

# **PCIS-DDE**

DDE Server for  
NuDAQ PCI-bus Cards (Win-NT)

**User' s Guide**



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# Contents

CHAPTER 1	Introduction to PCIS-DDE .....	1
1.1	WHAT IS DDE.....	1
1.2	DDE CONVERSATION .....	3
CHAPTER 2	Getting Started .....	5
2.1	PCIS-DDE INSTALLATION.....	5
2.1.1	<i>Installation</i> .....	5
2.1.2	<i>PCIS-DDE Device Driver Handling</i> .....	9
2.2	PCIS-DDE SERVER CONFIGURATION .....	11
2.2.1	<i>/Configure/Board Configuration</i> .....	11
2.2.2	<i>/Configure/Topic Definition</i> .....	13
2.2.3	<i>/Configure/DDE Server Settings</i> .....	15
CHAPTER 3	Using PCIS-DDE with InTouch .....	17
3.1	DDE ITEM NAMES DEFINITION IN INTOUCH.....	17
3.2	MONITOR THE COMMUNICATION STATUS OF MODULES .....	23
3.3	MONITOR THE STATUS OF AN DDE CONVERSATION.....	24
CHAPTER 4	DDE Item Names In PCIS-DDE .....	27
4.1	PCI-7200/7432.....	28
4.2	PCI-7230 .....	29
4.3	PCI-7234 .....	30
4.4	PCI-7250(WITH/WITHOUT PCI-7251) .....	31
4.5	PCI-7248/7296.....	32
4.6	PCI-7433 .....	34

4.7	PCI-7434 .....	35
4.8	PCI-9111DG/HR.....	36
4.9	PCI-9112 .....	38
4.10	PCI-9113 .....	40
4.11	PCI-9114DG/HG .....	41
4.12	PCI-9118DG/HG/HR.....	42
4.13	PCI-6208V/18V/08A.....	44
4.14	cPCI-7252 .....	45
Appendix InTouch Sample Programs .....		47
I.	EXECUTE SAMPLE PROGRAMS.....	48
II.	CONVERTING RAW DATA OF ANALOG INPUT AND ANALOG OUTPUT TO ENGINEERING UNIT.....	50

# Introduction to PCIS-DDE

PCIS-DDE is an application for Windows NT operating systems. It acts as a DDE (Dynamic Data Exchange) *Server* and allows other Windows application programs to access data from NuDAQ PCI-bus data acquisition cards. It may be used with Wonderware InTouch and any Microsoft Windows program that is capable of acting as a DDE *Client*.

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## 1.1 What is DDE?

DDE (Dynamic Data Exchange) is a communication protocol designed by Microsoft to allow concurrently running programs in the Windows environment to exchange data and instructions with each other. It implements a *client-server* relationship between the applications. The *server* application provides the data and accepts requests from any other application interested in the data. The requesting applications are called *clients* which can both read and write data maintained by the server. Some applications such as InTouch and Microsoft Excel can simultaneously be both a *client* and a *server*.

Client applications can use DDE for *one-time data transfers* or for *continuous data exchanges* in which updates are sent as soon as new information is available. For *one-time data transfers*, the client application only **requests** the “snapshot” data from the server application. For example, as a macro for report generation is executed in Excel, a link to another DDE program will be set up to request the specified data. The link will be terminated after the requested data is received. Then the received data are used to generate reports.

The *continuous data exchanges* mode is also named “hot link”. While a client application sets up a link to another DDE program, it requests the *server* application to **advise** the client whenever a specific item's value changes. These data links will remain active until either the *client* or *server* program terminates the link or the conversation. It is a very efficient means of exchanging data because once the link has been established no communication occurs until the specified data value changes. InTouch uses DDE to communicate with I/O device drivers and other DDE application programs.

For InTouch, if the tagname are defined as I/O type, they can read or write their values to or from another DDE compliant Windows program. For example, InTouch can read or write their values to Excel, and Excel can also read or write data to InTouch Database. Whenever the data from source are updated, the remote data are updated automatically as soon as new information is available. DDE can be used to dispatch control instructions to process-connected instruments. With this ability, two or more related applications can be combined together to make up a large size of *super application*. For example, Excel spreadsheet can perform the optimal calculation for production. Thus, Excel may read data from InTouch database, which are accessed from I/O controllers or sensors. Reference to the data, the Excel spreadsheet performs some complicated calculation. InTouch reads the calculated result back from Excel and then uses this optimal value to control various production parameters.



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## 1.2 DDE Conversation

Two Windows application wishing to exchange data must establish a conversation. The client opens a channel to the server application by specifying:

- **Server Application Name**

For PCIS-DDE server, the application name is PciDDE.

- **Topic (Logical Device) Name**

The DDE topic is a general classification of data within which multiple data items may be "discussed" (exchanged) during the conversation. For PCIS-DDE server, the topic might be a NuDAQ board name with its card number, e.g. Pci7200#0. The topic is active whenever at least one conversation has been established between the server's logical device and the outside world's applications (client). The topic is de-active when the last conversation to a topic has terminated.

- **Items/Tagnames**

Items are individual pieces of data that are passed between applications. An item is active whenever any DDE conversation is referencing this item. All the valid item names for PCIS-DDE server are mentioned in chapter 4 of this manual. For example, the item name is "PDI" for client application (e.g. InTouch) to get the digital input data of PCI-7200. Please refer to the related chapter for the details.

The following statement is the DDE address convention for representing an DDE conversation:

*Application|Topic|Item*

For example, to get the digital input data of PCI-7200 through PCIS-DDE server, the conversation might be the following (assume the topic name is defined as Pci7200#0):

*PciDDE|Pci7200#0|PDI*



# 2

## Getting Started


---

### 2.1 PCIS-DDE Installation

#### 2.1.1 Installation

The Setup program in *ADLink CD-ROM* performs all tasks necessary for complete installation.

- step 1.** Insert the *ADLink CD-ROM* into your CD-ROM drive.
- step 2.** If Windows NT is loaded, click the *Start* button on the Taskbar, and then choose *Run*.
- Step 3.** Type *x:\setup* (*x* identifies the drive that contains the compact disc) in *Open* text box, then click *OK*.
- Step 4.** Setup first displays the main screen. Select *Software Package*.
- Step 5.** Setup then displays the ADLink's software products screen. Select *InTouch & DDE Server*. Then select *PCI BASE DDE* to setup PCIS-DDE.

Setup first displays a Welcome dialog box. Please click  to go on installation.

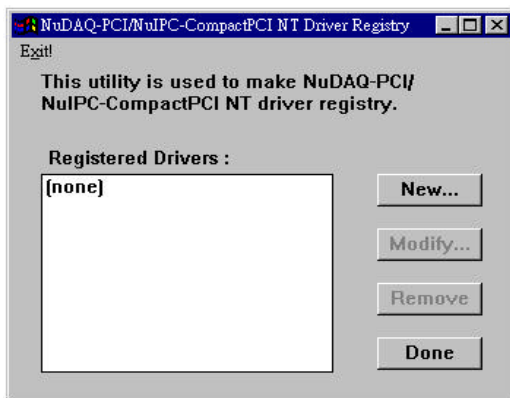
Setup then prompts a *user information* dialog box including *Name*, *Company* and *Serial Number* text field. The "Serial Number" field must be filled in correctly, otherwise the PCIS-DDE will run in 120 minutes *DEMO* mode.

Setup then prompts a dialog box for you to specify the destination directory for PCIS-DDE. The default path is *C:\ADLink\PCISDDE*. If you want to

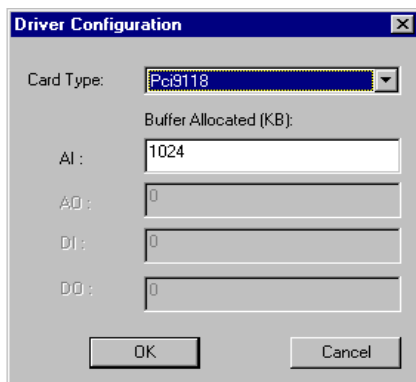
install PCIS-DDE in another directory, please click Browse button to change the destination directory.

Then you click Next button to go on the installation.

When the software component installation process is completed, Setup will launch the driver registry utility, *PciUtil*, for you to make the driver registries and board configuration. The *PciUtil* main window is shown as the following window. If any NuDAQ PCI-bus card' s driver has been registered, it will be shown on the *Registered Driver* list. The driver registry procedure must be done for PCIS-DDE to work with NuDAQ PCI-bus card.

