Practical Example

Client, Server, IEC61850 communications

Practical session 1	Installation of 61850 Server/Client Suite
Practical session 2	Server
Practical session 3	Improved Client Graphical User Interface (GUI)
Practical session 4	Improved Client Graphical User Interface (GUI) Continued

Installation of 61850 Server/Client Suite

Objective:

To install 61850 Test suite software. This software is provided by NettedAutomation and SystemCORP

IGNORE THIS SECTION IF YOU WILL BE USING THE REMOTE LABS! The software will have been installed on the remote lab PC already. Simply skip ahead to Practical 2.

Procedure:

Step 1:

- a. Download the following files from the server:
 - Console-Server-Client_2010-08-31.zip
 - DotNet-Client_executable_2011-02-23.zip
 - (A post installed version of the IEC server/client is available under the "IEC61850 CLIENT SERVER DEMO")
- b. Extract the files from the .zip files.
- c. Right click the "SET IEC61850 DLL Demo Installation.exe" and click on Run as administrator.



Step 2: Click on "Next" to continue.



Step 3: Accept the license agreement and click on "I Agree".



Step 4: Select the destination folder for the program to install and click on "Next".

By default the software will be installed in C:\SET\... (On the remote Labs, it will be installed to the Desktop) You can change the destination folder path if you wish to.

IEC 61850 PIS10).DLL Demonstration 1.02.01 Installation	- • ×
	Choose Install Location Choose the folder in which to install I Demonstration.	EC 61850 PIS10.DLL
	Setup will install IEC 61850 PIS10.DLL Demonstration folder. To install in a different folder, click Browse a folder. Click Next to continue. At least 6.93 Mb of free disk space is required.	on in the following and select another
C:\SET\IEC	5 1850 PIS 10 DLL	Browse
Copyright © 2010	, SystemCORP Embedded Technology Pty Ltd 	xt > Cancel

Step 5: Click on "Install" when you are ready.

EC 61850 PIS10.DLL E	Demonstration 1.02.01 Installation	×
	Ready to Install Setup is now ready to begin installing IEC 61850 PIS10.DLL Demonstration on your computer.	
Click Install to continue settings.	with the installation, or click Back if you want to review or change any	
Destination folder: C:\SET\IEC61850 PI	S 10 DLL	
Copyright © 2010, Syste	mCORP Embedded Technology Pty Ltd	

Step 6: Untick the Launch IEC... and the View Readme checkboxes. Click on "Finish" to Complete.



Step 7: If a compatibility assistant menu appears, simply click the "This program installed correctly" button.



Step 7: The software has successfully installed on your PC. The software does not create shortcuts on your desktop. To do this:

a. Browse to your installation directory:

CASETAIEC61850 PIS10 DLL								
e 💌 Include in library 💌 Share with 💌 Burn New folder								
orites	<u>^</u>	Name	^		Date modified	Туре		
esktop		퉬 Client			13/03/2014 1:05 PM	File folde		
ownloads		🐌 Documents			13/03/2014 1:05 PM	File folde		
ecent Places		퉬 Server			13/03/2014 1:05 PM	File folde		
	=	🚳 launchapp.bat			31/08/2010 2:09 PM	Windows		

b. First go to the Server folder. Right click the ServerDemo61850.exe and click "Create shortcut". Drag and drop the created shortcut to your desktop.



c. Repeat the same procedure for the ClientDemo61850.exe and move the shortcut to your desktop

You should have 2 new shortcuts on your desktop.



Server

Objective:

The objective is to start and configure an IEC61850 server and client. (Available on Remote Lab 8)

Description:

The purpose of the server is to showcase the starting of an IEC61850 server and client. Both the Server and the Client will be run on the same, local machine (localhost = IP 127.0.0.1). The software is provided by NettedAutomation and SystemCORP. The demo is based on the system explained in "IEC 61850 (IEC 61400-25) DLL Getting Started using SystemCORP Embedded Technology" shown below.



The Server is the main board with the Digital inputs configured using DIP switches representing "Indicators" and "Alarms". The client is an external HMI, allowing the user to set the alarm temperature and toggle virtual LEDs, which will send messages back to the server, which in turn will physically toggle the LEDs next to the DIP switches.



