

S7 ETHERNET/MPI Communication Server for SIMATIC S7-300/S7-400

for Microsoft Windows
and InTouch Applications

**User Manual
Ver 1.x Rev 1.2
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DR 470 11**

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S7ETHMPI Communication Server for SIMATIC S7-300/S7-400

Overview

The **SIEMENS S7 ETHERNET/MPI Server** (hereafter referred to as the “S7ETHMPI Server” or “S7ETHMPI” or “Server”) is a Microsoft Windows application program that acts as a communication protocol Server and allows other Windows application programs to access to the data from Siemens S7-300 and S7-400 controllers using the Ethernet Gateway (communication adapter-cable) for MPI, providing interface between 10/100 Mbps Ethernet and Siemens MPI bus. The connection is possible with a hub or switch or via a crossover cable directly with PC network card, the used protocol is standard TCP/IP. Any Microsoft Windows program that is capable of acting as a **DDE**, **FastDDE**, **SuiteLink** or **OPC Client** may use the S7ETHMPI Server.

There are two different S7ETHMPI Server versions described in this manual:

- Server version (ordering number DR 470 10), supporting SuiteLink, FastDDE and DDE protocols; this version hereafter is referred to as the “**Suite Link & DDE**” version.
- Server version (ordering number DR 470 11), supporting OPC and DDE protocols; this version hereafter is referred to as the “**OPC & DDE**” version;

The separate installation package is supplied for each version of the Server. In both cases, the name of Server executable file is **S7ETHMPI.EXE**. All further information in this manual is same for all versions of the Server, with the exception of few points where communication protocol specific features are explained.

Note!

The current version 1.02 of S7ETHMPI Server supports only point-to-point connection, i.e. only one PLC can be accessed via one communication adapter-cable.

Communication Protocols

Dynamic Data Exchange (DDE) is a communication protocol developed by Microsoft to allow applications in the Windows environment to send/receive data and instructions to/from each other. It implements a client-server relationship between two concurrently running applications. The server application provides the data and accepts requests from any other application interested in its data. Requesting applications are called clients. Some applications such as Wonderware InTouch and Microsoft Excel can simultaneously be both a client and a server.

FastDDE provides a means of packing many proprietary Wonderware DDE messages into a single Microsoft DDE message. This packing improves efficiency and performance by reducing the total number of DDE transactions required between a client and a server. Although Wonderware's FastDDE has extended the usefulness of DDE for the industry, this extension is being pushed to its performance constraints in distributed environments.

The S7ETHMPI Server “Suite Link & DDE version” supports the FastDDE Version 3 - an extension to Wonderware’s proprietary FastDDE Version 2. This extension supports the transfer of Value Time Quality (VTQ) information. The original DDE and FastDDE Version 2 formats are still supported, providing full backward compatibility with older DDE clients. FastDDE Version 3 works on Windows 9x systems as well as Windows NT systems.

NetDDE extends the standard Windows DDE functionality to include communication over local area networks and through serial ports. Network extensions are available to allow DDE links between applications running on different computers connected via networks or modems. For example, NetDDE supports DDE between applications running on IBM compatible computers connected via LAN or modem and DDE-aware applications running on non-PC based platforms under operating environments such as VMS and UNIX.

SuiteLink uses a TCP/IP based protocol and is designed by Wonderware specifically to meet industrial needs such as data integrity, high-throughput, and easier diagnostics. This protocol standard is only supported on Microsoft Windows NT 4.0 or higher. SuiteLink is not a replacement for DDE, FastDDE, or NetDDE. The protocol used between a client and a server depends on your network connections and configurations. SuiteLink was designed to be the industrial data network distribution standard and provides the following features:

- Value Time Quality (VTQ) places a time stamp and quality indicator on all data values delivered to VTQ-aware clients.
- Extensive diagnostics of the data throughput, server loading, computer resource consumption, and network transport are made accessible through the Microsoft Windows NT operating system Performance Monitor. This feature is critical for the scheme and maintenance of distributed industrial networks.
- Consistent high data volumes can be maintained between applications regardless if the applications are on a single node or distributed over a large node count.
- The network transport protocol is TCP/IP using Microsoft’s standard WinSock interface.

OPC (OLE for Process Control) is an open interface standard to provide data from a data source and communicate the data to any client application in a common standard way. The OPC is based on Microsoft OLE, COM and DCOM technologies and enables simple and standardised data interchange between the industrial or office sector and the production sector. From general point of view many aspects of OPC are similar to DDE, but main difference is in the implementation by using Microsoft's COM (Component Object Model) technology. It enables fast exchange with process automation data and OPC open interface allows access to data from OPC Server in same standard way from OPC client applications supplied by different developers.

For more information on the basics of OPC, please refer to the **OPC Specification**. The OPC Data Access Custom Interface Specification is maintained by **OPC Foundation**, the current specification is 2.05A dated June 2002 (3.00 dated March 2003).

The OPC support for S7ETHMPI Server “OPC & DDE” version is implemented based on **FactorySoft OPC Server Development Toolkit** and it conforms to OPC Data Access Custom Interface Specification 2.04. The S7ETHMPI Server “OPC & DDE” version is

tested for compliance and is compatible with OPC Foundation OPC Data Access Compliance Test Tool.

The Suite Link, FastDDE (Version 3) and DDE support for S7ETHMPI Server “Suite Link & DDE” version is implemented by **Wonderware I/O Server Toolkit** ver. 7,2,1,6.

The FastDDE (Version 2) and DDE support for S7ETHMPI Server “OPC & DDE” version is implemented by **Wonderware I/O Server Toolkit** ver. 5.0 (008).

Accessing Remote Items via the Server

The communication protocol addresses an element of data in a conversation that uses a three-part naming convention that includes the **application name**, **topic name** and **item name**. The following briefly describes each portion of this naming convention:

application name

The name of the Windows program (server) that will be accessing the data element. In the case of data coming from or going to Siemens Simatic S7-300 or S7-400 PLC via this Server, the application portion of the address is **S7ETHMPI**.

topic name

Meaningful names are configured in the Server to identify specific devices. These names are then used as the topic name in all conversations to that device. For example, **S7300**.

Note! You can define multiple topic names for the same device (PLC) to poll different items at different rates.

item name

A specific data element within the specified topic. For the **S7ETHMPI** Server, an item is an individual data bit, byte, word, integer, string, etc., in the PLC. The term "point" is used interchangeably with the term "item" in this User Manual. For more information on item names, see the **Item Names** section later in this manual.

Installing the S7ETHMPI Server

Installing the Server

The S7ETHMPI Server installation package can be supplied:

1. As a self-extracting archive (47010xxx.EXE for “Suite Link & DDE” version or 47011xxx.EXE for “OPC & DDE” version) if downloaded from Klinkmann’s web site (the xxx is the current (latest) version of the Server).
2. From installation on CD.
3. On two or three distribution disks (floppies).

To **install** the S7ETHMPI Server from the self-extracting archive, run the 47010xxx.EXE or 47011xxx.EXE and proceed as directed by the S7ETHMPI Server Setup program.

To **install** the S7ETHMPI Server from CD or distribution disks, on MS Windows (NT, 2000, XP or 95 (98)):

1. Insert the CD with Klinkmann Software into CD drive or insert the S7ETHMPI Server Disk1 into a floppy drive A: or B:.
2. Select the **Run** command under the **Start** menu.
3. Run STARTUP.EXE if installing from CD or SETUP.EXE if installing from distribution disks (floppies).
4. If installing from CD: select "Protocol Servers (DDE, SuiteLink, OPC)", find "S7ETHMPI SL and DDE Server" or "S7ETHMPI OPC and DDE Server" and click on "Setup...".
5. Proceed as directed by the S7ETHMPI Server Setup program.

Note:

All MS Windows (both NT and 9x) applications using Microsoft's shared DLLs (e.g. MFC42.DLL and MSVCRT.DLL) must be closed before installing the S7ETHMPI Server "OPC & DDE" version. Otherwise there can be problems with S7ETHMPI Server registration as OPC server. If during the S7ETHMPI Server "OPC & DDE" version installation some warning messages about shared DLLs are displayed, then it is quite possible the S7ETHMPI Server registration as OPC server failed. In this case after system reboot the S7ETHMPI Server registration as OPC server can be done by starting the S7ETHMPI Server manually with special command line parameter added: "S7ETHMPI /Regserver".

When installation is finished, the subdirectory specified as a folder where to install the S7ETHMPI Server files will contain the following files:

S7ETHMPI.EXE	The S7ETHMPI Server Program. This is a Microsoft Windows 32-bit application program.
S7ETHMPI.HLP	The S7ETHMPI Server Help file.
S7ETHMPI.CFG	An example configuration file.
LICENSE.TXT	Klinkmann Automation software license file.
KLSERVER.DLL	Dynamic Link Library necessary for "OPC & DDE" version of the Server.
WWDLG32.DLL	Dynamic Link Library necessary only for "OPC & DDE" version of the Server.

To **uninstall** the S7ETHMPI Server, start Control Panel, select "Add/Remove Programs" and select the "S7ETHMPI SL and DDE Server" or "S7ETHMPI OPC and DDE Server" from the list of available software products. Click on "Add/Remove..." and proceed as directed by the UnInstallShield program.

Notes:

1. *The S7ETHMPI Server "Suite Link & DDE" version is developed with Wonderware I/O Server Toolkit (ver 7.0) and needs the **Wonderware FS2000 Common Components** to be installed on computer where the S7ETHMPI Server is running. The Wonderware FS2000 Common Components are installed automatically when any of Wonderware FS2000 Components (e.g. InTouch or some Wonderware I/O server) is installed.*

2. If S7ETHMPI Server "Suite Link & DDE" version will run on PC where Wonderware FS2000 Common Components are not installed then a special **I/O Server Infrastructure installation package** can be obtained from Klinkmann Automation (see **Installing the I/O Server Infrastructure** section below). This I/O Server Infrastructure installation package contains the minimum set of software needed to run the S7ETHMPI Server "Suite Link & DDE" version and these infrastructure files must be install prior to executing the S7ETHMPI Server.
3. The HASP key is needed for full time running of S7ETHMPI Server. The HASP Driver setup is performed during the Server setup. Without HASP Driver installed and HASP key plugged into PC parallel port, the S7ETHMPI Server will run only 1 hour (with all features enabled).

Installing the I/O Server Infrastructure

The I/O Server Infrastructure installation package can be supplied:

1. As a self-extracting archive (IOServerInfrastructure.exe), if downloaded from Klinkmann's web site.
2. On one distribution disk (floppy).

To **install** the I/O Server Infrastructure from the self-extracting archive, run the IOServerInfrastructure.exe and proceed as directed by the I/O Server Infrastructure Setup program.

To **install** the I/O Server Infrastructure from the distribution disk, on MS Windows (NT or 95):

1. Insert the I/O Server Infrastructure disk into a floppy drive A: or B:.
2. Select the **Run** command under the **Start** menu.
3. Type "A:SETUP" or "B:SETUP".
4. Click on **OK**.
5. Proceed as directed by the I/O Server Infrastructure Setup program.

To **uninstall** the I/O Server Infrastructure, start Control Panel, select "Add/Remove Programs" and select the "IO Server Infrastructure" from the list of available software products. Click on "Add/Remove..." and proceed as directed by the UnInstallShield program.

Note: The I/O Server Infrastructure installation will be rejected if Wonderware FS2000 Common Components are already installed on same computer.

Installing and Configuring the Communication adapter-cable

The communication adapter-cable is connected to PLC MPI port at adapter side, the connection to Ethernet network is possible with a hub or switch or via a crossover cable directly with PC network card. Before using the communication adapter-cable, the special **driver** must be installed and configured.

