

MDLC Gateway Communication Server

for Microsoft Windows
and InTouch Applications

**User Manual
Ver 1.x Rev 1.10
DR 21010**

**KLINKMANN AUTOMATION
P.O. Box 38
FIN-00371 Helsinki Finland
tel. int. + 358 9 5404940
fax int. + 358 9 5413541
www.klinkmann.com**

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MDLC Gateway Communication Server

Overview

The **MDLC Gateway Communication Server** (hereafter referred to as the “MDLC Gateway Server” or “MDLCGATE Server” or “MDLCGATE” or “Server”) is a Microsoft Windows application program that acts as a communication protocol *Server* and allows other Windows application programs access to data from the MOSCAD Remote Terminal Units, using Motorola MDLC Gateway for TCP/IP. The MDLC Gateway Server requires an Ethernet card and TCP/IP protocol (supporting Windows Sockets interface) installed on the computer to communicate with the MDLC Gateway(s) connected to the Ethernet network.

The MDLC Gateway Server calls MDLC Gateway API routines to establish the connections with Gateway and to send data, commands and data requests to the field RTUs.

The MDLCGATE Server is primarily intended for use with **Wonderware InTouch**, but any Microsoft Windows program that is capable of acting as a **DDE**, **FastDDE** or **SuiteLink Client** may use the MDLCGATE Server.

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 our industry, this extension is being pushed to its performance constraints in distributed environments. The MDLCGATE Server 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.

The Suite Link, FastDDE (Version 3) and DDE support for MDLCGATE Server is implemented by **Wonderware I/O Server Toolkit** ver. 7.2.1.6.

Accessing a Remote Items via MDLCGATE 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 MOSCAD RTUs, the application portion of the address is **MDLCGATE**.

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, **Node1**. The MDLCGATE Server considers each MOSCAD RTU to be a separate topic

Note. *You can define multiple topic names for the same RTU to poll different items at different rates.*

item name

Item is a specific data element within the specified topic. For the MDLCGATE Server, an item can be a variable from RTU Communication Table or some special purpose item. (The item/point names are fixed by the MDLCGATE Server as described in the **Item (Point) Naming** section.)

Note: *In some cases, the term "point" is used interchangeably with the term "item".*

Installing and starting the MDLCGATE Server

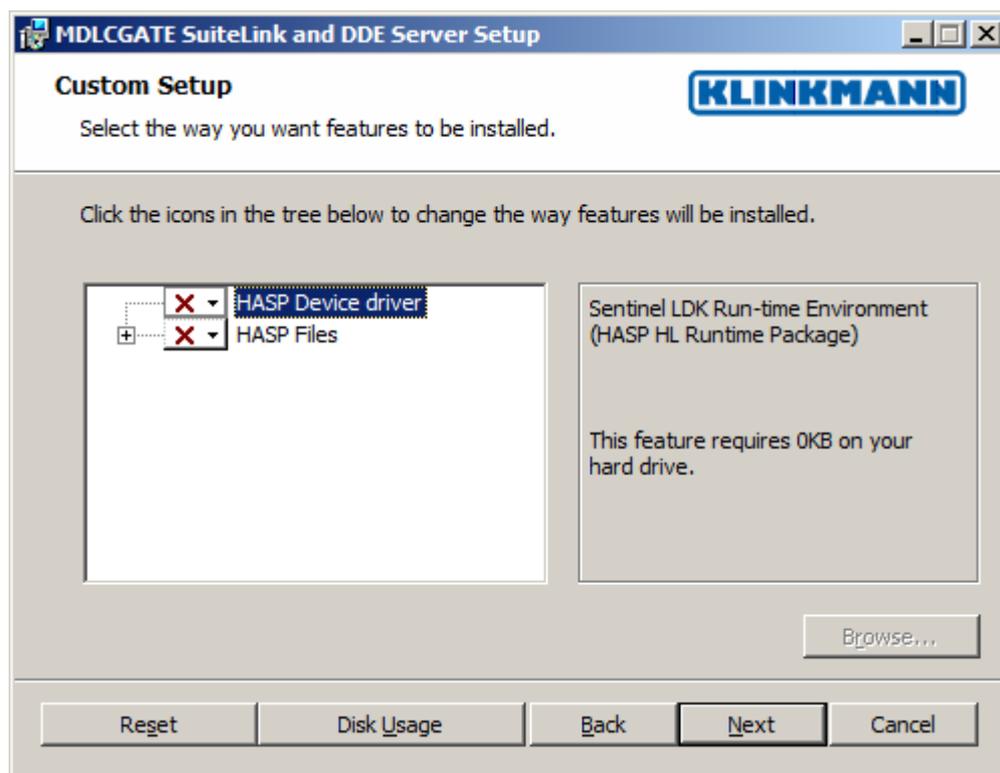
Installing the Server

The MDLCGATE Server installation package is supplied as a Microsoft Installer file DR21010_xxx.msi, where xxx is the current (latest) version of MDLCGATE Server.

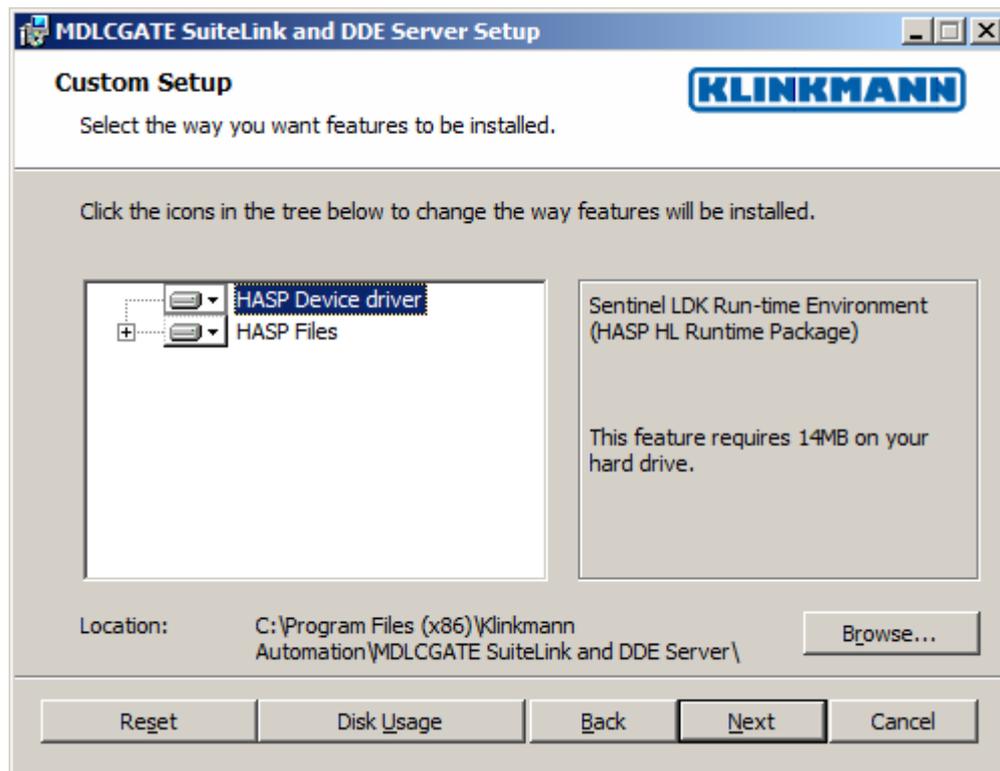
To install the MDLCGATE Server, run the DR44010_xxx.msi and proceed as directed by the MDLCGATE Server Setup Wizard. The installation is simple and straightforward, only it is important to select the correct protection (**HASP key** or **software license**) in “Custom Setup” dialog:

The HASP key or software license key is needed for full time running of MDLCGATE Server. The **HASP key** is an USB key (dongle) to be installed into PC USB port and needs the SafeNet Sentinel LDK Run-time Environment (HASP HL Runtime Package) to be installed and running – see details in “Licensing by using HASP HL key” section below. The **software license key** is a 16-character alphanumeric “computer-dependent” string, provided after purchasing the MDLCGATE Server (for more information, see “Software license key” section below. Without HASP key installed or software license key entered, the MDLCGATE Server will run one hour in demo mode. After purchasing the MDLCGATE Server, the appropriate HASP key or software license key is provided and no re-installation of MDLCGATE Server is needed.

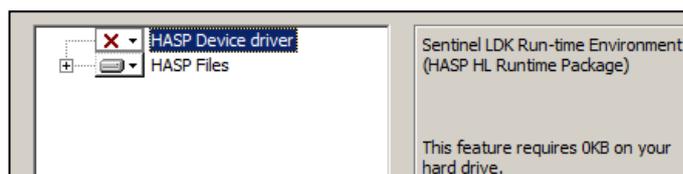
In case “HASP Device driver” and “HASP Files” **are not selected** then HASP USB key will not be supported and only the **software license** will be available (files needed for HASP USB key will not be installed):



In case “HASP Device driver” and “HASP Files” **are selected** then HASP USB key will be supported and both HASP-key and software license will be available (files needed for HASP USB key will be installed):



Note: In case the SafeNet Sentinel LDK Run-time Environment (HASP HL Runtime Package) is already installed on your computer (separately or by some other software) then it can be disabled:



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

- | | |
|-------------------------------|---|
| MDLCGATE.EXE | The MDLCGATE Server Program. This is a Microsoft Windows 32-bit application program. |
| MDLCGATE.CHM | The MDLCGATE Server Help file. |
| MDLCGATE.CFG | An example configuration file. |
| RTUTYPES.CFG | An example configuration file. |
| MSYSDEF.CFG | An example configuration file. |
| hasp_windows_44 42.dll | Dynamic Link Library installed only if “HASP Files” is selected during the installation in “Custom Setup” dialog. |

haspdinst.exe Sentinel LDK Run-time Environment Installer (HASP HL Runtime Package), copied to MDLCGATE Server folder only if “HASP Device driver” is selected during the installation in “Custom Setup” dialog.

LICENSE.RTF Klinkmann Automation software license file.

In case the “HASP Device driver” is selected during the installation in “Custom Setup” dialog, the Sentinel LDK Run-time Environment (HASP HL Runtime Package) is installed during the MDLCGATE Server installation (and will be uninstalled during the MDLCGATE Server uninstallation). The presence of Sentinel LDK Run-time Environment can be checked after the MDLCGATE Server installation by looking-up in Control Panel / Administrative Tools Services – the Service “Sentinel Local License Manager” must be started.

Notes:

1. The MDLCGATE Server is developed with Wonderware I/O Server Toolkit (ver 7,2,1,6) and needs the **Wonderware FS 2000 Common Components** to be installed on computer where the MDLCGATE Server is running. If using Wonderware InTouch 8.0 or newer, install the FS 2000 Common Components **before** installing InTouch (see also Wonderware Tech Notes 404 and 313). The Wonderware FS2000 Common Components are installed automatically when any of Wonderware product (e.g. InTouch or some Wonderware I/O server) is installed.
2. If MDLCGATE 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 (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 MDLCGATE Server and these infrastructure files must be install prior to executing the MDLCGATE Server. The **I/O Server Infrastructure** does not support using MDLCGATE Server as a Windows Service and remote access to MDLCGATE Server (when DDE/SuiteLink Client is not located on same computer as MDLCGATE Server).

To **uninstall** the MDLCGATE Server, start Control Panel, select “Uninstall a program” (“Add/Remove Programs” on XP/2003) and select the “MDLCGATE SuiteLink and DDE Server” from the list of available software products. Click on “Uninstall” (“Add/Remove...” on XP/2003) and proceed as directed by the Uninstall Wizard.