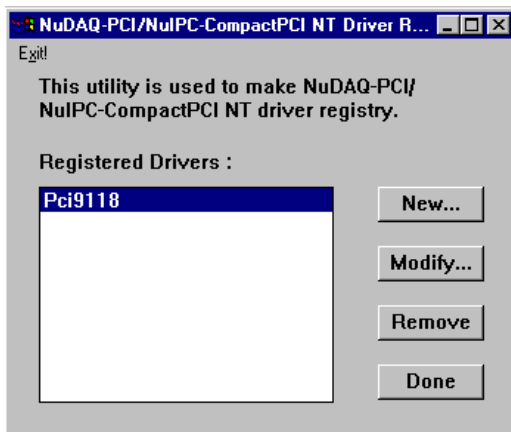


To register one of NuDAQ PCI-bus cards' drivers, click "New..": button and a *Driver Configuration* window appears.



From this window, user can select the driver you want to register and type the value in the box corresponding to AI, AO, DI, or DO according to the requirement of your applications. The “Buffer Allocated” of AI, AO, DI, DO represent the sizes of contiguous Initially Allocated memory for continuous analog input, analog output, digital input, digital output respectively. Its unit is KB, i.e. 1024 bytes. Device driver will try to allocate these sizes of memory at system startup time. The size of initially allocated memory is the maximum memory size that DMA or Interrupt transfer can be performed. It will induce an unexpected result in that DMA or Interrupt transfer performed exceeds the initially allocated size.

After the device configurations of the driver you select is finished, click “OK” to register the driver and return to the *PciUtil* main window. The driver you just registered will be shown on the registered driver list as the following figure:

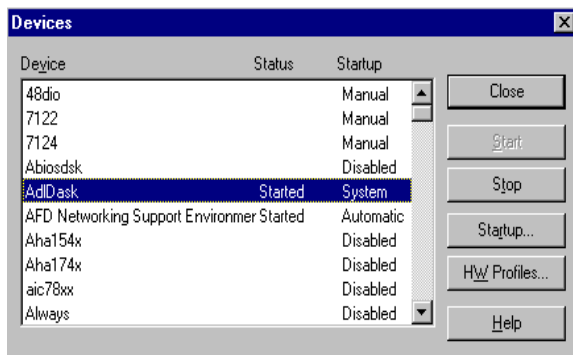


Then you can select Exit! Command in the menu bar to exit the driver registry utility. To make the registered drivers work, you have to re-start Windows NT system.

When the installation process is completed, the PCISDDE directory should contain the following files and sub-directories.

File/Sub-directory	Description
<i>PciDDE.exe</i>	NuDAQ PCI-base card 32-bit DDE Server Program
<i>PciDDE.hlp</i>	NuDAQ PCI-base card 32-bit DDE Server Help File
<i>PciDDE.cnt</i>	NuDAQ PCI-base card 32-bit DDE Server Help Contents File
<i>Wwdlg32.dll</i>	Required DLL file for running PCIS-DDE server program
<i>Pdde.dll</i>	Required DLL file for running PCIS-DDE server program
<i>PciDDE.pdf</i>	PCIS-DDE User' s Manual
<i>Samples &lt;DIR&gt;</i>	InTouch Sample programs
<i>SamplesWuDAQ.cfg</i>	Configuration file for running sample programs
<i>Util &lt;DIR&gt;</i>	Driver Registry utility

After finishing the installation and re-entering Windows NT, make sure the device drivers of NuDAQ cards are already started. For PCIS-DDE to be able to communicate with NuDAQ PCI-bus card, device driver AdIDask as well as the card's own device driver (e.g. PCI7200, PCI7230, PCI7234.SYS, PCI7250, PCI7248, PCI7296, PCI7432, PCI7433, PCI7434, PCI9111, PCI9112, PCI9113, PCI-9114, PCI9118, PCI6208 or cPCI7252) must be started. You can open the "Control Panel", double-click "Devices", and a Devices window will be shown as below.



If the device status is none, you have to select the AdlDask, PCI7200, PCI7230, PCI-7234, PCI7250, PCI7248, PCI7296, PCI7432, PCI7433, PCI7434, PCI9111, PCI9112, PCI-9113, PCI-9114, PCI9118, PCI6208 or PCI7252 device and press the “Start” button.

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**Note:** The AdlDask driver must have been started as you press Start button to start the card's own device driver.

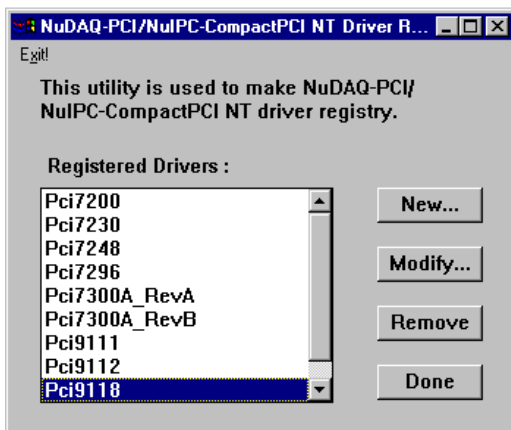
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### 2.1.2 PCIS-DDE Device Driver Handling

PCIS-DDE provides a utility, *PciUtil*. This utility is used for users to **make the registry** of PCIS-DDE drivers, **remove** installed drivers and **modify** the allocated buffer sizes of AI, AO, DI and DO. The allocated buffer sizes of AI, AO, DI, DO represent the sizes of contiguous Initially Allocated memory for continuous analog input, analog output, digital input, digital output respectively. Its unit is page KB, i.e. 1024 bytes.

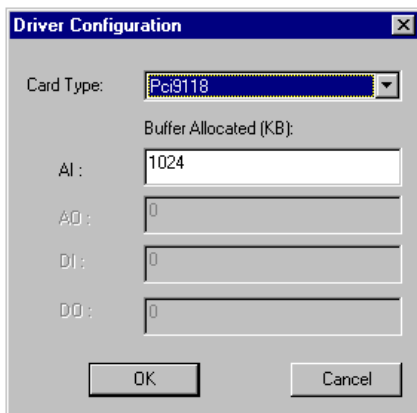
Device driver will try to allocate these sizes of memory at system startup time. The size of initially allocated memory is the maximum memory size that DMA or Interrupt transfer can be performed. It will induce an unexpected result in that DMA or Interrupt transfer performed exceeds the initially allocated size.

The *PciUtil* main window is as the following figure. The *PciUtil* is installed with PCIS-DDE and located in <InstallDir>\Util directory. You can use it to register the device drivers you need.



Using this utility to **install** a new driver, please refer to section 2.1.1.

Using *PciUtil* to **change the buffer allocated settings** of one of the NuDAQ PCI-bus cards' device drivers, select the driver from the *Registered Driver* list and click "Modify..": button and then a "Driver Configuration" window is shown as below.



Inside the allocated buffer size fields of AI, AO, DI and DO are the originally set values. Type the value in the box corresponding to AI, AO, DI, or DO according to the requirement of your applications, and then click "OK" button.

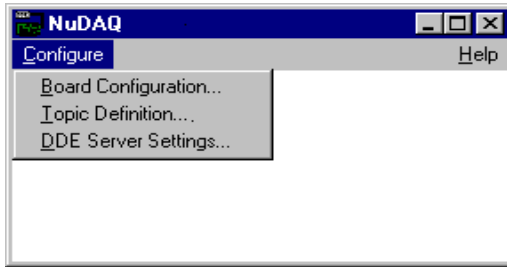
To **remove** a registered driver, select the driver from the *Registered Driver* list in The *PciUtil* main window and click "Remove" button. The selected driver will be deleted from the registry table.



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## 2.2 PCIS-DDE Server Configuration

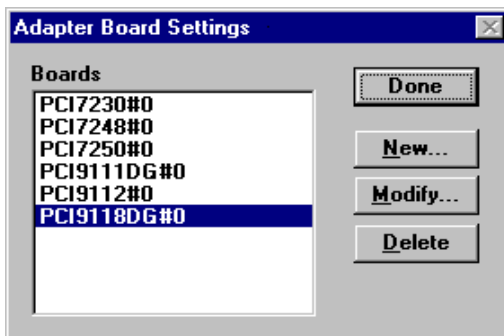
For PCIS-DDE to perform properly, PCIS-DDE server configuration is required before its operation. To perform the required configurations, start up PCIS-DDE by clicking *PCIS-DDE V1.2* from *program files* menu and then the PCIS-DDE Server main window is shown as follows:



The configuration items include Board Configuration, Topic Definition and DDE Server Settings. The detail of the configuration items is described in the following sections.