Thus the Server Outputs to the client are:

- Indicator 1-4 (Represented by the top four DIP switches 1-4)
- Alarm 5 6 (Represented by the bottom four DIP switches 5-8)
- Temperature

The Client receives the messages from the server, and allows the following user configurations to be sent back to the server:

- Alarm max temperature (This will initiate an alarm message at the client side, whenever the temperature exceeds the limit on the server side)
- LED toggles (representing input from the end user HMI)

Note:

Additional information on the IEC61850 Demo software can be found in the attached 09&10_EXAMPLE_IEC61850_NA.pdf in your course material files.

Server - Step 1:

Open the ServerDemo61850.exe from the shortcut created on the desktop. The following window will open:

ServerDemo61850.exe - Shortcut								
IEC61850 Server DLL Demo from SystemCORP Pty Ltd Suite 4/12 Brodie Hall Drive, Bentley, Technology Park,Western Australia,6102 email: info@systemcorp.com.au Telephone:+61 (0) 8 9472 8500 http://www.systemcorp.com.au								
OFF DO:Ind1	Report Con LN:DIPS_G OFF D0:Ind2	ntrol Bloc GIO1 OFF DO:Ind3	ks OFF DO:Ind4	OFF DO∶Alm5	GOOSE Cont LN:DIPS_GO OFF DO:Alm6	trol Blocks GIO2 OFF DO:Alm7	oFF DO:Alm8	
Single point control outputs LN:LEDO_GGI03 OFF OFF OFF OFF OFF OFF OFF D0:SPCS01 D0:SPCS02 D0:SPCS03 D0:SPCS04 D0:SPCS05 D0:SPCS06 D0:SPCS07 D0:SPCS08 Enter t20 to set the temperature to 20, alarm temperature is 27 Enter a5 1 to turn on Alarm5, i1 0 to turn off indication 1(x to exit):_								

This window represents the Server. The server shows the four indicators (Ind1-4), the alarms (Alm5-8), the LED feedback from the user (SPCS01-08) and the alarm temperature setting from the client, and the temperature measurement.

ServerDemo61850.exe - Shortcut								
IEC61850 Server DLL Demo from SystemCORP Pty Ltd								
Indicator 1-4 1: info@systemcorp.com.au Telephone:+61 (0) 8 9472 8500 Alarm 5-	-8							
Report Control Blocks GOOSE Control Bloc.								
OFF								
Temperature is set to 20. Temperature reading								
Single point control outputs LN:LEDO GGI03								
OFF OFF OFF OFF OFF OFF OFF OFF OFF D0:SPCS01 D0:SPCS02 D0:SPCS03 D0:SPCS04 D0:SPCS05 D0:SPCS06 D0:SPCS07 D0:SPCS08 Enter t20 to set the temperature to 20, alarm temperature is 27 Enter a5 1 to turn on Alarm5, i1 0 to parn off indication 1(x to exit):								
LED user feedback								

Server - Step 2:

The temperature can be set to 20° C by typing **t20** in the window. The Indicators could be toggled by typing **i1 1** to switch on and **i1 0** to switch off. The same holds for the Alarms by typing **a5 1** or **a8 0**.

Client - Step 1:

Open the ServerDemo61850.exe from the shortcut created on the desktop. The following window will open:

💷 ClientDen	no61850.exe - S	hortcut								
IEC61850 Suite 4/ email: i http://w	IEC61850 Client DLL Demo from SystemCORP Pty Ltd Suite 4/12 Brodie Hall Drive, Bentley, Technology Park,Western Australia,6102 email: info@systemcorp.com.au Telephone:+61 (0) 8 9472 8500 http://www.systemcorp.com.au									
OFF	Report Control Blocks LN:DIPS_GGI01				GOOSE Control Blocks LN:DIPS_GGI02					
DO:Ind1	DO:Ind2	DO:Ind3	DO:Ind4	DO:Alm5	DO:Alm6	DO:Alm7	DO:Alm8			
Temperatu	re is 20									
Single point control outputs LN:LEDO_GGI03										
DO:SPCSO1 Enter m27 Enter (1	LN:LEDO_GGI03 D0:SPCS01 D0:SPCS02 D0:SPCS03 D0:SPCS04 D0:SPCS05 D0:SPCS06 D0:SPCS07 D0:SPCS08 Enter m27 to set the alarm max temperature to 27. Enter (1 to 8) to control the LEDs (x to exit):									

This window represents the Client. The Client shows the four indicators (Ind1-4), the alarms (Alm5-8), the LED control from the user (SPCS01-08), the temperature measurement sent from the Server. It also allows the alarm max temperature value to be configured by the User, and shows a notification when the measured temperature received from the server exceeds the max threshold.