Licensing by using HASP HL key

The following should be done to enable the licensing by HASP HL key:

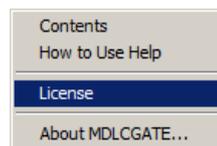
- The “HASP Device driver” and “HASP Files” are selected during the MDLCGATE Server installation in “Custom Setup” dialog – that causes correspondingly haspdinst.exe and hasp_windows_4442.dll files are copied to MDLCGATE Server folder and Sentinel LDK Run-time Environment (HASP HL Runtime Package) is installed and started, enabling the MDLCGATE Server can detect the HASP HL USB dongle;
- insert the received HASP key into USB port, and **wait** until “Installing device driver software” message disappears and “Device driver software installed successfully” message appears;

- start MDLCGATE Server and check - if “Software key or HASP HL key not found!” message does not appear then it means everything is done correctly and MDLCGATE Server runs in full mode with licensing by HASP HL key enabled.

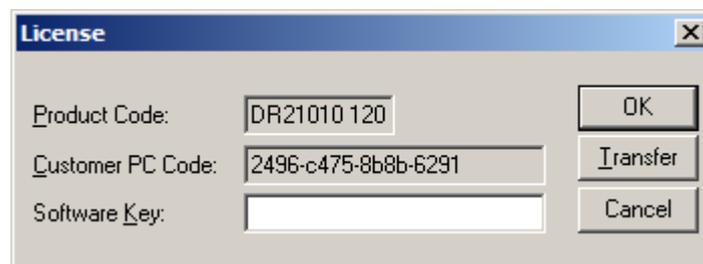
Software license key

MDLCGATE Server supports the “computer dependent” **software licensing**. The following steps are required to enable it:

- 1) Start MDLCGATE Server, click on "Help" menu item (also short-cut Alt+H can be used) and pop-up menu with "Help" menu commands will appear:



Select “License” and “License” dialog will appear:



- 2) Here the “Customer PC Code” is “computer-dependent” string generated by MDLCGATE Server and it is unique for this computer. Write it down or Copy/Paste to e-mail when ordering the MDLCGATE Server.

- 3) After purchasing the MDLCGATE Server, you will get the software license key - 16-character alphanumeric string. Open the “License” dialog again and Copy/Paste it to “Software Key” field:



- 4) Click OK and restart MDLCGATE Server. MDLCGATE Server software license now is enabled.

Note – the “Software Key” string is saved to MS Windows system directory (e.g. C:\Windows) WIN.INI file [MDLCGATE] section to enable it is automatically detected at MDLCGATE Server next start-up.

Transferring the software license to other computer

The transfer of Software License Key might be needed in very rare situations when it is necessary to move Klinkmann software to other computer (or operation system change is planned for same computer). Such transfer **PERMANENTLY** removes the Software License Key, so be very careful when deciding to use this option.

The following steps are required to transfer the Software License Key:

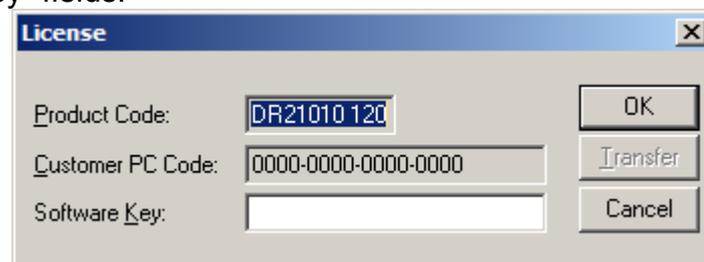
- 1) Start the MDLCGATE Server. For MDLCGATE Server “Suite Link & DDE” version, the ArchestrA SMC Log Viewer (or Wonderware Logger) must be started. For MDLCGATE Server “OPC & DDE” version, the MDLCGATE Internal Logger and “Log to File” should be enabled (see “Troubleshooting menu” and “Internal Logger” sections at the end of this manual). Select Help/License from main menu and click the “Transfer” button on “License” dialog:



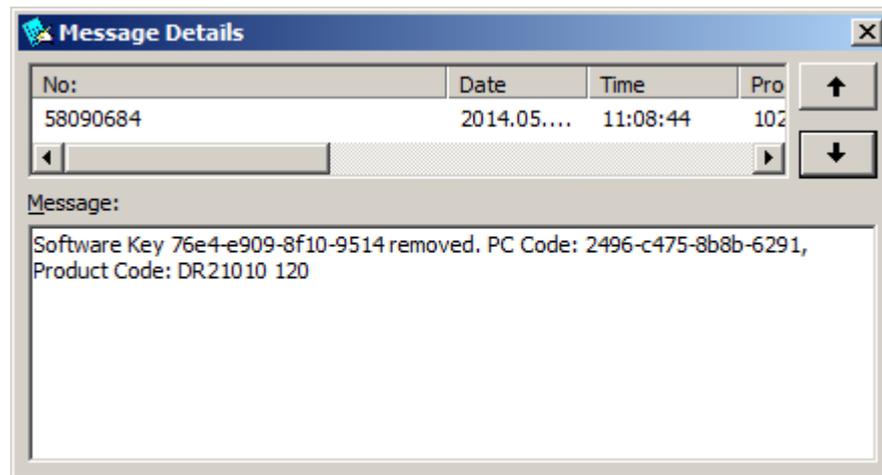
- 2) Confirm the transfer of Software License Key by clicking on Yes button:



The “License” dialog now will contain the empty “Customer PC Code” and “Software Key” fields:



- 3) Take the screenshot from ArchestrA SMC Logger or MDLCGATE Internal Log file window containing the “Software License Key removal message”, like below:



or take the string with “Software License Key removal message” directly from ArchestrA SMC Logger or MDLCGATE Internal Log file, like following:

Software Key 76e4-e909-8f10-9514 removed. PC Code: 2496-c475-8b8b-6291, Product Code: DR21010 120

- 4) Provide the obtained “Software License Key removal message” screenshot or string together with new “Customer PC Code” when applying for new Software License Key without purchasing the new license (in situations when it is necessary to move Klinkmann software to other computer or operation system change is planned).

Note!

Without providing the “Software License Key removal message” screenshot or string, the new Software License Key will not be assigned.

Starting the MDLCGATE Server

The Server can be started in some different ways:

- (1) At MS Windows startup from Startup group;
- (2) Manually - before client (Wonderware InTouch, MS Excel) startup;
- (3) When starting client (e.g. Wonderware InTouch) with Server name in the path.

At Server startup the MDLC Gateway API function *gwlib_init_api()* is called to build the internal data structure used to identify the MOSCAD system. The names of two files (RTU Types Definition file and MOSCAD System Definition file) can be specified in the Server command line or default file names RTUTYPES.CFG and MSYSDEF.CFG can be used.

For example, the following command will start the MDLCGATE Server with non-default definition files:

mdlcgate mdlc_typ.cfg mdlc_sys.cfg

where **mdlc_typ.cfg** is RTU Types Definition file and **mdlc_sys.cfg** is MOSCAD System Definition file. The structure of these files is described in the **MOSCAD System Definition Files** section.

Installing the I/O Server Infrastructure

The I/O Server Infrastructure installation package is supplied as a self-extracting archive (IOServerInfrastructure.exe) and can be downloaded from Klinkmann's web site.

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.

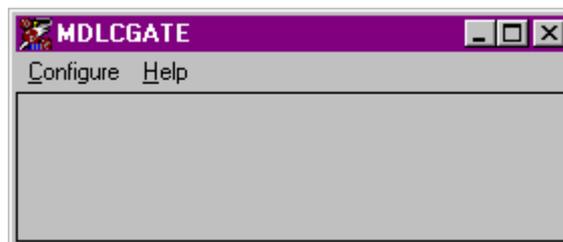
To **uninstall** the I/O Server Infrastructure, start Control Panel, select "Add/Remove Programs" and select the "IO Server Infrastructure" from the list of available software products. Click on "Add/Remove..." and proceed as directed by the UnInstallShield program.

Note: The I/O Server Infrastructure installation will be rejected if Wonderware FS2000 Common Components are already installed on same computer. The I/O Server Infrastructure does not support using MDLCGATE Server as a Windows Service and remote access to MDLCGATE Server (when DDE/SuiteLink Client is not located on same computer as MDLCGATE Server).

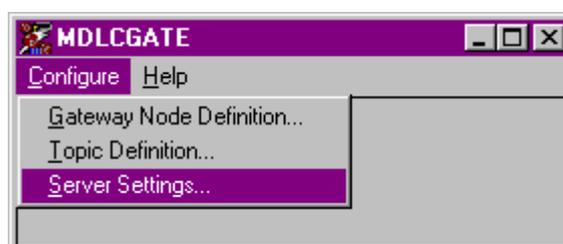
Configuring the MDLCGATE Server

After the MDLCGATE Server is initially installed, a small amount of configuration is required. Configuring the Server automatically creates a **MDLCGATE.CFG** file that holds all of the Gateway Node and Topic definitions entered. This file will automatically be placed in the same directory in which the MDLCGATE Server is located unless the path where the configuration file will be placed is specified via the `/Configure/Server Settings...` command.

To perform the required configurations, start up the MDLCGATE Server. If the Server starts up as an icon, double-click on the icon to open the Server's window. The following will appear:



To access the commands used for the various configurations, open the `/Configure` menu:

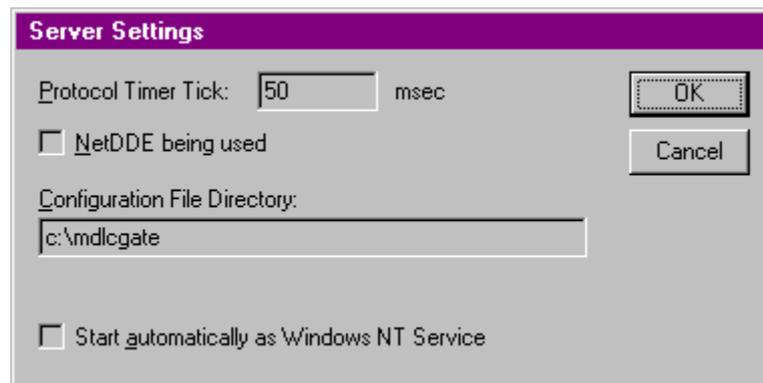


Note: The `/Configure/Topic Definition...` command invokes the configuration dialogs for System's all Topics (for System's all Nodes if multiple gateways are used). To configure Topics on a per Node basis the `/Configure/Gateway Node Definition...` command should be invoked.

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 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 is continuously activated (the Server checks for work to do). If the computer is very busy or some other MS Windows application is taking over the computer then the Server could be activated less frequently than the setting in the **Protocol Timer Tick**.

Note: The default value is 50. If a value lower than 50 is entered, the Server uses 50 milliseconds. For Windows NT the minimum value is 10 milliseconds.

NetDDE being used

Select this option if you are networking using NetDDE.

Configuration File Directory

Specify the path (disk drive and directory) in which MDLCGATE Server will save its current configuration file. MDLCGATE Server will use this path to load the configuration file the next time it is started.

