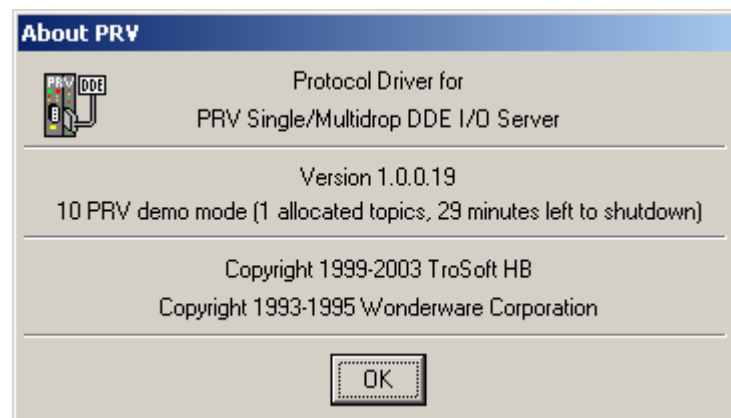


PRV DDE I/O Server

for use with Siemens Landis & Staefa PRV building automation devices

User and installation manual



Revision history

Version	Date	Author	Reason
Preliminary	June 1999	Tomas Rook	First release
Release	September 1999	Tomas Rook	Revision
1.00.00.0	May 2000	Tomas Rook	Event based / persistant cache
1.00.00.6	November 2000	Tomas Rook	New parameters
1.00.00.20	April 2005	Tomas Rook	Setup revision
1.00.00.22	October 2005	Tomas Rook	New parameters

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1 About the PRV DDE I/O Server

The PRV DDE I/O Server is a Microsoft Windows application program which acts as a DDE (Dynamic Data Exchange) Server and allows other Windows application programs access to data in the Siemens Landis & Staefa PRV line of building automation devices. In the text that follows we will be using the term 'PRV' to represent a '*Siemens Landis & Staefa PRV line of building automation device*' i.e *PRV1*, and *PRV2*. The old *EKL-X* device is also supported.

The PRV DDE I/O Server can read from and write to almost any parameter in the PRV. The Server is able to communicate with the PRV using three different methods:

1. Through a standard RS-232 serial port directly connected to one of the PRV terminal ports. A short range modem may be used to improve cable length. This method is hereafter named *Direct*.
2. Using KK-Systems KD485-ADE Multidrop nodes to interconnect up to six PRV at the same bus. The KD485-ADE is connected to one of the PRV terminal ports. The KD485-ADE's are interconnected using 2 twisted pairs (4 wires). The PC is connected to the RS-485/422 bus using a RS-232/485 converter of standard type. This method is hereafter named *Multidrop*.
3. Using TCP/IP terminal servers that supports raw TCP ports. This method is hereafter named *TCP/IP*.

This communication methods may be mixed, until the maximum number of PRVs are connected.

The PRV DDE I/O Server is a general purpose DDE Server, it may be used by any Microsoft Windows program which is capable of acting as a DDE Client. Examples of such programs are *Microsoft Excel*, *Intellution FIX*, *CiT Citect* and *Wonderware InTouch*.

The PRV DDE I/O Server requires Microsoft Windows version 95, 98, NT 4.0 or higher, and depending of configuration, a standard RS-232 serial port, appropriate converters and multidrop nodes or WinSock 2 (requires an upgrade for Windows 95, which is downloadable from Microsoft Web) and a terminal server. See below, *Hardware Requirements* for a detailed description.

The PRV DDE I/O Server is written in C using the *WonderWare DDE Server Toolkit*, which guarantees a stable and fast platform for interprocess DDE communications and compliance to the *FastDDE* interface.

2 What is DDE ?

DDE stands for *Dynamic Data Exchange*. DDE is a complete communication protocol designed by Microsoft to allow applications in the Windows environment to exchange data with each other. It implements a client-server relationship between two concurrent running applications.

2.1 Client and Server

The server application provides the data and accepts requests from any other application interested in its data. Requesting applications are called clients. Some application can simultaneously be both a client and server. To obtain data from another application the client program opens a channel to the server application by specifying three things: the service name, the topic name and the specific item name. For example, in the case of Excel, the service name is 'Excel', the topic name is the name of the specific spreadsheet that contains the data and the item name is the specific cell on the spreadsheet.

When a client application sets up a link to another DDE program, it requests the server application to advise the client whenever a specific item's value changes. These data links will remain active until either the client or server program terminate the link or the conversation. They are a very efficient means of exchanging data because once the link has been established no communication occurs until the specified data value changes. This makes it possible to show real-time data in almost any Microsoft Windows application.

2.2 Application, Topic and Item

The DDE protocol identifies an element of data by using a three part address. The three parts of a DDE address are *Application*, *Topic* and *Item*.

2.2.1 Application

Application refers to the name of the Windows program (server) which knows how to access the data element. In the case of data coming from or going to a PRV, the application portion of the DDE address is 'PRV'.

2.2.2 Topic

Topic is an application-specific sub-group of data elements. The user creates meaningful names for the PRVs and uses these names as the topic names for DDE references.

2.2.3 Item

Item indicates a specific item within the specified topic. With the PRV DDE I/O Server, an item is an individual pointparameter in a PRV.

Note: *In some cases, the term 'point' is used interchangeable with the term 'item'.*

3 Installation

3.1 Before you start

Before you continue, make a complete copy of your PRV DDE I/O Server distribution diskette and store the original diskette away in a safe place.

3.2 How to install

Copy the files in the DDE I/O Server to a similar folder on the hard disk.

If you intend to use the *Time Switch Setup Program (PRVView)*, which is used to change *Time Switch Catalogues* in the PRV, it must be setup separately.

3.2.1 Setup of INI-file

If you have a serial port connected to a PRV, the server is now almost ready for action. Only a small amount of configuration changes is needed to complete the installation.

3.2.2 Licensing

If you have a hardware key, read the *PC Hardware key requirement* section for information about sentinel driver installation.