ClientDemo61850.exe - Shortcut	
IFC61850 Client DLL Demo from Syste	mCORP Pty Ltd
http://www.systemcorp.com.au	phone:+61 (0) 8 9472 8500 Alarm 5-8
Report Control Blocks LH:DIPC_CCIO1 OFF OFF OFF OFF OFF D0:Ind1 D0:Ind2 D0:Ind3 D0:Ind	GOOSE Control Blocks LN:DIPS_GGIO2 4 DO:Alm5 DO:Alm6 DO:Alm7 DO:Alm8
Temperature is 20	nperature reading
Temperature alarm is set	nperature Alarm
Single poin LN:LEDO_GGI	or control outputs 03
D0:SPCS01 D0:SPCS02 D0:SPCS03 D0:SPC Enter m27 to set the alarm max tempe Enter (1 to 8) to control the LEDs (S04 D0:SPCS05 D0:SPCS06 D0:SPCS07 D0:SPCS08 Pature to 27.
LED us	er Control

Client - Step 2:

The temperature alarm threshold can be set to 25° C by typing **m25** in the window. The LEDs can be toggled by repeatedly typing **1** to switch LED 1 on or off. The same holds for LEDs 2-8. Any changes made on the Server DIP switches, such as the Indicators, or temperature reading, will be reflected in the Client window.

Server/Client - Step 3:

In the Server: Change the Temperature, Switch on any of the Indicators and Alarms.

In the Client: Toggle any of the LEDs and change the Temperature Alarm Threshold. (Be sure to try and obtain the "Temperature alarm is set" message in the Client side.

Improved Client Graphical User Interface (GUI)

Objective:

To install version of the Client with an improved GUI. This GUI software is provided by NettedAutomation and SystemCORP

Description:

The GUI provides a Test Client in order to exercise Client/Server implementations.

IGNORE THIS SECTION IF YOU WILL BE USING THE REMOTE LABS! The software will have already been installed on the Remote Lab PC. Simply skip ahead to Practical 4.

Procedure:

Step 1:

- a. Download the following files from the server:
 - DotNet-Client_executable_2011-02-23.zip
- b. Extract the files from the .zip files to your preferred directory.
- Step 2: The software will be extracted to your PC. The software does not create a shortcut on your desktop. To do this:
 - a. Browse to your installation directory. Right click the IEC61850Client.exe and click "Create shortcut". Drag and drop the created shortcut to your desktop:
 - b.



You should have 1 new shortcuts on your desktop.



Improved Client Graphical User Interface (GUI) Continued

Objective:

To connect to the Server hosted in Practical 2 through an improved Client with a graphical interface.

Description:

The GUI provides a Test Client in order to exercise Client/Server implementations. It is similar to the Command Prompt version used in Practical 2, with prettier pictures...

Step 1:

Ensure the Server as explained in Practical 2 is active by:

Open the ServerDemo61850.exe from the shortcut created on the desktop. The following window will open

💷 ServerDen	no61850.exe - S	Shortcut					- • •		
IEC61850 Server DLL Demo from SystemCORP Pty Ltd Suite 4/12 Brodie Hall Drive, Bentley, Technology Park,Western Australia,6102 email: info@systemcorp.com.au Telephone:+61 (0) 8 9472 8500 http://www.systemcorp.com.au									
OFF DO:Ind1	Report Co LN:DIPS_C OFF DO:Ind2	ontrol Bloc GGI01 OFF DO:Ind3	cks OFF DO:Ind4	OFF DO:Alm5	GOOSE Con LN:DIPS_(OFF DO:Alm6	ntrol Bloc) GGIO2 OFF DO:Alm7	ks OFF DO:Alm8		
Single point control outputs LN:LEDO_GGI03 OFF OFF OFF OFF OFF OFF OFF OFF D0:SPCS01 D0:SPCS02 D0:SPCS03 D0:SPCS04 D0:SPCS05 D0:SPCS06 D0:SPCS07 D0:SPCS08 Enter t20 to set the temperature to 20, alarm temperature is 27 Enter a5 1 to turn on Alarm5, i1 0 to turn off indication 1(x to exit):_									