Installing the Communication adapter-cable driver

The communication adapter-cable driver can be installed on MS Windows NT, 2000, XP, 98, 95 and ME. If installing this driver on MS Windows NT, 2000 and XP, you have to log on as an administrator.

To start the installation, run the setup program from the CD supplied with communication adapter-cable (or downloaded from cable manufacturers web site) and follow the instructions that appear on the screen. If on same PC also the Simatic STEP 7 software will be used then during installation do not use blanks or other special characters in the pathnames - otherwise the driver will not be found by STEP 7 software.

Always reboot your computer to make sure that changed settings are applied. After installation, the start menu of your PC will contain the program "NetLink and NetLink settings". This program can be used to assign and organize the IP addresses of the connected communication adapter-cable. The user interface of the NetLink driver is also visible inside STEP 7 under the menu item "Set PG/PC interface".

Operation via local network (LAN)

Before you can select the connected control in the driver settings of the programming devices, the IP address of the connected **NetLink** must be known.

To make sure that the control can be accessed when setting up a new connection, first use a PING <IP address> to make sure that your network link is working.

The TCP port **1099** is currently used for communication.

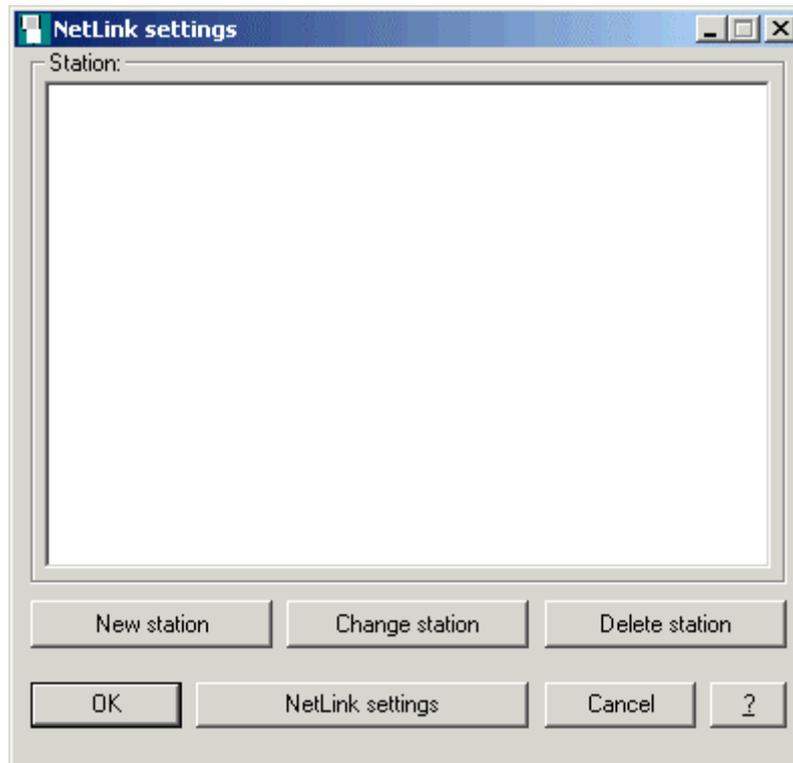
If the computers are behind a firewall, the port for communication must be enabled in the firewall software. Contact your network administrator or refer to the documentation of your firewall software.

Operation via the Internet

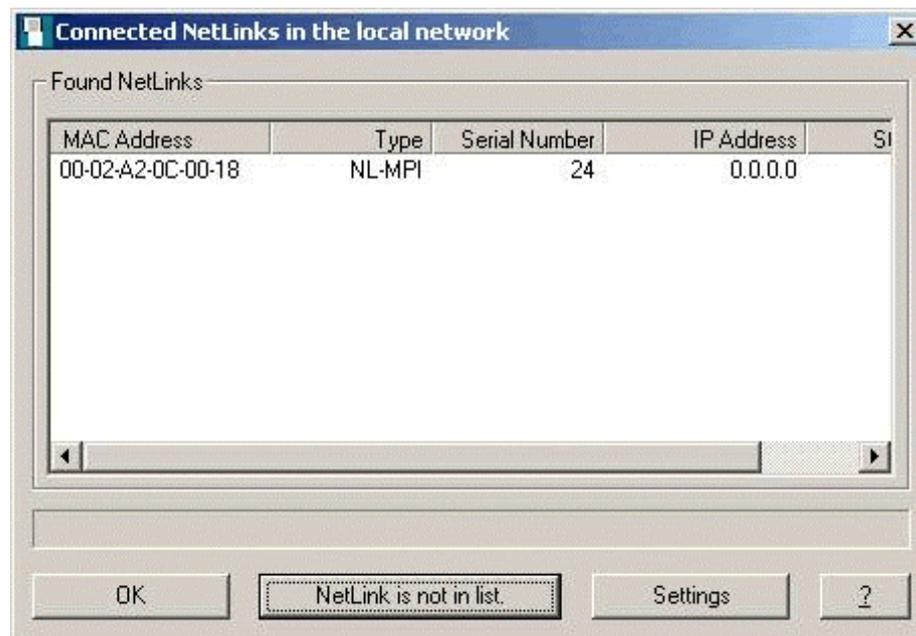
Basically the rules are same as for operation via local network (LAN). The routing of IP telegrams from a local computer to a point far away (e.g. for remote control) needs mostly a network administrator with established knowledge about the technical environment between the communication partners.

Configuring the Communication adapter-cable

Start the "NetLink/NetLink settings" program from the start menu. The following window will appear:



At initial start-up no access names have been defined and empty list appears. At first IP addresses must be assigned to connected adapter-cables. Click on the "NetLink settings" button - the following will appear:



This list shows all the adapter-cables found in the subnet. If no IP address has been assigned yet, the address 0.0.0.0. will appear. If no adapter-cable appears in the list,

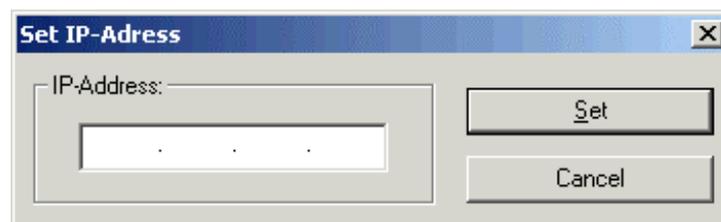
there is none in the same subnet or it is not in configuration mode. In this case, click on the "NetLink is not in list" button. The following message will appear:



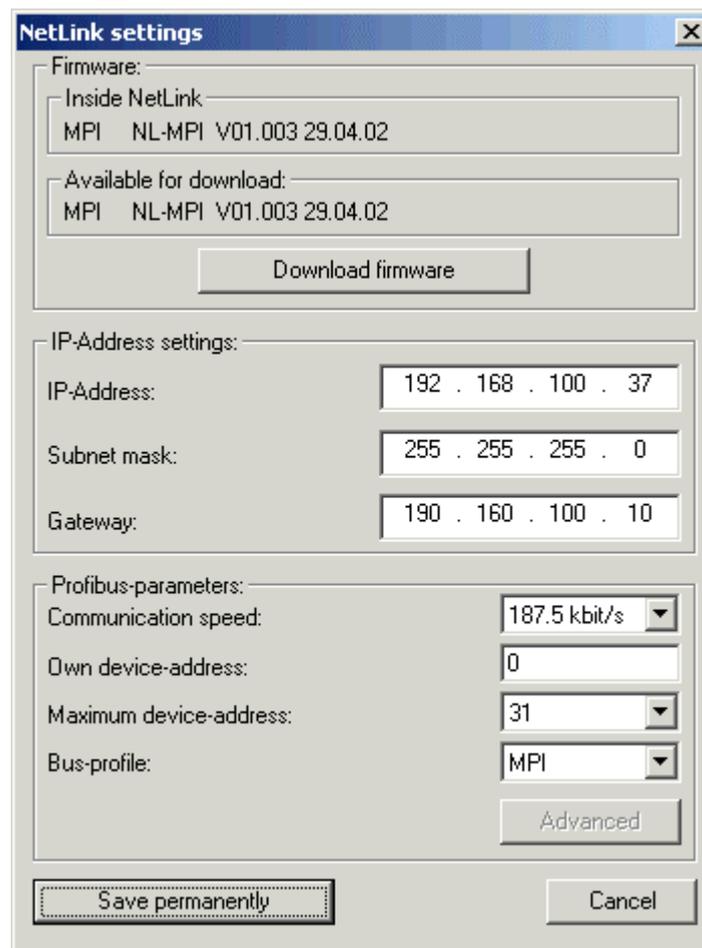
Follow the instructions from above message - disconnect the adapter-cable from the power supply and then reconnect it. Only when it is done, confirm with the "OK" button. The list is refreshed and the adapter-cable will appear in the list.

Select the adapter-cable to be configured and click on the "Settings" button.

Assign the IP address for the adapter-cable in the following dialog box:



After pressing the "Set" button, the next "NetLink Settings" dialog box will appear where the "Subnet mask" in which the adapter-cable operates and the IP address of "Gateway" (if there is such a one) can be entered. If there is no gateway used, just leave these fields empty. Select the "Communication speed" equal to **187.5 kbps** and **MPI** as "Bus-profile". Leave the default setting **0** for "Own device-address" and enter the "Maximum device-address" (if that differs from default value **31**). On starting up the adapter-cable, be sure there are no addressing conflicts, so the highest node address and the bus profile (MPI/Profibus) must be set-up correctly:



After you have entered the settings, click on the "Save permanently" button. Follow the instructions to apply the configuration permanently.

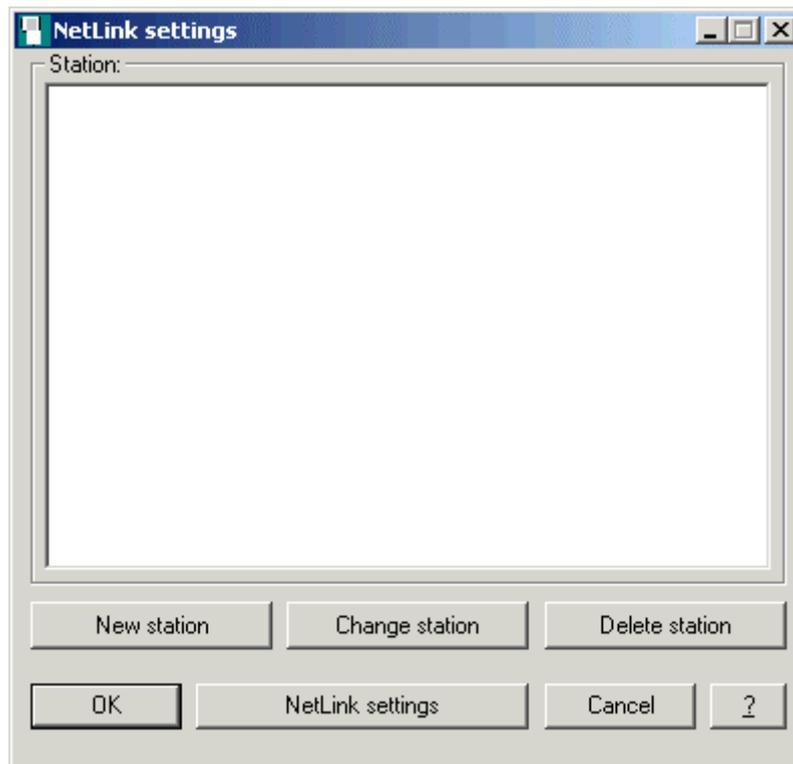


Configuration of the IP address and the communication speed is ready and adapter-cable now can be used.

The firmware version of the connected adapter-cable is also displayed in the "NetLink Settings" dialog box. Clicking on the "Load firmware" button updates the adapter-cable to the latest firmware version. After a safety query, firmware updating starts.