3.2.3 Files in the PRV DDE I/O Server installation directory

The following files are located in the PRV DDE I/O Server folder (normally *C:\Program Files\PRV*)

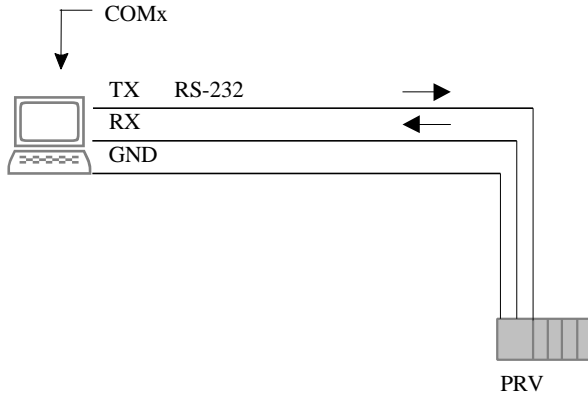
PRV.EXE	The PRV DDE I/O Server itself
PRV.INI	The INI-file containing Topic and Port definitions
PRV.XLS	An example excel sheet
WWLOGGER.EXE	WonderWare Logger program
WWLOGSVC.EXE	WWLogger help module
WWCOMDLG.DLL	WonderWare Common Dialog Controls
RPCRT4.DLL	WWLogger help module
COMMONUI.DLL	WWLogger help module
LMGR325A.DLL	WWLogger help module
WWCOMMON.DLL	WWLogger help module

4 Hardware requirements

For enabling the communication link there are some hardware requirements.

4.1 Hardware requirements, Direct (method 1)

The PC computer needs to be equipped with at least one standard RS-232 serial port.



4.1.1 Cabling

The cabling to the PRV is made of the TX/RX and GND signals properly connected, as:

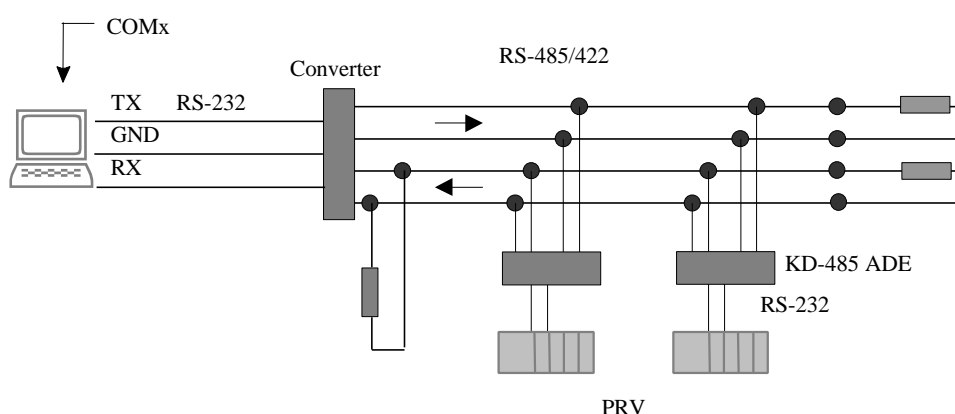
EKL-X/PRV	to	PC	or	PC
DSUB-25M		DSUB-9F		DSUB-25F
2	-----	2	-----	3
3	-----	3	-----	2
7	-----	5	-----	7
PRV2	to	PC	or	PC
DSUB-25F		DSUB-9F		DSUB-25F
2	-----	2	-----	3
3	-----	3	-----	2
7	-----	5	-----	7

If more than the specified RS-232 cable length (about 15 m) is needed, short range modems should be used.

4.2 Hardware requirements, Multidrop (method 2)



One KD485-ADE multidrop node per PRV and one standard RS-232/422 converter + RS-232 port per multidrop network is required.



The RS-232/422 converter should be of a standard type, i.e. RAD MIC-232 etc. See the converters' documentation for connection instructions.

The communication speed at the KD485-ADE network should be higher (9,6-38,4 kbps) than the speed to the PRV (1,2-9,6 kbps). KD485-ADE supports speed conversion and also holds a 2 kB buffer of data. No hardware flow control is used by the DDE I/O Server, which means that any features as RTS transmission control should be turned off. The PC is transmitting data using a RS-422 fashion, i.e. the converters' RS-422 transmitter should always be turned on to specify an appropriate signal level on the bus.

The KD485-ADE multidrop nodes transmit data when they are addressed (polled by DDE I/O Server). Between the polls the KD485-ADE place its RS-485 transmitter in a high impedance mode. The KD485-ADE internally uses a weak pull up at the bus to ensure proper signal level. Be assured to terminate this bus in both ends. Read the KD485-ADE documentation for detailed descriptions, be extra careful reading the chapter that describes the signal ground connection issue.

If more than the RS-485/422 specified cable length (about 1200 m at 9600 bps with AWG24) is needed, a RS-485/422 repeater is needed. The repeater must work at hardware signal level and cause no delay on the line.

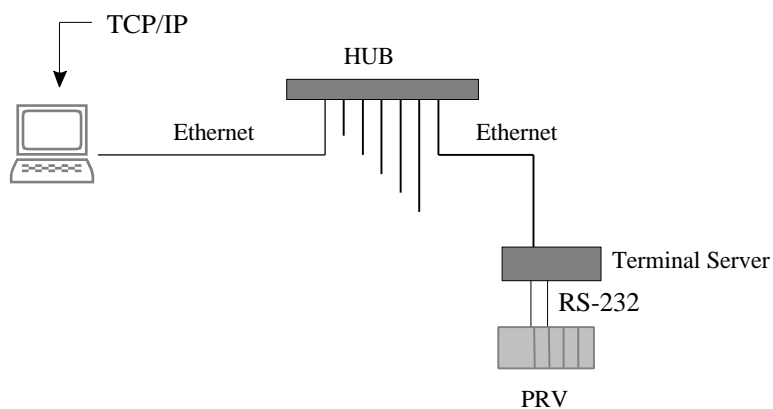
The KD485-ADE multidrop nodes are available from KK-Systems in U.K. Check <http://www.kksystems.com/> for pricing and local distributor information. Power supply needs to give 12VDC/200mA. Startup current ~500mA.

4.3 Hardware requirements, TCP/IP (method 3)

If TCP/IP communications are to be used, a network card with appropriate settings in Windows for TCP/IP is required. Further a terminal server is required.



The *Net Controller* available from WHI-konsult (<http://www.whi.se/>) has been tested successfully with the I/O Server, but any terminal server that can be set up with raw TCP ports will do.



There are also several models that use TCP/IP as transport media, but emulates COM-ports in Windows (i.e. *Digis' EtherLite* etc). These may also be used, but should, and could, not be set up as TCP/IP connected devices.

4.4 Hardware requirements for the PRV

A free terminal port. If communicating with a PRV2, don't use the front port (TTY3) though it has poor performance.

4.5 PC Hardware key requirement

To be able to run the PRV DDE I/O Server in normal mode (not demo) a hardware key (i.e. 'dongle') needs to be installed. It is simply plugged into the parallel port of the PC. Any printer is connected directly after the hardware key. The hardware key is of the type *Rainbow Sentinel SuperPro*, which is very short.