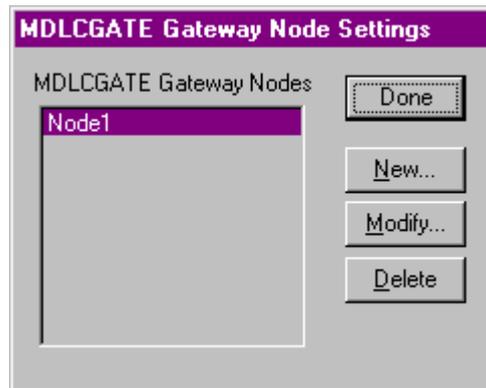
Note: Only the "path" may be modified with this field. The configuration file is always named **MDLCGATE.CFG**.

Note: There is no limit to the number of configuration files created, although each must be in a separate directory. When using the MDLCGATE Server with **InTouch**, it is good practice to place the configuration file in the application directory.

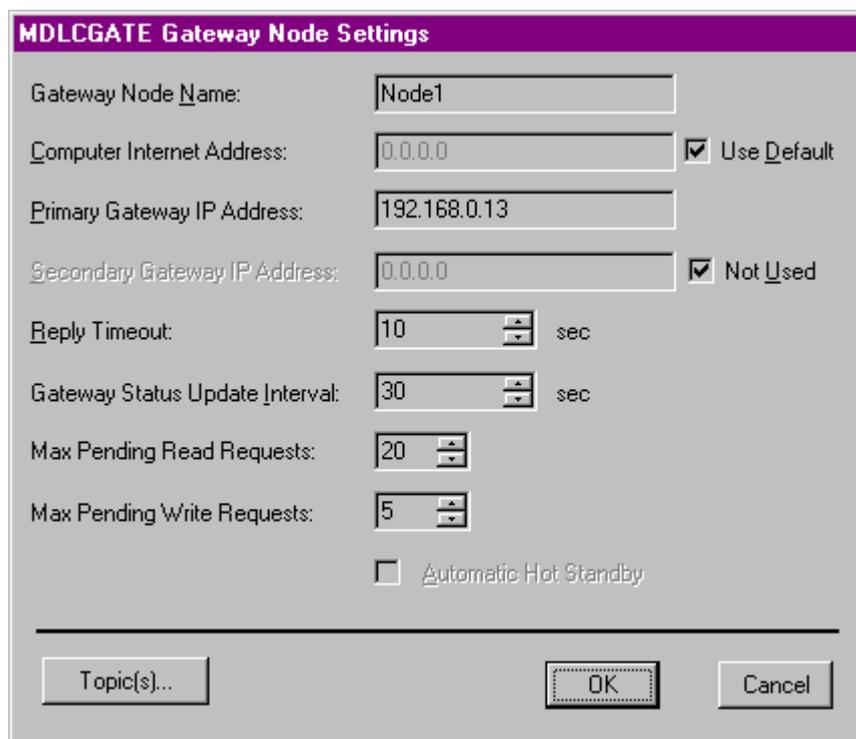
Once all entries have been made, click on **OK**.

Gateway Node Definition Command

To configure the MDLC Gateway Node, invoke the `/Configure/Gateway Node Definition...` command. The "MDLCGATE Gateway Node Settings" first dialog box will appear:



To modify or examine an existing Gateway Node, select the Node name and click on **Modify**. To define a new Gateway Node, click on **New**. The "MDLCGATE Gateway Node Settings" second dialog box will appear. The following is an example of "MDLCGATE Gateway Node Settings" dialog box where the default configuration is entered (single Primary Gateway, no Hot Standby):



The following describes each dialog field in this dialog box:

Gateway Node Name

Enter the Gateway Node name and later use it in *Topic Definition*.

Computer Internet Address

Enter the Computer Internet Address (IP Address) if it has more than one. If there is only one Internet Address for computer then **Use Default** can be checked to use this Address. If Computer is multi-homed (more than one Internet Address used) and **Use Default** is checked then it is impossible to know which Address must be used.

Primary Gateway IP Address

Enter the Primary Gateway Internet Address (IP Address).

Secondary Gateway IP Address

Enter the Secondary Gateway Internet Address (IP Address). If **Not Used** is checked then Secondary Gateway is not used for this Gateway Node.

Reply Timeout

Enter the reply timeout value (in seconds) for the TCP/IP communications; this value is used as a *timeout* parameter for the MDLC Gateway API function *gwlib_receive_buffer()*.

Gateway Status Update Interval

Enter the interval (in seconds) at which the Gateway status (both for the Primary and Secondary Gateways) will be read.

Max Pending Read Requests

The possibility to configure the maximum number of pending read requests which are allowed to be sent to the Gateway. This parameter value depends on MOTOROLA Gateway hardware model and current settings. In two Gateways using mode this number cannot exceed weaker Gateway capacity. MDLCGATE Server allows set up to 128 pending read(poll) requests. Smallest possible value is 2(1 Gateway STATUS read(poll) request and one regular read(poll) request). Default value is 20.

Max Pending Write Requests

The possibility to configure the maximum number of pending write requests which are allowed to be sent to the Gateway. This parameter value depends on MOTOROLA Gateway hardware model and current settings. In two Gateways using mode this number cannot exceed weaker Gateway capacity. MDLCGATE Server allows set up to 128 pending write(command) requests. Smallest possible value is 1. Default value is 5.

Automatic Hot Standby

This setting enables or disables the “*automatic hot standby*” to indicate how the hot standby is implemented; if this setting is ON (checkbox is checked) then hot standby is processed by the Server; if this setting is OFF (checkbox is unchecked) then hot standby must be processed by the client program using special items/points created for topic **GATEWAYS** (see the **Hot Standby - Principles of Operation** and **Item (Point) Naming** sections).

Topic(s)...

To configure only the current Gateway Node's Topics press the **Topic(s)...** pushbutton. The "Topic Definition" dialog box (see the **Topic Definition Section**) will appear. Up to 500 Topics can be configured for one Gateway Node.

Notes:

1. The channel type opened both for Primary Gateway and (if configured) for Secondary Gateway and used to send/receive poll messages and to receive burst messages is `GWLIB_BURST_CHANNEL_TYPE` | `GWLIB_SEND_CHANNEL_TYPE` | `GWLIB_RECEIVE_CHANNEL_TYPE`.

2. The Gateway status is requested at *Gateway status update interval* both for Primary Gateway and (if configured) for Secondary Gateway. The data from all connected RTUs are accessed through the Primary Gateway.

The following is an example of "MDLCGATE Gateway Node Settings" dialog box where the **Secondary Gateway IP Address** is entered and **Automatic Hot Standby** is used:

MDLCGATE Gateway Node Settings

Gateway Node Name: Node1

Computer Internet Address: 0.0.0.0 Use Default

Primary Gateway IP Address: 192.168.0.13

Secondary Gateway IP Address: 192.168.0.11 Not Used

Reply Timeout: 10 sec

Gateway Status Update Interval: 30 sec

Max Pending Read Requests: 20

Max Pending Write Requests: 5

Automatic Hot Standby

Topic(s)... OK Cancel

Once all entries have been made, click on **OK** to process the configuration for the Gateway Node. The "MDLCGATE Gateway Node Settings" first dialog box will appear again.

Click on **Done** when configuration for all Gateway Nodes has been performed.

Note: If this is the first time the Gateway Nodes have been configured, the user will be prompted to save configuration to an existing directory.

Hot Standby - Principles of Operation

The MDLC Gateway redundancy is supported as an option to increase the reliability of the system. Two MDLC Gateways can be configured in a Primary/Secondary mode. If Primary Gateway is not available then Secondary Gateway can be used. Each Gateway has to be configured with unique IP address. Also redundant Hosts (computers with MDLC Gateway Server running) and redundant MDLC and LAN communication devices can be used.

The following are examples of possible configurations:

1. A single Primary Gateway with a single Host. No MDLC Gateway redundancy. No MDLC Gateway Server redundancy - the Server is running only on one computer.
2. A single Primary Gateway with multiple Hosts. No MDLC Gateway redundancy. The redundant MDLC Gateway Servers are used - the Server is running on multiple computers and if some of them fail then data from RTUs can still be accessed by other ones.
3. Dual redundant Primary/Secondary Gateway with a single Host. The MDLC Gateway redundancy supported, no MDLC Gateway Server redundancy
4. Dual redundant Primary/Secondary Gateway with multiple Hosts. The MDLC Gateway redundancy supported, redundant MDLC Gateway Servers are used.

Depending on necessary reliability level the above mentioned dual Gateway configurations can be used with single communication device, with redundant communication devices and with multiple redundant communication devices.

The **Hot Standby** feature, implemented in the MDLC Gateway Server, supports the redundant MDLC Gateways in the following way.

1. After startup the Gateway status is requested at *Gateway status update interval* both for Primary and Secondary Gateways. The data from all connected RTUs are accessed through the Primary Gateway.
2. If the communication with Primary Gateway fails (no answer to *gwlib_get_gw_status()* command or returned Gateway status is Secondary) then depending on the “*automatic hot standby*” setting the hot standby is processed in the following way.

If “*automatic hot standby*” is ON and if communication with Secondary Gateway is O.K. (returned status is `GWLIB_SECONDARY`) then Secondary Gateway is changed to Primary (by MDLC Gateway API function) and data from all connected RTUs now are accessed through this Gateway's channels.

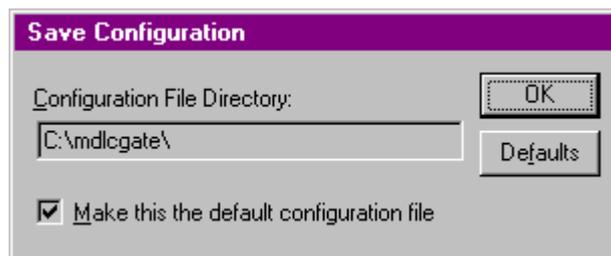
If “*automatic hot standby*” is OFF then the status of each Gateway can be monitored and changed if special topic **GATEWAYS** containing items **GS_LSB_XXX.XXX.XXX.XXX**, **GS_MSB_XXX.XXX.XXX.XXX** and **GMODE_SET_XXX.XXX.XXX.XXX** (where **XXX.XXX.XXX.XXX** is the Gateway IP address) is created (see the **Item (Point) Naming** section). In this case if Primary Gateway fails and if Secondary Gateway status is O.K. then **GMODE_SET_XXX.XXX.XXX.XXX** (where **XXX.XXX.XXX.XXX** is the Secondary

Gateway IP address) value must be switched from 0 to 1 and then Secondary Gateway is changed to Primary.

3. The Primary Gateway can be set to Secondary by switching the Discrete item GMODE_SET_ **xxx.xxx.xxx.xxx** value (where **xxx.xxx.xxx.xxx** is the Primary Gateway IP address) to 0. The Secondary Gateway can be set to Primary by switching the Discrete item GMODE_SET_ **xxx.xxx.xxx.xxx** value (where **xxx.xxx.xxx.xxx** is the Secondary Gateway IP address) to 1.

Saving MDLCGATE 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 MDLCGATE 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 "**Make this the default configuration file**" option. Doing so will allow the MDLCGATE Server to find the configuration file automatically each time it is started. This option is available only when the configuration file path is changed.