### 2.2.1 /Configure/Board Configuration

To configure the board, select Board Configuration from Configuration Menu in NuDAQ main window. The "Adapter Board Settings" dialog box is as follows:



The fields and buttons in *Adapter Board Settings* dialog box are described in the following:



Push this button to close the dialog box.



Define a new board and the “*NuDAQ Adapter Card Setting*” dialog box displays as the figure below.

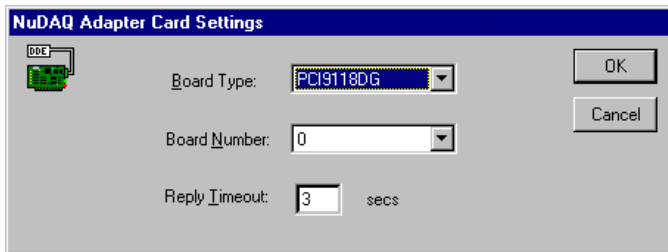


This button appears only as at least one board has been defined. Push this button to modify the settings for the selected board.



This button appears only as at least one board is defined. Push this button to delete the selected board.

The following section shows the ***NuDAQ Adapter Card Setting*** dialog box and gives the detailed description of each field:



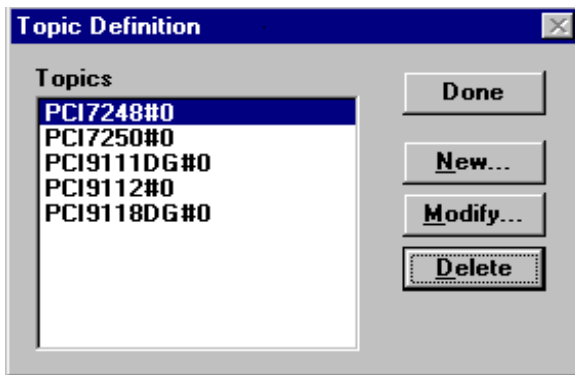
**Board Type:**Select the board type for this configuration.

**Board Number:**Select the board sequence number. The board sequence number represents the sequence number of the cards with the same *card type* or *card series* plugged in the PCI slots (The relationship between card types and card series is listed in the description of *Board Type* field). The card sequence number setting is according to the PCI slot sequence in the mainboard. For example, if there are two PCI-7200 cards and one PCI-9112 card plugged on your PC, the *Board number* of the PCI-7200 board in the prior slot should be set as 0, and the *Board number* of the other PCI-7200 will be 1. The *Board number* of the PCI-9112 card has to be set as 0.

**Reply Timeout:** This field is used to input the amount of time (in seconds) the NuDAQ boards on the system will be given to reply to commands from the PCIS-DDE Server. The **Timeout** message is sent out when a NuDAQ board fails to respond. The value is valid from 1 to 32 and the default value is 3 seconds.

### 2.2.2 /Configure/Topic Definition

To define the Topics, select *Topic Definition* from Configuration Menu in NuDAQ main window. The topic definition operation is not valid until at least one board is defined. The "*Topic Definition*" dialog box is as follows:



The fields and buttons in *Topic Definition* dialog box are described in the following:



Push this button to close the dialog box.



Define a new topic and the *NuDAQ Topic Definition* dialog box displays as the figure below.

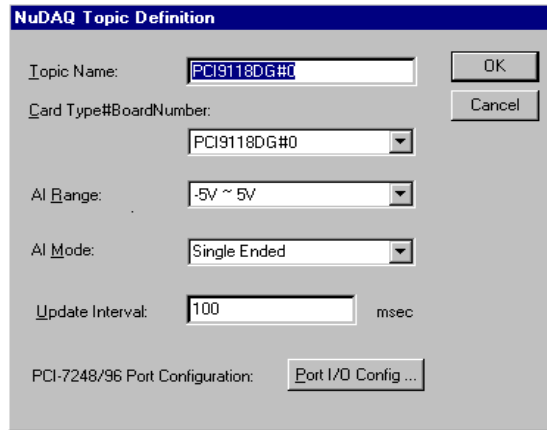


This button appears only as at least one topic is defined. Push this button to modify the settings for the selected topic.



This button appears only as at least one topic is defined. Push this button to delete the selected topic.

The following section shows the **NuDAQ Topic Definition** dialog box and gives the detailed description of each field:



**Topic Name:** This field is used to enter a **Topic Name**. (The same DDE Topic Name is entered in the InTouch "DDE Access Name definition" dialog box described in the section 3.1). The topic must be a unique name that is matched by the DDE clients (for example InTouch). **Topic Name** can be up to 32 characters long.

**Card Type#BoardNumber:** Associate the topic with a NuDAQ board (additional topics may be associated with this same board at a later time).

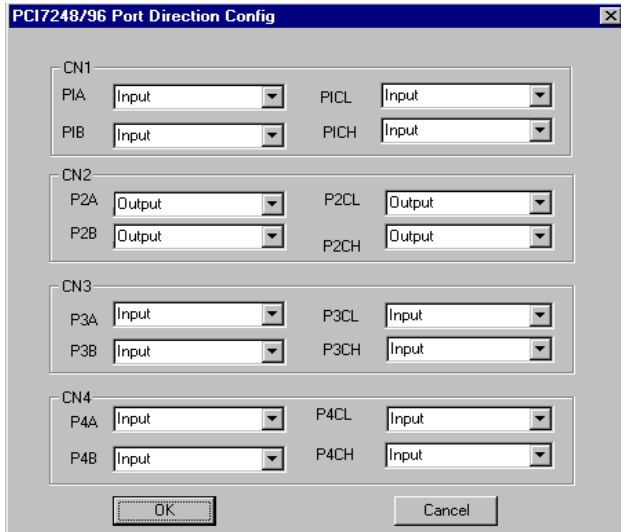
**AI Range:** The data range setting of analog input for the **NuDAQ board** configured. The field is only available for the boards support AI (PCI-9111 DG/HR, PCI-9112, PCI-9113, PCI9114 DG/HG and PCI-9118DG/HG/HR).

**AI Mode:** The analog input mode (Single Ended or Differential mode) for the **NuDAQ board** configured. The field is only available for the boards that support both the two modes (PCI-9112, PCI9114DG/HG and PCI-9118DG/HG/HR). The default AI mode is *Single Ended* mode.

**Update Interval:** This field tells the server how often it will try to poll the data from the board associated to the topic defined. The valid range of **Update Interval** is from 1 to 65535 and the default value is 1000(msec).

Port I/O Config ...

Since each DI/O port of PCI-7248/96 can be set as input port or output port, this button is used to configure the port direction (Input port or output port) of PCI-7248/7296 boards. To perform PCI-7248/96 DI/O port configuration, push this button and the dialog box is shown as the following figure:

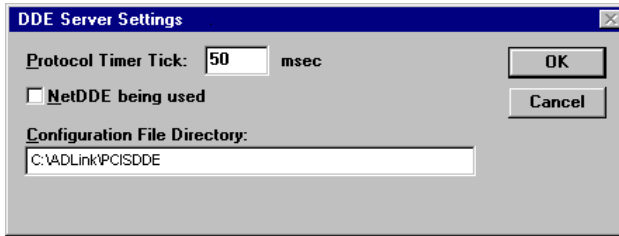


In this window, you can set each port as an input port or an output port by selecting the port direction from the combo box that is beside each port name. CN1 and CN2 sections are available for both PCI-7248 and PCI-7296. However, CN3 and CN4 sections are only available for PCI-7296.

### 2.2.3 /Configure/DDE Server Settings

A number of parameters that controls 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 configure the PCIS-DDE server, select *DDE Server Settings* from Configuration Menu in NuDAQ main window. The "DDE Server Settings" dialog box is as follows:

The fields and buttons in dialog box above are described in the following:



**Configuration File Directory:** This field is used to specify the path (disk drive and directory) in which the PCIS-DDE will save its configuration file. PCIS-DDE will use this path to load the configuration file the next time it is started.

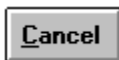
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**Note:** Only the "path" may be modified with this field. The configuration file is always named *NuDAQ.cfg*.

---

**Protocol Timer Tick:** This field is used to change the frequency, where the Server executes the communication protocol. The valid range of the **Protocol Timer Tick** is from 1 to 65535 and the default value is **50 msec**.

**NetDDE being used:** This field must be checked when **Wonderware NetDDE** is used.



Push this button to close "DDE Server Settings" dialog box and cancel this command.