Sometimes there is a need for a driver for this hardware key to be installed. The driver is supported on the setup diskette, simply run the SETUP.EXE in the Sentinel directory. There will not be any message if the installation has succeeded and in most cases the PC does not need to be restarted.

Check <http://www.pericosecurity.com> for updates.

4.5.1 Other licensing methods

The hardware dongle is also available as an USB dongle.

If the hardware dongle does not fit (ex running on a server without parallel or enough USB ports) a registration code based upon the system id is available from TroSoft. The system id is shown in the *About* box.

4.5.2 License add-ons

An existing license may be upgraded in two ways

- Purchase a new hardware key and add it behind the other key(s). The PRV DDE I/O Server will scan all keys and add the licenses together before it starts.
- Return the original key when a new, upgraded one, is delivered

These methods ensure that the PRV DDE I/O Server may run continuously without any interruption until the new Topics should be activated. The PRV DDE I/O Server then needs to be restarted.

4.5.3 Demo mode

If the hardware key is missing the PRV DDE I/O Server will start in demo mode. In this mode it has all functionality as in normal mode with the following limitations

- It runs with maximum 10 PRVs
- It will automatically shut down within 30 minutes

When the demo time has expired, the PRV DDE I/O Server may be restarted for another period of 30 minutes.

5 Software Requirements

At least Windows 95, Windows 98 or Windows NT (SP3).

If Windows 95 is to be used in conjunction with communication method 3 (TCP/IP) the Winsock 2 update has to be installed. This update is available from the Microsoft Web (<http://www.microsoft.com>). This upgrade requires DCOM95 to be installed. Both upgrades are about 2 MB total.

5.1 Resource Requirements

Windows 95/98 DRAM	16 MB
Windows NT 4.0 DRAM	32 MB
Hard disk space	5 MB

Be aware of that any additional application may require more memory, i.e. the SCADA system. There should be enough DRAM memory to avoid memory paging to disk (usually named 'swapping') though this will degrade performance.

If logging is made to disk (using *WWLogger*), it will consume disk space in a considerable speed, about 1,5 kB/s if 10 polled devices are logged. This is about 5 MB/hour.

5.2 Limitations

Maximum devices per DDE I/O server	Depending of license
Maximum number of nodes/network (method 2)	6 (recommended max)
Maximum PC cable length, Direct	15 m
Maximum network cable length, Multidrop	1200 m (without repeater)
Maximum distance, TCP/IP (routed)	Unlimited
Maximum PC baudrate, Direct	1200-9600 bps
Maximum PC baudrate, Multidrop	38400 bps
Maximum PC baudrate, TCP/IP	n/a
The PRV baudrate is always	1200-9600 bps
Maximum traffic PRV2	55000 events/hour (unloaded device, Direct, polled)

6 Configuration

All settings to this driver is made up in the PRV.INI file located in the PRV directory (defaults to C:\Program\PRV). Future versions of this driver will include a setup program for this file, but until then all settings have to be done manually by editing the file (using *NotePad* etc).

The PRV DDE I/O Server always needs to be restarted for any changes in the PRV.INI to become valid.

Please notice that all times/timeouts are in ms.

6.1 Configuration of the PRV DDE I/O Server, Direct (method 1)

In the [Ports] section in the PRV.INI a row has to be entered that describes the port setup and the Topic associated with that port. Though it is a directly connected PRV there must be only one Topic associated. The row should have the following format:

COMp,0,b,d,s,f,r=t,x

where

p = Port	1 = COM1, 2 = COM2 ...
b = BaudRate as is, i.e	9600 = 9600 etc
d = Databits	7 = 7, 8 = 8
s = Stopbits	0 = 1, 1 = 1.5, 2 = 2
f = Flowcontrol	0 = None, 1 = Hardware, 2 = Xon/Xoff
r = Parity	0 = None, 1 = Odd, 2 = Even, 3 = Mark, 4 = Space
t = Topic	DUC1 = DUC1 etc, max 8 characters
x = Idle timeout	300 = 300 ms etc (delay from answer to next request)

example

COM1,0,1200,8,0,2,0=DUC1,500

Means that it is a direct connection to COM1, using 1200 bps, 8 databits, 1 stop bit, Xon/Xoff as flowcontrol and No Parity.

The Topic is 'DUC1' and the time the PRV DDE I/O Server waits from an answer until next request is 500 ms. This pause is necessary for slow devices (early PRV1 and EKL-X) to give them time to do normal processing but may be lowered to about 100 ms for fast devices (PRV2) that is unloaded.

6.2 Configuration of the PRV DDE I/O Server, Multidrop (method 2)

In the [Ports] section in the PRV.INI a row has to be entered that describes the port setup and the Topics associated with that port. Though it is a multidrop connected PRV there could be more than one Topic associated. The row should have the following format:

COMp,1,b,d,s,f,r=t,x,,ka,kt;t,x,ka,kt;t,x,ka,kt...

where

p = Port	1 = COM1, 2 = COM2 ...
b = BaudRate as is, i.e	9600 = 9600 etc
d = Databits	7 = 7, 8 = 8
s = Stopbits	0 = 1, 1 = 1.5, 2 = 2
f = Flowcontrol	0 = None, 1 = Hardware, 2 = Xon/Xoff
r = Parity	0 = None, 1 = Odd, 2 = Even, 3 = Mark, 4 = Space

t = Topic	DUC1 = DUC1 etc, max 8 characters
x = Idle timeout	300 = 300 ms etc (delay from answer to next request)
kt = Timeslot timeout	20 = 20 ms etc (for KD485-ADE timeout)
ka = Address	12 = 12 etc (address in KD485-ADE)

example

COM2,1,19200,8,0,0,2=DUC2,300,12,20;DUC3,300,13,20

Means that it is a multidrop connection using COM2, at 19200 bps, 8 databits, 1 stop bit, no flowcontrol and Even Parity.

The first Topic is 'DUC2' and the time the PRV DDE I/O Server waits from an answer until next request is 300 ms. This pause is necessary for slow devices (early PRV1 and EKL-X) to give them time to do normal processing. The KD485-ADE address is 12 and it has a timeout time of 20 ms, which must correspond to the setting in the *Mode 2 Configuration* below.

The second Topic is 'DUC3' and the time the PRV DDE I/O Server waits from an answer until next request is 300 ms. The KD485-ADE address is 13 and it has a timeout time of 20 ms, which must correspond to the setting in the *Mode 2 Configuration* below.

6.2.1 Configuration of the KD485-ADE, Multidrop node

The KD485-ADE nodes has to be set up using a direct connected PC. Install the KDCFG program for Windows. This program is shipped along with the KD485-ADE multidrop nodes.

