REF 542plus

Connectivity Package

Configuration manual

Contents

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1. Introduction

1.1. This manual

The purpose of this document is to bring out the REF 542plus Connectivity Package features. A Connectivity Package is a collection of software and information related to a specific IED, in this case the REF 542plus, that provides means for applications and tools to connect and interact with the IED. The Connectivity Packages' main purpose is to provide description of an IED topology in SCL and the needed data to all the supported tool components. This implies, for example, an IEC61850 compatible description of IED parameters and dispatcher components for communication purposes.

This document is intended to explain the complete user interaction and the functionality of the REF 542plus Connectivity Package. The document is mainly used by the operator who intends to use the PCM600 Version 2.1, COM600-CET and the standard tools to interact with REF 542plus.

This manual is divided into following sections:

Product overview

This section gives an overview of the purpose of the Connectivity Package application with respect to REF 542plus' connectivity package.

Installation

This section provides general information on installation and uninstallation of the REF 542plus Connectivity packages.

Communication Wizard

This section describes the functionality of Communication Wizard.

SCL Configuration Wizard

This section describes the functionality of SCL Configuration Wizard.

SCL File import and export

This section describes the functionality of SCL File Import and Export.

Parameter setting connectivity package

This section describes the functionality of Parameter Setting Connectivity Package.

Disturbance handling connectivity package

This section describes the functionality of Disturbance Handling Connectivity Package.

1.2. Product documentation

Name of the manual	Document ID
Real-time Clock Synchronization, IRIG B Input Time Master	1MRS755870
CAN Manual	1VTA100189
Configuration Manual	1MRS755871
i-Button Programmer User Manual	1MRS755863
Manual Part 3, Installation and Commission	1VTA100004
Manual Part 4, Communication	1VTA100005
Motor Protection with ATEX Certification Manual	1MRS755862
Operator's Manual	1MRS755869
Protection Manual	1MRS755860
Technical Reference Manual	1MRS755859
Technical Reference MODBUS RTU	1MRS755868
Web Manual, Installation	1MRS755865
Web Manual, Operation	1MRS755864
SCL Tool Configuration Manual	1MRS756342
IEC 61850 PIXIT	1MRS756360
IEC 61850 Conformance Statement	1MRS756361
IEC 61850 TISSUES Conformance Statement	1MRS756362
Lifecycle Service Tool	1MRS756725

1.3. Document revisions

Version	IED Rev No	Date	Comment
A	2.5	15.06.2007	First release
B	2.6	29.01.2010	Release 2.6

Applicability

This manual is applicable to REF 542plus Release 2.6, software version V4F06x.

2. Product overview

REF 542plus Connectivity Packages contains an REF 542plus IED-specific support in PCM 600&COM600-CET and their tool components. The PCM600/COM600-CET, in this case, is the user of the ConnPacks.

2.1. Features of the product

The project involves the creation of connectivity packages for REF 542plus IEDs to various PCM600&COM600-CET components.

Transparent SPA (SPA over TCP-IP) is used for communication between PCM600 and REF 542plus. The above set of PCM component tools is released to be used with the REF 542plus release 2.6 SP1 and Ethernet board 2.0. FTP protocol is used to get the COMTRADE file from REF 542plus.

2.2. Feature list

The connectivity packages are made for the following PCM component tools in PCM600:

Object Type	
Configuration Wizard (CW)	to prepare an SCL file as per REF 542plus Configuration
Language Handler (LH)	for native/national language support
Parameter Setting Tool (PST)	to view and change REF 542plus protection settings
Disturbance Record Component (DRC)	to access REF 542plus fault recordings

PST and DRC are online tools that require connectivity between PCM600 and REF 542plus.

2.3. Prerequisites and requirements

2.3.1. Hardware requirements

Minimum specifications
Windows XP SP2
Pentium III, 500 MHz
128 MB RAM
40 MB disk space

Recommended specification
Windows XP SP2
Pentium 4, 2.4 GHz
512 MB RAM
50 MB free disk space

2.3.2. Software requirements

The following software should be installed in PC before installing the REF 542plus Connectivity Package.

.Net Framework 2.0

PCM600, version 2.1 or above/COM600-CET Version 3.2 or above

IEC 61850 Connectivity package

2.3.3. Supported IEDs

The supported system products, protocols and tools for a medium-voltage IED by the Connectivity Package.

REF 542plus Connectivity Package	
Communication Engineering Tool for COM600 Version 3.0.1 or later	
IEC 61850	Version 2.0 or later
SPA	-
SPA TCP	Version 2.0 or later
LON	-
COM600 Version 3.2 or later	
SLD Editor	Version 2.0 or later
Parameter Filtering Tool	Version 2.0 or later
MicroSCADA ProSYS 600 version 9.0 or later	
Communication Engineering Tool for IEC 61850	Version 2.0 or later
SCL importer	-
Protection and Control IED Manager PCM 600 Version 1.5	
IEC 61850	Version 2.1 or later
SPA	-
SPA TCP	Version 2.1 or later
LON	-

REF 542plus Connectivity Package	
Parameter Setting Tool	Version 2.1 or later
Disturbance Handling	Version 2.1 or later
Event ViewerT	-
Signal Monitoring	-
Signal Matrix	-
SCL Configuration Wizard	Version 3.1 or later

2.3.4. Supported medium-voltage IED revisions in connectivity packages

REF 542plus Release	2.6	2.6 SP1
	yes	yes

2.3.5. Logical node mapping for IEDs

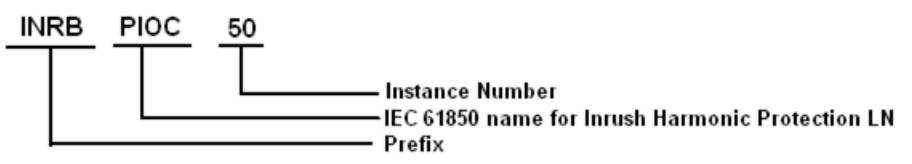
The connectivity package contains the descriptions for logical nodes. REF 542plus Configuration Tool and REF 542plus SCL Tool are used to convert the IED configuration into an SCL file (.CID/.ICD).

When the SCL file is imported to, for example, Communication Engineering Tool (CET) for COM600/MicroSCADA, the logical devices (LD) and logical nodes (LN) configured in the REF 542plus SCL file can be seen.

An IED object can include many logical devices, and a logical device can include many logical nodes. The logical node names are composed of three different parts: LN prefix, LN class and LN instance number.

The LN prefix is an ABB specific string with a maximum of four characters (see the table below). The LN class is the name of the logical node class defined in the IEC 61850-7-4 specification. For the REF 542plus, the LN instance number is the SPA channel number of the corresponding FUPLA function block configured in the REF 542plus Configuration Tool.

Figure shows an example of designation code for the logical nodes in the connectivity package. In the following example, the logical node name is INRB PIOC 50.