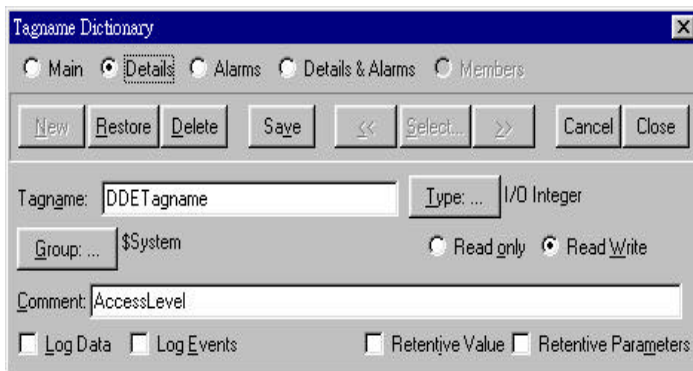
Push this button to save the settings and close "DDE Server Settings" dialog box after the configuration is finished.

# 3

## Using PCIS-DDE with InTouch

### 3.1 DDE Item Names Definition in InTouch

For InTouch, the DDE item name can be defined in *Tag Name Dictionary* to read/write data from other applications. To define the tagnames, invoke the */Special/Tag Name Dictionary...* command (in **WindowMaker**). The "Tagname Dictionary" dialog box will appear:



**New**

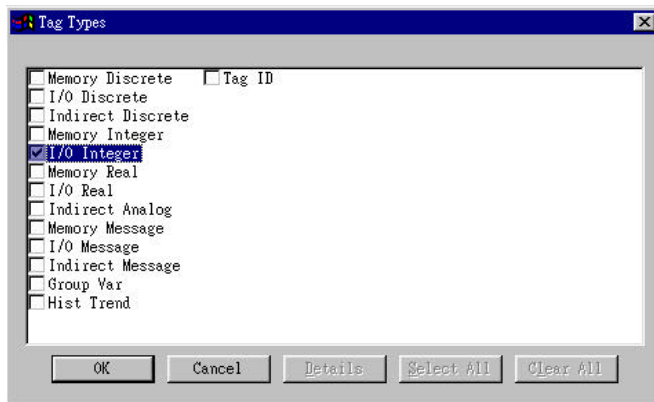
Click on this button to define a new Tag Name

**Tag Name:**

Enter the Tagname in this field. (The tagname defined here is the name **InTouch** will use. The PCIS-DDE server does not see this name. The item name that PCIS-DDE server uses is defined in *Item Name* field, an input field in *Details* box).

**Type: ...**

Click on this button to select the tag type. The *Tag Types* dialog box is as follows:



To access PCIS-DDE server items, the type of Tagname should be I/O type.

There are four I/O types. They are briefly described in the following:

- **I/O Discrete**

Discrete input/output tagname with a value of either 0 (False, Off) or 1 (True, On).

- **I/O Integer**

A 32-bit signed integer value between -2,147,483,648 and 2,147,483,647.

- **I/O Real**

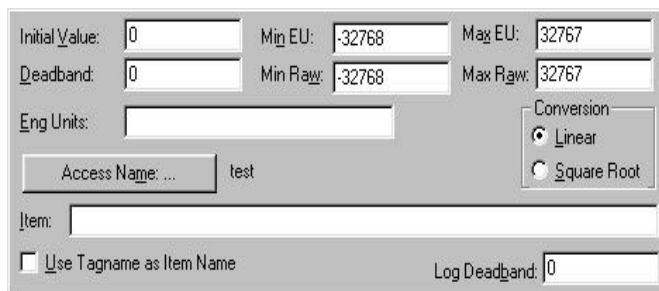
Floating (decimal) point tagname. The floating point value may be between  $-3.4e^{38}$  and  $+3.4e^{38}$ . All floating point calculations are performed with 64-bit resolution, but the result is stored in 32-bit.

- **I/O Message**

Text string input/output tagname that can be up to 131 characters long.



After selecting tag types, the "Details" dialog box associated to the tag type will appear:



The "Details" dialog box contains the following fields and controls:

- Initial Value:
- Min EU:
- Max EU:
- Deadband:
- Min Raw:
- Max Raw:
- Eng Units:
- Conversion:  Linear,  Square Root
- Access Name: ...
- Item:
- Use Tagname as Item Name
- Log Deadband:

---

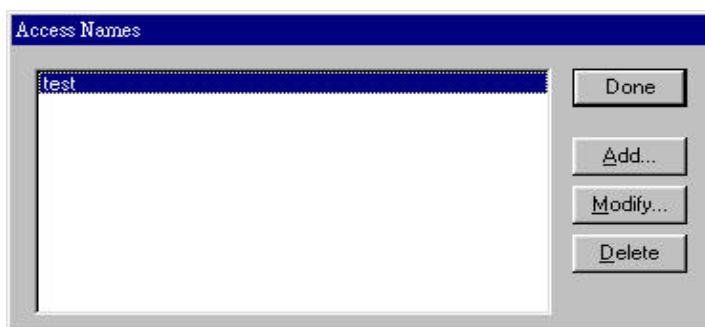
**Note:** If Details dialog box does not appear, click Details at the top of the Tagname Dictionary dialog box.

---

Input all the information related to the tag name. If selecting I/O Integer or I/O Real as the type for your tagname, it is required to input the values of *Min EU*, *Max EU*, *Min Raw* and *Max Raw*

Access Name: ...

Click on this button to define the DDE access name associated to the tagname. The *Access Name* dialog box is as follows:



The "Access Names" dialog box features a list box containing the text "test". To the right of the list box are four buttons: "Done", "Add...", "Modify...", and "Delete".



Click on this button to close the dialog box.



Click on this button to define a new DDE access name.

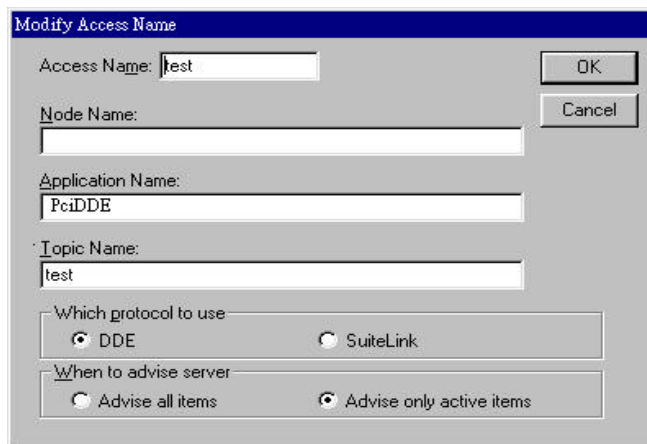


Click on this button to modified the selected DDE access name. An **Modify Access Name** dialog box will appear.



Click on this button to delete the selected DDE access name.

The following figure illustrate the *Add/Modify Access Name* dialog box:



**Access Name:**

Enter an arbitrary name. InTouch uses Access Names to reference real-time I/O data of tagname associated to the Access name. (It is generally advisable that the same name defined for the PCIS-DDE topic is used here.)

**Node Name:**

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

Application Name:

PCIDDE

In this field, type the actual program name, *PciDDE*, for the PCIS-DDE server program from which the data value will be acquired.

---

**Note:** Do not enter the .exe extension portion of the program name.

---

Topic Name:

test

In this field, type the topic name you want to access. The "Topic Name" MUST be the same name used when the topics were configured in the PCIS I/O DDE Server program.

**Advise all items**

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.

---

**Note:** Selecting this option will impact performance, therefore its use is not recommended.

---

**Advise only active items**

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.

OK

Click on this button to save the settings followed by closing the dialog box and then the Access Names dialog box will reappear. Click "Done" to close the dialog box and return to Tagname Dictionary dialog box and Details dialog box as the figure below.

Cancel

Click on this button to cancel the command followed by closing the dialog box and then the Access Names dialog box will reappear. Click "Done" to close the dialog box and return to Tagname Dictionary dialog box and Details dialog box as the figure below.

Tagname Dictionary

Main
  Details
  Alarms
  Details & Alarms
  Members

Tagname: 
 Type:

Group: 
 Read only
  Read Write

Comment:

Log Events
  Retentive Value

Maximum Length:

Initial Value:

test

Item:

Use Tagname as Item Name

Item:

The last step is to define the DDE item name. In this field, type the *item name* for the desired data value in the PCIS-DDE server. Please refer to the chapter 4 for the valid item names of each NuDAQ PCI-bus data acquisition cards. For example, to access the *digital input value* of PCI-7200 module, type *PDI* in this field.