Shortly explained a node setup is made as follows: Connect the cable between the KD485-ADE port 1 and the PC COM. Connect power to the KD485-ADE port as described in the manual and set the node in executive mode. Start the KDCFG program. For detailed description, consult the KD485-ADE manual.

Set the following parameters in the KD485-ADE.

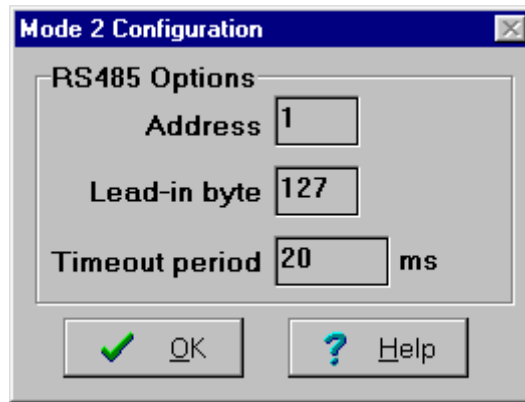
The screenshot shows the 'KD485 Configuration' window with the following settings:

- Port 1 RS232:**
 - Baud rate: 4800
 - Bits/word: 8
 - Parity: none
 - Stop bits: 1
 - RX Xon/Xoff: enabled
 - TX Xon/Xoff: enabled
- Port 2 RS422/485:**
 - Baud rate: 19200
 - Bits/word: 8
 - Parity: even
 - Stop bits: 1
 - RX Xon/Xoff: disabled
 - TX Xon/Xoff: disabled
- ADE Fixed Program:**
 - Mode: 2
 - Buttons: Configure, Upload, Delete
 - Valid Program: N/A
 - Update KD485 button
- Status Bar:**
 - PC Port: COM1
 - Product Type: ADE
 - Version: v1.03
 - Serial number: 15991

The baudrate for port 1 should be set to the same speed the PRV will be set to. The KD485-ADE network that resides on port 2 should be set to the same speed as the COM port will be

set to in the PC. Observe that the parity at port 2 should be set to “even”. This is for increased data integrity.

The nodes' Fixed Program must be set to work in Mode 2 (addressable multidrop node). The configuration for this mode is set as follows:



The address corresponds to the desired device number. This address will be connected to the topic defined for this device. The address lies between 1-126. It is not necessary to have the same address as the device it is connected to, but it will be much easier to remember. I.e. PRV \$027 should have address 27 etc, not 1 etc. The lead-in byte should always be set to 127, which is an illegal character in the byte data stream to the device. The timeout period should be set to some proper value. 20 ms will do in most cases. Remember these values, as they have to be set up in the topic definition in the I/O Server.

Save the settings in the KD485-ADE by selecting 'Update'.

All KD485-ADE switches should be set in their 'off' position.

6.2.2 Timeslots

Simply described, the communication is done as follows:

- The PRV DDE I/O Server sends out a lead-in character, immediate followed by a address byte. In the same packet a message to the desired device is appended.
- The PRV DDE I/O Server switches to listen mode. A pause is made until all characters are sent. The desired KD485-ADE will turn on its port 2 transmitter and send out all bytes in its internal buffer. This buffer can reside about 2 kB. It will simultaneously send the message it got from the DDE I/O Server on port 2 to port 1, where the PRV is connected. This data is also buffered, and the software flow control between the node and the PRV will become active if neccessary.
- A pause is made for the KD485-ADE Mode 2 timeout to expire. If the KD485-ADE still has data to send, the PRV DDE I/O Server listens until it has been quiet for at least one KD485-ADE Mode 2 timeout period. This indicates that the KD485-ADE has shut off its port 2 transmitter.
- The PRV DDE I/O Server repeats this sequence until all devices on that network has been polled, then it restarts with the first node.

This sequence for a node is called *Time Slot*.

6.3 Configuration of the PRV DDE I/O Server, TCP/IP (method 3)

In the [Ports] section in the PRV.INI a row has to be entered that describes the port setup and the Topics associated with that port. Though it is a multidrop connected PRV there could be more than one Topic associated. The row should have the following format:

TCPta=t,x

where

ta = Address	192.168.123.50:10001 or duc4.automatisera.nu:10001 etc
t = Topic	DUC1 = DUC1 etc, max 8 characters
x = Idle timeout	300 = 300 ms etc (delay from answer to next request)

example

TCP192.168.123.50:23=DUC4,300

Means that it is a TCP connection to 192.168.123.50 at port 23.

The Topic is 'DUC4' and the time the PRV DDE I/O Server waits from an answer until next request is 300 ms.

6.3.1 Configuration of the Terminal Server, TCP/IP

The terminal server is usually set up using a directly connected serial cable or a Telnet session. See the terminal servers' documentation for detailed description. Set the terminal servers' serial port to use the XOn/Xoff protocol. The port must be associated to a socket port number. For a *Net Controller* this is by default set to 10001 (port 1) and 10002 (port 2). The port must be set up as a raw tcp port (*TCPPORT* etc). Any byte stream changing port protocol must be disabling including login, Telnet etc.

Set the timeout (*Nagle algorithm*) to a low value, though it is small packets sent to the DDE I/O Server. For 9600 bps about 15 ms should be appropriate.

If the terminal servers IP-address is to be associated with a domain name, the *WAN/LAN/Internet DNS* must be set up with the terminal servers' IP-address. It is also possible to associate the domain name in the local *HOSTS* file located in the Windows directory (\WINNT or \WINDOWS).

Check that the PC has a connection to the terminal server by pinging it:

PING 192.168.123.97

or

PING duc4.automatisera.nu

etc.

6.4 Other settings

The PRV.INI file holds some other useful settings in the [General] section.

The default setting indicates what is set internally in the PRV DDE I/O Server if the parameter is not entered in the PRV.INI file.

6.4.1 DefaultPolled

If this parameter is set to 1 and no suffix character is used in the Item (i.e. '\$030.HW' not '\$030.HW/E' or '\$030.HW/P' etc) then the point is treated as polled.

If this parameter is set to 0 and no suffix character is used in the Item (i.e. '\$030.HW' not '\$030.HW/E' or '\$030.HW/P' etc) then the point is treated as event based.

The only parameters that are affected by this are ESTA, ERSTA, HW, ST, SB, ZW, ML and MW. All other Items (parameter types) are *always* polled.

Default: 1

6.4.2 PreventWriteOfSameValue

If this parameter is set to 1 and the DDE client tries to write an Item that already holds the same value that is written, then the I/O Server will simply ignore the write. The default is that all writes actually are written to the device, no matter of its previous value.

Some system that uses linked blocks or some kind of script to transfer values between different devices may cause excessive writes to occur. By setting this parameter to 1 it will be prohibited.