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Description as per IEC 61850-7-4	LN Prefix	LN Class	LN Inst. No.	Description of REF 542plus function
Ethernet Board				
Logical node zero		LLN0		Logical node zero
Physical device information		LPHD	1	Physical device information
Generic process I/O	CD	GGIO	1	EB Communication Diagnostics
Generic process I/O	PS	GGIO	1	Ethernet Board Port Status 0
Generic process I/O	PS	GGIO	2	Ethernet Board Port Status 1
REF 542plus				
Logical node zero		LLN0		Logical node zero
Physical device information		LPHD	1	Physical device information
Control set information	ACTSET	GGIO	80	Set1/Set2 Selection
REF 542plus Measurands				
Measurement	UI	MMXU	1,2	
Generic process I/O	UI	GGIO	1,2	
REF 542plus Protections				
Instantaneous overcurrent	INRB	PIOC	50	Inrush Blocking
Generic process I/O	INRB	GGIO	50	Inrush Blocking
Instantaneous overcurrent	INRH	HAR	180	Inrush Harmonic
Generic process I/O	INRH	GGIO	180	Inrush Harmonic
Instantaneous overcurrent	IOI	PIOC	51	Instantaneous overcurrent
Generic process I/O	IOI	GGIO	51	Instantaneous overcurrent
Time overcurrent	DTH	PTOC	52	Overcurrent Definite Time, High set
Generic process I/O	DTHOI	GGIO	52	Overcurrent Definite Time, High set
Time overcurrent	DTL	PTOC	53	Overcurrent Definite Time, Low set
Generic process I/O	DTLOI	GGIO	53	Overcurrent Definite Time, Low set
Time overcurrent	DIRH	PTOC	54	Overcurrent Direction, High set
Generic process I/O	DHOI	GGIO	54	Overcurrent Direction, High set
Time overcurrent	DIRL	PTOC	55	Overcurrent Direction, Low set

Description as per IEC 61850-7-4	LN Prefix	LN Class	LN Inst. No.	Description of REF 542plus function
Generic process I/O	DLOI	GGIO	55	Overcurrent Direction, Low set
Time overcurrent	INV	PTOC	56	Overcurrent IDMT, Normally inverse
Generic process I/O	INVOI	GGIO	56	Overcurrent IDMT, Normally inverse
Time overcurrent	INV	PTOC	57	Overcurrent IDMT, Very inverse
Generic process I/O	INVOI	GGIO	57	Overcurrent IDMT, Very inverse
Time overcurrent	INV	PTOC	58	Overcurrent IDMT, Extremely inverse
Generic process I/O	INVOI	GGIO	58	Overcurrent IDMT, Extremely inverse
Time overcurrent	INV	PTOC	59	Overcurrent IDMT, Long-time inverse
Generic process I/O	INVOI	GGIO	59	Overcurrent IDMT, Long-time inverse
Time overcurrent	EFNDH	PTOC	66	Earth fault, Non-directional, High set
Generic process I/O	EFNDH	GGIO	66	Earth fault, Non-directional, High set
Time overcurrent	EFNDL	PTOC	67	Earth fault, Non-directional, Low set
Generic process I/O	EFNDL	GGIO	67	Earth fault, Non-directional, Low set
Time overcurrent	EFINV	PTOC	68	Earth fault IDMT Normal inverse
Generic process I/O	EFIOI	GGIO	68	Earth fault IDMT Normal inverse
Time overcurrent	EFINV	PTOC	69	Earth fault IDMT Very inverse
Generic process I/O	EFIOI	GGIO	69	Earth fault IDMT Very inverse
Time overcurrent	EFINV	PTOC	70	Earth fault IDMT Very inverse
Generic process I/O	EFIOI	GGIO	70	Earth fault IDMT Very inverse
Time overcurrent	EFINV	PTOC	71	Earth fault IDMT Long-time inverse
Generic process I/O	EFIOI	GGIO	71	Earth fault IDMT Long-time inverse
Time overcurrent	EFDH	PTOC	72	Earth fault Directional, High set
Generic process I/O	EFDH	GGIO	72	Earth fault Directional, High set
Time overcurrent	EFDL	PTOC	73	Earth fault Directional, High set

Description as per IEC 61850-7-4	LN Prefix	LN Class	LN Inst. No.	Description of REF 542plus function
Generic process I/O	EFDL	GGIO	73	Earth fault Directional, High set
Sensitive direction earth fault	EFD	PSDE	88	Sensitive earth fault directional
Sensitive direction earth fault	EFD	GGIO	88	Sensitive earth fault directional
Time overcurrent	EFD	PTOC	190-199	Earth fault directional sector
Generic process I/O	EFDI	GGIO	190-199	Earth fault directional sector
Overvoltage	IOU	PTOV	60	Instantaneous overvoltage
Generic process I/O	IOU	GGIO	60	Instantaneous overvoltage
Overvoltage	DTH	PTOV	61	Instantaneous overvoltage
Generic process I/O	DTHOU	GGIO	61	Instantaneous overvoltage
Overvoltage	DTL	PTOV	62	Instantaneous overvoltage
Generic process I/O	DTLOU	GGIO	62	Instantaneous overvoltage
Undervoltage	IUU	PTUV	63	Undervoltage instantaneous
Generic process I/O	IUU	GGIO	63	Undervoltage instantaneous
Undervoltage	DTH	PTUV	64	Undervoltage Definite Time, High set
Generic process I/O	DTHUU	GGIO	64	Undervoltage Definite Time, High set
Undervoltage	DTL	PTUV	65	Undervoltage Definite Time, Low set
Generic process I/O	DTLUU	GGIO	65	Undervoltage Definite Time, Low set
Overvoltage	RDTH	PTOV	82	Residual Overvoltage Definite Time, High set
Generic process I/O	RDTHU	GGIO	82	Residual Overvoltage Definite Time, High set
Overvoltage	RDTL	PTOV	83	Residual Overvoltage Definite Time, High set
Generic process I/O	RDTLU	GGIO	83	Residual Overvoltage Definite Time, High set
Thermal overload	MTHL	PTTR	74	Thermal Overload
Generic process I/O	MTHL	GGIO	74	Thermal Overload