Configuration File Location

When the MDLCGATE 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 **File/Run** command and enter the following:

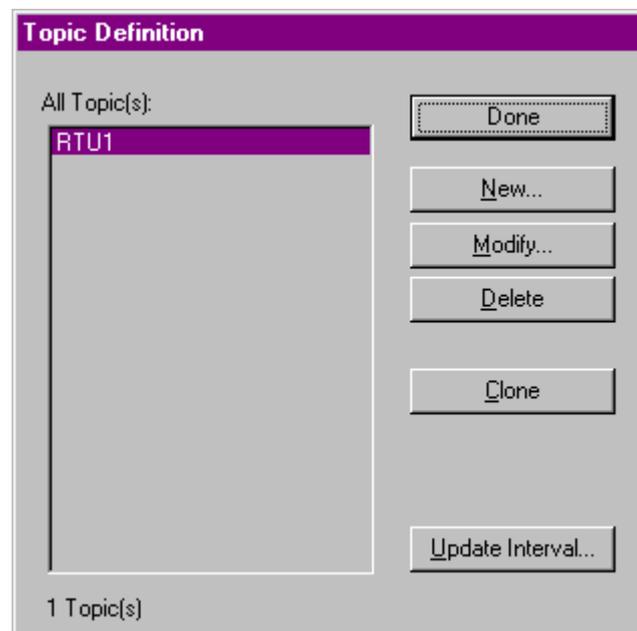
MDLCGATE /d:c:\directoryname

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

Topic Definition Command

The user provides each MOSCAD Remote Terminal Unit with an arbitrary name that is used as the topic for all references to the RTU. More than one Topic can be defined for the same RTU.

To define the Topics (MOSCAD RTUs) attached to one or more MDLC Gateways invoke the **/Configure/Topic Definition...** command. The "Topic Definition" dialog box will appear:



To modify or examine an existing topic, select the topic name and click on **Modify**. To define a new topic, click on **New**. The "MDLCGATE Topic Definition" dialog box will appear:

The following describes each dialog field in this dialog box:

Topic Name

Enter the Topic Name that corresponds to the Topic Name in the "Access Name Definition" dialog box described in the **Using the MDLCGATE Server with InTouch** section.

"GATEWAYS" (Special Topic Name)

If this checkbox is checked then this is a special topic **GATEWAYS** containing only some special predefined items (see the **Item (Point) Naming** section).

Gateway Node Name

Select the Gateway Node to associate it with the topic. Additional topics may be associated with the same Gateway Node at a later time.

RTU Site ID

Enter this RTU Site ID. The corresponding value must be present in the MOSCAD System Definition file.

RTU Type Name

This RTU Type Name (value from the RTU Types Definition file) is displayed here. The new value can not be entered. This field is used only for information.

Poll mode

Select the *poll mode* (**GWLIB_POLL_MODE** or **GWLIB_POLL_COS_MODE**) used to send poll requests to this RTU.

MOSCAD RTU Update Interval

Enter the frequency (in configurable units (milliseconds, seconds, minutes, hours)) at which the values of items will be read (polled) from this MOSCAD RTU.

Historical Data Update Interval

Enter the frequency (in seconds) at which the values of specially marked items (item/point name with suffix h(or H)) will be stored in the historical file (see the sections **Item (Point) Naming** and **Historical File**). The value is stored only if it has been changed.

"Ping" Status Update Interval

Enter the frequency (in seconds) at which this MOSCAD RTU status is requested. The RTU status "ping" command requests this RTU first Table's (first Table is from the RTU Types Definition file, not Table 1) first element (column 0, row 0). "Ping" request is disabled if value of "Ping" Status Update Interval is 0.

Once all entries have been made, click on **OK** to process the configuration for the Topic. The "Topic Definition" dialog box will appear again.

SUSPEND Topic On Start-Up

The MDLC Gateway Server supports the possibility to protect communication from data flow impact at connection start-up. If SUSPEND checkbox is selected then no poll messages of the topic will be sent. State of this "SUSPEND Topic On Start-Up" checkbox is assigned to special "SUSPEND"(see **Item(Point) Naming** chapter) item of the Topic if such item is activated in user's InTouch application. Further communication control can be performed using SUSPEND item of corresponding topic: if value of item is set to 0 then polling is stopped otherwise polling is executed in general way.

Note: This option does not take effect to write messages execution.

Clone of Topic

Since MDLCGATE supports up to 500 topics (per Gateway) the configuration of topics could be time-consuming. It is possible to make clones (similar copies) of any topic (except special GATEWAYS topic). Only difference between clone(s) and base topic is name. Name can be generated by MDLCGATE Server or extracted from text file. To clone some topic select it and press "Clone" button. "Topic Clone" dialog box will appear:

The screenshot shows a dialog box titled "TOPIC CLONE". It has a purple title bar with a close button (X). The main area is light gray and contains the following elements:

- Text: "Topic to Clone: RTU1"
- Text: "Number of Clones: 3" (with a small spinner control)
- A horizontal separator line.
- Radio button (selected): "Base Name: SAMPLE" (with a text input field containing "SAMPLE")
- Checked checkbox: "Pad with 0"
- Another horizontal separator line.
- Radio button (unselected): "File Name:" (with an empty text input field)
- "Browse..." button
- Another horizontal separator line.
- "OK" button (with a dashed border)
- "Cancel" button

Topic to Clone

Appears topic name of cloned topic.

Number Of Clones

Enter the number of copies(clones) will be created.

Base Name

Enter the “Base Name” for created Topic Names. Name of created topic will be: [BaseName]+[NumberOfClone].

Examples:

1) if “Base Name” is SAMPLE and “Number of Clones” is 3 and “Pad with 0” checkbox **is not checked** then will be created 3 topics with following names: SAMPLE1, SAMPLE2, SAMPLE3.

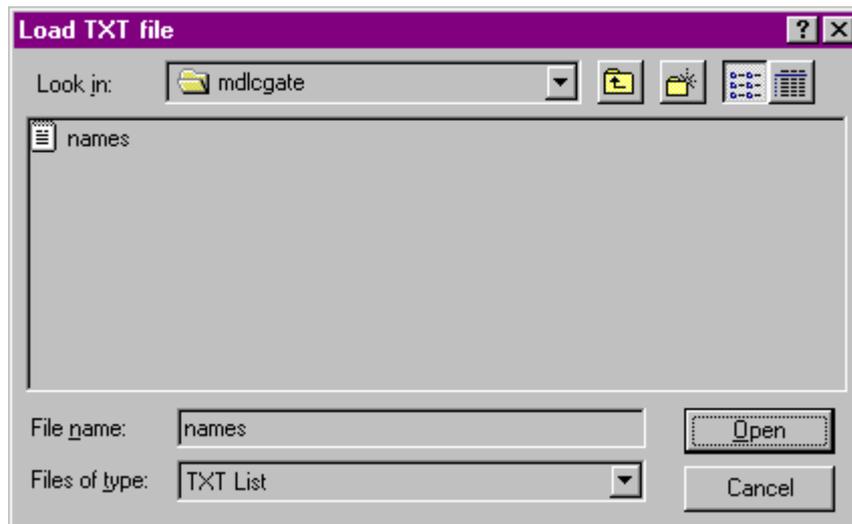
2) if “Base Name” is SAMPLE and “Number of Clones” is 3 and “Pad with 0” checkbox **is checked** then will be created 3 topics with following names: SAMPLE001, SAMPLE002, SAMPLE003.

File Name

To extracted clone name(s) from the text file check the radio button nearby “File Name” static control. “Browse...” button and “File Name” static control and editbox becomes enabled. Do not type the file name into “File Name” editbox but press “Browse...” button to select the file with topic names.

Browse... and file format

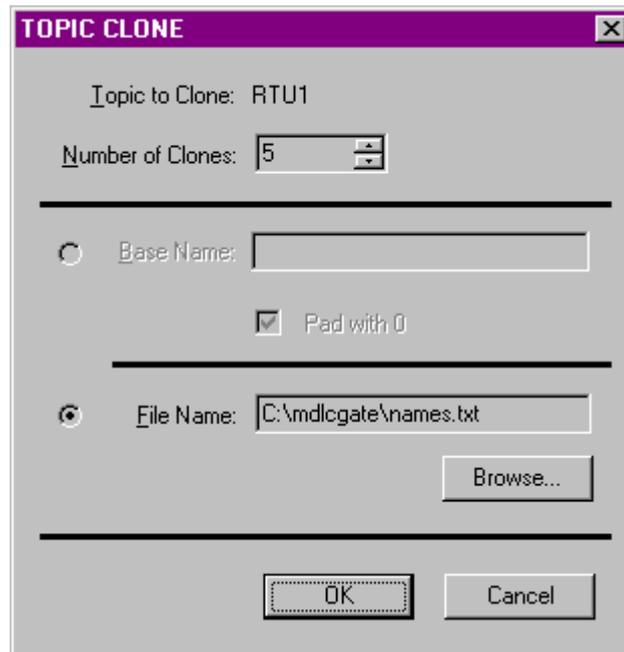
To enter file name press “Browse...” button. “Load TXT file” common dialog box will appear:



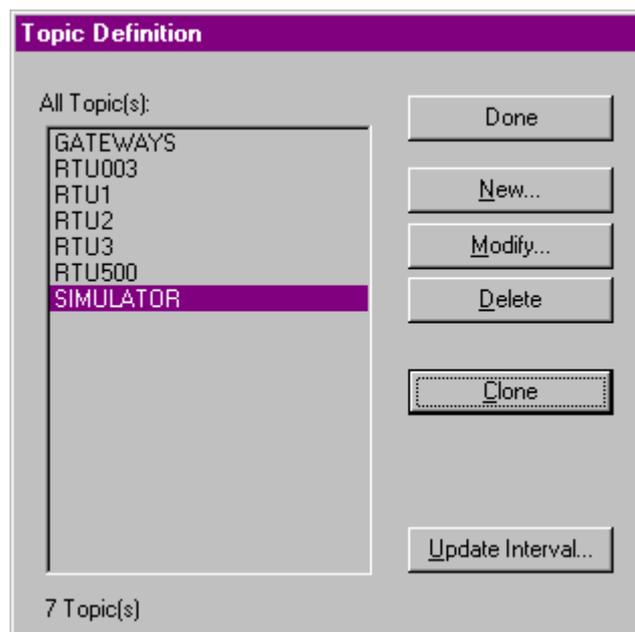
Select the file with topic names. The file with topic names must be plain text file previously created by any text editor (e.g. NOTEPAD). Each line of such file must contain either one topic name or comment. Comment starts by ‘;’ or ‘#’. Default file extension is *.TXT. The following is contents of example file (names.txt):

```
RTU003
RTU2
RTU3
```

RTU500 SIMULATOR

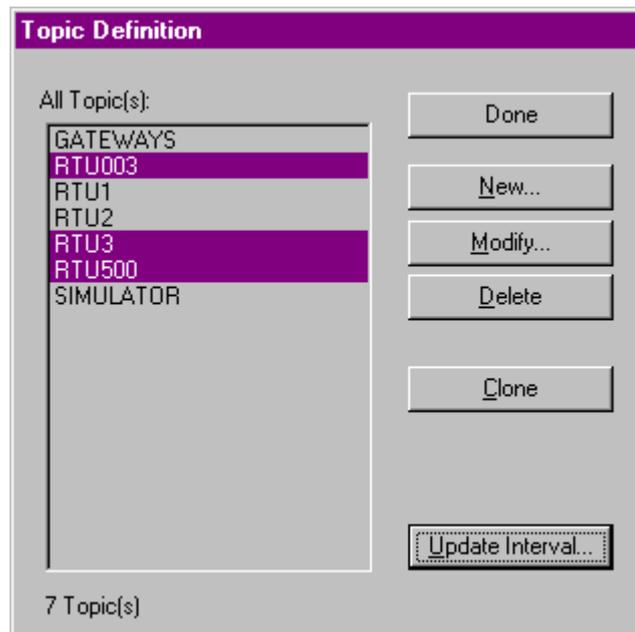


For topic creation press OK. Server will report about successfully created topics (number of clones should be equal to *Number of Clones* configuration value). New topics will appear in the Topic Definition window:

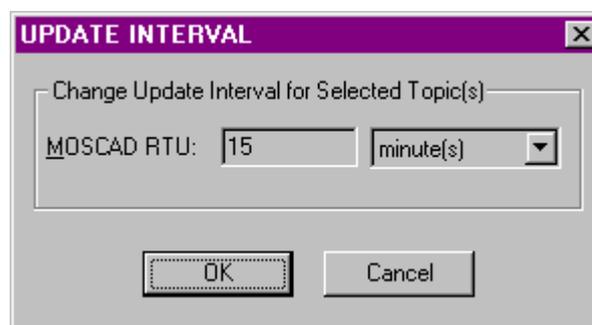


Update Interval for Multiple Topics

The MDLC Gateway Server supports the possibility to enter the new **MOSCAD RTU Update Interval** value for multiple Topics in a single operation. At first these multiple Topics must be selected in the "MDLCGATE Topic Definition" dialog box by holding the CTRL key while clicking on the selected ones:



Then click on **Update Interval**. The "UPDATE INTERVAL" dialog box will appear:



Enter the new value in the **MOSCAD RTU Update Interval** field and click on **OK** to change this value for all selected Topics or click on **Cancel**. The "Topic Definition" dialog box will appear again.