Default: 0

6.4.3 ProtocolTimer

The frequency at which the I/O Server checks for work to do.

This timer creates the time slots for multidrop communication which means that if the mode 2 timeout for the KD485-ADE is 20 ms the I/O Server will wait for at least 30 + 50 extra milliseconds before the time slot is ended. The default rate of 50 ms will do well for most applications.

If this value is set to low, there will be a excessive system overhead just doing nothing.

Default: 50 ms

6.4.4 RequestTimer

The interval the DDE functions will check for any request timeouts (*ValidDataTimeout*). This could be set up to a couple of seconds.

Default: 500 ms

6.4.5 ValidDataTimeout

The amount of time the DDE protocol will wait for a value from a device before an NACK will be sent to the client.

If the device is busy, this timer may expire and send a NACK to the client.

Default: 20000 ms

6.4.6 RefreshTimer

The interval within the event based items should updated, defaults to 30 minutes (30 x 60 x 1000 ms).

All event based items are polled immediately they are requested for the first time. When the first poll is made, it relies to that the device sends any updates for that point. If, for some reason, any update is lost (i.e. the cable is unplugged a short moment when an update is sent etc) it will never change state unless it is periodically updated, just like polled points.

Therefore event based points are polled, but with a very long interval. This defaults to 30 minutes (30 x 60 x 1000 ms).

The shortest interval that could be set is one minute (60000 ms).

Default: 1800000 ms

6.4.7 RefreshSpan

The span the server uses to spread refresh requests. This will smooth communication during refreshes, though any new event based Items get a refresh time that is the sum of the *RefreshTimer* time and a random portion of the *RefreshSpan* time, i.e. by default spans from 30-40 minutes.

This defaults to 10 minutes (10 x 60 x 1000 ms).

Default: 600000 ms

6.4.8 TCPErrerTimer

The time the server waits before it tries to reconnect a broken TCP connection.

Default: 120000 ms

6.4.9 StartupHideTimer

Hides the main window within this time from startup. If set to 0 it will never be hidden.

The PRV DDE I/O Server always is shown in the notify area at the desktop.

6.4.10 ShowSend, ShowReceive, ShowErrors, ShowEvents, ShowStatistics

These settings indicate which system menu items should be checked at startup.

Default: ShowErrors defaults to 1 all others to 0.

6.4.11 KeepUsedPortsOpen

If set to 1 and a port once is opened (Topic requested) it will be kept open, thus updating event based points.

This will cause any opened ports to never be closed until the PRV DDE I/O Server is shut down.

Default: 1

6.4.12 RememberEventItems

If set to 1, the server will save all allocated event items at shutdown. When the server is restarted, it will immediately reallocate these items and ask for them (do a firstpoll), then normal event handling is updating the items. This means that these items already are in the item list *and updated* when the client asks for them. The parameter *KeepUsedPortsOpen* have to be set for this to work.

The event based Items are saved in a file named 'topic.DAT', i.e. 'DUC1.DAT' etc. The file will be located in the same directory as the DDE I/O Server itself.

Default: 0

6.4.13 AddressByte

The KD485-ADE address byte.

This is used to signal address packet start in multidrop environments. This must be the same as *Mode 2 Configuration*, the *Lead In Byte* in the KD485-ADE setup.

Default: 127

6.4.14 DisableNagleAlgorithm

If set to 1, it will cause the driver to send TCP packets immediately instead of waiting for more data to be put in the output buffer. This will increase communication speed. The driver

automatically concatenates output data into a single frame which means that this parameter always should be turned on.

Default: 1

6.4.15 ForceUpdateInterval

If set to anything else than 0, it will cause the server to issue a *DbNewValueFromDevice*, i.e. sending an advise loop update with this millisecond interval for all valid points, even if they are unchanged.

Some DDE Clients does not notify updates properly and may need this parameter to be set. This will *not* affect physical communication speed or DCS load, but it will increase the PC CPU load if set to a very small value.

Default: 0

6.4.16 ManuallyStripNulls

If set to 1, it will cause the PRV driver to disable the *fNull* flag in the CommDCB and manually strip *NULLS* from the incoming data stream.

This prevents problem when Digi's RealPort software is used, though there is a problem with the Digi driver.

Default: 1

6.4.17 ERSTAAlwaysDigital

If set to 1, it will cause the driver to send all ESTA and ERSTA values to the DDE client as either 0 or 1. The value 0 will be updated as 0 and any value that not is 0 will be updated as 1 instead of its real value.

Default: 0

6.4.18 RegistrationCode

If there is no hardware dongle, the PRV DDE I/O Server may be licensed using a registration code based upon the system id. The system id is visible in the *About* box.

Default:

7 Configuration of the PRV

The PRV could be set up using the *Hyperterminal*. This *should* be done of a person with knowledge of the PRV.

Connect the PRV directly to a COM-port, and set up the *Hyperterminal* parameters to the desired settings, i.e. correct COM-port (*Direct COM1* etc), baud rate, no flow control etc.

7.1 Baud rate settings

In the PRV at least the baud rate should be set.

EKL-X	1200 bps
PRV	2400 bps
PRV2	4800 bps

The above baud rates may need to be adjusted downwards, depending of the load. In many cases the baud rates could be adjusted upwards for the PRV2.

Use the command:

TTY2.BD

and the device will respond with the actual baud rate. Use:

TTY2.BD=4800
INITTY2

etc for setting the baud rate in the device.

7.2 Special considerations for PRV2

Don't use the front port (TTY3) though it is not buffered and will have to be set to a very low baudrate.

7.3 Event update method

If the the event update method (see *PRV DDE I/O Server Item Naming*) is to be used the following program rows has to be entered in the Alarm and the Event task (*TSK252/TSK253*).

Use of the event update method is strongly recommended though it will significantly decrease the response time for these Items.

In the Alarm task, the following lines should be entered in the appropriate place

TSK252

...

1020 PA=PRIADR

1050 PRINT "<*"@PA.ADR"="@PA.HW";"@PA.ERSTA

...

In the Event task, the following lines should be entered in the appropriate place

TSK253

...

1020 EA=EVADR

```
1050 PRINT "<*"@EA.ADR"="@EA.HW";"@EA.ERSTA
```

...

The .ERSTA parameter should be exchanged to EST if a PRV/EKL-X is used.

Furthermore, all points that are used as event points should have the EVE parameter set to 1. Alarm points should have the PRIO parameter set to more than 0 otherwise they will not cause an alarm event. The difference of TSK252 and TSK253 is that TSK252 is started each time the point is changing its alarm state (if PRIO > 0), i.e. all delays have expired.