---

**Note:** *It is important to understand that the "tagname" is the name used within InTouch to refer to a data value. The Item is the name used by I/O DDE Server program to refer to the same value. These names do not have to be the same, however, it is recommended when applicable to use the same names.*

---

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## 3.2 Monitor the Communication Status of Modules

For each board being used, there is a built-in discrete item, **Status**, that you can use to monitor the state of the communications with NuDAQ PCI-bus data acquisition cards. *Status* is set to "0" when communications with the device fails and set to "1" when communications is successful. From InTouch, you can read the state of the communications by defining a tagname and associating it with the *topic* configured for the device by using the word *Status* as the item name. The following figure is an example of Tagname Definition for monitoring the status of all communication to a NuDAQ PCI-bus data acquisition card in InTouch.

The screenshot shows the 'Tagname Dictionary' dialog box in InTouch. The 'Details' tab is selected. The 'Tagname' field contains 'STATUS'. The 'Type' is set to 'I/O Discrete'. The 'Group' is '\$System'. The 'Comment' is 'AccessLevel'. The 'Log Data' and 'Log Events' checkboxes are unchecked, and 'Retentive Value' is also unchecked. Under 'Initial Value', 'Off' is selected. Under 'Input Conversion', 'Direct' is selected. The 'On Msg' field contains '1' and the 'Off Msg' field contains '0'. The 'Access Name' is 'test'. The 'Item' field contains 'STATUS'. The 'Use Tagname as Item Name' checkbox is unchecked.

From Excel, you can read the status of the communications by entering the following formula in a cell:  
**=PciDDE|TopicName!'STATUS'**

---

### 3.3 Monitor the Status of an DDE Conversation

InTouch also supports a built-in *topic name* called **IOStatus** (**DDEstatus** in versions prior to InTouch 7.0) that can be used to monitor the status of specific DDE conversations. When using the built-in topic **IOStatus** to monitor an I/O conversation, the item name is the actual **Topic Name** that you want to monitor. Let's assume that WindowViewer (View) is communicating with the PCIS-DDE server to a NuDAQ PCI-bus data acquisition cards that has been defined in the PCIS-DDE with Module1 for its *topic name*. The tagname definition is as the following figures:

The screenshot shows the 'Tagname Dictionary' dialog box with the 'Details' tab selected. The configuration is as follows:

- Buttons: New, Restore, Delete, Save, <<, Select..., >>, Cancel, Close
- Tagname: MODULE1
- Type: I/O Discrete
- Group: \$System
- Read only:  Read only,  Read Write
- Comment: AccessLevel
- Log Data:  Log Data,  Log Events,  Retentive Value
- Initial Value:  On,  Off
- Input Conversion:  Direct,  Reverse
- On Msg: 1
- Off Msg: 0
- Access Name: test
- Item: MODULE1
- Use Tagname as Item Name:

Modify Access Name

Access Name: test

Node Name:

Application Name: view

Topic Name: iostatus

Which protocol to use

DDE  SuiteLink

When to advise server

Advise all items  Advise only active items

OK

Cancel

Excel can also be used to perform this same type of monitoring by entering the same information in a formula in a spreadsheet cell. For example, to monitor the same topic as above, the following would be entered:

**=View|IOStatus!'Module1'**





# 4

## DDE Item Names In PCIS-DDE

The following sections list the commands and the corresponding item names and the data types of NuDAQ PCI-bus data acquisition cards. The Special Command Set is available for all the NuDAQ PCI-bus data acquisition cards. Except special commands, all the item names begin with an “P” character. The definition of each data type is described in section 3.1 of this manual. Please refer to the related section for the details.

---

## 4.1 PCI-7200/7432

### Digital I/O Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Digital Data In in digital format	PD*	Data: xxxxxxxxxx Example: 1234567890 Range: -2147483648~2147483647	R	Integer
Digital Data Out in digital format	PDO*	Data: xxxxxxxxxx Example: 1234567890 Range: -2147483648~2147483647	W	Integer
Digital Data In in real format	PRDI	Data: xxxxxxxxxx Example: 1234567890 Range: 0 ~ 4294967295	R	Real
Digital Data Out in String mode	PSDO	Data: xxxxxxxxxx Example: 1234567890 Range: 0 ~ 4294967295	W	String
Nth bit Digital Data In (N is the bit number)	PBIO.PBI31	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBIO ... PASBI31*	Data: 0 or 1	R	Integer

\* For InTouch, the value of Nth bit of PDO/PDI can be poked/advised by using Tag.0N as the item name. For example, to poke the value of the 0th bit of PDO, set tagname as Tag.00, or to poke the value of the 1st bit of PDO, set tagname as Tag.01.

\* To get the value of Nth bit of PDO/PDI by using Tag.0N as the item name, the data type of PDO/PDI have to be set as integer. As mentioned before, the "integer" is "32-bit signed integer" in InTouch. That means the range of "integer" is -2147483648 ~ 2147483647. However, to poke or advise the 32-bit unsigned data, use "PRDI" (the data type is real) for digital input or "PSDO" (the data type is string) for digital output.

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands are almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn”. Hence “PASBIn” command is especially suitable for multi-bits digital data input.

---

## 4.2 PCI-7230

### Digital I/O Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Digital Data In	PDI	Data Range: 0 ~ 65535 Example: 32767	R	Integer
Digital Data Out	PDO	Data Range: 0 ~ 65535 Example: 32767	W	Integer
Nth bit Digital Dat In (N is the bitnumber)	PBI0... PBI15	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBIO ... PASBI15*	Data: 0 or 1	R	Integer

\* For InTouch, the value of Nth bit of PDO/PDI can be poked by using Tag.0N as the item name. For example, to poke the value of the 0th bit of PDO, set tagname as Tag.00, or to poke the value of the 1st bit of PDO, set tagname as Tag.01.

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands are almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn”. Hence “PASBIn” command is especially suitable for multi-bits digital data input.

---

## 4.3 PCI-7234

### Digital I/O Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Digital Data Out in digital format	PDO*	Data: xxxxxxxxxx Example: 1234567890 Range: -2147483648 ~ 2147483647	W	Integer
Digital Data Out in String mode	PSDO*	Data: xxxxxxxxxx Example: 1234567890 Range: 0 ~ 4294967295	W	String

\* For InTouch, the value of Nth bit of PDO can be poked/ by using Tag.0N as the item name. For example, to poke the value of the 0th bit of PDO, set tagname as Tag.00, or to poke the value of the 1st bit of PDO, set tagname as Tag.01.

\* To get the value of Nth bit of PDO by using Tag.0N as the item name, the data type of PDO have to be set as integer. As mentioned before, the "integer" is "32-bit signed integer" in InTouch. That means the range of "integer" is -2147483648 ~ 2147483647. However, to poke 32-bit unsigned data, use "PSDO" (the data type is string) for digital output.

## 4.4 PCI-7250(with/without PCI-7251)

### Digital I/O Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Digital Data In	PDIO.PDI3*	Data Range: 0 ~ 255 Example: 128	R	Integer
Digital Data Out	PDO0.PDO3*	Data Range:0 ~ 255 Example: 128	W	Integer
Nth bit Digital Data In (N is the bit number)	PBI0.PBI31*	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBIO ... PASBI31*	Data: 0 or 1	R	Integer

\* The PCI-7551 cards are used as the expansion boards of the PCI-7250 board. Please refer to the PCI-7250/7251 user's manual for the details. In PCIS-DDE, the digital I/O ports and their related item names of PCI-7250/7251 are defined as follows:

Card	Port	Item Name
PCI-7250	0	PDO0 / PDI0 / PBI0 ~ PBI7
PCI-7251#1	1	PDO1 / PDI1 / PBI8 ~ PBI15
PCI-7251#2	2	PDO2 / PDI2 / PBI16 ~ PBI23
PCI-7251#3	3	PDO3 / PDI3 / PBI24 ~ PBI31

\* For InTouch, the value of Nth bit of PDO<sub>n</sub>/PDI<sub>n</sub> (n is the port number) can be poked/advised by using Tag.0N (N is the bit number) as the item name. For example, to poke the value of the 0th bit of PDO0, set tagname as Tag.00, or to poke the value of the 1st bit of PDO0, set tagname as Tag.01.

\* "PASBIn" and "PBI<sub>n</sub>" (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands are almost the same. However, for multi-bits digital data input, using "PASBIn" can get much higher performance than "PBI<sub>n</sub>". Hence "PASBIn" command is especially suitable for multi-bits digital data input.