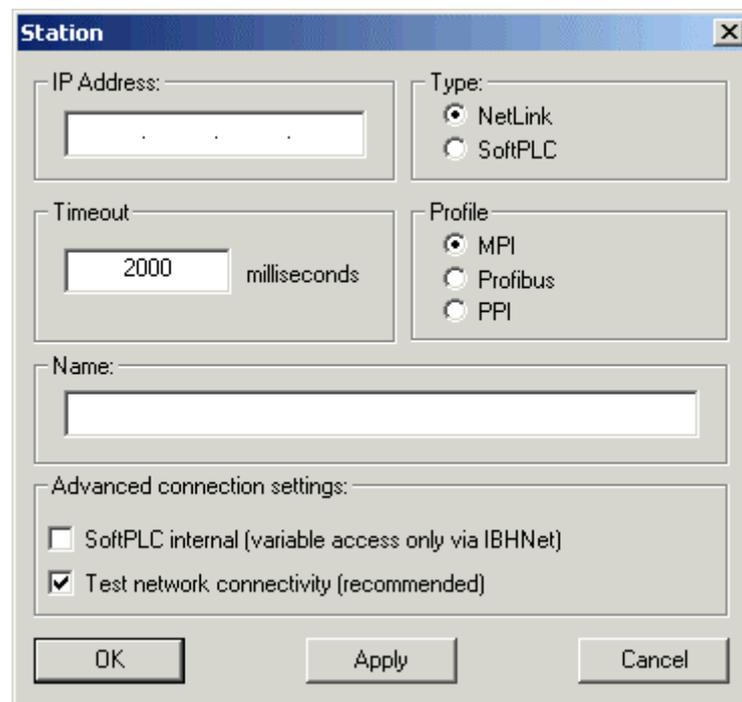
The next step is to configure a meaningful name to make accessing adapter-cable easier. Using meaningful names for adapter-cables makes it unnecessary to note down the IP addresses of all adapter-cables used.

Start the NetLink program from the start menu. The following window appears:

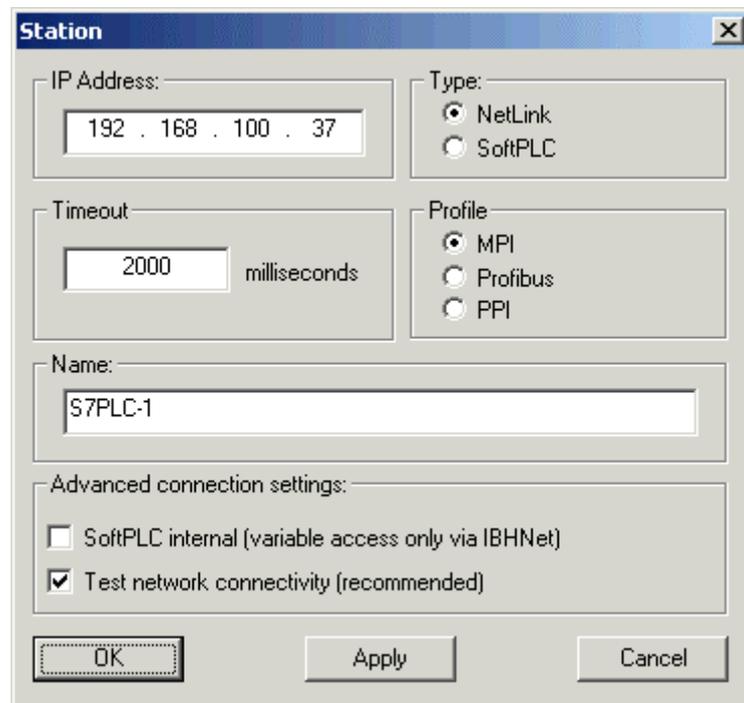


In the "Station" selection field, you can select existing stations, which you can alter if you click on the "Change station" button. The "NetLink settings" button takes you back to the adapter-cable configuration.

We are assuming that no station has been created and that you have to create a new station now. Click on the "New station" button. The following dialog box will appear:



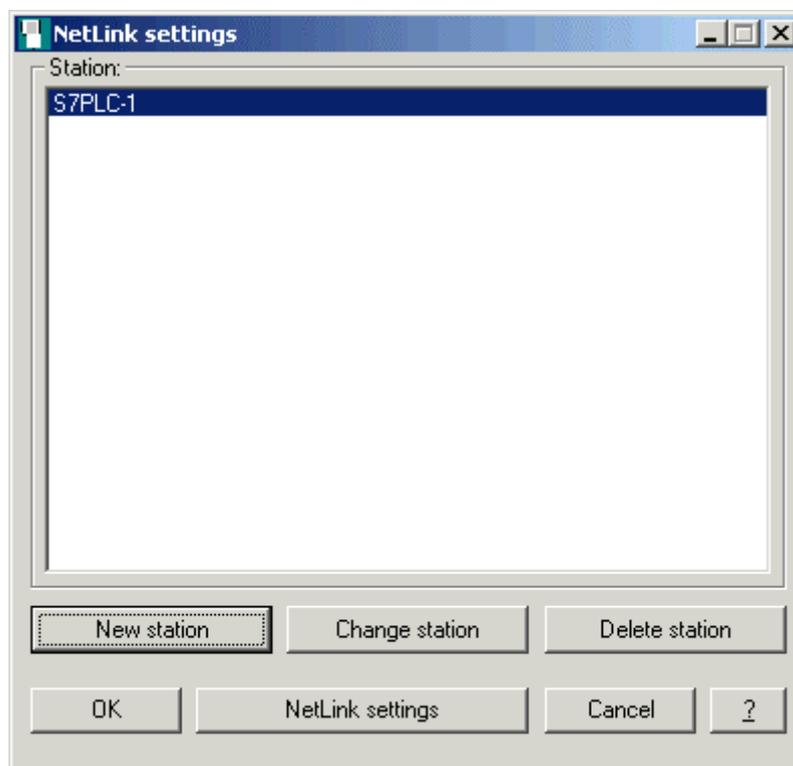
Enter the IP address of the adapter-cable that you want to access by a certain name. Select **NetLink** for the "Type" and **MPI** for "Profile". Assign unique name (e.g. S7PLC-1 as in example below) by which the adapter-cable can be accessed and click on the "Apply" button, then confirm by clicking on the "OK" button:



The 'Station' dialog box is used for configuring a station. It contains the following fields and options:

- IP Address:** A text box containing '192 . 168 . 100 . 37'.
- Type:** Radio buttons for 'NetLink' (selected) and 'SoftPLC'.
- Timeout:** A text box containing '2000' followed by 'milliseconds'.
- Profile:** Radio buttons for 'MPI' (selected), 'Profibus', and 'PPI'.
- Name:** A text box containing 'S7PLC-1'.
- Advanced connection settings:** Checkboxes for 'SoftPLC internal (variable access only via IBHNet)' (unchecked) and 'Test network connectivity (recommended)' (checked).
- Buttons:** 'OK', 'Apply', and 'Cancel'.

The access name of adapter-cable now appears on "NetLink settings" window:

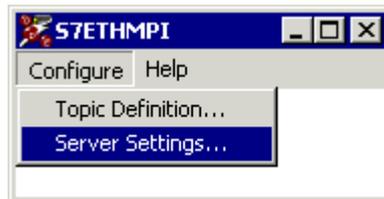


The 'NetLink settings' dialog box displays the configured station name in a list:

- Station:** A list box containing 'S7PLC-1'.
- Buttons:** 'New station', 'Change station', 'Delete station', 'OK', 'NetLink settings', 'Cancel', and '?'.

Configuring the S7ETHMPI Server

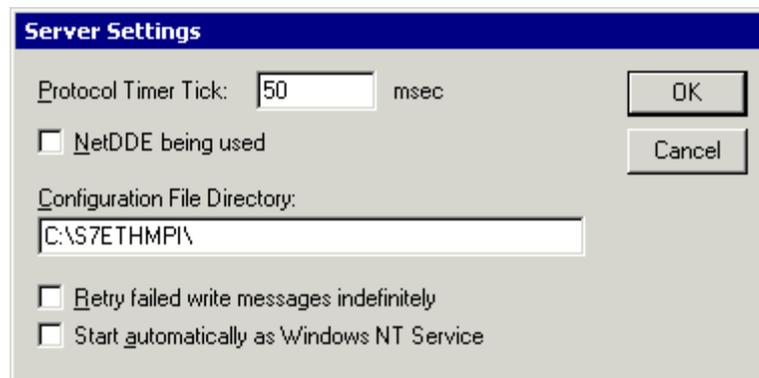
After the S7ETHMPI Server is initially installed, a small amount of configuration is required. Configuring the Server automatically creates a **S7ETHMPI.CFG** file that holds all of the topic definitions entered, as well as the communication port configurations. This file will automatically be placed in the same directory in which **S7ETHMPI.EXE** is located unless the path where the configuration file will be placed is specified via the /Configure/Server Settings... command.



Server Settings Command

A number of parameters that control the internal operation of the Server can be set. In most cases, the default settings for these parameters provide a good performance and do not require changing. However, they can be changed to fine-tune the Server for a specific environment.

To change the Server's internal parameters, invoke the Configure/Server Settings... command. The "Server Settings" dialog box will appear:



The following describes each field in this dialog box:

Protocol Timer Tick

This field is used to change the frequency at which the Server checks for work to do. At this frequency, the Server tries to send one data request to PLC and receive one reply from PLC. If the send/response cycle is too long then more than one activation of Server is necessary to process it. If computer is very busy or some other MS Windows application is taking over the computer then the Server is activated rarely than setting in the **Protocol Timer Tick**.

Note: *The default value is 50 milliseconds. The minimum value is 10 milliseconds.*

NetDDE being used

Select this option if you are networking using NetDDE.

Configuration File Directory

This field is used to specify the path (disk drive and directory) in which S7ETHMPI will save its current configuration file. The S7ETHMPI Server will use this path to load the configuration file the next time it is started.

Note: Only the "path" may be modified with this field. The configuration file is always named **S7ETHMPI.CFG**. There is no limit to the number of configuration files created, although each must be in a separate directory. When using the S7ETHMPI Server with **InTouch**, it is good practice to place the configuration file in the application directory.

Retry failed write messages indefinitely

This field is used to disable the deleting of pending write messages when *slow poll mode* on some topic is started. As default all write messages for this topic are deleted when topic enters the slow poll mode.

Note: Be careful when using this setting if PLC is disconnected or switched off, but client application continues to generate new values to be written to this device - it can cause the computer memory overload with memory allocated for write messages.

Start automatically as Windows NT Service

Enabling this option will cause the S7ETHMPI Server "Suite Link & DDE" version to start as a Windows NT service.

Windows NT offers the capability of running applications even when a user is not logged on to the system. This is valuable when systems must operate in an unattended mode. Enabling this option and rebooting the system will cause the Server to run as a Windows NT service. However, to view configuration information or to reconfigure the Server, the user must log on to the system. Any Server related problems that may arise such as missing adapter cards, licensing failures or device drivers not loading will not be visible to the user until a log on is performed. Disabling this option and rebooting the system will cause the Server to run as a Windows NT application program once again.

Notes:

1. The **Start automatically as Windows NT Service** feature can be activated only with S7ETHMPI Server "Suite Link & DDE" version. To start the S7ETHMPI Server "OPC & DDE" version as Windows NT Service, refer to **Running S7ETHMPI "OPC & DDE" version as Windows NT Service** section of this manual.
2. The Service Startup configuration can be changed by MS Windows NT **Control Panel/Services** configuration dialogs. The **Allow Service to Interact with Desktop** checkbox in "Service" dialog box must be checked (the "Service" dialog box can be invoked by pressing the "Startup" button on "Services" dialog box when Service **S7ETHMPI_IOServer** is selected). If **Allow Service to Interact with Desktop** is not selected then S7ETHMPI Server full functionality is not ensured (e.g. the Server configuration can not be changed, no message boxes will be displayed, etc.).