Step 2:

Open the new IEC61850Client.exe from the shortcut created on the desktop. The following window will open:



This window contains the same Client values as seen in Practical 2. The Temperature Alarm state reading is visible in addition to a few controls for the LEDs. Further, the GUI includes a cyclic reading function, to request three values: the Indicator 1 DIP, Alarm 5 DIP, and the Temperature Reading.



Step 3:

Open the LED selection index dropdown and select LED 5. Toggle the value of the LED to the "on" or "off" position in order to toggle the LED status on the server side:



You should be able to see the changes to the LED values on the Server side:

		Sin	(le noint co	ontrol outr	nuts		
		LN:	EDO_GGI03				
OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
DO:SPCSO1	DO:SPCSO2	DO:SPCSO	DO:SPCS04	DO:SPCSO5	DO:SPCS06	DO:SPCSO7	DO:SPCS08
Enter t20	to set the	e tempera	to 20,	alarn tory	erature i	s 28	
Enter a5 1	l to turn d	on Alarm5,	, i1 0 to tu	ırn off ind	lication 1	(x to exit)	:

Step 4:

Cyclically read the DIP for Indicator 1, every 10 seconds by selecting the following the Client GUI: Press start in order to read the values.

I emperature alarm is NO I	set.	 LN LEDO_GGIO3 LN LLN0
	Report on data change	
Read selected value cyclically DIPS_GGI01.Ind1 (DIP1) 10 s Start	04:11:24.316 PM: DIP1 value is 1 04:11:34.417 PM: DIP1 value is 1 04:11:44.518 PM: DIP1 value is 0 04:11:54.618 PM: DIP1 value is 0 04:12:04.719 PM: DIP1 value is 0 04:12:14.819 PM: DIP1 value is 0	Netted Automation Gub H Information & Consumisation Systems

Step 5:

Change the values for Indicator 1 on the Server side, and observe the value change on the Client GUI side: (The Server side should reflect show changes in the marked areas)

1	💷 ServerDe	mo61850.exe - 9	Shortcut						×
	IEC61850 Server DLL Demo from SystemCORP Pty Ltd Suite 4/12 Brodie Hall Drive, Bentley, Technology Park,Western Australia,6102 email: info@systemcorp.com.au Telephone:+61 (0) 8 9472 8500 http://www.systemcorp.com.au								
l		Report Co	otrol Blog			GOOSE Cor	trol Block		
Π	OFF	LN:DIPS_C	GI01	0FF	OFF	LN:DIPS_(GIO2	OFF	
	DO:Ind1	DO:Ind2	DO:Ind3	DO:Ind4	D0:A1m5	DO:Alm6	D0:A1m7	DO:Alm8	
	Temperature is set to 19.								
	Single point control outputs								
	OFF	OFF	OFF			OFF DO-SPCSO	OFF	OFF DO-SPCSOR	
	Enter t20 i1 Or a5	to set the total to the term	on Alarm5,	ture to 20, i1 0 to 1	, alarm ten turn off in	nperature indication 1	is 28 .(x to exit	;):i1 0_	÷

A similar cyclical reading exercise can be repeated for the Temperature readings:

Read selected value cyclically	04-19-07 162 PM: Temperatura value in 24	
STMP1.Tmp.mag (temperat 💌	04:19:09.363 PM: Temperature value is 24 04:19:08.263 PM: Temperature value is 24 04:19:09.363 PM: Temperature value is 24	Î
1s •	04:19:11.563 PM: Temperature value is 18 04:19:11.563 PM: Temperature value is 18 04:19:12.663 PM: Temperature value is 18	
Stop		Ψ.