## 4.5 PCI-7248/7296

### Configuration and Digital I/O Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Configuration Setting	PCP*	Data: xxxx Example: 000F, indicates that Output ports: P1A, P1B, P1CH, P1CL Input ports: P2A, P2B, P2CH, P2CL P3A, P3B, P3CH, P3CL P4A, P4B, P4CH, P4CL	W	Message
Digital Data In	PDI1A, PDI1B, PDI1C, PDI1CH, PDI1CL, P DI2A, PDI2B, PDI2C, PDI2CH, PDI2CL, P DI3A, PDI3B, PDI3C, PDI3CH, PDI3CL, PDI4A, PDI4B, PDI4C, PDI4CH, PDI4CL	Data Range: 0 ~ 15 for PDI1CH, PDI1CL, PDI2CH, PDI2CL, PDI3CH, PDI3CL, PDI41CH, PDI4CL; Data Range: 0 ~ 255 for the other ports.	R	Integer
Digital Data Out	PDO1A, PDO1B, PDO1C, PDO1CH, PDO1CL, PDO2A, PDO2B, PDO2C, PDO2CH, PDO2CL, PDO3A, PDO3B, PDO3C, PDO3CH, PDO3CL, PDO4A, PDO4B, PDO4C, PDO4CH, PDO4CL	Data Range: 0 ~ 15 for PDI1CH, PDI1CL, PDI2CH, PDI2CL, PDI3CH, PDI3CL, PDI41CH, PDI4CL; Data Range: 0 ~ 255 for the other ports	W	Integer
Nth bit Digital Data In (N is the bit number)	PBI0..PBI95*	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBI0... PASBI95*	Data: 0 or 1	R	Integer

- \* Since each DI/O port of PCI-7248/96 can be set as input port or output port, the item name PCP is used to configure the direction of each port. One bit of the poked data of PCP controls one port. The port names of PCI-7248/7296 and their corresponding control bits in PCP are listed in the following table:

Port Name	Controlled Bit in PCP	Remarks
P1A	0	For both PCI-7248/7296
P1B	1	For both PCI-7248/7296
P1CU	2	For both PCI-7248/7296
P1CL	3	For both PCI-7248/7296
P2A	4	For both PCI-7248/7296
P2B	5	For both PCI-7248/7296
P2CU	6	For both PCI-7248/7296
P2CL	7	For both PCI-7248/7296
P3A	8	For PCI-7296 only
P3B	9	For PCI-7296 only
P3CU	10	For PCI-7296 only
P3CL	11	For PCI-7296 only
P4A	12	For PCI-7296 only
P4B	13	For PCI-7296 only
P4CU	14	For PCI-7296 only
P4CL	15	For PCI-7296 only

- \* For example, if P1A, P1B, P1CH, P1CL are set as output ports and P2A, P2B, P2CH, P2CL P3A, P3B, P3CH, P3CL, P4A, P4B, P4CH, P4CL are set as input ports, the poked value in hexadecimal format will be 000F, that is 0000 0000 0000 1111 (in binary format).

- \* For “Nth bit Digital Data In” command, the bit number and their related port name are listed in the following table:

Port Name	Valid bit number in PBI	Remarks
P1A	0 ~ 7	For both PCI-7248/7296
P1B	8 ~15	For both PCI-7248/7296
P1C	16 ~ 23	For both PCI-7248/7296
P2A	24 ~ 31	For both PCI-7248/7296
P2B	32 ~ 39	For both PCI-7248/7296
P2C	40 ~ 47	For both PCI-7248/7296
P3A	48 ~ 55	For PCI-7296 only
P3B	56 ~ 63	For PCI-7296 only
P3C	64 ~ 71	For PCI-7296 only
P4A	72 ~ 79	For PCI-7296 only
P4B	80 ~ 87	For PCI-7296 only
P4C	88 ~ 95	For PCI-7296 only

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands are almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn”. Hence “PASBIn” command is especially suitable for multi-bits digital data input.

## 4.6 PCI-7433

### Digital I/O Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Digital Data In in digital format	PDIO ~ PD11*	Data: xxxxxxxxxx Example: 1234567890 Range: -2147483648~ 2147483647	R	Integer
Digital Data In in real format	PRDIO~ PRD11	Data: xxxxxxxxxx Example: 1234567890 Range: 0 ~ 4294967295	R	Real
Nth bit Digital Data In (N is the bit number)	PBI0 ... PBI63	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBIO ... PASBI63*	Data: 0 or 1	R	Integer

\* There are 64 digital input channels in a PCI-7433 card. Please refer to the PCI-7433 user's manual for the details. In PCIS-DDE server, the digital input ports and their related item names of PCI-7433 are defined as follows:

Channel Number	Port	Item Name
0 ~ 31	0	PDIO / PRDIO
32 ~ 63	1	PD11 / PRD11

\* For InTouch, the value of Nth bit of PDIO/PD11 can be advised by using Tag.0N as the item name. For example, to advice the value of the 0th bit of PDIO, set tagname as Tag.00, or to poke the value of the 1st bit of PDIO, set tagname as Tag.01.



\* To get the value of Nth bit of PDI0/PDI1 by using Tag.0N as the item name, the data type of PDI0/PDI1 have to be set as integer. As mentioned before, the “integer” is “32-bit signed integer” in InTouch. That means the range of “integer” is -2147483648 ~ 2147483647. However, to poke or advise the 32-bit unsigned data, use “PRDI0” or “PRDI1” (the data type is real) for digital input.

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands is almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn”. Hence “PASBIn” command is especially suitable for multi-bits digital data input.

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## 4.7 PCI-7434

### Digital I/O Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Digital Data Out in digital format	PDO0 ~ PDO1*	Data: xxxxxxxxxx Example: 1234567890 2147483648 ~ 2147483647	W	Integer
Digital Data Out in String mode	PSDO0 ~ PSDO1*	Data: xxxxxxxxxx Example: 1234567890 Range: 0 ~ 4294967295	W	String

\* There are 64 digital output channels in a PCI-7434 card. Please refer to the PCI-7434 user’s manual for the details. In PCIS-DDE server, the digital input ports and their related item names of PCI-7434 are defined as follows:

Channel Number	Port	Item Name
0 ~ 31	0	PDO0 / PSDO0
32 ~ 63	1	PDO1 / PSDO1

\* For InTouch, the value of Nth bit of PDO0/PDO1 can be poked/ by using Tag.0N as the item name. For example, to poke the value of the 0th bit of PDO0, set tagname as Tag.00, or to poke the value of the 1st bit of PDO0, set tagname as Tag.01.

\* To get the value of Nth bit of PDO0/PDO1 by using Tag.0N as the item name, the data type of PDO0/PDO1 have to be set as integer. As mentioned before, the “integer” is “32-bit signed integer” in InTouch. That means the range of “integer” is -2147483648 ~ 2147483647. However, to poke 32-bit unsigned data, use “PSDO0” or “PSDO1” (the data type is string) for digital output.

## 4.8 PCI-9111DG/HR

### Analog I/O, Digital I/O and Range Setting Command Set

Command	Item Name	Requested Poked value	RW	Data Type
Read Analog Input	PAI0..PAI15	For PCI-9111DG: Data range: -2048 ~ 2047 example: 1024 For PCI-9111HR: Data Range: -32768 ~ 32767 example: 12345	R	Integer
Fast Analog Input	PASAI0 ... PASAI15*	For PCI-9111DG: Data range: -2048 ~ 2047 example: 1024 For PCI-9111HR: Data Range: -32768 ~ 32767 example: 12345	R	Integer
Analog Data Out	PAO0	Data range: 0 ~ 4095 example: 2048	W	Integer
Digital Data In	PDI	Data Range: 0~65535 Example: 32767	R	Integer
Digital Data Out	PDO	Data Range: 0~65535 Example: 32767	W	Integer
Nth bit Digital Data In (N is the bit number)	PBI0..PBI15	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBI0 ... PASBI15*	Data: 0 or 1	R	Integer

Analog Input Range Setting	PSR	Data Range*: 1 ~ 5 Example: 2, indicates that the AI range is $\pm 5V$	W	Integer
Digital Data In from Extended input port	PEDI	Data Range: 0~255 Example: 127	R	Integer
Digital Data Out to Extended output port	PEDO	Data Range: 0~15 Example: 12	W	Integer
Nth bit Digital Data In from Extended output channels (N is the bit number)	PEBI0..PEBI15	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In from Extended output channels (N is the bit number)	PAEBIO ... PAEBI15*	Data: 0 or 1	R	Integer
Extended output port Setting	PSEDO	Data Range*: 1 ~ 3 Example: 2, indicates that the EDO port is set as output port	W	Integer

\* In PCIS-DDE, each analog input range is represented by an integer. The valid input ranges and their corresponding integers for PCI-9111DG/HR are:

Analog Input Range	Represented Integer
$\pm 10V$	1
$\pm 5V$	2
$\pm 2.5V$	3
$\pm 1.25V$	4
$\pm 0.625V$	5

\* In PCIS-DDE, the valid extended output port (EDO) settings for PCI-9111DG/HR are:

EDO mode	Represented Integer
EDO_INPUT	1
EDO_OUT_EDO	2
EDO_OUT_CHN	3

\* “PASAI $n$ ” and “PAI $n$ ” ( $n$  is the channel number) commands are both used for analog data in. For signal channel analog data input, the performance of these two commands are almost the same. However, for multi-channels analog data input, using “PASAI $n$ ” can get much higher performance than “PAI $n$ ”. Hence “PASAI $n$ ” command is especially suitable for multi-channels analog data input.