Description as per IEC 61850-7-4	LN Prefix	LN Class	LN Inst. No.	Description of REF 542plus function
Motor restart inhibition	MSTUP	PMRI	80	Motor start Protection
Generic process I/O	MSTUP	GGIO	80	Motor start Protection
Motor starting time supervision	RBLK	PMSS	86	Blocker Rotor Protection
Generic process I/O	RBLK	GGIO	86	Blocked Rotor Protection
Motor restart inhibition	MNS	PMRI	87	Number of starts
Generic process I/O	MNS	GGIO	87	Number of starts
Differential	DIF	PDIF	79	Differential protection
Generic process I/O	DIF	GGIO	79	Differential protection
Differential	RDIF	PDIF	95	Restricted Differential Protection
Generic process I/O	RDIF	GGIO	95	Restricted Differential Protection
Time overcurrent	ILD	PTOC	75	Asymmetrical Load (Unbalanced Load)
Generic process I/O	ILD	GGIO	75	Asymmetrical Load (Unbalanced Load)
Directional overpower	DIROP	PDOP	76	Directional Power Protection
Generic process I/O	DIROP	GGIO	76	Directional Power Protection
Directional underpower	DIRUP	PDUP	77	Low Load Protection
Generic process I/O	DIRUP	GGIO	77	Low Load Protection
Thermal overload	THLS	PTTR	78	Thermal Supervision
Generic process I/O	THLS	GGIO	78	Thermal Supervision
Frequency supervision	FRQS	PTOF	84	Frequency supervision
Generic process I/O	FRQS	GGIO	84	Frequency supervision
Synchronism check	SCHK	RSYN	85	Synchrocheck
Time overvoltage	SRSNC	PTOC	89	Switching Resonance
Generic process I/O	SRSNC	GGIO	89	Switching Resonance
Time overvoltage	HHRM	GGIO	93	High Harmonic
Generic process I/O	HHRM	GGIO	93	High Harmonic

Description as per IEC 61850-7-4	LN Prefix	LN Class	LN Inst. No.	Description of REF 542plus function
Underfrequency	FRN1	PTUF	150-155	Frequency Protection Net1
Generic process I/O	FRN1	GGIO	150-155	Frequency Protection Net1
Underfrequency	FRN2	PTUF	160-165	Frequency Protection Net2
Generic process I/O	FRN2	PTUF	160-165	Frequency Protection Net2
Autoreclosing	ARCL	RREC	250	Autoreclose 2
Generic process I/O	ARCL	GGIO	250	Autoreclose 2
Protection Trip Conditioning	GTR	PTRC	260	Protection Trip Conditioning
Time overcurrent	EFND	PTOC	220-227	Earth fault Non-directional
Generic process I/O	EFND	GGIO	220-227	Earth fault Non-directional
Time overcurrent	EFDS	PTOC	230-237	Earth fault Directional
Generic process I/O	EFDS	GGIO	230-237	Earth fault Directional
Time overcurrent	OCND	PTOC	200-207	Overcurrent Non-directional
Generic process I/O	OCND	GGIO	200-207	Overcurrent Non-directional
Time overcurrent	DOC	PTOC	210-217	Overcurrent Directional
Generic process I/O	DOC	GGIO	210-217	Overcurrent Directional
REF 542plus Primary Switches (Circuit Breaker CB, Disconnector DCO and Earthing Switch ESW)				
Interlocking	CB, DCO, ESW	CILO	Same as SPA CH number	
Switch controller	CB, DCO, ESW	CSWI	Same as SPA CH number	
Circuit breaker	CB	XCBR	Same as SPA CH number	
Circuit switch	DCO, ESW	XSWI	Same as SPA CH number	
REF 542plus General Status and Control				
Generic process I/O	To be filled by user	GGIO	Same as SPA CH number	

2.4. Installation

2.4.1. Prerequisites

The following software should be installed in the system before installing REF 542plus ConnPacks.

- .Net Framework 2.0
- PCM600, version 2.1 or above/COM600-CET Version 3.2 or above

2.4.2. Installing

The connectivity installation steps and the installer package contents are briefly explained below.

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- Start the Setup.msi file to install the REF 542plus Connectivity Package.

  The REF 542plus ConnPacks installation dialog box opens. This dialog has buttons for proceeding and canceling.

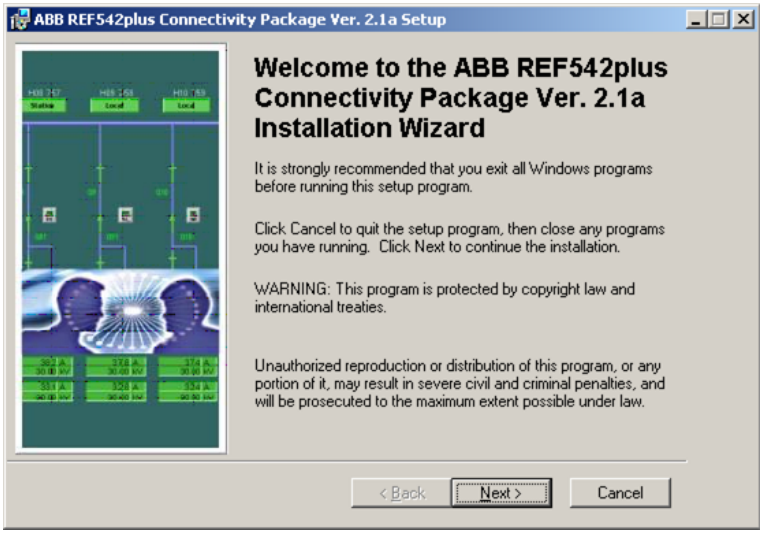

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Fig. 2.4.2.-1 Setup Wizard – welcome screen

Click **Cancel** in any dialog box to quit the installation.

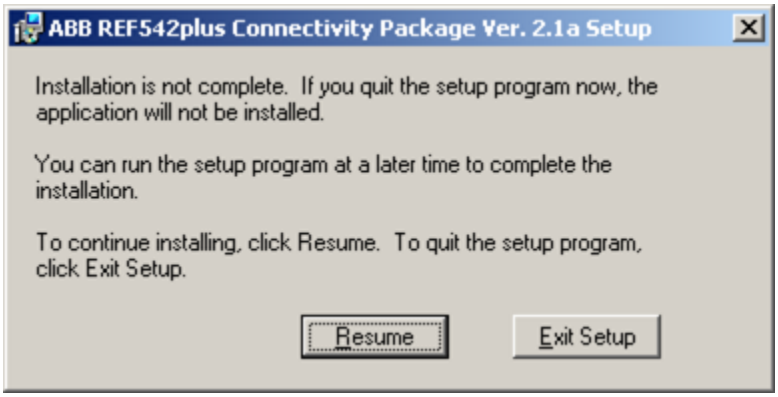

Fig. 2.4.2.-2 Setup Wizard – confirmation dialog for exiting the installer

- Click **Resume** in the confirmation dialog box to continue the installation or click **Exit Setup** to quit the installation.
- Click **Next** to proceed to the License Agreement dialog box.

Fig. 2.4.2.-3 Setup Wizard – License Agreement dialog

- Click "I accept the license agreement" to enable **Next**.
- Click **Next** to continue.

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Fig. 2.4.2.-4 Setup Wizard – folder selection dialog

- Select the folder to which REF 542plus ConnPacks Application needs to be installed. Use **Browse** to browse for the desired folder.