In the power on task, TSK254, the following rows should be entered in the appropriate place

...

```
1030 [252]TSKTTY=2
```

```
1040 [252]TSKPRP=2
```

```
1030 [253]TSKTTY=2
```

```
1040 [253]TSKPRP=2
```

...

This will set the Task Prompt to not be shown when the event happens, but not degrade performance of the event/alarm task. The TSKTTY statement should point to the port where the PRV DDE I/O Server is connected.

Remember to restart the device, or just simply run the TSK254 for these changes to become valid.

7.3.1 First time polls

When a new Item is requested the PRV DDE I/O Server will poll it the first time, and then it will only wait for it to be updated automatically by the device (TSK252 and TSK253).

7.3.2 Refresh of event based Items

All event based Items will be refreshed (new poll is made) in two cases:

- The Event Refresh Timer has expired. If a event is lost by some reason (the cable is unplugged for a short moment etc) it will be lost for all time. To avoid this problems event based Items are polled with a very slow frequency (refresh). The default is about 30 minutes.
- The Transparent Mode is exited. If the Time Switch Setup program is used, it will cause the event based Items to be refreshed when it disconnects from a Topic. The reason for this is that an event may be sent by the device during the transparent session, and it will then be lost.

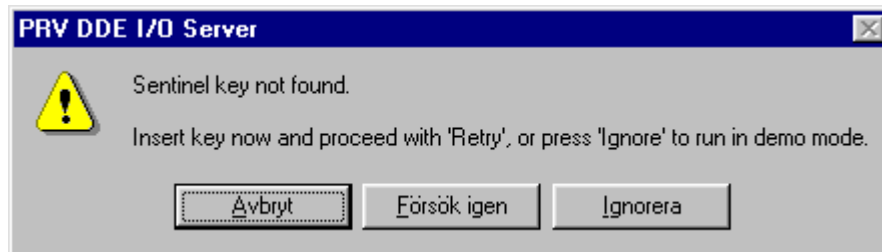
7.3.3 Persistent Items

If set in the INI-file (*RememberEventItems=1*), the event based Items will be remembered when the PRV DDE I/O Server is shut down, i.e. written to file. When the server is started next time, it will immediately read these Items and allocate memory for them. Next, the server will do a first time poll and then treat them as normal event based Items. This will result in that when an Item is requested (i.e. new Picture is selected) the value will be in memory and returned immediately.

8 Running the PRV DDE I/O Server

8.1 Startup

When the PRV DDE I/O Server is started, it will first of all try to find the hardware key in the parallel port. If it is not found, it will show this message



<i>Abort</i>	Shut down the program
<i>Retry</i>	Scan the parallel ports once again
<i>Ignore</i>	Ignore the missing hardware lock and run in demo mode

When the PRV DDE I/O Server has started, it will show some info box above the main window. After a few seconds this box will be automatically unloaded (it may also be unloaded by pressing the Ok button).



During startup, the PRV DDE I/O Server will scan through the PRV.INI file and create the Topics that are defined. If the Topic license limit is exceeded, the extra Topics will not be created, and therefore rejected when they are requested.

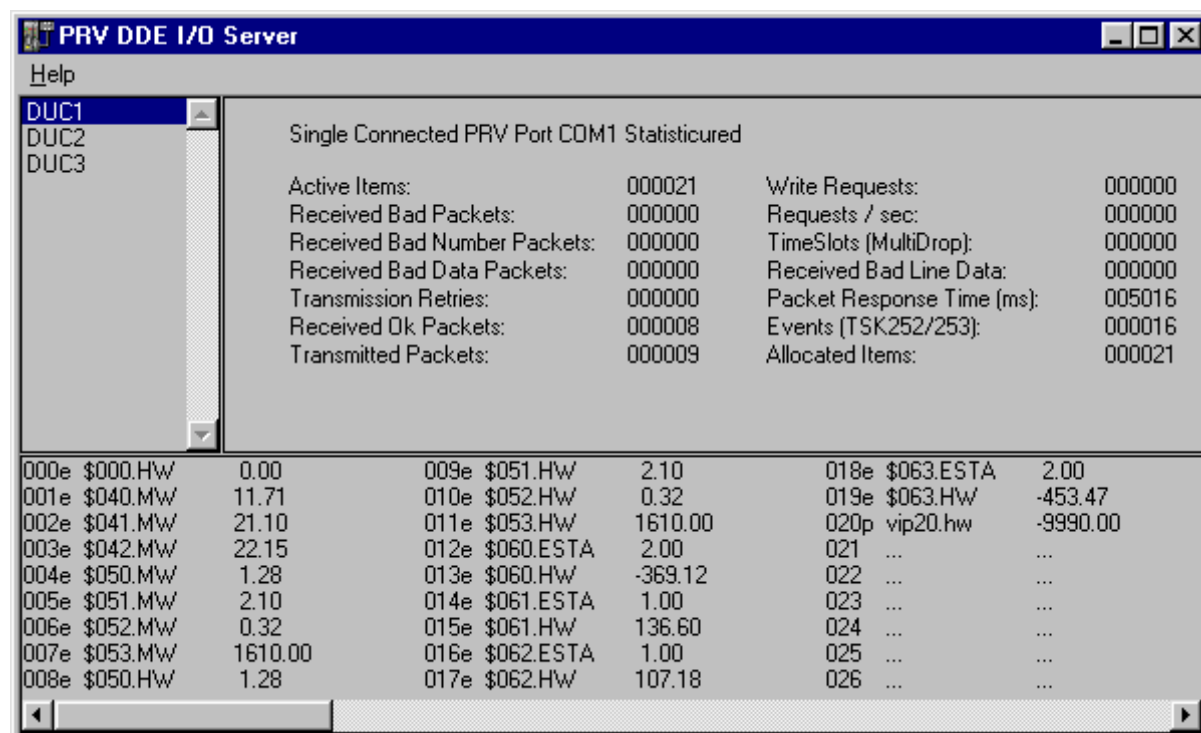
If the PRV DDE I/O Server should remember (*RememberEventItems=1*) any event based Items, it will read them at the time the Topics are created and start the first poll.

If the StartupHideTimer parameter is set to anything else than zero, it will cause the main window to be hidden when that time has expired. The PRV DDE I/O Server is always shown as an icon in the notify area, and could easily be shown again by simply clicking that icon.

When an event is encountered it will change the color of the icon for a short moment.

8.2 Main window

By default, the statistics are not shown in the main window. Select it to be shown in the systems menu.



In the above example, the Topic 'DUC1' is shown.

The list below views all Items that are connected to an client, or Items that are event based and are persistent.