\* “PASBI $n$ /PAEBI $n$ ” and “PBI $n$ /PEBI $n$ ” ( $n$  is the bit number) commands are both used for  $n$ -th bit digital data in. For signal bit digital data input, the performance of these two commands are almost the same. However, for multi-bits digital data input, using “PASBI $n$ /PAEBI $n$ ” can get much higher performance than “PBI $n$ /PEBI $n$ ”. Hence “PASBI $n$ /PAEBI $n$ ” command is especially suitable for multi-bits digital data input.

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## 4.9 PCI-9112

### Analog I/O, Digital I/O and Range Setting Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Read Analog Input	PAI0..PAI15	Data range: 0 ~ 4095 example: 2048	R	Integer
Fast Analog Input	PASAI0 ... PASAI15*	Data range: 0 ~ 4095 example: 2048	R	Integer
Analog Data Out	PAO0 PAO1	Data range: 0 ~ 4095 example: 2048	W	Integer
Digital Data In	PDI	Data Range: 0~65535 Example: 32767	R	Integer
Digital Data Out	PDO	Data Range: 0~65535 Example: 32767	W	Integer
Nth bit Digital Data In (N is the bit number)	PBI0..PBI15	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBI0 ... PASBI15*	Data: 0 or 1	R	Integer
Analog Input Range Setting	PSR	Data Range*: 1 ~ 5 (Bipolar) 15 ~ 18 (Unipolar) Example: 2, indicates that the AI range is $\pm 5V$	W	Integer

\* In PCIS-DDE, each analog input range is represented by an integer. The valid input ranges and their corresponding integers for PCI-9112 are:

Analog Input Range	Represented Integer
$\pm 10V$	1
$\pm 5V$	2
$\pm 2.5V$	3
$\pm 1.25V$	4
$\pm 0.625V$	5
0 ~ 10V	15
0 ~ 5V	16
0 ~ 2.5V	17
0 ~ 1.25V	18

\* “PASAIn” and “PAIn” (n is the channel number) commands are both used for analog data in. For signal channel analog data input, the performance of these two commands are almost the same. However, for multi-channels analog data input, using “PASAIn” can get much higher performance than “PAIn”. Hence “PASAIn” command is especially suitable for multi-channels analog data input.

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands are almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn”. Hence “PASBIn” command is especially suitable for multi-bits digital data input.

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## 4.10 PCI-9113

### Analog Input and Range Setting Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Read Analog Input	PAI0..PAI31	Data range: 0 ~ 4095 example: 2048	R	Integer
Fast Analog Input	PASAI0 ... PASAI31*	Data range: 0 ~ 4095 example: 2048	R	Integer
Analog Input Range Setting	PSR	Data Range*: 1, 2, 7 ~ 12 (Bipolar) 15, 19 ~ 21 (Unipolar) Example: 2, indicates that the AI range is $\pm 5V$	W	Integer

\* The analog input signal polarity and full range of PCI9113 have to be set by using the jumpers (JP1 and JP2) on board. Please refer to the PCI-9113 user' s manual for the details.

\* In PCIS-DDE, each analog input range is represented by an integer. The valid input ranges and their corresponding integers for PCI-9113 are:

Analog Input Range	Represented Integer
$\pm 10V$	1
$\pm 5V$	2
$\pm 0.5V$	7
$\pm 0.05V$	8
$\pm 0.005V$	9
$\pm 1V$	10
$\pm 0.1V$	11
$\pm 0.01V$	12
0 ~ 10V	15
0 ~ 1V	19
0 ~ 0.1V	20
0 ~ 0.01V	21

\* "PASAI $n$ " and "PAI $n$ " ( $n$  is the channel number) commands are both used for analog data in. For signal channel analog data input, the performance of these two commands are almost the same. However, for multi-channels analog data input, using "PASAI $n$ " can get much higher

performance than “PAIn”. Hence “PASAIIn” command is especially suitable for multi-channels analog data input.

## 4.11 PCI-9114DG/HG

### Analog Input, Digital I/O and Range Setting Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Read Analog Input	PAI0..PAI31	Data range: -32768 ~ 32767 example: 1024	R	Integer
Fast Analog Input	PASAI0 ... PASAI31*	Data range: -32768 ~ 32767 example: 1024	R	Integer
Digital Data In	PDI	Data Range: 0~65535 Example: 32767	R	Integer
Digital Data Out	PDO	Data Range: 0~65535 Example: 32767	W	Integer
Nth bit Digital Data In (N is the bit number)	PBI0..PBI15	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBI0 ... PASBI15*	Data: 0 or 1	R	Integer
Analog Input Range Setting	PSR	For PCI-9114DG Data Range*: 1 ~ 4 For PCI-9114HG Data Range*: 1, 10, 11, 12, Example: 2, indicates that the AI range is $\pm 5V$	W	Integer

\* In PCIS-DDE, each analog input range is represented by an integer. The valid input ranges and their corresponding integers for PCI-9114DG/HG are:

Analog Input Range	Represented Integer
$\pm 10V$	1
$\pm 5V$	2
$\pm 2.5V$	3
$\pm 1.25V$	4
$\pm 1V$	10
$\pm 0.1V$	11
$\pm 0.01V$	12

\* “PASAIn” and “PAIn” (n is the channel number) commands are both used for analog data in. For signal channel analog data input, the performance of these two commands are almost the same. However, for multi-channels analog data input, using “PASAIn” can get much higher performance than “PAIn”. Hence “PASAIn” command is especially suitable for multi-channels analog data input.

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands is almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn” . Hence “PASBIn” command is especially suitable for multi-bits digital data input.

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## 4.12 PCI-9118DG/HG/HR

### Analog I/O, Digital I/O and Range Setting Command Set

Command	Item Name	Requested/Poked value	RW	Data Type
Resd Analog Input	PAI0..PAI15	For PCI-9118DG/HG Data range 0 ~ 4095 example: 2048 For PCI-9118HR Data Range -32768 ~ 32768 example: -12345	R	Integer
Fast Analog Input	PASAI0... PASAI15	For PCI-9118DG/HG Data range: 0 ~ 4095 example: 2048 For PCI-9118HR Data Range: -32768 ~ 32768 example: -12345	R	Integer
Analog Data Out	PAO0 PAO1	Data range: 0 ~ 4095 example: 2048	W	Integer
Digital Data In	PDI	Data Range: 0 ~ 15 Example: 15	R	Integer
Digital Data Out	PDO	Data Range: 0 ~ 15 Example: 15	W	Integer



Nth bit Digital Data In (N is the bit number)	PBI0..PBI15	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data in (N is the bit number)	PASBI0... PASBI3	Data: 0 or 1	R	Integer
Analog Input Range Setting	PSR	For PCI-9118DG/HR Data Range*: 2 ~ 5 (Bipolar) 15 ~ 18 (Unipolar) For PCI-9118HG Data Range*: 2, 7 ~ 9 (Bipolar) 15, 19 ~ 21 (Unipolar) Example: 2, indicates that the AI range is $\pm 5V$	W	Integer

\* In PCIS-DDE, each analog input range is represented by an integer. The valid input ranges and their corresponding integer are:

Analog Input Range	Represented Integer
$\pm 5V$	2
$\pm 2.5V$	3
$\pm 1.25V$	4
$\pm 0.625V$	5
$\pm 0.5V$	7
$\pm 0.05V$	8
$\pm 0.005V$	9
0 ~ 10V	15
0 ~ 5V	16
0 ~ 2.5V	17
0 ~ 1.25V	18
0 ~ 1V	19
0 ~ 0.1V	20
0 ~ 0.01V	21

\* "PASAI<sub>n</sub>" and "PAI<sub>n</sub>" (n is the channel number) commands are both used for analog data in. For signal channel analog data input, the performance of these two commands are almost the same. However, for multi-channels analog data input, using "PASAI<sub>n</sub>" can get much higher performance than "PAI<sub>n</sub>". Hence "PASAI<sub>n</sub>" command is especially suitable for multi-channels analog data input.