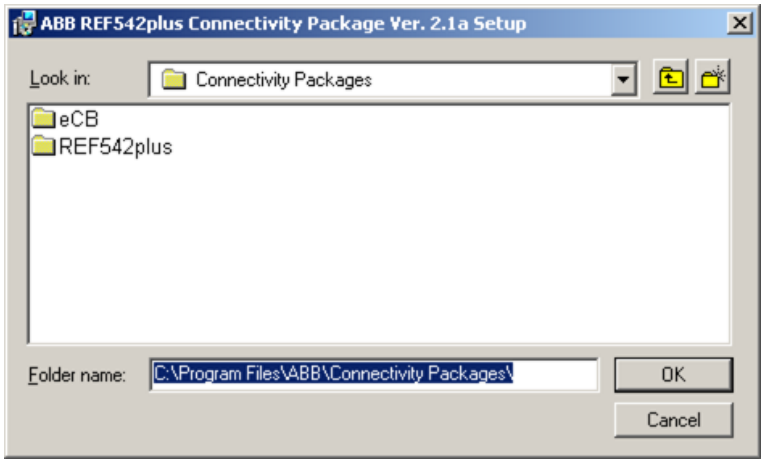

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Fig. 2.4.2.-5 Setup Wizard – folder selection dialog

- Click **OK** to return to the previous dialog.
- Click **Next** to continue the installation.

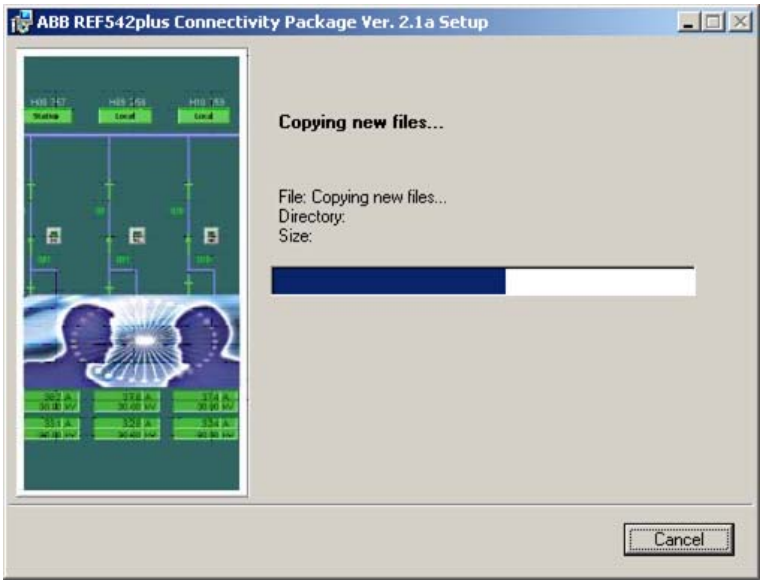

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Fig. 2.4.2.-6 Setup Wizard – installation progress dialog

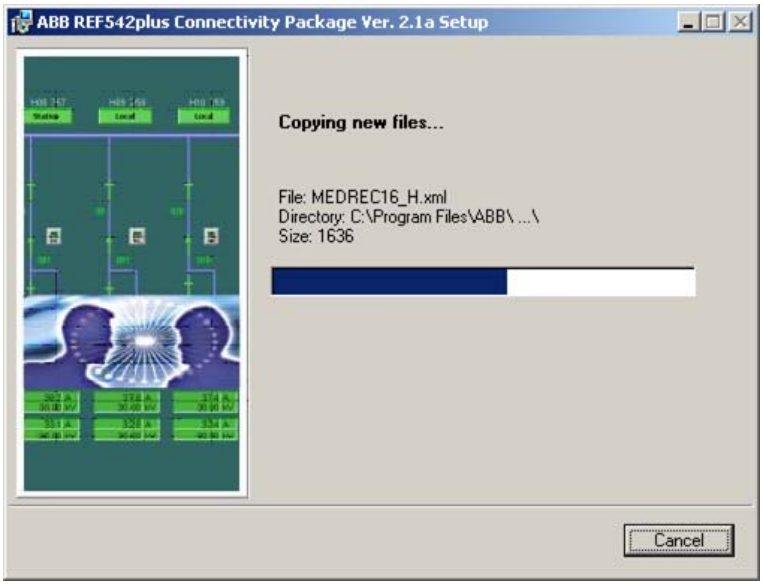

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Fig. 2.4.2.-7 Setup Wizard – installation progress dialog

After the installation of REF 542plus Connectivity Package, the installer displays the "Installation Complete" dialog.

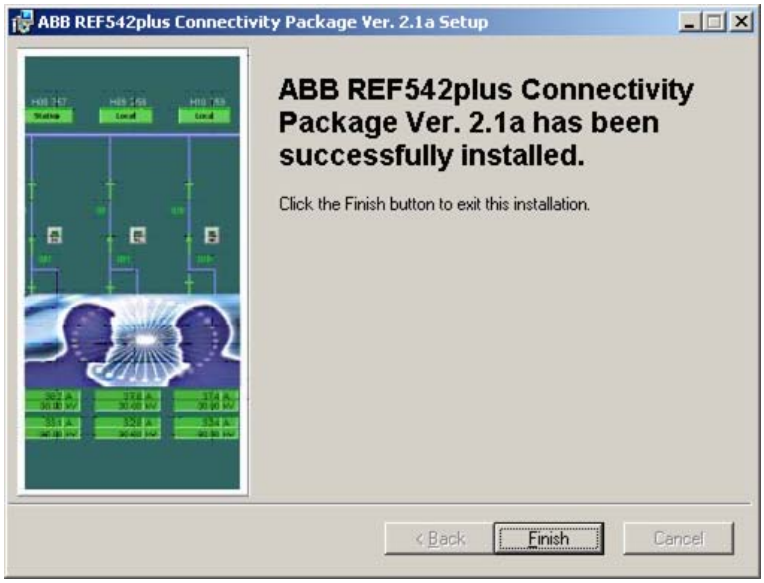

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Fig. 2.4.2.-8 Setup Wizard – Installation complete dialog

- Click **Finish** to exit the installer.

2.4.3. Uninstalling

Uninstalling of REF 542plus Connectivity Package is similar to that of a standard windows application.

- Open the Add or Remove Programs dialog by clicking the **Start** button on the Windows task bar, then clicking **Settings**, then clicking **Control Panel** and then double-clicking **Add or Remove Programs**.

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Fig. 2.4.3.-1 REF 542plus in Add and Remove Programs

- Select REF 542plus Connectivity Package and click **Remove**.
- Click **Yes** in the appearing dialog to confirm the uninstallation.

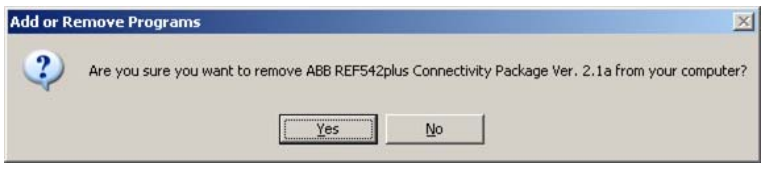

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Fig. 2.4.3.-2 Confirmation dialog for the uninstallation

A progress dialog displays the uninstallation progress. The uninstallation removes all the installed items (folders and files) from the installed folder of REF 542plus ConnPacks.