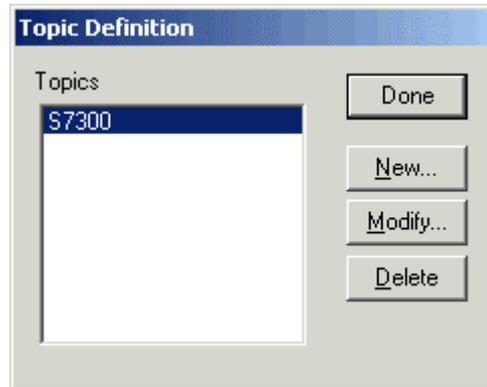
Once all entries have been made, click on **OK**.

Topic Definition Command

The user provides each connected Siemens S7 PLC with an arbitrary name that is used as the Topic Name for all references to this PLC.

The following steps are taken to define the Topic attached to the PLC:

1. Invoke the Configure/Topic Definition... The "Topic Definition" dialog box will appear:



2. To modify an existing topic, select the topic name and click on **M**odify. To define a new topic, click on **N**ew. The "S7ETHMPI Topic Definition" dialog box will appear:

3. Enter the **Topic Name**.

Note: If using *InTouch* the same Topic Name is to be entered in the "Add Access Name" dialog box described in the *Using the S7ETHMPI Server with InTouch* section.

4. Enter the **IP Address** of adapter-cable connected to this PLC - this must be the same IP address assigned to adapter-cable when configuring the communication adapter-cable, see *Configuring the Communication adapter-cable* section upper in this manual.

Note: Additional topics may be associated with the same adapter-cable later.

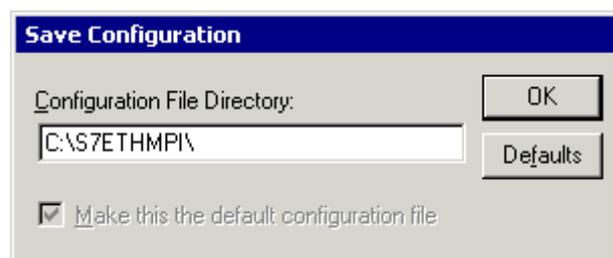
5. Enter the **MPI Address** of S7 PLC to be accessed. This address must match with PLC address entered when configuring the PLC with Simatic STEP 7 software. (Default value is 2.)
6. Set the **Update Interval** field to indicate the frequency the items/points on this topic will be read (polled). Default value is 1000 milliseconds.
7. Set the **Reply Timeout** field to indicate the amount of time (in seconds) the Controller using the selected communication adapter-cable will be given to reply to commands from the Server. Default value is 3 seconds.

When all entries have been made, click on **OK** to process the configuration for this topic.

Select **Done** in "Topic Definition" dialog box when configuration for all Topics has been performed.

Saving S7ETHMPI Configuration File

If the configuration file does not currently exist, or a new configuration path has been specified, the Server will display the "Save Configuration" dialog box:



This dialog box displays the path where the Server is going to save the current configuration file. The path may be changed if necessary. Also, the path can optionally be recorded in the **WIN.INI** file by selecting the "**M**ake this the default configuration file" option. Doing so it will allow the S7ETHMPI Server to find the configuration file automatically each time it is started.

Configuration File Location

When the S7ETHMPI Server starts up, it first attempts to locate its configuration file by first checking the **WIN.INI** file for a path that was previously specified. If the path is not present in the **WIN.INI** file, the Server will assume that the current working directory is to be used.

To start the Server from an application directory configuration file other than the default configuration file a special switch (**/d:**) is used. For example, invoke the **Start/Run** command and enter the following:

S7ETHMPI/d:c:\directoryname

Note: *There is no limit to the number of configuration files that may be created, although each must be in a separate directory.*

Item Names

The S7ETHMPI Server supports item/point names that are consistent with the point naming used by Siemens S7 PLCs. The tables below list the item/point names supported by the S7ETHMPI Server:

Data Blocks

Data Format	Items	Suffix	I/O Tag Type	Range
Bit	D<B,I>d, Xx.y		Discrete	0 or 1
String	D<B,I>d, Sx.v D<B,I>d, STRINGx.v D<B,I>d, Bx		Message Message Integer	String String 0 to 255
Byte	D<B,I>d, BYTEx	DT	Integer Message	0 to 255 1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	D<B,I>d, Bx.v D<B,I>d, BYTEx.v		Message Message	Hex ASCII String Hex ASCII String
Char	D<B,I>d, CHARx	DT	Integer Message	-128 to 127 1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	D<B,I>d, CHARx.v		Message	Hex ASCII String
Word	D<B,I>d, Wn D<B,I>d, WORDn	BCD KT S5T TR D	Integer Integer Integer Message Message Real Message	0 to 65535 0 to 65535 0 to 9999 0.0 to 999.3 0 ms to 2 h 46 m 30 s 0.0 to 9990.0 (s) 1990-1-1 to 2168-12-31
Word Array	D<B,I>d, Wn.v D<B,I>d, WORDn.v		Message Message	Hex ASCII String Hex ASCII String
Integer	D<B,I>d, INTn	BCD D	Integer Integer Message	-32768 to 32767 -999 to 999 1990-1-1 to 2168-12-31
Integer Array	D<B,I>d, INTn.v		Message	Hex ASCII String
Double Word	D<B,I>d, Dm D<B,I>d, DWORDm	BCD TOD T	Integer Integer Integer Message Message	0 to 2147483647 0 to 2147483647 0 to 999999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	D<B,I>d, Dm.v D<B,I>d, DWORDm.v		Message Message	Hex ASCII String Hex ASCII String
Double Integer	D<B,I>d, DINTm	BCD TOD T	Integer Integer Message Message	-2147483648 to 2147483647 -999999999 to 999999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Integer Array	D<B,I>d, DINTm.v		Message	Hex ASCII String
Real	D<B,I>d, REALm		Real	±3.4e38
Real Array	D<B,I>d, REALm.v		Message	Hex ASCII String

Notes:

1. All Data Blocks are **Read/Write**, **d=1...65535**, **x=0...65535**, **n=0...65534**, **m=0...65532**, **y=0...7**, **v=1...131/type size** - this size may vary.
2. The longest string InTouch can process is 131 bytes, so the following maximum length of arrays (**v**) is supported: 131 for String, 65 for Byte Array and Char Array, 32 for Word Array and Integer Array and 16 for Double Word Array, Double Integer Array and Real Array. Arrays are converted into HEX ASCII strings representing the big endian format of the binary data.
3. The S7ETHMPI Server will process a write (POKE) to a Data Block.

Examples:

DB123,W24 – Word starting from address 24 in Data Block 123, I/O Type: Integer

DB23,DINT10BCD - Double Integer starting from address 10 in Data Block 23, value interpreted as BCD, I/O Type: Integer

DI5,X3.0 - Bit 0 in byte with address 3 in Data Block 5, I/O Type: Discrete

DI6,BYTE5,10 - Byte Array with length 10 bytes starting from address 5 in Data Block 6, I/O Type: Message

Flag Bytes (Merker)

Data Format	Items	Suffix	I/O Tag Type	Range
Bit	FXx.y		Discrete	0 or 1
	MXx.y		Discrete	0 or 1
String	FSx,v		Message	String
	MSx,v		Message	String
	FSTRINGx,v		Message	String
	MSTRINGx,v		Message	String
Byte	FBx		Integer	0 to 255
	MBx		Integer	0 to 255
	FBYTEx		Integer	0 to 255
	MBYTEx		Integer	0 to 255
		DT	Message	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	FBx,v		Message	Hex ASCII String
	MBx,v		Message	Hex ASCII String
	FBYTEx,v		Message	Hex ASCII String
	MBYTEx,v		Message	Hex ASCII String
Char	FCHARx		Integer	-128 to 127
	MCHARx		Integer	-128 to 127
		DT	Message	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	FCHARx,v		Message	Hex ASCII String
	MCHARx,v		Message	Hex ASCII String
Word	FWn		Integer	0 to 65535
	MWn		Integer	0 to 65535
	FWORDn		Integer	0 to 65535
	MWORDn		Integer	0 to 65535
		BCD	Integer	0 to 9999
		KT	Message	0.0 to 999.3
		S5T	Message	0 ms to 2 h 46 m 30 s
		TR	Real	1.0 to 9990.0 (s)
		D	Message	1990-1-1 to 2168-12-31

Flag Bytes (Merker) (continued)

Data Format	Items	Suffix	I/O Tag Type	Range
Word Array	FWn,v MWn,v FWORDn,v MWORDn,v		Message Message Message Message	Hex ASCII String Hex ASCII String Hex ASCII String Hex ASCII String
Integer	FINTn FINTn	BCD D	Integer Integer Integer Message	-32768 to 32767 -32768 to 32767 -999 to 999 1990-1-1 to 2168-12-31
Integer Array	FINTn,v MINTn,v		Message Message	Hex ASCII String Hex ASCII String
Double Word	FDm MDm FDWORDm MDWORDm	BCD TOD T	Integer Integer Integer Integer Integer Message Message	0 to 2147483647 0 to 2147483647 0 to 2147483647 0 to 2147483647 0 to 999999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	FDm,v MDm,v FDWORDm,v MDWORDm,v		Message Message Message Message	Hex ASCII String Hex ASCII String Hex ASCII String Hex ASCII String
Double Integer	FDINTm MDINTm	BCD TOD T	Integer Integer Integer Message Message	-2147483648 to 2147483647 -2147483648 to 2147483647 -9999999 to 9999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Integer Array	FDINTm,v MDINTm,v		Message Message	Hex ASCII String Hex ASCII String
Real	FREALm MREALm		Real Real	±3.4e38 ±3.4e38
Real Array	FREALm,v MREALm,v		Message Message	Hex ASCII String Hex ASCII String

Notes:

1. All Flags are **Read/Write**, $x=0\dots65535$, $n=0\dots65534$, $m=0\dots65532$, $y=0\dots7$, $v=1\dots131/\text{type size}$ - this size may vary.
2. The longest string *InTouch* can process is 131 bytes, so the following maximum length of arrays (v) is supported: 131 for String, 65 for Byte Array and Char Array, 32 for Word Array and Integer Array and 16 for Double Word Array, Double Integer Array and Real Array. Arrays are converted into HEX ASCII strings representing the big endian format of the binary data.
3. The S7ETHMPI Server will process a write (POKE) to a Flag Byte.