The **MOSCAD RTU Update Interval** can be change also at run-time, i.e. when Topics are activated by client application (see **Guidelines on Server Performance** section).

Select **Done** when configuration for all MOSCAD RTUs has been performed.

Guidelines on Server Performance

Depending on the complexity of the MOSCAD environment where the MDLC Gateway Server is used, the following guidelines should help to achieve the optimum Server performance.

Update Intervals

The optimum usage of Update Intervals is very important. There are three Update Intervals (listed according to their priority) which greatly affect the performance of the Server:

- (1) Gateway Status Update Interval,
- (2) "Ping" Status Update Interval,
- (3) MOSCAD RTU Update Interval.

If Gateway Status and "Ping" Status Update Intervals are very short (less than one second or for very complex systems less than ten seconds) and also data from RTUs are requested very often (MOSCAD RTU Update Intervals also are some seconds), then it is very possible that there is not enough time to execute all poll requests. 20 - 60 seconds could be a reasonable value for Gateway Status and "Ping" Status Update Interval in not too complex systems. Gateway Status poll and RTU Ping are intended for error detection. Theoretically one poll should be equal up to three RTU Ping and up to ten Gateway Status Intervals because it gives some time to Server for error processing. It should protect the server from useless polling(reading) and writing.

The optimum MOSCAD RTU Update Interval value depends on the total number of connected (active) RTUs to which poll requests are sent and also on total amount of active items for the corresponding Topic. It is very difficult to suggest some default value for MOSCAD RTU Update Interval because it highly depends on current environment. This Update Interval must give enough time to execute all poll requests, receive burst data and not to overload the system or the radio airtime usage. Typically RTU Update Intervals in radio-based systems are 10-30 minutes or 1-12 hours depending on system requirements.

Note: *Unlike other SCADA systems MOSCAD uses an unsolicited, spontaneous burst mechanism to update important data changes. Therefore it is less critical to poll RTUs frequently.*

QUEUE_IS_FULL_XXX.XXX.XXX.XXX item

The Server supports Discrete Read Only item **QUEUE_IS_FULL_XXX.XXX.XXX.XXX** (where **XXX.XXX.XXX.XXX** is the Gateway IP address), used for indication of polling queue or write queue overflow. This item is connected to whole active Gateway, not to some RTU (special Topic "GATEWAYS" is used). This item value is OFF (0) if the current number of poll requests for current active Gateway does not exceed **Max Pending Poll Requests** (see chapter **MDLCGATE Gateway Node Settings**) or if the current number of pending write commands does not exceed **Max Pending Write Requests** (see chapter **MDLCGATE Gateway Node Settings**). This item value changes to ON (1) if there are more than maximum pending poll requests or maximum write requests allowed for this Gateway(Node).

If **QUEUE_IS_FULL_XXX.XXX.XXX.XXX** item is specified in the client application (e.g. in InTouch) then the system load can be monitored. If **QUEUE_IS_FULL_XXX.XXX.XXX.XXX**

is ON too long then operator can modify (increase) the MOSCAD RTU Update Interval value for single or multiple Topics (see **Changing MOSCAD RTU Update Interval at run-time** subsection).

RESET_QUEUE_xxx.xxx.xxx.xxx item

For special topic "GATEWAYS" one additional item "RESET_QUEUE_xxx.xxx.xxx.xxx", (where xxx.xxx.xxx.xxx is the IP address of the Primary Gateway of the node) can be used. This is a Read/Write discrete item. If this item value is changed from 0 to 1 then both read and write queue will be reseted. After setting "RESET_QUEUE_xxx.xxx.xxx.xxx" to 1 replies on previous requests are not expected. The capacity of write requests queue becomes equal to "Max Pending Write Requests" value and capacity of read(poll) requests queue becomes equal to "Max Pending Read Requests" value. Value can be switched to 1 and both queues will be emptied. This possibility is usable in case when data exchange is wavelike. Unreachable Gateway or data flow impact can be a reason for non-answering requests. Such situation can be recognized at communication silence when the special topic "GATEWAYS" items READ_COUNTER_xxx.xxx.xxx.xxx does not become equal to "Max Pending Read Request" or WRITE_COUNTER_xxx.xxx.xxx.xxx and does not become equal to "Max Pending Write Request" (see chapter **MDLCGATE Gateway Node Settings** and chapter **Item(Point) Naming**). It means that servers performance is reduced (less and less pending request can be sent) after each non-answered request because Server waits FOREVER answer on the sent request(except Gateway Status message).

RESET_READS_xxx.xxx.xxx.xxx item

For special topic "GATEWAYS" one additional item "RESET_READS_xxx.xxx.xxx.xxx", (where xxx.xxx.xxx.xxx is the IP address of the Primary Gateway of the node) can be used. This is a Read/Write discrete item. If this item value is changed from 0 to 1 then only read part of queue will be reseted. After setting "RESET_READS_xxx.xxx.xxx.xxx" to 1 replies on previous poll requests are not expected and READ_COUNTER_xxx.xxx.xxx.xxx becomes equal to current Gateway Node **Max Pending Read Requests** parameter value (see chapter **MDLCGATE Gateway Node Settings**).

RESET_WRITES_xxx.xxx.xxx.xxx item

For special topic "GATEWAYS" one additional item "RESET_WRITES_xxx.xxx.xxx.xxx", (where xxx.xxx.xxx.xxx is the IP address of the Primary Gateway of the node) can be used. This is a Read/Write discrete item. If this item value is changed from 0 to 1 then only write part of queue will be reseted. After setting "RESET_WRITES_xxx.xxx.xxx.xxx" to 1 replies on previous write requests are not expected and WRITE_COUNTER_xxx.xxx.xxx.xxx becomes equal to current Gateway Node **Max Pending Write Requests** value (see chapter **MDLCGATE Gateway Node Settings**).

SUSPEND item

Discrete Read-Write item. Very important and usable possibility against wavelike data flow impact. This item gives control on data exchanging. The initial value of the SUSPEND item the MDLCGATE Server takes from the "SUSPEND Topic On Start-Up" checkbox (see chapter **MDLCGATE Topic Definition**). If value of item is 0 reads(polls) executes in general way. If SUSPEND item value becomes 1 only writes of this topic will be executed. Read(poll) requests can be executed only by item POLL_NOW using.

POLL_NOW item

The Server supports Discrete Write Only item **POLL_NOW**, used for immediately one time polling of all active items from some RTU. This one time polling can be used when MOSCAD RTU Update Interval value has been changed at run-time and it is necessary to receive fresh data from RTU before previous MOSCAD RTU Update Interval is elapsed. At start-up the value of the POLL_NOW item is 0. The Server issued all poll messages of corresponding topic when value of item changes from 0 to 1. The changing of POLL_NOW value from 1 to 0 does not take effect.

Note: The Server does not change (resets) value from 1 to 0. This reset operation has to be performed by client (e.g. InTouch).

Changing MOSCAD RTU Update Interval at run-time

At run-time the MOSCAD RTU Update Interval can be changed in two different ways:

- (1) Manually for single or multiple Topics as described in the **Topic Definition Command** section. In this case configurable units (milliseconds, seconds, minutes, hours) can be used.
- (2) In the client application for single Topic by defining the Integer Read/Write item **UPDATE_INTERVAL**. If this item value is changed in the client application (e.g. manually or by InTouch script) then the Server uses this value in the further processing of poll requests. In this case only seconds can be used.

It is important to understand that new MOSCAD RTU Update Interval value becomes effective only after the previous MOSCAD RTU Update Interval has elapsed, i.e. there is no automatic all RTU data polling performed at Update Interval change. This is done in order to prevent additional overload if the system is still overloaded (**QUEUE_IS_FULL_XXX.XXX.XXX.XXX** is ON). To perform immediate poll when MOSCAD RTU Update Interval has been changed the POLL_NOW item can be used.

Several MDLCGATE Servers connected to one Gateway.

It is possible to connect to one Gateway from two or more MDLCGATE Servers running on different PCs. In this case several things has to be observed:

- 1) If Servers are communicating with same Gateway simultaneously then **Max Pending Read Requests** and **Max Pending Write Requests** parameters must be set . These parameters are set in the (see chapter **MDLCGATE Gateway Node Settings**) on each PC where Server is running. These parameters should be set according the following rule: the sum of **Max Pending Read Requests** for all connected Servers cannot exceed allowed capacity of pending poll requests of Gateway and the sum of **Max Pending Write Requests** cannot exceed allowed capacity of pending write requests of Gateway .
- 2) If Servers are communicating with Gateway not simultaneously (client performs swapping from one Server to another) then **Max Pending Read Requests** can be up to maximum of Gateways capacity of pending read requests and **Max Pending Write Requests** can be up to Gateways capacity of pending write requests for each Server. The Server is not resetting queue of requests when connection with Gateway by some reason is lost. This allows to process replies after reconnecting. This feature usually is not working during Servers swapping. When swapping is performed then queue of requests of just connected Server must be reset because Server waits forever for reply on sent request. The client (e.g. InTouch) must write value 1 to GATEWAYS

topic special item **RESET_QUEUE_XXX.XXX.XXX.XXX** or write value 1 to GATEWAYS topic special items **RESET_READS_XXX.XXX.XXX.XXX** and **RESET_WRITES_XXX.XXX.XXX.XXX**. Reset ensures that queue of requests will be empty and Server can send the total amount of poll (**Max Pending Read Requests** or default value 20) and write requests (**Max Pending Write Requests** or default value 5).

Item (Point) Naming

The MDLC Gateway Server item/point naming is based on information contained in the RTU Types Definition file. The item/point name generally may be described as:

TzCxRy[TSn] [.b][h]

where:

z - table number;

x - number of column (starting from 0) in the table;

y - number of row (starting from 0) in the table;

TSn - used only if data type is **Timestamp1** and **Timestamp2** (n can be 1 or 2); for these items the corresponding element type in the RTU Types Definition file must be **float**;

.b - optionally used address of bit if data type is Compressed Bits and only one bit must be accessed;

h - (or **H**) optionally used suffix indicating that this item value will be stored in the historical file.