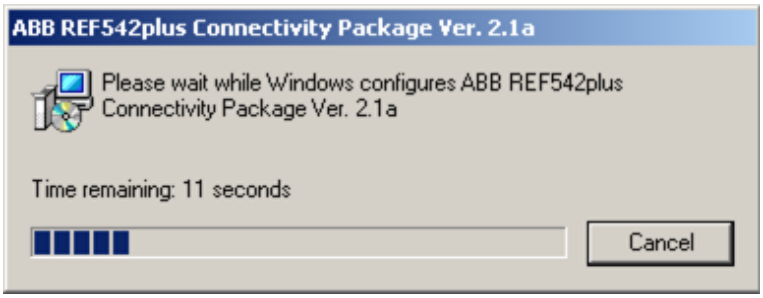

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Fig. 2.4.3.-3 Dialog with the uninstallation progress bar

3. REF 542plus Connectivity Package Applications

3.1. REF 542plus ConnPack files and folders

Critical folders and files are installed by the REF 542plus Connectivity Package installer.

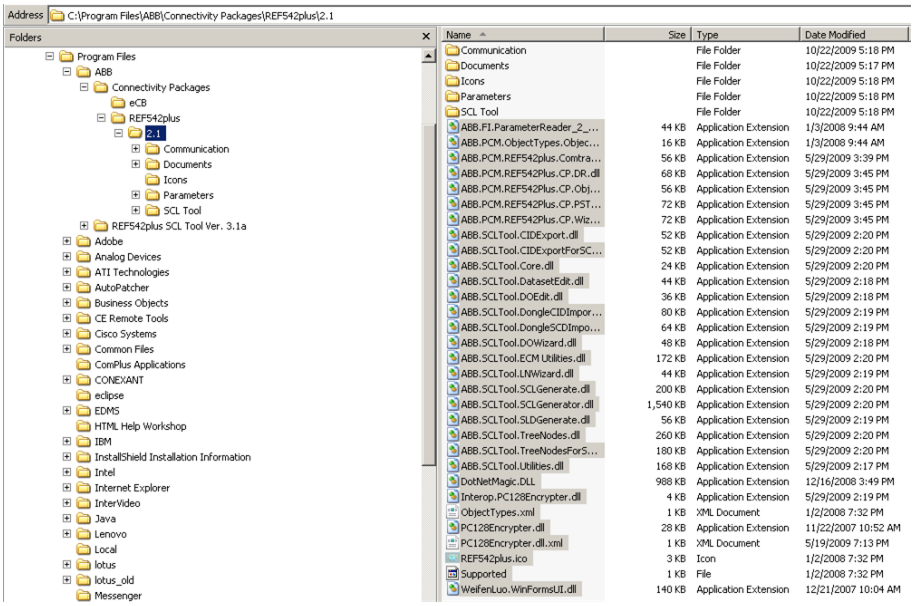

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Fig. 3.1.-1 Installed REF 542plus ConnPack files and folders

3.1.1. Standard ConnPack folders

The standard folders contain the type data files and other required configuration files and folders for REF 542plus Connectivity Packages. These folders are standard folders of any Connectivity Package.

3.1.1.1. Parameters

This folder contains the XML files corresponding to the protection functions that are available in REF 542plus. These files are PST type data, which is used to display the parameters for a particular protection function.

Each protection function has a corresponding resource file that is used to pick up parameter details, like name, as per language. This folder contains sub-folders for resource files as per language that is been supported by REF 542plus.

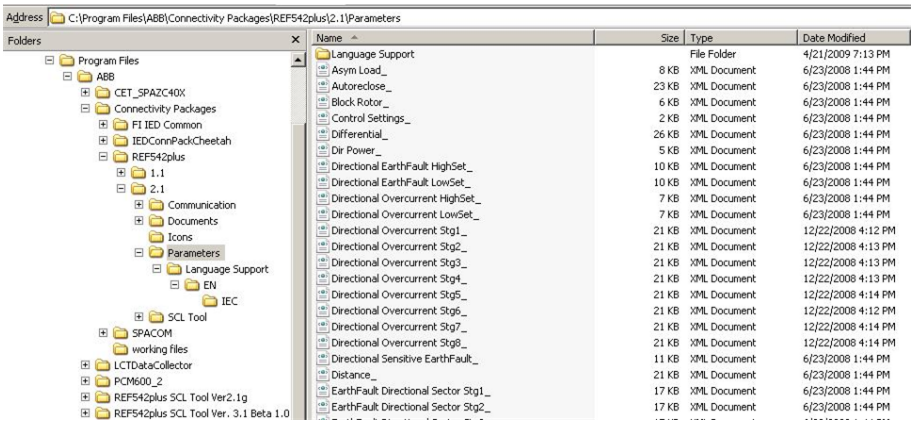


Fig. 3.1.1.1.-1 Contents of the Parameter folder

Table 3.1.1.1.-1 Protection function names and their corresponding xml files

SNo	Type	File name	Functional group
		Inrush_.xml	Inrush blocking
		Inrush Harmonic_.xml	Inrush harmonic
		Overcurrent Isntantaneous_.xml	Overcurrent instantaneous
		Overcurrent HighSet_.xml	Overcurrent definite time, high set
		Overcurrent LowSet_.xml	Overcurrent definite time, low set
		Directional Overcurrent HighSet_.xml	Overcurrent directional, high set
		Directional Overcurrent LowSet_.xml	Overcurrent directional, low set
		IDMT_.xml	Overcurrent IDMT normally inverse
		IDMT_.xml	Overcurrent IDMT very inverse
		IDMT_.xml	Overcurrent IDMT extremely inverse
		IDMT_.xml	Overcurrent IDMT long-time inverse
		Directional EarthFault HighSet_.xml	Earth fault non-directional, high set
		Directional EarthFault LowSet_.xml	Earth fault non-directional, low set
		IDMT EarthFault_.xml	Earth fault IDMT normal inverse
		IDMT EarthFault_.xml	Earth fault IDMT very inverse
		IDMT EarthFault_.xml	Earth fault IDMT extremely inverse
		IDMT EarthFault_.xml	Earth fault IDMT long-time inverse