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands is almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn”. Hence “PASBIn” command is especially suitable for multi-bits digital data input.

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## 4.13 PCI-6208V/18V/08A

### Configuration and Analog Output Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Voltage to Current Mode Setting for PCI-6208A	PCP	Data range: 0 ~ 2, Where 0: 0 ~ 20 mA 1: 5 ~ 25 mA 2: 4 ~ 20 mA	W	Integer
Analog Data Out	For PCI-6208V /08A: PAO0 ~ PAO7 For PCI-6216V: PAO0 ~ PAO15	For PCI-6208V/16V: Data range: -32768 ~ 32767 example: 2048 For PCI-6208A: Data range: 0 ~ 32767 example: 2048	W	Integer
Digital Data In	PDI	Data Range: 0 ~ 15 Example: 10	R	Integer
Digital Data Out	PDO	Data Range: 0 ~ 15 Example: 10	W	Integer
Nth bit Digital Data In (N is the bit number)	PBI0..PBI3	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBIO... PASBI3	Data:0 or 1	R	Integer

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands is almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn”. Hence “PASBIn” command is especially suitable for multi-bits digital data input.

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## 4.14 cPCI-7252

### Digital I/O Command Set

Command	Item Name	Requested/Poked value	R/W	Data Type
Digital Data In	PDI	Data Range: 0 ~ 65535 Example: 128	R	Integer
Digital Data Out	PDO	Data Range: 0 ~ 255 Example: 128	W	Integer
Nth bit Digital Data In (N is the bit number)	PBI0..PBI15	Data: 0 or 1	R	Integer
Fast Nth bit Digital Data In (N is the bit number)	PASBI0... PASBI15	Data: 0 or 1	R	Integer

\* For InTouch, the value of Nth bit of PDO/PDI can be poked/advised by using Tag.0N (N is the bit number) as the item name. For example, to poke the value of the 0th bit of PDO, set tagname as Tag.00, or to poke the value of the 1st bit of PDO, set tagname as Tag.01.

\* “PASBIn” and “PBIn” (n is the bit number) commands are both used for n-th bit digital data in. For signal bit digital data input, the performance of these two commands is almost the same. However, for multi-bits digital data input, using “PASBIn” can get much higher performance than “PBIn”. Hence “PASBIn” command is especially suitable for multi-bits digital data input.



# Appendix InTouch Sample Programs

There are several InTouch sample programs provided in this software package. They could help you to program your own applications by using InTouch and PCIS-DDE easily. The brief descriptions of these sample programs are specified as follows:

7200Demo	PCI-7200 InTouch Sample Program -- 32-bit DI & 32-bit DO
7248Demo	PCI -7248 InTouch Sample Program -- 24-bit DI & 24-bit DO Output ports: P1A, P1B, P1CH, P1CL Input ports: P2A, P2B, P2CH, P2CL
7296Demo	PCI -7296 InTouch Sample Program -- 48-bit DI & 48-bit DO Output ports: P1A, P1B, P1CH, P1CL P3A, P3B, P3CH, P3CL Input ports: P2A, P2B, P2CH, P2CL P4A, P4B, P4CH, P4CL
7230Demo	PCI -7230 InTouch Sample Program -- 16-bit DI & 16-bit DO
7234Demo	PCI -7234 InTouch Sample Program -- 32-bit DO
7250Demo	PCI -7250 InTouch Sample Program -- 4 ports 8-bit DI/ Relay DO
7432Demo	PCI -7432 InTouch Sample Program -- 32-bit DI/DO
7433Demo	PCI -7433 InTouch Sample Program -- 64-bit DI
7434Demo	PCI -7434 InTouch Sample Program -- 64-bit DO
6208_16Vdemo	PCI -6208V/16V InTouch Sample Program -- 8 channels AO
6208Ademo	PCI -6208A InTouch Sample Program --

9111Demo	0 to 20 mA of 8 channels AO PCI -9111DG InTouch Sample Program - 16 bit DI/DO, 16 channels AI, 1 channel AO
9112Demo	PCI -9112 InTouch Sample Program – 16 bit DI/DO, 16 channels AI, 2 channel AO
9113Demo	PCI -9113 InTouch Sample Program – 32 channels AI
9114dgDemo	PCI –9114DG InTouch Sample Program – 32 channels AI, 16 bit DI/DO
9118dghgDemo	PCI-9118DG/HG InTouch Sample Program -- 16 bit DI/DO, 16 channels AI, 2 channel AO
7252Demo	cPCI -7252 InTouch Sample Program – 16 bit DI, 8 bit Relay DO

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## I. Execute Sample Programs

To run these sample programs, please follow the following steps:

**Step 1.** Execute PCIS-DDE program

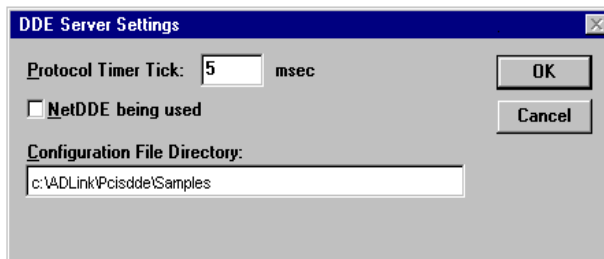
**Step 2.** Configure PCIS-DDE properly

The topic names required for each sample program have to be defined. The demo programs with their own corresponding topics are list in the following table:

Demo Program	Topic Name
7200Demo	PCI7200#0
7248Demo	PCI7248#0
7296Demo	PCI7296#0
7230Demo	PCI7230#0
7234Demo	PCI7234#0
7250Demo	PCI7250#0
7432Demo	PCI7432#0
7433Demo	PCI7433#0
7434Demo	PCI7434#0
6208_16VDemo	PCI6208V#0
6208ADemo	PCI6208A#0
9111Demo	PCI9111DG#0
9112Demo	PCI9112#0
9113Demo	PCI9113#0
9114dghgDemo	PCI9114DG#0
9118dghgDemo	PCI9118DG#0
7252Demo	cPCI7252#0

Please refer to chapter 2 for the detailed descriptions about the PCIS-DDE Server configuration.

A configuration file “*NuDAQ.cfg*”, located in *Samples* directory, is provided. This configuration file defines all the topic names required for executing our sample programs. To use this configuration file, set the *configuration file path* as the directory where this configuration file is located (the default is “C:\ADLink\Pcisdde\Samples”), and then re-execute PCIS-DDE server program.



This configuration file will be used while *PCIS-DDE Server program* is re-executed. For the configured topics fitting your system, use “/Configure/Topic Definition” command to modify the contents of the topics (e. module address, data range, ..etc.). Please refer to section 2.2.2 for the detailed descriptions about topic definition.

**Step 3.** Start the InTouch program (INTOUCH.EXE) and select the InTouch sample program you want to execute in the list in the **InTouch Application Manager** dialog box. If the sample programs are not shown in the list, on the **Tools** menu, click **Find Applications**. The **Starting directory for search** dialog box appears and locates the directory in which you want to search for applications, and then click **OK**. The InTouch Application Manager will reappear displaying icons for all the applications that were found in the selected directory.

Please refer to InTouch User’s Guide or related reference books to get the information about using InTouch.

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## II. Converting Raw Data of analog input and analog output to Engineering Unit

In InTouch, you can convert *raw data* of AI and AO to *engineering unit* in tagname dictionary dialog box. For example, the analog input range is  $\pm 5V$  and the data range of AI raw data is 0 to 4095 for PCI9112. You can set the range of engineering unit and raw data as the following figure:

The screenshot shows the 'Tagname Dictionary' dialog box with the 'Details' tab selected. The tag name is 'PCI9112\_PA10' and its type is 'I/O Real'. The group is '\$System' and the access mode is 'Read/Write'. The comment field is empty. There are checkboxes for 'Log Data', 'Log Events', 'Retentive Value', and 'Retentive Parameters', all of which are currently unchecked. The 'Initial Value' is set to 0, 'Min EU' to -5, and 'Max EU' to 5. The 'Deadband' is 0, 'Min Raw' is 0, and 'Max Raw' is 4095. The 'Eng Units' field is empty. The 'Access Name' is 'PCI9112#0'. The 'Conversion' section has 'Linear' selected and 'Square Root' unselected. The 'Item' is 'PA10'. There is a checkbox for 'Use Tagname as Item Name' which is unchecked, and a 'Log Deadband' field set to 0.

Since the data conversion will be performed by InTouch, it's very convenient for users using *engineering unit* to perform AI/AO in InTouch.