Examples:

FB12 - Byte with address 12, I/O Type: Integer

MDWORD60BCD - Double Word starting from address 60, value interpreted as BCD, I/O Type: Integer

FX7.2 - Bit 2 in byte with address 7, I/O Type: Discrete

MINT5,10 - Integer Array with length 10 integers (20 bytes) starting from address 5, I/O Type: Message

Input Bytes (Eingänge)

Data Format	Items	Suffix	I/O Tag Type	Range
Bit	Ix.y		Discrete	0 or 1
	Ex.y		Discrete	0 or 1
	IXx.y		Discrete	0 or 1
	EXx.y		Discrete	0 or 1
String	ISx,v		Message	String
	ESx,v		Message	String
	ISTRINGx,v		Message	String
	ESTRINGx,v		Message	String
Byte	IBx		Integer	0 to 255
	EBx		Integer	0 to 255
	IBYTEx		Integer	0 to 255
	EBYTEx		Integer	0 to 255
		DT	Message	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	IBx,v		Message	Hex ASCII String
	EBx,v		Message	Hex ASCII String
	IBYTEx,v		Message	Hex ASCII String
	EBYTEx,v		Message	Hex ASCII String
Char	ICHARx		Integer	-128 to 127
	ECHARx		Integer	-128 to 127
		DT	Message	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	ICHARx,v		Message	Hex ASCII String
	ECHARx,v		Message	Hex ASCII String
Word	IWn		Integer	0 to 65535
	EWn		Integer	0 to 65535
	IWORDn		Integer	0 to 65535
	EWORDn		Integer	0 to 65535
		BCD	Integer	0 to 9999
		KT	Message	0.0 to 999.3
		S5T	Message	0 ms to 2 h 46 m 30 s
		TR	Real	2.0 to 9990.0 (s)
	D	Message	1990-1-1 to 2168-12-31	
Word Array	IWn,v		Message	Hex ASCII String
	EWn,v		Message	Hex ASCII String
	IWORDn,v		Message	Hex ASCII String
	EWORDn,v		Message	Hex ASCII String
Integer	IINTn		Integer	-32768 to 32767
	EINTn		Integer	-32768 to 32767
		BCD	Integer	-999 to 999
		D	Message	1990-1-1 to 2168-12-31
Integer Array	IINTn,v		Message	Hex ASCII String
	EINTn,v		Message	Hex ASCII String

Input Bytes (Eingänge) (continued)

Data Format	Items	Suffix	I/O Tag Type	Range
Double Word	IDm EDm IDWORDm EDWORDm	BCD TOD T	Integer Integer Integer Integer Integer Message Message	0 to 2147483647 0 to 2147483647 0 to 2147483647 0 to 2147483647 0 to 999999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	IDm,v EDm,v IDWORDm,v EDWORDm,v		Message Message Message Message	Hex ASCII String Hex ASCII String Hex ASCII String Hex ASCII String
Double Integer	IDINTm EDINTm	BCD TOD T	Integer Integer Integer Message Message	-2147483648 to 2147483647 -2147483648 to 2147483647 -99999999 to 99999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Integer Array	IDINTm,v EDINTm,v		Message Message	Hex ASCII String Hex ASCII String
Real	IREALm EREALm		Real Real	±3.4e38 ±3.4e38
Real Array	IREALm,v EREALm,v		Message Message	Hex ASCII String Hex ASCII String

Notes:

- All Inputs are **Read Only**, $x=0\dots65535$, $n=0\dots65534$, $m=0\dots65532$, $y=0\dots7$, $v=1\dots131/\text{type size}$ - this size may vary.
- The longest string InTouch can process is 131 bytes, so the following maximum length of arrays (v) is supported: 131 for String, 65 for Byte Array and Char Array, 32 for Word Array and Integer Array and 16 for Double Word Array, Double Integer Array and Real Array. Arrays are converted into HEX ASCII strings representing the big endian format of the binary data.
- The S7ETHMPI Server will not process a write (POKE) to an Input Byte.

Examples:

ICHAR13 - Char with address 13, I/O Type: Integer

EDINT40TOD - Double Integer starting from address 40, value interpreted as TOD, I/O Type: Message

I4.3 - Bit 3 in byte with address 4, I/O Type: Discrete

EREAL5,10 - Real Array with length 10 reals (40 bytes) starting from address 5, I/O Type: Message

Output Bytes (Ausgänge)

Data Format	Items	Suffix	I/O Tag Type	Range
Bit	Ox.y		Discrete	0 or 1
	Ax.y		Discrete	0 or 1
	OXx.y		Discrete	0 or 1
	AXx.y		Discrete	0 or 1
String	OSx,v		Message	String
	ESx,v		Message	String
	OSTRINGx,v		Message	String
	ASTRINGx,v		Message	String
Byte	OBx		Integer	0 to 255
	ABx		Integer	0 to 255
	OBYTEx		Integer	0 to 255
	ABYTEx		Integer	0 to 255
		DT	Message	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Byte Array	OBx,v		Message	Hex ASCII String
	ABx,v		Message	Hex ASCII String
	OBYTEx,v		Message	Hex ASCII String
	ABYTEx,v		Message	Hex ASCII String
Char	OCHARx		Integer	-128 to 127
	ACHARx		Integer	-128 to 127
		DT	Message	1990-1-1-0:00:00.000 to 2089-12-31-23:59:59.999
Char Array	OCHARx,v		Message	Hex ASCII String
	ACHARx,v		Message	Hex ASCII String
Word	OWn		Integer	0 to 65535
	AWn		Integer	0 to 65535
	OWORDn		Integer	0 to 65535
	AWORDn		Integer	0 to 65535
		BCD	Integer	0 to 9999
		KT	Message	0.0 to 999.3
		S5T	Message	0 ms to 2 h 46 m 30 s
		TR	Real	3.0 to 9990.0 (s)
		D	Message	1990-1-1 to 2168-12-31
Word Array	OWn,v		Message	Hex ASCII String
	AWn,v		Message	Hex ASCII String
	OWORDn,v		Message	Hex ASCII String
	AWORDn,v		Message	Hex ASCII String
Integer	OINTn		Integer	-32768 to 32767
	AINTn		Integer	-32768 to 32767
		BCD	Integer	-999 to 999
		D	Message	1990-1-1 to 2168-12-31
Integer Array	OINTn,v		Message	Hex ASCII String
	AINTn,v		Message	Hex ASCII String

Output Bytes (Ausgänge) (continued)

Data Format	Items	Suffix	I/O Tag Type	Range
Double Word	ODm ADm ODWORDm ADWORDm	BCD TOD T	Integer Integer Integer Integer Integer Message Message	0 to 2147483647 0 to 2147483647 0 to 2147483647 0 to 2147483647 0 to 999999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Word Array	ODm,v ADm,v ODWORDm,v ADWORDm,v		Message Message Message Message	Hex ASCII String Hex ASCII String Hex ASCII String Hex ASCII String
Double Integer	ODINTm ADINTm	BCD TOD T	Integer Integer Integer Message Message	-2147483648 to 2147483647 -2147483648 to 2147483647 -99999999 to 99999999 0:00:00.000 to 23:59:59.999 -24D_20H_31M_23S_648MS to 24D_20H_31M_23S_647MS
Double Integer Array	ODINTm,v ADINTm,v		Message Message	Hex ASCII String Hex ASCII String
Real	OREALm AREALm		Real Real	±3.4e38 ±3.4e38
Real Array	OREALm,v AREALm,v		Message Message	Hex ASCII String Hex ASCII String

Notes:

1. All Outputs are **Read/Write**, $x=0\dots65535$, $n=0\dots65534$, $m=0\dots65532$, $y=0\dots7$, $v=1\dots131/\text{type size}$ - this size may vary.
2. The longest string InTouch can process is 131 bytes, so the following maximum length of arrays (v) is supported: 131 for String, 65 for Byte Array and Char Array, 32 for Word Array and Integer Array and 16 for Double Word Array, Double Integer Array and Real Array. Arrays are converted into HEX ASCII strings representing the big endian format of the binary data.
3. The S7ETHMPI Server will process a write (POKE) to an Output Byte.

Examples:

OB20 - Byte with address 20, I/O Type: Integer

ASTRING30,10 - String starting from address 30, length 10 bytes, I/O Type: Message

OX13.4 - Bit 4 in byte with address 13, I/O Type: Discrete

AREAL10 - Real starting from address 10, I/O Type: Real

Monitoring and Controlling Communication with a PLC

For each topic, there are following additional items offered by S7ETHMPI Server to monitor and control the communication with PLC.

STATUS

For each topic, there is a built-in discrete item that indicates the state of communication with PLC. The discrete item (**STATUS**) is set to **0** when communication fails and set to **1** when communication is successful. The **STATUS** value is set to 0 after 3 consecutive unsuccessful retries to communicate with this PLC.

From **InTouch** the state of communication may be read by defining an I/O Discrete tagname and associating it with the topic configured for the PLC and using **STATUS** as the item name.

From **Excel**, the status of the communication may be read by entering the following formula in a cell:

=S7ETHMPI|topic!STATUS

where **topic** is the name of topic (e.g. plc01) configured for PLC.

RUN

The **RUN** item is a Discrete type Read Only item used to monitor the state of PLC program: value 1 (ON) means PLC program is running and value 0 (OFF) means PLC program is not running.

UPDATEINTERVAL

The **UPDATEINTERVAL** item is an Integer type Read/Write item used to access the currently set Update Interval (see *Topic Definition Command* section). It indicates the current requested update interval (in milliseconds). The value of this item can be read through DDE, Suite Link or OPC. Client can poke new values to this item. The range of valid values is from 10 to 2147483647 milliseconds. The value of zero indicates that no items on this topic are updated. The write commands are still executed (new values written to PLC) if **UPDATEINTERVAL** value is 0 (zero).

Note: By poking a value of zero to the **UPDATEINTERVAL** item, a client can stop all update activities on the corresponding topic without having to deactivate the items.

MAXINTERVAL

The **MAXINTERVAL** item is an Integer type Read Only item used to access the measured maximum update interval (in milliseconds) of all items for the corresponding topic for the last completed poll cycle. The range of valid values is from 0 to 2147483647 milliseconds.

The **UPDATEINTERVAL** and **MAXINTERVAL** items can be used to tune the performance of communication.

ITEMCOUNT

The **ITEMCOUNT** item is an Integer type Read Only item used to access the number of active items in the corresponding topic. The range of valid values is from 0 to 2147483647.

ERRORCOUNT

The **ERRORCOUNT** item is an Integer type Read Only item used to access the number of active items with errors in the corresponding topic. The range of valid values is from 0 to 2147483647.

ERRORITEMS

The **ERRORITEMS** item is an Integer type Read/Write Only (unique for each topic) used to access the total number of items with invalid item names (these items are rejected by Server). The **ERRORITEMS** value can be reset by writing 0 to this item. The range of valid values is from 0 to 2147483647.

WRITECOUNT

The **WRITECOUNT** item is an Integer type Read Only item used to access the number of write commands (messages) waiting for execution. The range of valid values is from 0 to 2147483647.

For example, in following way the **WRITECOUNT** item can be used to avoid the increasing of memory occupied by not executed write commands:

- activate the hot link with **WRITECOUNT** item and start to monitor it;
- activate new write command (by poking new value) only if value of **WRITECOUNT** becomes equal to 0, e.g. all previous write commands are executed and memory occupied by them is freed.

SUSPEND

Special Read/Write Discrete Item **SUSPEND** may be used to control the communication with a separate topic. If application changes **SUSPEND** value from 0 to 1 then communication with topic is suspended. If **SUSPEND** value is changed back to 0 then communication with this topic is resumed.

Note: If topic is suspended by setting **SUSPEND** value to 1, then Server rejects all new write values to this topic, i.e. no new write messages are created after **SUSPEND** value has changed from 0 to 1.

Using the S7ETHMPI Server with Suite Link and DDE Clients

The “**Suite Link & DDE**” version of S7ETHMPI Server is accessible from Suite Link clients (e.g. InTouch) and DDE clients (e.g. Excel). The “**OPC & DDE**” version of S7ETHMPI Server is accessible from DDE clients.

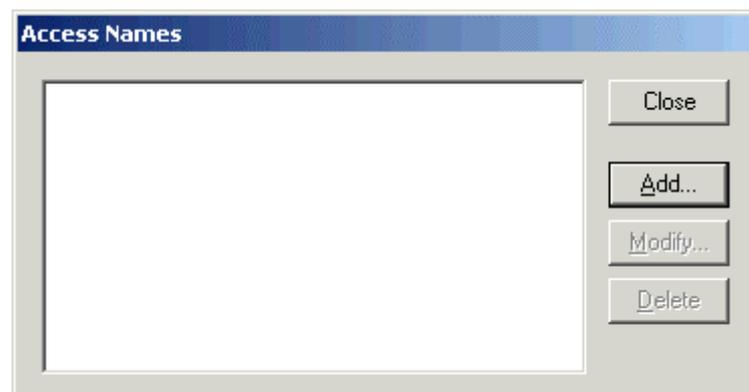
Using the S7ETHMPI Server with InTouch

To access to data from Siemens S7 PLCs from InTouch by using S7ETHMPI Server, the Access Names and Tag names should be defined in **WindowMaker**.