SNo	Type	File name	Functional group
		EarthFault HighSet_.xml	Earth fault directional, high set
		EarthFault LowSet_.xml	Earth fault directional, low set
		Directional Sensitive EarthFault_.xml	Sensitive earth fault directional
		Earthfault Directional Sector_.xml	Earth fault directional sector
		Directional Overcurrent Stg1	Directional overcurrent
		Directional Overcurrent Stg2	Directional overcurrent
		Directional Overcurrent Stg3	Directional overcurrent
		Directional Overcurrent Stg4	Directional overcurrent
		Directional Overcurrent Stg5	Directional overcurrent
		Directional Overcurrent Stg6	Directional overcurrent
		Directional Overcurrent Stg7	Directional overcurrent
		Directional Overcurrent Stg8	Directional overcurrent
		EarthFault Directional Stg1	Earth fault directional
		EarthFault Directional Stg2	Earth fault directional
		EarthFault Directional Stg3	Earth fault directional
		EarthFault Directional Stg4	Earth fault directional
		EarthFault Directional Stg5	Earth fault directional
		EarthFault Directional Stg6	Earth fault directional
		EarthFault Directional Stg7	Earth fault directional
		EarthFault Directional Stg8	Earth fault directional
		Non Directional overcurrent Stg1	Non-directional overcurrent
		Non Directional overcurrent Stg2	Non-directional overcurrent
		Non Directional overcurrent Stg3	Non-directional overcurrent
		Non Directional overcurrent Stg4	Non-directional overcurrent
		Non Directional overcurrent Stg5	Non-directional overcurrent
		Non Directional overcurrent Stg6	Non-directional overcurrent
		Non Directional overcurrent Stg7	Non-directional overcurrent
		Non Directional overcurrent Stg8	Non-directional overcurrent
		EarthFault Non Directional Stg1	Earth fault non-directional
		EarthFault Non Directional Stg2	Earth fault non-directional
		EarthFault Non Directional Stg3	Earth fault non-directional

SNo	Type	File name	Functional group
		EarthFault Non Directional Stg4	Earth fault non-directional
		EarthFault Non Directional Stg5	Earth fault non-directional
		EarthFault Non Directional Stg6	Earth fault non-directional
		EarthFault Non Directional Stg7	Earth fault non-directional
		EarthFault Non Directional Stg8	Earth fault non-directional
2	Voltage protection functions	Overvoltage Instantaneous_.xml	Overvoltage instantaneous
		Overvoltage HighSet_.xml	Overvoltage definite time, high set
		Overvoltage LowSet_.xml	Overvoltage definite time, low set
		Undervoltage Instantaneous_.xml	Undervoltage instantaneous
		Undervoltage DefiniteTime HighSet_.xml	Undervoltage definite time, high set
		Undervoltage DefiniteTime LowSet_.xml	Undervoltage definite time, low set
		Residual undervoltage HighSet_.xml	Residual overvoltage definite time high
		Residual undervoltage HighSet_.xml	Residual overvoltage definite time low
	Motor protection function	Thermal Overload_.xml	Thermal Overload
		Motor Start_.xml	Motor start protection
		Block Rotor_.xml	Blocked rotor protection
		Nr Starts_.xml	Number of Starts
		Differential_.xml	Differential protection
		Res Differential_.xml	Restricted differential protection
		Asym Load_.xml	Unbalanced load II
		Dir Power_.xml	Directional power protection
		Low Load_.xml	Low load protection
		Thermal Spv_.xml	Thermal supervision
		Frequency Spv_.xml	Frequency supervision
		Syn Check_.xml	Synchrocheck
		Sw Resonance_.xml	Switching resonance
		Hi Harmonic_.xml	High harmonic
		Frequency Protection Net1 Stg1_.xml	Frequency protection Net 1/Stg 1
		Frequency Protection Net1 Stg2_.xml	Frequency protection Net 1/Stg 2

SNo	Type	File name	Functional group
		Frequency Protection Net1 Stg3_.xml	Frequency protection Net 1/Stg 3
		Frequency Protection Net1 Stg4_.xml	Frequency protection Net 1/Stg 4
		Frequency Protection Net1 Stg5_.xml	Frequency protection Net 1/Stg 5
		Frequency Protection Net1 Stg6_.xml	Frequency protection Net 1/Stg 6
		Frequency Protection Net2 Stg1_.xml	Frequency protection Net 2/Stg 1
		Frequency Protection Net2 Stg2_.xml	Frequency protection Net 2/Stg 2
		Frequency Protection Net2 Stg3_.xml	Frequency protection Net 2/Stg 3
		Frequency Protection Net2 Stg4_.xml	Frequency protection Net 2/Stg 4
		Frequency Protection Net2 Stg5_.xml	Frequency protection Net 2/Stg 5
		Frequency Protection Net2 Stg6_.xml	Frequency protection Net 2/Stg 6
		Autoreclose_.xml	Autoreclose

3.1.1.2. Documents

This folder includes document(s) related to REF 542plus. At the moment, the folder has the file "REF542plus-ProtectionManual."

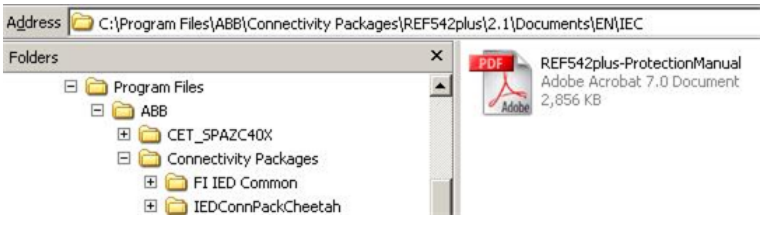


Fig. 3.1.1.2.-1 Documents folder

3.1.1.3. Icons

This folder has the REF 542plus icon that is used as REF 542plus Object Type Icon in PCM600 and the SplashScreen1 icon that is used as a display image in the Add or Remove Program function.

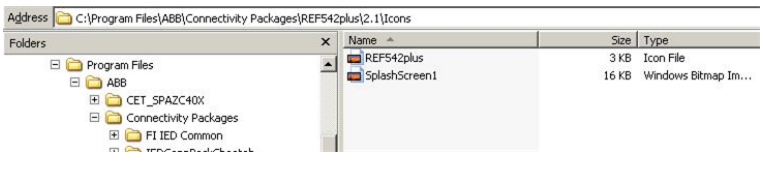


Fig. 3.1.1.3.-1 Icons folder

3.1.1.4. Communication description

This folder has the files that are needed for the IEC 61850 communication.

3.1.2. SCL tool

This folder has all the files and folders that are required to create SCL files. Please refer to the SCL Tool user manual for further details.

3.2. REF 542plus object type creation

After the installation of REF 542plus Connectivity Packages, the REF 542plus object type is created in PCM 600. This REF 542plus object type is required to invoke the standard tools of PCM600.

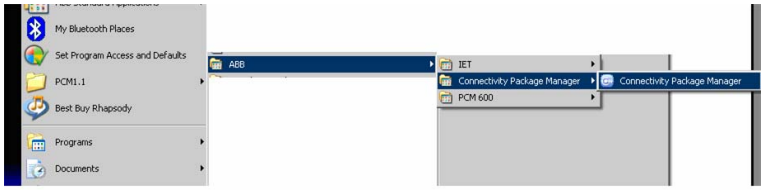
3.2.1. Configuring REF 542plus ConnPack in Connectivity Package Manager

REF 542plus Connectivity package can be configured in Connectivity Package Manager to work with REF 542plus object type in PCM 600.

- Close PCM600 if it is open.
- Open Connectivity Package Manager by double-clicking the shortcut on the desktop or by first clicking **Programs**, then clicking **ABB**, then clicking **Connectivity Package Manager** and then clicking **Connectivity Package Manager**.