Examples:

T1C2R0 - Column 2 Row 0 in Table 1;

T1C2R5h - Column 2 Row 5 in Table 1, values will be stored in the historical file;

T12C0R1.4 - bit 4 in Column 0 Row 1 in Table 12.

T12C0R1.4H - bit 4 in Column 0 R1 in Table 12, values will be stored in the historical file.

T1C2R0TS1 - Column 2 Row 0 in Table 1, data type is Timestamp1;

The following item types are supported.

Item Type	Value Range	Type
Bit	0,1	Discrete
Bit in Compressed Bits	0,1	Discrete
Compressed Bits (represents a Row of up to 8 Bits in a Table)	0...255	Integer
Analog	-32768...32767	Integer
Float	Standard IEEE 32 bit floating value	Real
TS1 Timestamp1	11 bytes long string	Message
TS2 Timestamp2	9 bytes long string	Message

Notes:

1. The **Type** is the item/point type used in the Wonderware InTouch.

2. The **Bit in Compressed Bits**, **TS1** and **TS2** are Read Only, all other types are Read and Write.

3. The **TS1** items have the format: "**yy/mm/dd/hh**" where **yy** is year (00...99), **mm** is month (01...12), **dd** is day (01...31) and **hh** is hour(00...23).

4. The **TS2** items have the format: "**MM:SS:MSC**" where **MM** is minutes (00...59), **SS** is seconds (00...59) and **MSC** is milliseconds(000...999).

The additional items/points can be used for special actions:

1. The special topic **GATEWAYS** items/points (**xxx.xxx.xxx.xxx** is the Gateway IP address):

QUEUE_IS_FULL_xxx.xxx.xxx.xxx - Discrete, Read Only; used for indication of polling queue overflow; this item value is 0 if the current number of poll requests for active Gateway does not exceed **Max Pending Read Requests**(see chapter **MDLCGATE Gateway Node Settings**) ; this item value changes to 1 if there are more than **Max Pending Read Requests** for this Gateway (see also **Guidelines on Server Performance** section).

RESET_QUEUE_xxx.xxx.xxx.xxx - Discrete, Read-Write; used for reset of polling and writing queue overflow; If this item value is changed from 0 to 1 then both read and write queue will be reseted. After setting "RESET_QUEUE_xxx.xxx.xxx.xxx" to 1 replies on previous requests are not expected. The capacity of write requests queue becomes equal to **Max Pending Write Requests**(see chapter **MDLCGATE Gateway Node Settings**) and capacity of read(poll) requests queue becomes equal to **Max Pending Read Requests**. Value can be switched to 1 and both queues will be emptied. In case of redundant Gateway use only Primary Gateway address in the item name because **RESET_QUEUE_xxx.xxx.xxx.xxx** item belongs to MDLCGATE Gateway node (see also **Guidelines on Server Performance** section).

READ_COUNTER_xxx.xxx.xxx.xxx - Integer, Read Only; used for monitoring of read(poll) message queue; initial value of this item is **Max Pending Read Requests** (see chapter **MDLCGATE Gateway Node Settings**). Value decrease by each read request sending and increase by answer receiving. Value of item represents how many reads can be sent to active Gateway. In the reads included active Gateway STATUS message. For Gateway STATUS message one position is reserved because it must be sent in its update interval. It means that actually amount of reads is **Max Pending Read Requests - 1**. If value of item becomes 1 only Gateway STATUS message can be sent. In this case the warning message "Read(Poll) Message Queue is FULL. Only GW STATUS can be requested" appears in the WWLogger. If value of item is 0 read(poll) queue is full and server waits for answer on sent requests. In case of redundant Gateway use only Primary Gateway address in the item name because **READ_COUNTER_xxx.xxx.xxx.xxx** item belongs to MDLCGATE Gateway node.

WRITE_COUNTER_xxx.xxx.xxx.xxx - Integer, Read Only; used for monitoring of write message queue; initial value of this item is **Max Pending Write Requests** (see chapter **MDLCGATE Gateway Node Settings**). Value decreases by each write request sending and increase by answer receiving. Value of item represents how many writes can be sent to Gateway. If value of item is 0 write queue is full and server waits for answer on sent requests. In this case the warning message "Write Pending Message Queue is FULL." appears in the WWLogger. In case of redundant Gateway use only Primary Gateway address in the item name because **WRITE_COUNTER_xxx.xxx.xxx.xxx** item belongs to MDLCGATE Gateway node.

GS_LSB_xxx.xxx.xxx.xxx - Integer, Read Only; used for storing of two LSBytes with Gateway mode indications.

GS_MSB_xxx.xxx.xxx.xxx - Integer, Read Only; used for storing of two MSBytes with Error and Warning indications.

GMODE_SET_xxx.xxx.xxx.xxx - Discrete, used for setting of the Gateway operation mode - when switched from 0 to 1 then MDLC Gateway API function *gwlib_set_mode()* is called with *mode* set to *GWLIB_PRIMARY_MODE*; if switched from 1 to 0 then called with *mode* set to *GWLIB_SECONDARY_MODE*.

SEND_ERROR_xxx.xxx.xxx.xxx - Integer, Read Only; used for storing of return values from MDLC Gateway API functions *gwlib_poll()*, *gwlib_send_data()*, *gwlib_send_command()*, *gwlib_set_time()*, *gwlib_get_time()*;

RECEIVE_ERROR_xxx.xxx.xxx.xxx - Integer, Read Only; used for storing of return values from MDLC Gateway API functions *gwlib_receive_bufferl()*, *gwlib_get_message()*.

DUMP – Discrete; all information about gateway nodes, topics, messages and data items are logged. This can be used to find out how many messages are actually sent to the network.

Example:

GS_LSB_192.17.33.160 - Integer, Read Only; used for storing of Gateway mode indication for the Gateway with IP address 192.17.33.160.

2. The special items/points which can be created for each topic (RTU):

POLL_NOW - Discrete, used for immediately one time polling of all active items (see **Guidelines on Server Performance** section); this one time polling is performed when **POLL_NOW** value switches from 0 to 1; no effect when switches from 1 to 0;

UPDATE_INTERVAL - Integer, used for run-time changing of *MOSCAD RTU Update Interval* for this Topic (see **Guidelines on Server Performance** section);

SET_TIME - Discrete, used for downloading of Server date and time (by calling *gwlib_set_time*) to a specified RTU;

GET_TIME - Discrete, used for uploading of a specified RTU date and time; the date and time request (by calling MDLC Gateway API function *gwlib_get_time*) is sent when

GET_TIME value switches from 0 to 1; no effect when switches from 1 to 0; the result is stored in the item **DATE_TIME**;

DATE_TIME - Message, Read Only; used for storing of character string containing the specified RTU date and time in the following format: "YY/MM/DD hh:mm:ss" where YY is year, MM - month, DD - day, hh - hours, mm - minutes and ss - seconds;

SUSPEND - Discrete, Read Write; used for suspending of poll messages of topic; value 0 allows poll message sending, but value 1 disables all current polls and only write messages can be sent; poll can be executed to each topic by **POLL_NOW** = 1 (see also **Guidelines on Server Performance** section);

Historical File

Only data marked with suffix h(or H) are stored in the historical file. This file is updated at the historical data update interval. The name of historical file is *Hyyymmdd.LOG* where *yy* is year, *mm* - month and *dd* - day. For example, H960702.LOG is the name of a historical file with data received from all connected Gateways at July 2, 1996.

This single file record (row) contains a single received item data. The format of this single file record is as follows:

yy/mm/dd,HH:MM:SS:MSEC,ID,STAT,TzCxRy,value

where: **yy** is year(00...99), **mm** - month (0...11), **dd** - day(1...31), **HH** - hours (00...23), **MM** - minutes (00...59), **SS** - seconds (00...59), **MSEC** - milliseconds (000...999);
ID - RTU Site ID;
STAT - the RTU Status,
TzCxRy - the address of item (table, column and row),
value - received value.

If the same table contains TS1 and TS2 elements then RTU data and time are stored; otherwise the computer data and time are stored.

The following would be an example of one this file record if RTU Site ID is 13, RTU Status is 0, item address is Table 2 Column 5 Row 0 and received data value is 1:

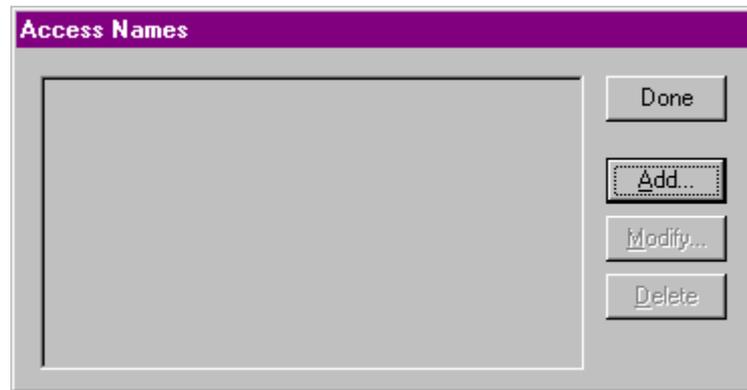
96/02/07,09:48:40:760,13,0,T2C5R0,1

Using the MDLCGATE Server with InTouch

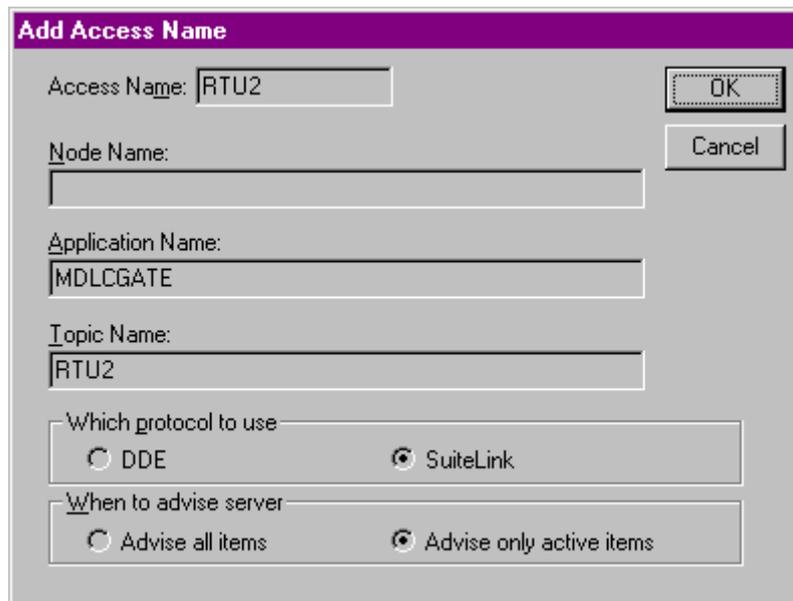
To access items/points on the MOSCAD RTUs from **InTouch**, the Access names and Tag names should be defined in **WindowMaker**.

Defining the DDE Access names

To define the Access Names in WindowMaker for each 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 dialogue 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

Enter an arbitrary name that will be used by **InTouch** to refer to the topic. For simplicity, it is recommended that the name defined for the topic in MDLCGATE Server also be to be used 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 MDLCGATE Server the MDLCGATE is used. Do not enter the .exe extension portion of the program name.