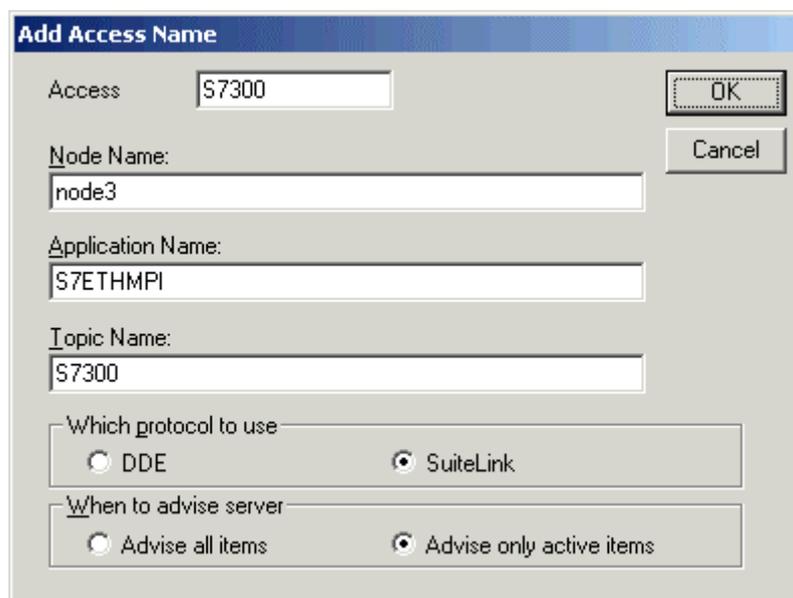
Defining the Access Names

InTouch uses **Access Names** to reference real-time I/O data. Each Access Name equates to an I/O address, which can contain a **Node**, **Application**, and **Topic**. In a distributed application, I/O references can be set up as global addresses to a network I/O Server or local addresses to a local I/O Server.

To define the Access Names in WindowMaker node invoke the */Special/Access Names...* command. The "Access Names" dialog box will appear:



Click on **Add...**. The "Add Access Name" Dialog Box will appear:



Note: If **Add** is selected, this dialog box will be blank when it initially appears. Data has been entered here to illustrate the entries that are made.

The following fields are required entries when entering an Access Name Definition:

Access Name

In the Access Name box type the name you want InTouch to use to this Access Name. (For simplicity, use the same name that you will use for the **Topic Name** here.)

Node Name

If the data resides in a network I/O Server, in the Node Name box, type the remote node's name.

Application Name

In the Application Name box, type the actual program name for the I/O Server program from which the data values will be acquired. In case the values are coming from the S7ETHMPI Server the "S7ETHMPI" is used. Do not enter the .exe extension portion of the program name.

Topic Name

Enter the name defined for the topic in the S7ETHMPI Server to identify the topic the S7ETHMPI Server will be accessing.

The Topic Name is an application-specific sub-group of data elements. In the case of data coming from a S7ETHMPI Server program, the topic name is the exact same name configured for the topic in the S7ETHMPI Server.

Note: This will usually be the same as the "Access Name", although, if desired, they may be different. However, it must be the same name used when the topics were configured in section **Configuring the S7ETHMPI Server**.

Which protocol to use

Select the protocol (DDE or Suite Link) that you are using.

When to advise server

Select **Advise all items** if you want the Server program to poll for all data whether or not it is in visible windows, alarmed, logged, trended or used in a script. Selecting this option will impact performance, therefore its use is not recommended.

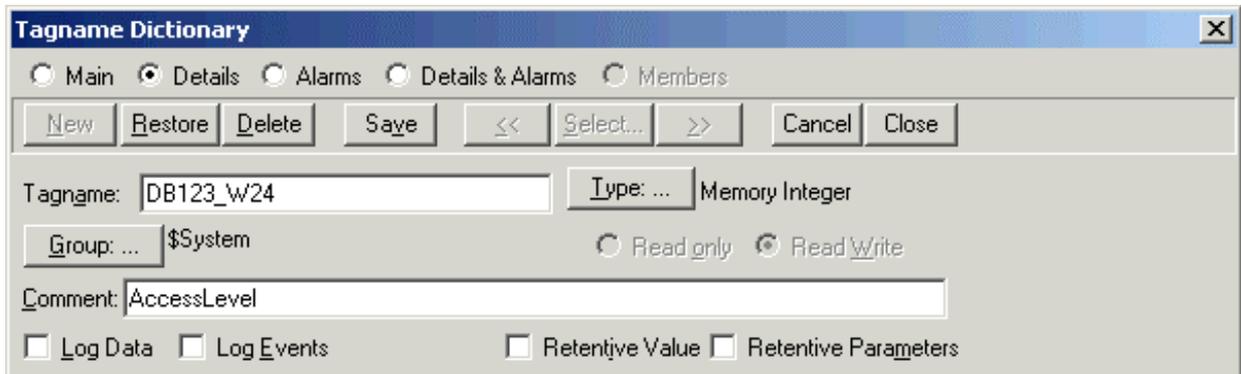
Select **Advise only active items** if you want the Server program to poll only points in visible windows and points that are alarmed, logged, trended or used in any script.

Click **OK** to accept the new Access Name and close the "Add Access Name" dialog box. The "Access Names" dialog box will reappear displaying the new Access Name selected in the list.

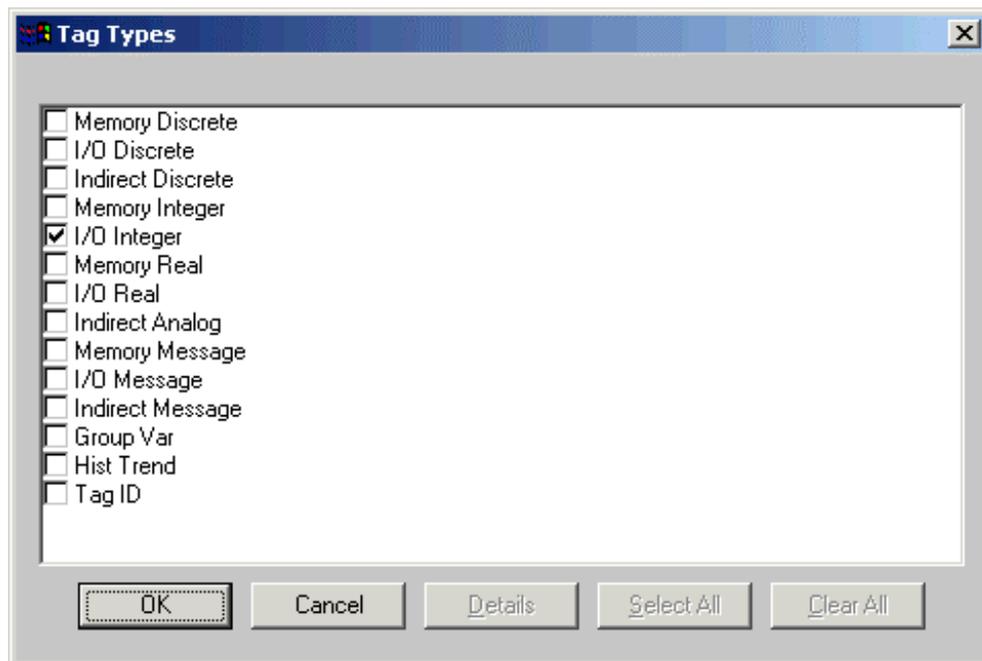
Click **Close** to close the "Access Names" dialog box.

Defining the Tag names

To define the Tag names associated with the new "Access Name", invoke the */Special/TagName Dictionary...* command (in **WindowMaker**). The "TagName Dictionary" dialog box will appear. Click on **New** and enter the **TagName**. (The tagname defined here is the name **InTouch** will use. The S7ETHMPI Server does not see this name.):



Select the tag type by clicking on the **Type:...** button. The "Tag Types" dialog box will appear:



To access S7ETHMPI items, the type must be **I/O Discrete**, **I/O Integer**, **I/O Real** or **I/O Message**. Select the Tag type.

The "Details" dialog box for the tag name will appear:

Initial Value: <input type="text" value="0"/>	Min EU: <input type="text" value="-32768"/>	Max EU: <input type="text" value="32767"/>
Deadband: <input type="text" value="0"/>	Min Raw: <input type="text" value="-32768"/>	Max Raw: <input type="text" value="32767"/>
Eng Units: <input type="text"/>	Log Deadband: <input type="text" value="0"/>	Conversion: <input checked="" type="radio"/> Linear <input type="radio"/> Square Root
Access Name: ... Unassigned		
Item: <input type="text"/>		<input type="checkbox"/> Use Tagname as Item Name

Select the Access name for S7ETHMPI Server by clicking on the **Access Name:...** button. The "Access Names" dialog box will appear:

Access Names

<input type="text" value="S7300"/>	Close
	Add...
	Modify...
	Delete

Select the appropriate Access Name and click on **Close**. (If the Access Name has not been defined as previously described, click on **Add** and define the Access Name now.)

The "Details" dialog box will appear displaying the selected Access Name:

Initial Value: <input type="text" value="0"/>	Min EU: <input type="text" value="-32768"/>	Max EU: <input type="text" value="32767"/>
Deadband: <input type="text" value="0"/>	Min Raw: <input type="text" value="-32768"/>	Max Raw: <input type="text" value="32767"/>
Eng Units: <input type="text"/>	Log Deadband: <input type="text" value="0"/>	Conversion: <input checked="" type="radio"/> Linear <input type="radio"/> Square Root
Access Name: ... S7300		
Item: <input type="text"/>		<input type="checkbox"/> Use Tagname as Item Name

For integers and reals fill in the **Min EU**, **Max EU**, **Min Raw** and **Max Raw** fields. These fields control the range of values that will be accepted from the Server and how the values are scaled. If no scaling is desired, **Min EU** should be equal to **Min Raw** and **Max EU** equal to **Max Raw**.

Enter the S7ETHMPI item name to be associated with this tagname in the **Item:** field in the "Details" box:

Initial Value:	<input type="text" value="0"/>	Min EU:	<input type="text" value="-32768"/>	Max EU:	<input type="text" value="32767"/>
Deadband:	<input type="text" value="0"/>	Min Raw:	<input type="text" value="-32768"/>	Max Raw:	<input type="text" value="32767"/>
Eng Units:	<input type="text"/>	Log Deadband:	<input type="text" value="0"/>	Conversion <input checked="" type="radio"/> Linear <input type="radio"/> Square Root	
Access Name: ...	<input type="text" value="S7300"/>				
Item:	<input type="text" value="DB123.W24"/>				
<input type="checkbox"/> Use Tagname as Item Name					

(Refer to the **Item Names** section below for complete details.)

Where applicable, the **Use Tagname as Item Name** option may be selected to automatically enter the tag name in this field. **Note:** *The tag name can only be used if it follows the conventions listed in the **Item Names** section.*

Once all entries have been made, click on the **Save** button (in the top dialog box) to accept the new tag name. To define additional tagnames click on the **New** button. To return to the **WindowMaker** main screen, select **Close**.