A100204

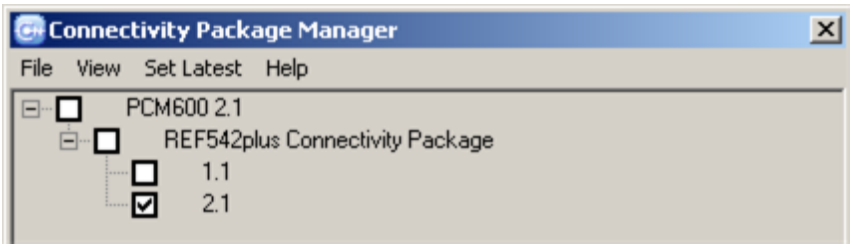
Fig. 3.2.1.-1 Connectivity Package Manager desktop icon



A100206

Fig. 3.2.1.-2 Connectivity Package Manager on the Programs menu

Connectivity Package Manager appears.



A100208

Fig. 3.2.1.-3 REF 542plus ConnPack in Connectivity Package Manager

- Expand the REF 542plus Connectivity Package node by clicking it.
- Select the 2.1 version check box to enable REF 542plus Connectivity Package in PCM600. If it is not enabled, the REF 542plus object type cannot be created in PCM600.
- On the **File** menu, click **Close menu** to close Connectivity Package Manager.

3.2.2. Managing projects in PCM600

An existing or a new PCM600 project can be used to create the REF 542plus object type in PCM600. A project can be managed in PCM600.

- Open PCM600 by double-clicking the PCM600 shortcut on the desktop.

A100210

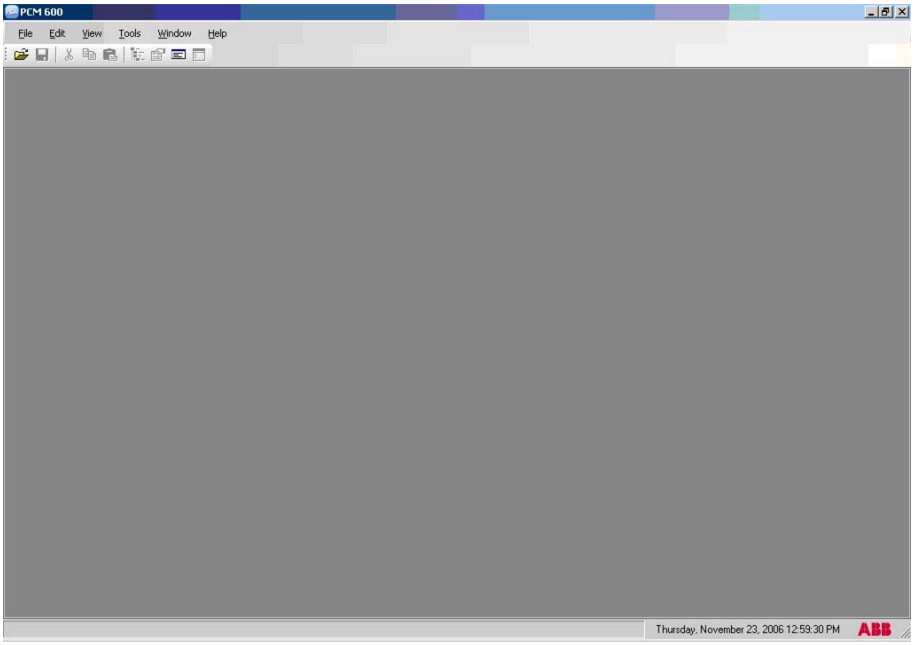
Fig. 3.2.2.-1 PCM600 desktop icon

- PCM600 can also be opened by clicking **Programs**, then clicking **ABB**, then clicking **PCM600** and then clicking **PCM600**.

A100212

Fig. 3.2.2.-2 PCM600 on the Programs menu

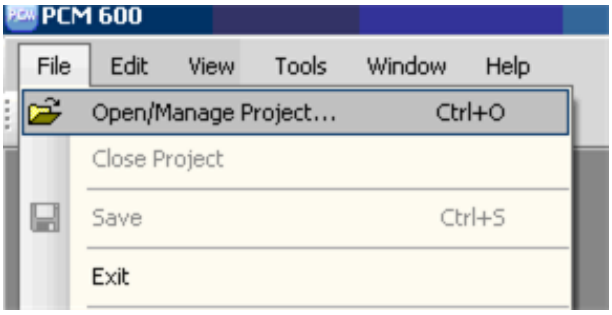
PCM600 window opens. If PCM600 has any open projects, the tree structure of that project is shown. Otherwise, the window is empty.



A100214

Fig. 3.2.2.-3 PCM600 window without the tree structure of a project

- On the **File** menu, click **Open/Manage project** to create a new or manage an existing project.



A100216

Fig. 3.2.2.-4 Open/Manage project

The Open/Manage Project dialog appears. It is used to do the following operations:

- creating a new project
- deleting a project
- importing a project
- exporting a project
- opening a project

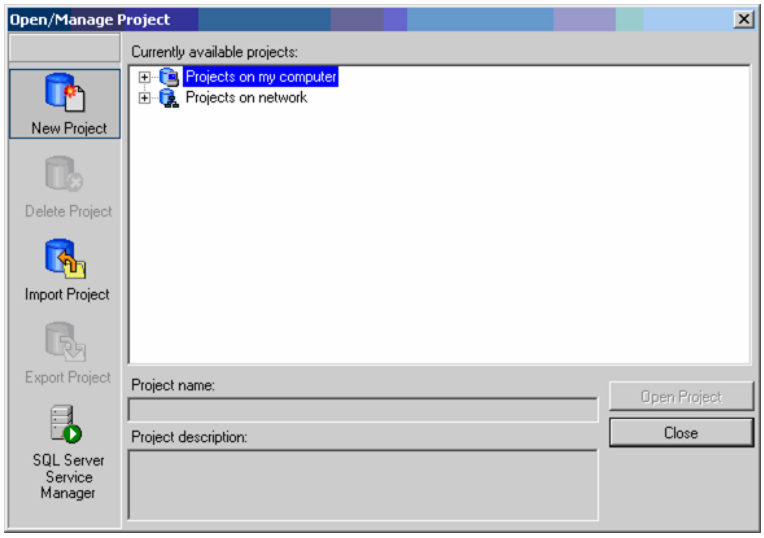


Fig. 3.2.2.-5 Open/Manage Project dialog

3.2.2.1. Creating new projects

- Click **New Project** in the Open/Manage Project dialog to create a new project.
- Enter the project name and the description of the project in the New Project dialog.