Topic Name

Enter the name defined for the topic in the MDLCGATE Server to identify the topic the MDLCGATE Server will be accessing. The Topic Name is an application-specific sub-group of data elements. In the case of data coming from a MDLCGATE Server program, the topic name is the exact same name configured for the topic in the MDLCGATE 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 MDLCGATE Server**.

Which protocol to use

Select the protocol (**DDE** or **SuiteLink**) 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.

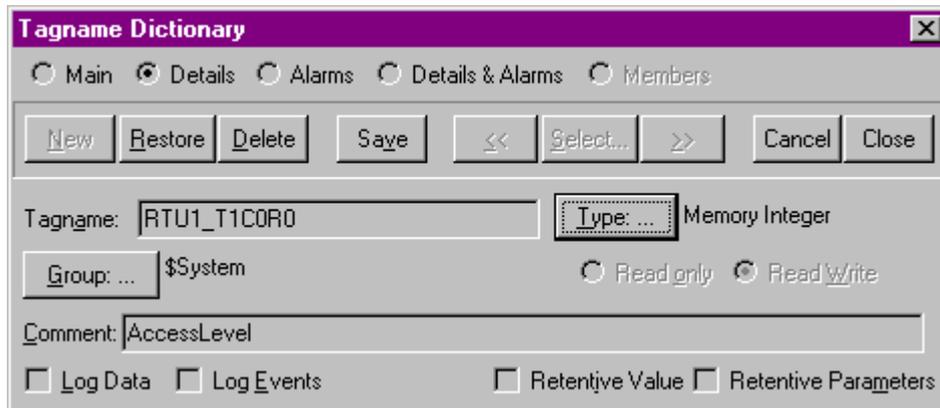
Select **Advise only active items** if you want the Server program to poll only points in visible windows and points that are alarmed, logged, trended or used in any script.

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

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

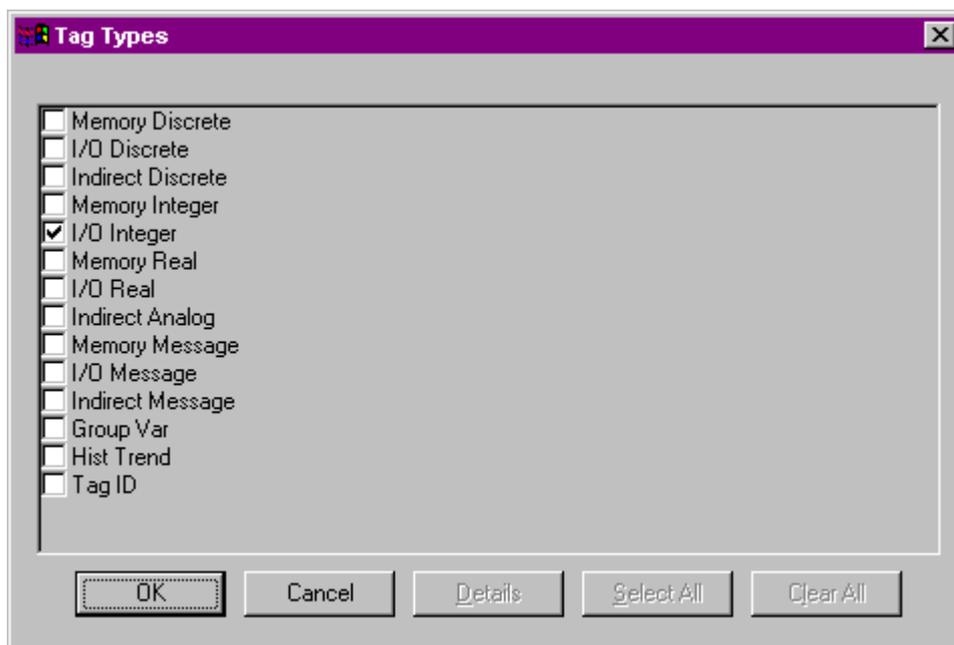
Defining the Tag Names

To define the Tag names associated with the new "Access Name", invoke the */Special/Tagname Dictionary...* command (in **WindowMaker**). The "Tagname Dictionary" dialogue box will appear:



Click on **New** and enter the **Tagname**. (The tagname defined here is the name InTouch will use. The MDLCGATE Server does not see this name.)

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



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

The "Details" dialogue box for the tagname 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"/>				Conversion
<input type="button" value="Access Name: ..."/> Unassigned					<input checked="" type="radio"/> Linear
					<input type="radio"/> Square Root
Item:	<input type="text"/>				
<input type="checkbox"/> Use Tagname as Item Name					Log Deadband: <input type="text" value="0"/>

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

Access Names	
<input type="text" value="RTU1"/>	<input type="button" value="Done"/>
	<input type="button" value="Add..."/>
	<input type="button" value="Modify..."/>
	<input type="button" value="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" dialogue 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"/>				Conversion
<input type="button" value="Access Name: ..."/> RTU1					<input checked="" type="radio"/> Linear
					<input type="radio"/> Square Root
Item:	<input type="text"/>				
<input type="checkbox"/> Use Tagname as Item Name					Log Deadband: <input type="text" value="0"/>

For integers 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 MDLCGATE 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"/>				Conversion
<input type="text" value="Access Name: ..."/> RTU1					<input checked="" type="radio"/> Linear
Item: <input type="text" value="T1COR0"/>					<input type="radio"/> Square Root
<input type="checkbox"/> Use Tagname as Item Name					Log Deadband: <input type="text" value="0"/>

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

Where applicable, the **Use Tagname as Item Name** option may be selected to enter automatically 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 dialogue 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 **RTU1** is the Topic Name configured for MDLCGATE Server):

=view|DDEStatus!RTU1

or

=view|IOStatus!RTU1

Notes on Using Microsoft Excel

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

=MDLCGATE|topic!item

Sometimes, 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 (Point) Naming** 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:

=MDLCGATE|'RTU2!' T1C2R0'
=MDLCGATE|' RTU3!' T2C5R1.3'
=MDLCGATE|' RTU10!' T1C2R0TS2'

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

Writing Values to MDLCGATE 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("MDLCGATE","topicname")
=POKE(channel,"itemname", Data_Reference)
=TERMINATE (channel)
=RETURN()

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

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

Opens a channel to a specific topic name (defined in the Server) in an application with name MDLCGATE (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 specific operand in the MDLCGATE 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 specified like 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 **RTU1** item **T1C0R0**:

```
PokeMacro –Ctrl a
=INITIATE("MDLCGATE","RTU1")
=POKE(A2,"T1C0R0",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.

Troubleshooting

WIN.INI entries

The first time you run the MDLCGATE Server configuration, most of the items in the following list will automatically appear in the WIN.INI file. It is usually in the C:\WINDOWS directory. 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 DOS text*). The following is a typical entry for the MDLCGATE Server:

[MDLCGATE]	
ProtocolTimer=50	Protocol Timer Tick
ConfigurationFile=C:\MDLCGATE\	Configuration File Path
WinIconic=0	Server starts up minimized (if 1)
WinFullScreen=0	Server starts up maximized (if 1)
WinTop=112	Position and size of Server's window at Server startup (if not minimized or maximized)
WinLeft=0	
WinWidth=200	
WinHeight=168	
DebugMenu=1	Show Troubleshooting menu (if 1)
ShowSend=0	ShowSend is checked (if 1)
ShowReceive=0	ShowReceive is checked (if 1)
ShowErrors=1	ShowErrors is checked (if 1)
DumpScreen=0	DumpScreen is checked (if 1)

Following optional entries for MDLCGATE Server can be used if default values of parameters must be changed:

DelayAfterLostRequest=10

Time in seconds of delay after LOST REQUEST message received from Gateway till next request sending. Value can be from 1 to 65535 seconds.

LogSend=1

The possibility to configure which subitem of the "Log Send" system menu item will be selected at start-up. Subitems has the following values:

"Log All Data" = 1;

"Custom Log" = 2;

"No Logging" = 0.

At Server first start-up the default selection is "No Logging".

LogReceive=1

The possibility to configure which subitem of the "Log Receive" system menu item will be selected at start-up. Subitems has the following values:

"Log All Data" = 1;

"Custom Log" = 2;

"No Logging" = 0.

At Server first start-up the default selection is "No Logging".

MultiWrite=0

Can be used in cases when write command execution order is important for user application the Server must be configured to transfer only one non-answered write message to each topic.

Value 0 enables only one non-answered write sending to each topic. In this case

Max Pending Write Request

parameter(see chapter *MDLCGATE*

Gateway Node Settings) value is

disabled. Default value of MultiWrite is 1.

WarningOnPollMiss=1

Can be used in cases when it is necessary to see that general poll issue is missed. Parameter has two valid values:

0 - Off;

1 - On.

Default parameter value is 0. If above described situation presents then

warning message should appear in the WWLogger file. For example:

98/07/09 09:30:00.227/MDLCGATE/GW

node:Node2 Topic:RTU01 Table:1.

WarningOnPollDelay=5

Missed Poll Issue during Update Interval(900 seconds)

Can be used in cases when it is necessary to see that general poll issue is not missed yet but only delayed some time. Valid values of parameter are between 0 and 86400 seconds. No message will be logged if value is 0. Default this parameter value is 0. If above string is included then warning message should appear in the WWLogger file. For example:

98/07/09 09:15:05.215/MDLCGATE/GW node:Node2, Topic:RTU01, Table:1. Poll issue delay is 5 seconds.

DelayBetweenPolls=600

The possibility to configure special poll mode. Value can be from 0 to 86400 seconds. Value 0 of this parameter means that general polling mode is used and poll execution depends on update interval. Non-zero value defines time interval in seconds between STARTINGS of each consecutively processed topic polling (not between last request of currently processed topic and the first request of the next topic). Topics are polled consecutively (one by one) in the order of the initiation. If parameter **DelayBetweenPolls** appears in the MDLCGATE section of the WIN.INI file and its value differs from 0 then following changes in the Server performance are expected:

1) All topics are suspended. Value of SUSPEND item for each topic is equal to 1

and cannot be changed.

2) MOSCAD RTU Update Interval is disabled.

3) Ping Update Interval is disabled. The "Pings to RTU" are not executed.

Writes are executed in general way.

FirstBadTryMsgBox=0

The possibility to disable the first connection alert message box. Default value is 1.

ResetMode=0

If this parameter value is 0 the pending requests queue will be emptied when no connection to Gateways happens. Default value is 1, ie, MDLCGATE Server remembers pending request numbers till the Server shutdown. Only by reset command can clear pending(read and write) requests queue(see chapter **Item (Point) Naming**).

Troubleshooting menu

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

Suspend Protocol/Resume Protocol - these choices permit you to turn protocol processing on and off, which means that you can suspend access to the RTUs.

Log Send - this system menu item is provided for organizing of send package logging to the WWLogger file. This item has the following subitems: "**Log All Data**", "**Custom Log**", "**No Logging**".

Log All Data - if checked then all outgoing user data is logged to the WWLogger file. Each message's log contains 1 or more strings. First string format differs from each next ones of message's log. First string of message's log has the following format(date, time and application name are skipped):

<type of request>:<node name> < contents of request> size:<size of request> mailbox:<#>- <request in hexadecimal format>

where

<type of request> - "Poll" or "Write" types of request are possible

<node name> - name of sender node

<contents of request>:

1. For Gateway status poll message - in the following format:
<GW <#> STATUS>,
where # is 'I' for PRIMARY 'II' for SECONDARY Gateway.

2. For Poll or Write requests format is the following:
<<Topic Name> Table:<#> StartRow:<#> EndRow:<#>
StartCol:<#> EndCol:<#>>. Request contains the Name of sender Topic and the RTU table number. The StartRow and EndRow shows the smallest and the greatest row numbers of active items of the table of the topic. The StartCol and EndCol shows the smallest and the greatest column numbers of active items of the table of the topic.

3. For "PING" of topic poll message in the following format:
 <<Topic Name> PING>, where
 <Topic Name> - name of sender topic.

<size of request> - size of request in bytes
<#> - number of mailbox for request and reply
<request in hexadecimal format> - hexadecimal queue of the request

For example, the Gateway Status request number 144 for node Node2:

Poll(mailbox:144):Node2 GW I STATUS(size:36):00 01 7F FD 00 00...

Each next string of log (if such is necessary) has the following format:

<type of request>+:<request in hexadecimal format>

where

<type of request> - "Poll" or "Write" type (same as in the first string of the log)

<request in hexadecimal format> - continuation of the hexadecimal queue of the request

For example:

Poll+:00 00 00 00...

- Custom Log** - messages will be logged to the WWLogger corresponding to settings in the Server's main window;
- No Logging** - no messages will be logged to the WWLogger;

When the Server starts the default selection is "No Logging". This default value can be changed by settings in the WIN.INI file. Subitems has the following values:

"Log All Data" = 1;

"Custom Log" = 2;

"No Logging" = 0.

The following is an example for "Log All Data" subitem selection in the Server's system menu:

```
[MDLCGATE]
```

```
LogSend=1
```

- Show Receive** - this system menu item is provided for organizing of received package logging to the WWLogger file. This item has the following subitems: "Log All Data", "Custom Log", "No Logging".

- Log All Data** - if checked then all incoming user data is logged to the WWLogger file. Each message's log contains 1 or more strings. First string format differs from each next ones of message's log. First string of message's log has the following format:

<type of message>:<node name> size:<size of message>-< contents of message> [mailbox:<#>]- <message in hexadecimal format>

where

<type of message> - "Receive" or "Burst" types of message are possible

<node name> - name of receiver node

<size of request> - size of received message in bytes

<contents of message>:

1. Reply (acknowledge) on the Gateway status or mode poll contains the following string: "GET_MODE_ACK or GET_STATUS_ACK".
2. Reply (acknowledge) format on Poll, PING, Set time, Get time, Write and request is the following:
 <<Topic Name> <acknowledge type>>. Request contains the name of sender Topic and type of acknowledge ("POLL_ACK", "GET_TIME_ACK", "SET_TIME_ACK", "COMMAND_ACK").
3. For "Burst"(unsolicited) message in the following format:
 <<Topic Name> BURST_MSG>, where
 <Topic Name> - the name of sender topic.

<(mailbox:<#>> - the number of mailbox for "Receive" type of message. This parameter is not used for "Burst" messages

<request in hexadecimal format> - the hexadecimal queue of the request

Custom Log - messages will be logged to the WWLogger corresponding to settings in the Server's main window.

No Logging - no messages will be logged to the WWLogger.

At Server first start-up the default selection is "No Logging". This default value can be changed by settings in the WIN.INI file. Subitems has the following values:

"Log All Data" = 1;

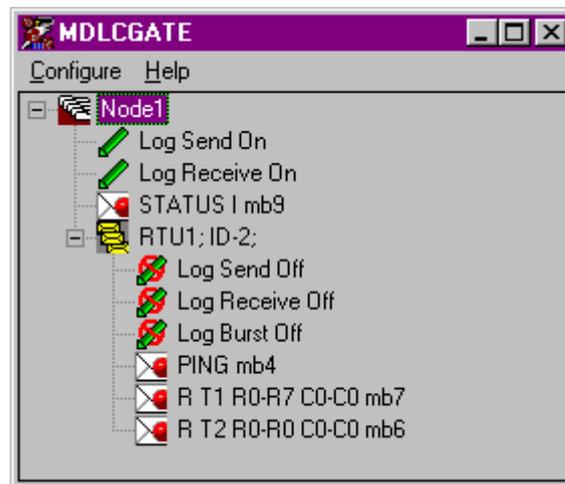
"Custom Log" = 2;

"No Logging" = 0.

The following is an example for "Log All Data" subitem selection in the Server's system menu.

```
[MDLCGATE]
LogReceive=1
```

- Show Errors** - if checked then all information about errors is logged.
- Dump** - all information about gateway nodes, topics, messages and data items are logged. This can be used to find out how many messages are actually sent to the network.
- Dump Screen** - if checked then information about open connections and active messages is displayed as a tree of communication component structure and it is drawn in the Server's main window.



where

- "Gateways Nodes" and special topic "Gateways"
- Initialized Topic Name and Topic ID
- Log On. Shows which type of data ("Send", "Receive", "Burst") will be logged
- Log Off. Shows which type of data ("Send", "Receive", "Burst") will be not logged

"Log On" or "Log Off" mode can be set by mouse left button double click on the item. These settings are in use if "Custom Log" menu subitem of "Log Send"/"Log Receive" menu item is selected in the Server's system menu.

- Requests:
 - "STATUS I" - item shows "Gateway Status Poll Message" with it's last mailbox number.
 - "STATUS II" - item shows "Redundant Gateway Status Poll Message" (if redundant Gateway is configured) with it's last mailbox number.
 - "Ping" - item shows Topic Ping Status message with its last mailbox number.
 - "Read Message" - item shows general read message in the following format:

R T<#> R<s#>-R<e#> C<s#>-C<e#> mb<#>

Where

- R - letter representing the read message;
- T<#> - table number (from Rtutypes.cfg);
- R<s#> - from which row the message starts (start row);
- R<e#> - which row is the last in the message (end row);
- C<s#> - from which column (from Rtutypes.cfg) the message starts (start column);

C<e#> - which column (from Rtutypes.cfg) is the last in the message (end column);
mb<#> - last mailbox number of poll (read) message.

Note: Read message disappears when the last item is unadvised.

“Write Message” - item shows general write message in the following format:

W T<#> R<s#>-R<e#> C<s#>-C<e#> mb<#>

Where

W - letter representing the write message;

T<#> - table number (from Rtutypes.cfg);

R<s#> - from which row the message starts (start row);

R<e#> - which row is last in the message (end row);

C<s#> - from which column (from Rtutypes.cfg) the message starts (start column);

C<e#> - which column (from Rtutypes.cfg) is last in the message (end column);

mb<#> - last mailbox number of poll (read) message.

Note: Write message disappears when reply is received.

By mouse right button clicking it is possible to access the submenu. The submenu contains the following items:

Log All Sends - selects all "Log Send" treeview items of topics of the current gateway node.

Log All Receives - selects all "Log Receive" treeview items of topics of the current gateway node.

Log All Bursts - selects all "Log Burst" treeview items of topics of the current gateway node.

No Log Sends - unselects all "Log Send" treeview items of topics of the current gateway node.

No Log Receives - unselects all "Log Receive" treeview items of topics of the current gateway node.

No Log Bursts - unselects all "Log Burst" treeview items of topics of the current gateway node.

Dump - dump internal data of the Server to WWLogger. Data will be logged depending on treeview item that is under mouse cursor (the clicking on topic initiates the internal info logging for this topic).

All debug information (except **Dump Screen**) is displayed via the Wonderware Logger, which must be active for these commands to work.

Warning: if you check **Log Send/Log All Data** and/or **Log Receive/Log All Data** debug output grows very fast and it is possible that computer becomes very slow.

MOSCAD System Definition Files

The definition of the entire MOSCAD System (all RTUs for all Gateway Nodes) is stored in the two files:

1. RTU Types Definition file.
2. MOSCAD System Definition file.

RTU Types Definition

In the RTU Types Definition file the RTU TYPES in the MOSCAD System are defined.

Each RTU Type Definition includes:

- I. Number of Tables
- II. For each Table:
 - A. Table Number (in the MOSCAD application)
 - B. Number of columns in the Table
 - C. Type of each column

The file is case insensitive.

```

;-----
; File Type & Version
;-----
*File_Type =RTU_TYPE
*Version=XXX
;-----
; Definition of Types      ;
;-----
* No_of_Types=Nt
;
;-----
;Definition for Type No   ;
;-----
*Type_name No_of_tables
;
;-----
;Definition for Table No j. in Type No ;
;-----
* Table_no No_of_columns Column_type_0 ... Column_type_i

```

Example:

```

;RTU Types File Version
FILE_TYPE RTU_TYPE
VERSION 1.0

; Definition of RTU Types
Number_of_Types 3
;
;
;      Type_name No_of_tables
Type Pump 3
;
;      Table_no N_cols Col_0 Col_1 Col_2 Col_3 Col_4 Col_5 Col_6 Col_7
Table 0 5 Bit Bit Bit Bit Bit
Table 2 8 C_Bit C_Bit C_Bit C_Bit C_Bit C_Bit C_Bit C_Bit
Table 3 3 Float Val Bit
;
;      Type_name No_of_tables
Type Valve 1
;
;      Table_no N_cols Col_0 Col_1 Col_2 Col_3 Col_4 Col_5 Col_6 Col_7
Table 10 3 Float Val Bit
;      Type_name No_of_tables
;
;
Type PoleTop 1
;
;      Table_no N_cols Col_0 Col_1 Col_2 Col_3 Col_4 Col_5 Col_6 Col_7
Table 1 1 Bit

```

MOSCAD System Definition

In the MOSCAD System Definition file the association of RTU - 'RTU Type' is defined. Each RTU (defined by its Site_id) is assigned an 'RTU Type' (defined in the RTU Types Definition file).

The file is case insensitive.

```

;-----
;File Version
;-----
*File_Type=SYSTEM
*Version=XXX
;-----
;Definition of RTUs      ;
;-----
*No_of_Rtus
;
;-----
;Definition for RTU No. i ;
;-----
*   Site_id   Type_name

```

Example:

```

;MOSCAD System File Version
FILE_TYPE SYSTEM
VERSION 1.0
;   No of RTUs
N_RTU 4
;
;   Site_id   Type_name
RTU 1   Pump
RTU 2   Pump
RTU 3   PoleTop
RTU 4   Valve

```

KLINKMANN AUTOMATION
MDLC Gateway DDE Server
ReMDLCGATE History

Sep 96	Rev 1.0	First Release
Nov 96	Rev 1.1	Hot Standby - Principles of Operation section added. Guidelines on Server Performance section added. Installing and starting the MDLCGATE Server section modified. Gateway Node Definition Command section modified. Topic Definition Command section modified. Historical File section modified. Item (Point) Naming section modified.
Dec 96	Rev 1.2	
Feb 97	Rev 1.3	
Sep 97	Rev 1.4	Manual file name changed. Minor changes.
Oct 97	Rev 1.5	Changes in Item(Point) Names section added. Topic Definition Command section modified. Troubleshooting Menu section modified.
Oct 98	Rev 1.6	Troubleshooting section modified. Topic Definition Command section modified. Guidelines on server performance section modified. Item(point) naming section modified.
Mar 2000	Rev 1.7	Item(point) naming section modified. Gateway Node Definition Command section modified. Communication Protocols section modified. Other minor changes.
Apr 2000	Rev 1.8	Suite Link support added. Max Pending Read and Write Requests added in MDLCGATE Gateway Node Settings" dialog.
Mar 2002	Rev 1.9	Installation from CD information added.
Jun 2014	Rev 1.10	"Installing and starting the MDLCGATE Server" section modified, "Licensing by using HASP HL key" and "Software license key" sub-sections added.