Polled Items are indicated using a 'p' following the Item number, and event based Items are indicated using an 'e' following the Item number. Static points are indicated as event based.

The address and the last known value (which in fact are the actual value) are also shown. If the value is unknown, it is replaced by '???'.

The '...' indicates that that Item is not used, although it is allocated. Items are always allocated in blocks of 64 even if they are not used. This is done to avoid fragmentation of the memory.

The statistics above to the right indicate the status of the Topic.

8.3 System menu

Most of the run time settings are made in the System menu.



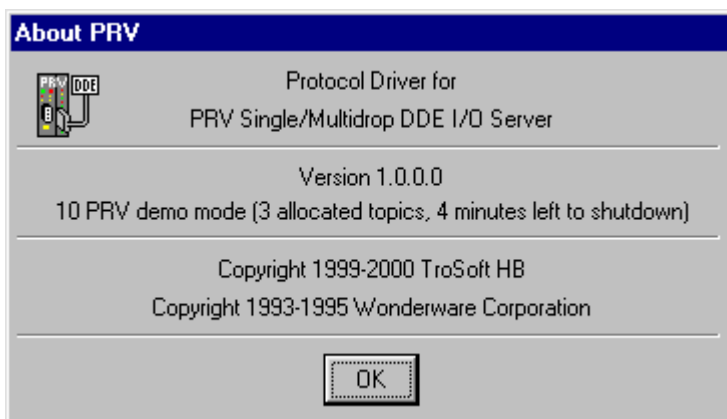
The above settings are self explanatory. All 'Show' menu items refer to the WWLogger debugging except 'Show statistics' which indicates whether the statistics should be shown in the main window or not.

8.3.1 Statistic performance

If the statistics is shown in the main window and a Topic that is connected to a PRV2 using a lot of Items, the statistics itself may degrade performance.

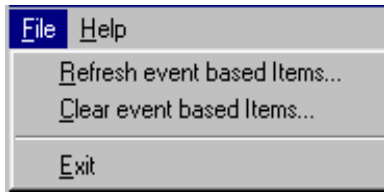
8.4 Help menu

The only choice in this menu is the 'About' info



This About info box indicates the license information (which indeed is shown also in WWLogger).

8.5 File menu



8.5.1 Refresh event based Items

Forces the PRV DDE I/O Server to refresh the value of all event based Items. The 'RefreshTimer' will also be reset for all event based Items.

This requires a Topic to be selected in the Topics list, which in turn requires the statistics to be turned on.

8.5.2 Clear event based Items

Event based Items that are hold by the PRV DDE I/O Server, but does not actually have an connected client will be removed.

This requires a Topic to be selected in the Topics list, which in turn requires the statistics to be turned on.

8.5.3 Exit

Shuts down the PRV DDE I/O Server

9 Using the DDE Server from a DDE Client program

9.1 Using the PRV DDE I/O Server with Microsoft Excel

Data from PRV topics may be accessed from Excel spreadsheets. To do so, enter a formula like the following into a cell on the spreadsheet.

`= 'PRV' ! 'topic' ! 'item'`

In some cases, Excel requires the topic and/or item/points to be surrounded by apostrophes.

In the formula, topic must be replaced with one of the valid topic names defined during the Server configuration process. Replace item with one of the valid item/point names described in the *Item Naming* section.

9.1.1 Reading Values into Excel Spreadsheets.

Values may be read directly into Excel spreadsheets by entering a DDE formatted formula into a cell, as shown in the following examples:

`= 'PRV' ! 'DUC12' ! '$000'`

`= 'PRV' ! 'DUC43' ! '040_DEL01'`

9.1.2 Writing Values to PRV device points

Values may be written to the PRV DDE I/O Server by creating an Excel macro which uses the DDE POKE Command. The command is entered in Excel as follows:

`= INITIATE ("PRV ", "Topic Name")`
`= POKE ("Channel_Id", "Item", "Data_Reference")`
`= RETURN ()`

For *Channel_Id*, use the cell reference where the *INITIATE* statement is found. For *Data_Reference*, use the cell identification which contains the *POKE* value.

Some applications have a limited number of channels, therefore they should be closed when finished by using a *TERMINATE* statement in the macro. The *TERMINATE* macro should have sufficient delay to ensure that the *POKE* has been executed.

Refer to the Excel Manual for further details.

10 PRV DDE I/O Server Item Naming

The PRV DDE I/O Server accepts item names with syntax that are as much as possible consistent with Siemens Landis & Staefa point naming conventions. Because some DDE clients are inconsistent and incomplete in their DDE specification, the I/O Server will accept names that look different and internally adjust them.

Most point types can be read and written, while some can only be read.

All physical points and their parameters in a PRV are accesable through the PRV DDE I/O Server. Though there are several parameters, please consult the PRV reference litterature to get a complete list.

Supported access modes are indicated in the table.

10.1 Item naming examples

Item name	will expand to	valid
\$040	\$040.HW	YES
040	\$040.HW	YES
40	\$040.HW	YES
\$040.HW/E	\$040.HW	YES
\$040.HW/P	\$040.HW	YES
40_DEL01	\$040.DEL01	YES
\$040.ERSTA	\$040.ERSTA	YES
SYSNUS	SYSNUS	NO
[10]As	[10]As	NO
PLT1	PLT1.HW	YES
PLT1_LCM0	PLT1.LCM0	YES
PLT1_LCM0_S	PLT1.LCM0	YES
PLT1.LCM0/S	PLT1.LCM0	YES

Generally, no system parameters are accesable, i.e. SYSNUS, SYSVER, DATE, TIME etc. All point parameters are accesable.

All dots '.' and '/' are exchangeable with underscores '_', and the address will be automatically prefixed with a dollar sign '\$'.

10.2 Polled Items

If the Item name is suffixed with '/P' or '_P' it will always be treated as an polled Item, i.e. the value is continously asked for by the PRV DDE I/O Server.

If there are no suffix at all, the point will be set to be polled or event based depending of the INI-file setting (only true for the above mentioned parameters, all others are always polled).

10.2.1 Response time to client requests

Depends of the load of the PRV and the PRV DDE I/O Server (for that Topic). New Items always gets the highest priority. An EKL-X returns about 1-2 item per second (packet of 5), which gives a response time about 1-5 seconds for 5 new Items.

10.3 Event based Items

If the Item name is suffixed with '/E' or '_E' it will always be treated as an event based Item., i.e. the value is asked for once (first time poll) and then it relies to the Alarm and Event task to send updates.

Only points in the PRV using any of the HW, ESTA, ERSTA, MW, ST, ML, SB or ZW parameters could be event based. All others will always be polled, ignoring any added '/E' or '_E' suffix (although it could be set *static*, check below).