Monitoring the Status of Communication with InTouch

InTouch supports built-in topic names called **DDEStatus** and **IOStatus** that are used to monitor the status of communications between the Server and InTouch. For more information on the built-in topic names DDEStatus and IOStatus, see your online "InTouch User's Guide".

The status of communication between the Server and InTouch can be read into **Excel** by entering the following DDE reference formula in a cell on a spreadsheet (in following examples **S7300** is the Topic Name configured for S7ETHMPI Server):

=view|DDEStatus!S7300

or

=view|IOStatus!S7300

Notes on Using Microsoft Excel

Data from the S7ETHMPI topic (S7 PLC) may be accessed from Excel spreadsheets. To do so, enter a formula like the following into a cell on the spreadsheet.

= S7ETHMPI|topic|item

Sometimes, Excel requires the **topic** and/or **item** 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 names described in the **Item Names** section.

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:

```
=S7ETHMPI|'S7300!'DB123,W24'
=S7ETHMPI |'S7300!'FB12'
=S7ETHMPI |'PLC1!'I4.3'
```

Note: Refer to the Microsoft Excel manual for complete details on entering Remote Reference formulas for cells.

Writing Values to S7ETHMPI Points

Values may be written to the Server from Microsoft Excel by creating an Excel macro that uses the **POKE** command. The proper command is entered in Excel as follows:

```
channel=INITIATE("S7ETHMPI ","topicname")
=POKE(channel,"itemname", Data_Reference)
=TERMINATE (channel)
=RETURN()
```

The following describes each of the above **POKE** macro statements:

channel=INITIATE("S7ETHMPI ","topicname")

Opens a channel to a specific topic name (defined in the Server) in an application with name S7ETHMPI (the executable name less the .EXE) and assigns the number of that opened channel to **channel**.

Note: By using the **channel=INITIATE** statement the word **channel** must be used in the **=POKE** statement instead of the actual cell reference. The **"applicationname"** and **"topicname"** portions of the formula must be enclosed in quotation marks.

=POKE(channel,"itemname", Data_Reference)

POKEs the value contained in the **Data_Reference** to the specified item name (actual location in the Siemens equipment) via the **channel** number returned by the previously executed **INITIATE** function. **Data_Reference** is the row/column ID of the cell containing the data value. For **"itemname"**, use some of the valid item names described in the **Item Names** section.

=TERMINATE(channel)

Closes the channel at the end of the macro. Some applications have a limited number of channels. Therefore they should be closed when finished. **Channel** is the channel number returned by the previously executed **INITIATE** function.

=RETURN()

Marks the end of the macro.

The following is an example of Excel macro used to poke value from cell B2 to topic **S7300** item **DB123,W24**:

```
PokeMacro -Ctrl a
=INITIATE("S7ETHMPI ","S7300")
=POKE(A2,"DB123,W24",B2)
=ON.TIME(NOW()+0.01,"TerminateDDEChannel")
=RETURN()
```

TerminateDDEChannel
=TERMINATE(A2)
=RETURN()

Note: Refer to the Microsoft Excel manual for complete details on entering Remote Reference formulas for cells.

Using the S7ETHMPI Server with OPC Clients

The “**OPC & DDE**” version of S7ETHMPI Server is accessible from OPC Clients.

There are following general steps needed to access an OPC item from S7ETHMPI Server:

1. Run OPC Client application and select the “S7ETHMPI OPC and DDE Server” from the list of available OPC Servers. If S7ETHMPI Server currently is not running, it will start automatically.
2. Create a new group (or topic if Wonderware OPCLink application is used).
3. If OPC Client supports the validating of items, validate the item before adding it.
4. Add the item. Depending on OPC Client it can be done in several different ways, for example:
 - a) By entering separately the access path to topic name (valid topic name configured in S7ETHMPI Topic definition) and separately the item name.
 - b) By entering the full path to item name in the format **TopicName.ItemName** where **TopicName** is the valid topic name configured in S7ETHMPI Topic definition.
 - c) By browsing the server address space.

By default the S7ETHMPI Server is installed and used as a local OPC Server - both OPC Server and OPC Client reside on same computer. The S7ETHMPI Server can run also as a remote OPC Server - in this case OPC Server and OPC Client are located on separate computers. Accessing the remote OPC Server is same as for local OPC Server, but some DCOM (Distributed COM) configuration is required before accessing the remote OPC Server. The DCOM configuration must be done both on OPC Server and OPC Client computers.

Configuring DCOM

To access S7ETHMPI Server as a remote OPC Server, it is necessary to install S7ETHMPI Server on both (OPC Server and OPC Client) computers. Also the DCOM must be configured on both computers.

After Server installation the System Administrator must configure DCOM by **Dcomcnfg.exe** (or Dcomcnfg32.exe for Win9x) system tool. This utility is located in the Windows system directory – e.g. in \WinNT\system32\ or \Win9x\system\.

Below is a simple example how to configure DCOM on NT Workstations for OPC Server computer (computer name *JohnB*) and on OPC Client computer (computer name *SteveL*).

Action	Remote OPC Server Computer name – <i>JohnB</i>	OPC Client Computer name – <i>SteveL</i>
Install the OPC Server.	✓	✓
Run Dcomcnfg.exe	✓	✓
Invoke Default Properties and set Default Authentication Level to (<i>None</i>), Default Impersonation Level to <i>Impersonate</i> .	✓	✓
Select OPC Server from Applications list and click on the Properties... button. Click on the Location tab, uncheck Run application on this computer , check Run application on the following computer and browse the remote computer <i>JohnB</i> .		✓
Edit Security settings: 1) set the following custom access permissions : NETWORK, SYSTEM, <i>SteveL</i> ; 2) set the following custom launch permissions : INTERACTIVE, SYSTEM, NETWORK, <i>SteveL</i> ; 3) be sure the Default Configuration Permissions contain SYSTEM.	✓	
Click on the Identity tab and select The interactive user .	✓	

Before starting a remote OPC Server, be sure the OPC Server computer and OPC Client computer can access each other on the network. The “Remote Procedure Call” Service should be started on OPC Server computer.

Now remote OPC Server is accessible for OPC Client on computer *SteveL*. To allow the access to more OPC Clients, configure DCOM on each OPC Client computer.

The following table contains most frequent errors when configuring DCOM.

Error message	Possible reason
DCOM not installed	DCOM has not been installed
Server execution failed	<ol style="list-style-type: none"> 1) OPC Server can not be started 2) Identity for OPC server not properly configured 3) OPC Server is not located on a local hard disk 4) OPC Server path in registry is too long or uses LFN (Long File Names) 5) DCOMCNFG Location is not set to Run on this computer.
Class not registered	OPC Server has not been registered
RPC server is unavailable	<ol style="list-style-type: none"> 1) Remote Procedure Call service is not running on the OPC Server computer 2) Invalid computer name for remote OPC Server 3) Make sure TCP/IP is installed properly
Interface not supported	<ol style="list-style-type: none"> 1) Permission not granted to OPC Client 2) Guest account disabled
Access is denied	<ol style="list-style-type: none"> 1) DCOM security not configured properly 2) OPC Server application not located on local hard disk 3) SYSTEM account in DCOMCNFG must have Access, Launch and Configure privileges
Error 80070776	Network error - TCP/IP has not been configured properly
Catastrophic failure	<ol style="list-style-type: none"> 1) Trying to access an object before it is created 2) Unhandled exception is occurs on the OPC Server
Not enough storage	SYSTEM account in DCOMCNFG must have Access , Launch and Configure privileges

Running S7ETHMPI “OPC & DDE” version as Windows NT Service

To install S7ETHMPI Server “OPC & DDE” version to run as **Windows NT Service**, the S7ETHMPI Server must be started with command line parameter `"/Service"`:

S7ETHMPI /Service

After this the “S7ETHMPI OPC & DDE Server” NT Service will be installed with Startup type “Manual”. The Service Startup configuration can be changed by MS Windows NT *Control Panel/Services* configuration dialog boxes. The **Allow Service to Interact with Desktop** checkbox in “Service” dialog box must be checked (the “Service” dialog box can be invoked by pressing the “Startup” button on “Services” dialog box when Service **S7ETHMPI OPC & DDE Server** is selected). If **Allow Service to Interact with Desktop** is not selected then S7ETHMPI Server full functionality is not ensured (e.g. the Server configuration can not be changed, no message boxes will be displayed, etc.).

To use S7ETHMPI Server “OPC & DDE” version as Windows NT Service you may need to configure DCOM. For details of configuring DCOM refer to *Configuring DCOM* section of this manual. If “S7ETHMPI OPC & DDE Server” NT Service will be accessed only from

local OPC clients (i.e. S7ETHMPI Server will not be used as a remote OPC Server), then **custom access** and **launch permissions** "NETWORK" are not needed.

To uninstall "S7ETHMPI OPC & DDE Server" NT Service, at first the Service must be stopped by *Control Panel/Services/Stop* and then S7ETHMPI Server must be started manually with command line parameter "/DelService":

S7ETHMPI /DelService

After this the S7ETHMPI Server "OPC & DDE" version will be still registered and accessible to OPC clients.

Using S7ETHMPI with OPCLink Server

The Wonderware OPCLink I/O Server (hereafter referred to as "OPCLink") is a Microsoft Windows application program that acts as a communication protocol converter and allows other Windows application programs access to data from local or remote OPC servers. OPCLink connects to OPC servers, converts client commands to OPC protocol and transfers data back to clients using DDE, FastDDE, or Suite Link protocols.

Please refer to *Wonderware OPCLink Server and OPC Browser User's Guide* for details how to install, start and use the OPCLink Server. The following information in this section covers only the most important points about using "OPC & DDE" version of S7ETHMPI Server with OPCLink Server.

OPCLink Topic Definition

The **Topic Definition** option from OPC Link Configure menu is used to create, modify, or delete OPCLink topic definitions. If OPC Link will communicate with S7ETHMPI Server then there must exist one or more topics defined for S7ETHMPI Server. There are following important fields on the "OPCLink Topic Definition" dialog box:

Topic Name

Enter a unique name (e.g. **Controller1**) for the PLC in this field. If using InTouch then same Topic Name is to be entered in the "Add Access Name" dialog box when defining the Access Names for OPCLink Server in InTouch WindowMaker.

OPC Server Name

Select the name of the OPC server (**S7ETHMPI.OPC_Server**) that will be used by this topic. The list box shows the registered OPC servers in the system.

OPC Path

Enter the name of the OPC path (e.g. **S7300.**) used by this topic. This OPC path is the first part of a full OPC item name string common to all items that will be used in this topic. The available OPC paths for S7ETHMPI Server can be obtained by clicking on "Browse" button (this allows to view the S7ETHMPI Server's exposed address space).

Update Interval

Enter the frequency (in milliseconds) that the server will acquire data for the items/points associated with this topic. If 0 (zero) is entered here, OPCLink will not gather data from S7ETHMPI Server.

Browse

Clicking on this button initiates the browsing through exposed address space of S7ETHMPI Server. The starting addresses of each available data area and names of pre-defined (additional) items will appear on “Browse OPC items:” window in alphabetical order.

Accessing S7ETHMPI Items via the OPCLink Server

The communication protocol addresses an element of data in a conversation that uses a three-part naming convention that includes the **application name**, **topic name** and **item name**. The following briefly describes each portion of this naming convention:

application name

The name of the Windows program (server) that will be accessing the data element. In the case of data coming from or going to S7ETHMPI Server “OPC & DDE” version, the application portion of the address is **OPCLINK**.

topic name

Meaningful names are configured to identify specific devices (PLCs). These names are then used as the topic name in all conversations to that device (PLC). This must be same name as **Topic Name** entered in the “OPCLink Topic Definition” dialog box, for example, **Controller1**.

