd generate 3 transactions on the PLC network. Put them in one group, and the OPC server can optimize and do one transaction to read 3 words starting at N7:0. There's your performance savings. Normally we suggest minimizing groups, but when you get to the point of over 3000 tags multiple groups can be helpful if the data rates you need are different. For example if you need 100 tags at 500ms, but the other 2900 at once per 1000ms, you might see a performance increase by having two groups. Overall, this can be highly application dependent. If you are using a Software Toolbox product, or considering using one, you can certainly consult with our team for input on your system design. Submit your questions at <http://support.softwaretoolbox.com>.

Q: The first time that I use the TOP Server, I put more than one PLC on same channel. We had several problems. Now I always put one plc --> one channel



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and no problems with network... Is it a configuration problem or it is better separate plc on different channels?

A: In most cases it's best to have one device under on channel. The URL below links to the document that explains more about this topic:

http://ftp.softwaretoolbox.com/support/papers/MultipleChannels_TOPServer.pdf

Q: What is DCOM vs COM?

A: The D in DCOM stands for Distributed, so DCOM is COM between multiple PC's. DCOM is used for software on one computer to talk to software on another computer -- COM is software to software connectivity on the same PC.

Q: What does the UA in OPC UA stand for?

A: Unified Architecture. OPC UA among other things seeks to unify the various different original OPC standards under one common architecture to remove redundancy in the software interfaces.