Event based Items are read from the PRV during these conditions:

- The item has never been asked for anytime (first time poll). If the *RemeberEventItems* parameter is set in PRV.INI the items will be first time polled immediately when the PRV DDE I/O Server is started, thus available when a client is asking for it.
- The item is written.
- The PRV sends an update from the Alarms or Event task.
- The RefreshTimer (and its added random content of RefreshSpan) expires. During these updates, the Item is responding to new client requests with the last known value, which is still considered valid.
- The Transparent mode is exited (when the PRVView program releases the Topic)

10.3.1 Response time to client requests

If the Item is available and valid in memory it is returned when the Topic state machine returns to its idle state, i.e. defaults to 50 ms. If a first time poll must be done (the Item has never been asked for before), it will use as much time as the polled Item does, although next time a client requests the Item it will be in memory.

10.4 Static Items

To force a point that normally won't be able to update using the Event or Alarm task (such as PAR1, LOL, HIL) to be static, it should be suffixed using '/S' or '_S'. This will cause the PRV DDE I/O Server to only read the Item once (first poll) just like any event based Item. It will also further on be treated as a normal event based Item, although it will never be updated by the PRV.

This type of static Item is very useful when a parameter that is fairly static should be read. This Item will be updated when it is written or refreshed by the PRV DDE I/O Server for some reason, and also refreshed as event based Items. This Item type should be used if the parameter is never updated by any task in the PRV though it will significantly decrease the response time when the Item is requested from a client.

Event based Items are read from the PRV during these conditions:

- The item has never been asked for anytime (first time poll). If the *RemeberEventItems* parameter is set in PRV.INI the items will be first time polled immediately when the PRV DDE I/O Server is started, thus available when a client is asking for it.
- The item is written.
- The RefreshTimer (and its added random content of RefreshSpan) expires. During these updates, the Item is responding to new client requests with the last known value, which is still considered valid.
- The Transparent mode is exited (when the PRVView program releases the Topic)

10.4.1 Response time to client requests

If the Item is available and valid in memory it is returned when the Topic state machine returns to its idle state, i.e. defaults to 50 ms. If a first time poll must be done (the Item has never been asked for before), it will use as much time as the polled Item does, although next time a client requests the Item it will be in memory.

10.5 Default Item type

If no suffix ('/E', '_E', '/P', '_P', '/S' or '_S') is added to the Item, it will by default become of the type indicated by the *DefaultPolled* parameter in PRV.INI.

If *DefaultPolled* is set to 0 then all Items with the PRV parameter type HW, ESTA, ERSTA, MW, ST, ML, SB or ZW will be event based. All others are polled.

If *DefaultPolled* is set to 1 then all Items will be polled.

10.6 Reserved Item Names

Some names are used internally by the PRV DDE I/O Server to provide information for the user about the different topics.

10.6.1 Status

Returns the connection status information about the topic. This is a discrete, and it is set to 1 if the connection is ok and 0 if there is some connection failure.

10.6.2 Statistics(nn)

Returns the statistic information about the topic. The returned information is a long integer and contains the same information that the PRV DDE I/O Server shows in the main window. This item may also be written i.e. to clear this information.

The statistics are subjects to change, but for now they contain:

<i>Statistics(0)</i>	Active Items (advise loops)
<i>Statistics(1)</i>	Bad packets
<i>Statistics(2)</i>	Bad packet numbers returned
<i>Statistics(3)</i>	Bad packet data in data field
<i>Statistics(4)</i>	Retries made
<i>Statistics(5)</i>	Ok packets received
<i>Statistics(6)</i>	Packets sent
<i>Statistics(7)</i>	Sent write requests
<i>Statistics(8)</i>	Handled requests per second
<i>Statistics(9)</i>	TimeSlots sent
<i>Statistics(10)</i>	Bad Line Data (parity, overrun etc)
<i>Statistics(11)</i>	Packets response time (ms)
<i>Statistics(12)</i>	Allocated Items (advise loops including not used event based items)

10.6.3 Transparent

When the Transparent item is accessed for a topic (i.e. an advise loop is created) all other item update for that topic will be shut off, and a direct connection to the topic is made. All characters that is poked to Transparent is sent directly to the PRV and all characters that is received is immediately transferred to the Transparent client.

This item is only intended for use with the PRVView program.

11 WWLogger

This logging program provides a way to log information from servers written using the *WonderWare DDE Server Toolkit*. It can log to window or to disk. All data that is sent to and received from the devices may be logged.

By default, any errors are logged to WWLogger. The WWLogger should be shut down if not needed for debugging purposes.

12 Time Switch Program (TSP)

Though the PRVs has a rather complex structure of the time switch programs, which also differs between PRV1/PRV2, there is a external program (*PRVView*) supplied with the PRV DDE I/O Server to provide access to the different TSPs.

The supported TSPs are

EKL-X/PRV1	WDC, SDC, OVC
PRV2	DST -> WDC, SDC, OVC

PRVView accesses the PRV DDE I/O Server through the reserved item name *TRANSPARENT* and will request explicit communication to the desired device, thus shutting down any updates for that device during the TSP up/download phase.

Read the *PRVView* documentation for installation and user info.

13 Performance

13.1 Different link types

13.1.1 Hot Link (Advise Loop / DDE Advise)

The client program must create an advise loop, i.e. use a hot link style when the DDE items are accessed, because the PRV DDE I/O Server has an internal cache and sorts all items before any request is sent to the PRV. About five values are requested at a time. If a hot link is used, the I/O Server will automatically update the client when the value changes, thus minimize the amount of DDE messages sent internally or through NetDDE.

13.1.2 Cold Link (DDE Peek)

If a cold link is used and an item is peeked, this will cause the PRV DDE I/O Server to create a cached structure for this item, request it from the PRV and send the answer back to the client. The cached structure will then be deleted. This will significantly degrade performance, though newly created cache structures will get the highest priority in the read queue. The only requests that will get higher priority are write requests.

13.1.3 Scada system link types

Almost all SCADA systems creates advise loops (ex. *Intellution FIX*, *Wonderware InTouch*, *CiT Citect*). Even Excel creates an advise loop.

13.2 New Items response time

A directly connected PRV2 will respond with about 10 new values per second at most if polled.
A slow EKL-X fully loaded will respond with about 2 items per second at most if polled.

13.3 Event based Items response time

Try to use as many event based points as possible, though it will dramatically increase performance. The difference is greater the older the device is that is used.

The average response time for new Items that are event based and valid in memory (first poll already made) is less than *ProtocolTimer* (defaults to 50 ms) if there are no outstanding reuests.