Note! You can define multiple topic names for the same PLC to poll different points at different rates.

item name

A specific data element within the specified topic. The OPCLink Server item syntax follows the following rules. The item names must start with:

- d – discrete value
- i – integer value
- r – real value
- m – message (string)

The item name added to the OPC path of the topic (without the heading type letter) must give a fully qualified OPC item name for the S7ETHMPI Server. Some examples of possible item names acceptable by OPCLink Server/ S7ETHMPI Server connection:

- iDB123,W24** - word starting from address 24 in Data Block 123
- di4.3** - bit 3 in input byte with address 4

Error messages

The messages about errors detected by the Server are displayed on the WWLogger or S7ETHMPI Internal Logger main window and saved to log file. Some of most often errors are:

Connecting to station "<name>" (MPI address <address>) failed, error code <errcode>

This error message is displayed if there are problems with communication adapter-cable driver configuration and connection with PLC cannot be established. The possible <errcode> values are:

- 1 - adapter-cable driver not installed or damaged
- 2 - failure when opening communication via adapter-cable driver
- 3 - failure when connecting to PLC
- 5 - failure when closing communication via adapter-cable driver

If <errcode> equals 1 then communication adapter-cable driver must be reinstalled. If <errcode> equals 2, 4 or 5 then most probably the reason is in wrong communication adapter-cable configuration or wrong Station Name or MPI address used in S7ETHMPI Server Topic definition.

Invalid item name "<I/O item name>"

This error message is displayed if client application has requested wrong I/O item name from S7ETHMPI Server.

Item "<I/O item name>" on the topic "<topic name>" can not be accessed for writing.

This error message is displayed if S7ETHMPI Server cannot write new value to PLC address specified by I/O item name.

Function "ReadVals(..)" failed. Topic: "<topic name>" Station name: "<station name>" area: <data area name>, data block: <data block address>, start address: <data start address>, length: <data length> - value(s) can not be accessed.

This error message is displayed if S7ETHMPI Server has problems to read data from some data areas. Most probably communication adapter-cable driver is overloaded and cannot process all read commands requested. Solution could be to decrease the load of communications for all S7ETHMPI Server by increasing Protocol Timer Tick value (see *Server Settings Command* section) or by increasing the Update Interval value (see *Topic Definition Command* section).

Troubleshooting

WIN.INI entries

The first time you run the S7ETHMPI Server configuration, most of the items in the following list will automatically appear in the WIN.INI file, located in the MS Windows system directory (e.g. C:\WINNT). It is an ASCII file and can be altered manually if you wish with any text editor, e.g., MS Windows Notepad (*do not use a program that formats text, such as MS Word or Write unless the file is saved as a DOS text*). The following is a typical entry for the S7ETHMPI Server:

```
[S7ETHMPI]
WinIconic=0
WinFullScreen=0
WinTop=112
WinLeft=0
WinWidth=200
WinHeight=168
ProtocolTimer=10
ConfigurationFile=C:\S7ETHMPI\
ShowSend=0
ShowReceive=0
ShowErrors=1
```

There are following additional WIN.INI entries available for S7ETHMPI Server:

SlowPollRetries and SlowPollInterval

The **SlowPollRetries** entry is used to enter the number of consecutive error retries for one topic (PLC). If after **SlowPollRetries** there is still no successful response from PLC, then this topic is changed to *slow poll mode*. The WIN.INI file **SlowPollInterval** entry is used to enter the slow poll mode update interval (in seconds).

The default values (they are used if WIN.INI file does not contain these entries) are **SlowPollRetries** equal to 3 and **SlowPollInterval** equal to 60 seconds.

For example, the following entries can be used to specify that slow poll mode 2 minutes will start after 5 consecutive unsuccessful retries:

```
SlowPollRetries =5
SlowPollInterval=120
```

Entering into slow poll mode is reported to WWLogger or to S7ETHMPI Internal Logger by following string:

"Entering slow poll mode on topic <TOPICNAME>."

If all topics connected to same adapter-cable are in slow poll mode then after 5 full slow poll cycles (all topics are at least 5 times polled) the connection to this adapter-cable is closed and then reopened again.

Leaving the slow poll mode is reported to WWLogger or to S7ETHMPI Internal Logger by following string:

"Leaving slow poll mode on topic <TOPICNAME>."

ShowRejectedWrites

The **ShowRejectedWrites** entry is used to enable the logging of rejected write messages. This option can be useful when communication with a separate topic (PLC) is suspended by SUSPEND item (see *Item Names* section) and the Server rejects each write to this topic (PLC). If **ShowRejectedWrites=1** then information about each rejected write value is reported to WWLogger or to S7ETHMPI Internal Logger. If **ShowRejectedWrites=0** (default) then Server rejects each write to suspended topic(s) without logging any information.

Troubleshooting menu

The following debugging choices are appended to the Server's System Menu (the menu that appears when you click on the Server icon in the upper left hand corner of the Server's window):

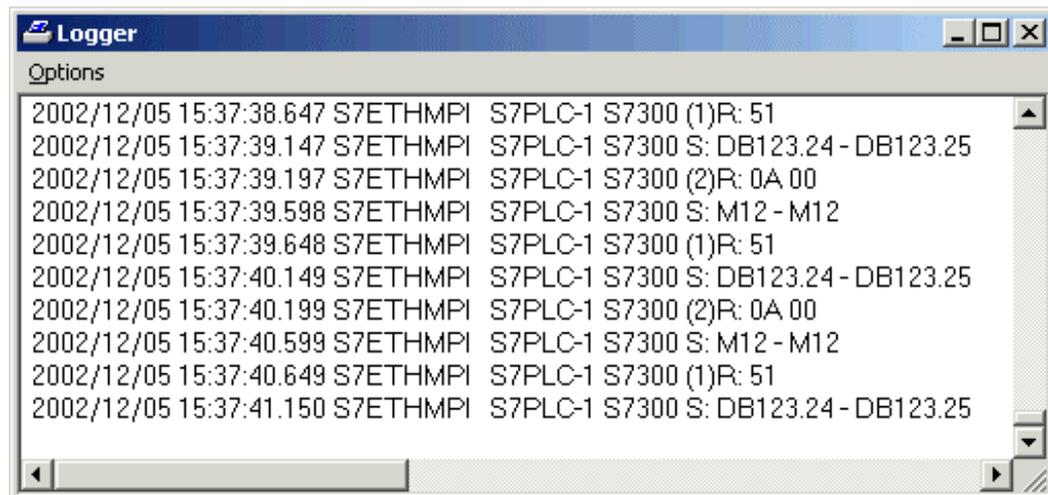
- Suspend Protocol/Resume Protocol** - these choices permit you to turn protocol processing on and off, what means that you can suspend access to PLC(s).
- Show Send** - if checked then all outgoing data are logged in hexadecimal format.
- Show Receive** - if checked then all incoming data are logged in hexadecimal format.
- Show Errors** - if checked then all information about errors is logged.
- Show Logger** - this option is available only for "OPC & DDE" version of S7ETHMPI Server - if checked then S7ETHMPI Internal Logger is activated/deactivated (see *Internal Logger* section below).
- Dump** - all information about topics, messages and data items is logged. This can be use to find out how many messages are actually sent to the PLC(s).
- Dump Screen** - if checked then information about active messages are displayed on the S7ETHMPI main window. This also can be used to find out how many messages are actually sent to the PLC(s).

All debug information (except **Dump Screen**) is displayed through the Wonderware Logger or S7ETHMPI Internal Logger depending on **Show Logger** option state and settings on the S7ETHMPI Internal Logger "Disk Options" dialog box - see *Internal Logger* section below.

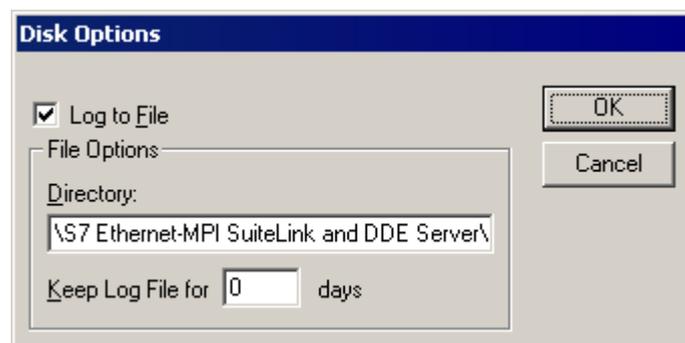
Note: If you check **Show Send** and/or **Show Receive** debug output grows very fast and it is possible that computer can become very slow.

Internal Logger

Internal Logger is available only for "OPC & DDE" version of S7ETHMPI Server. To enable the S7ETHMPI Internal Logger, check the **Show Logger** option at the S7ETHMPI Server System Menu (see *Troubleshooting menu* section above) - this command can be used to start/stop Internal Logger. The Internal Logger window looks like following:



To save Internal Logger information to file, select *Options/Disk Options...* from Internal Logger main menu – the “Disk Options” dialog box will appear:



The following can be entered in this dialog box:

Log to File

If checked then Internal Logger information will be saved to Internal Logger File. The S7ETHMPI Internal Logger file name is created in the following format:

S7ETHMPI_YYYYMMDD.LOGn

where **YYYY** is a year, **MM** is a month, **DD** is a day and **n** is a order number of consecutive S7ETHMPI Internal Logger file, starting from 1. The S7ETHMPI Internal Logger file maximum size is 16 MB; if there is more information logged then next consecutive file is created, e.g. there can be consecutive files S7ETHMPI_20021205.LOG1, S7ETHMPI_20021205.LOG2, etc.

Directory

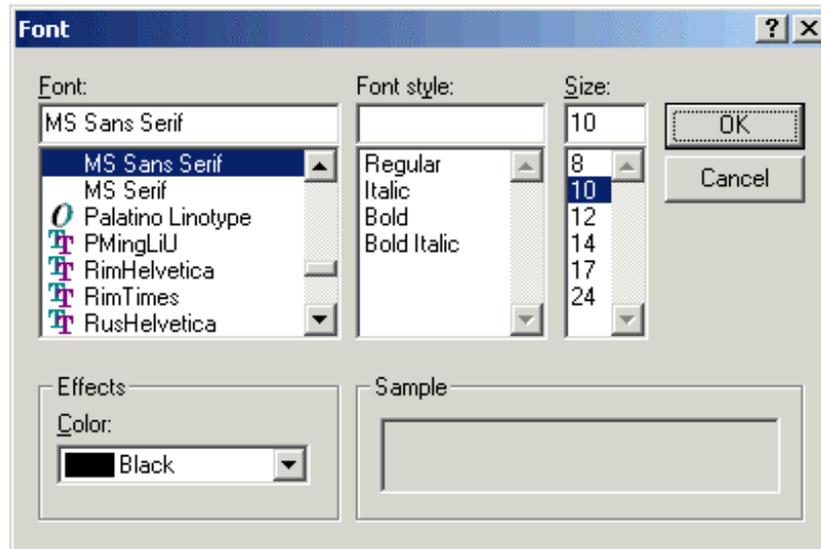
Enter the path where to keep the Internal Logger File.

Keep Log File for

Here the number of days how long to keep the Internal Logger File can be entered. After this number of days expires, the corresponding Internal Logger File will be automatically deleted. The default value **0** keeps Internal Logger Files forever - in this case they can be deleted manually.

Options/Font

To configure the font used by Internal Logger, select *Options/Font...* from Internal Logger main menu - the "Font" dialog box will appear:



KLINKMANN AUTOMATION
S7ETHMPI Communication Server
Revision History

Dec 2002	Rev 1.0	First Release
Apr 2003	Rev 1.1	Retry failed write messages indefinitely added
Jul 2004	Rev 1.2	Topic Defintion Command section modified. RUN item description modified in Monitoring and Controlling Communication with a PLC section. Troubleshooting section modified.