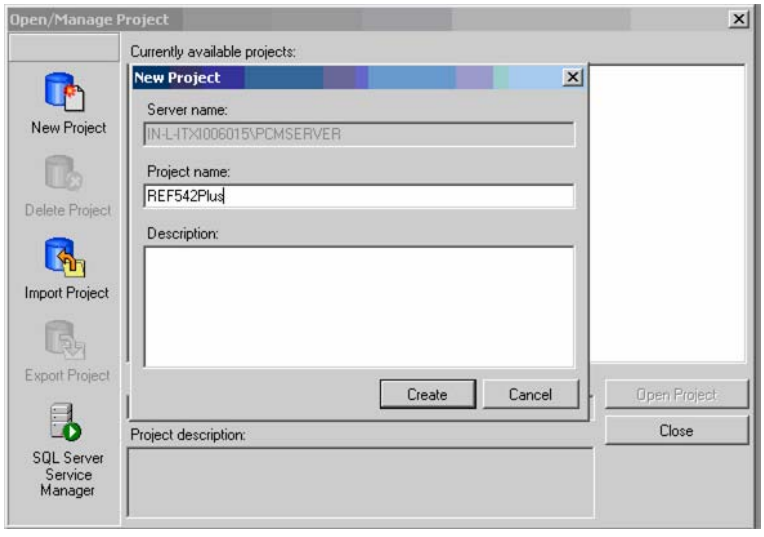


Fig. 3.2.2.1.-1 New Project dialog

- Click **Create** to create a new project.

  When the project is created, it is displayed in the "Projects on my computer" tree structure.

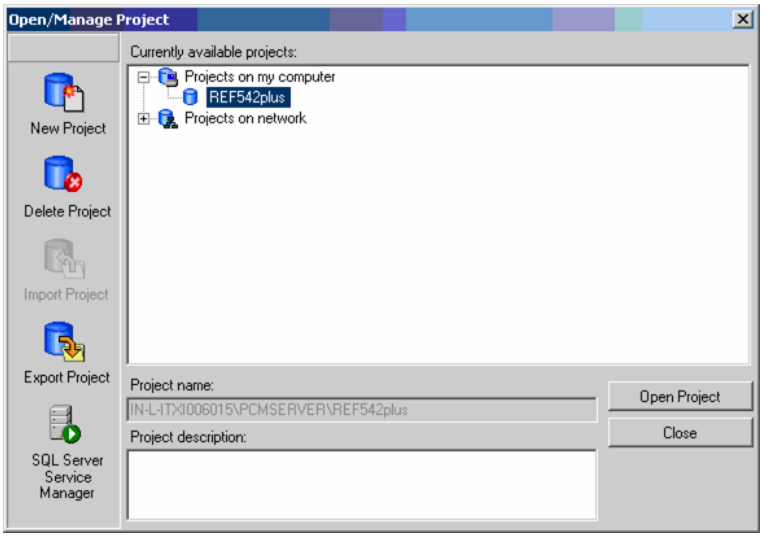


Fig. 3.2.2.1.-2 Open/Manage Project dialog with a created project

3.2.2.2. Opening existing projects

- Open a created project by first clicking the project name to select the project and then clicking **Open Project**. The selected project can also be deleted or exported here.

  PCM600 shows the tree structure of the opened project. The tree structure is empty in new projects.

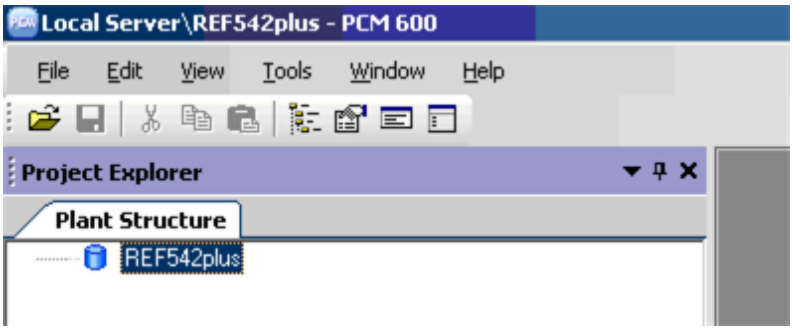


Fig. 3.2.2.2.-1 Tree structure with REF 542plus

- Create a Substation or Region node by right-clicking the project and then selecting **New**, then **General** and then **Substation**. The Substation node is created as a child node of the project in the tree structure.

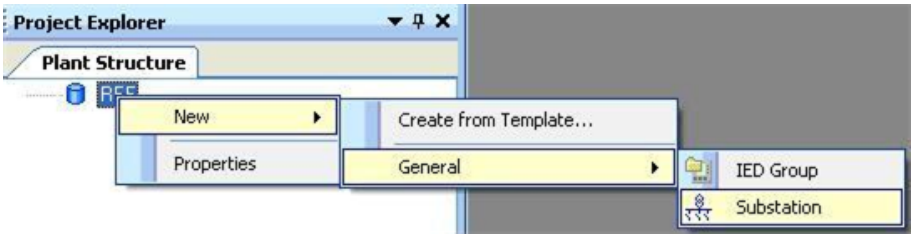


Fig. 3.2.2.2.-2 Menu navigation for creating the Region or Substation nodes

- Create the Voltage Level node by right-clicking the Substation node and then selecting **New**, then **General** and then **Voltage Level**.

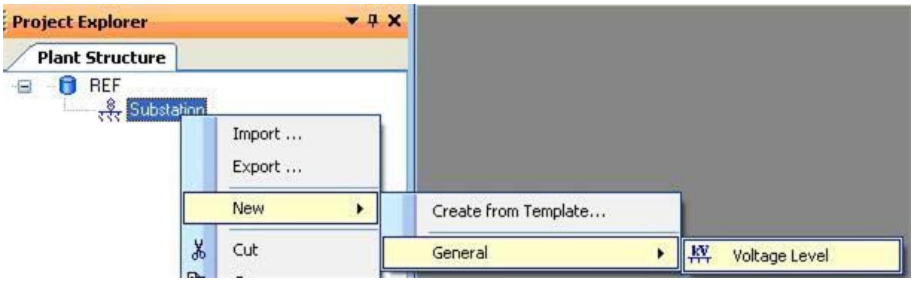


Fig. 3.2.2.2.-3 Menu navigation for creating the Voltage Level node

- Create the Bay node by right-clicking the Voltage Level node and then selecting **New**, then **General** and then **Bay**.

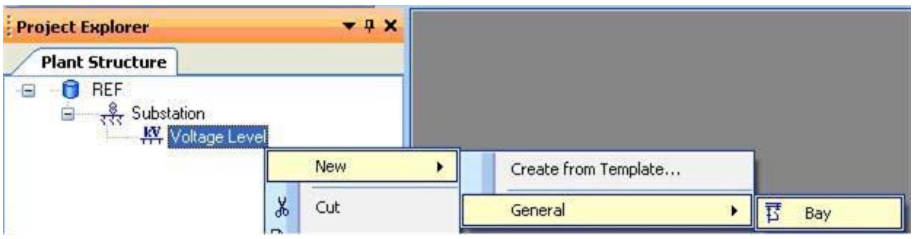


Fig. 3.2.2.2.-4 Menu navigation for creating the Bay node

- Right-click the Voltage Level node to view the shortcut menu.

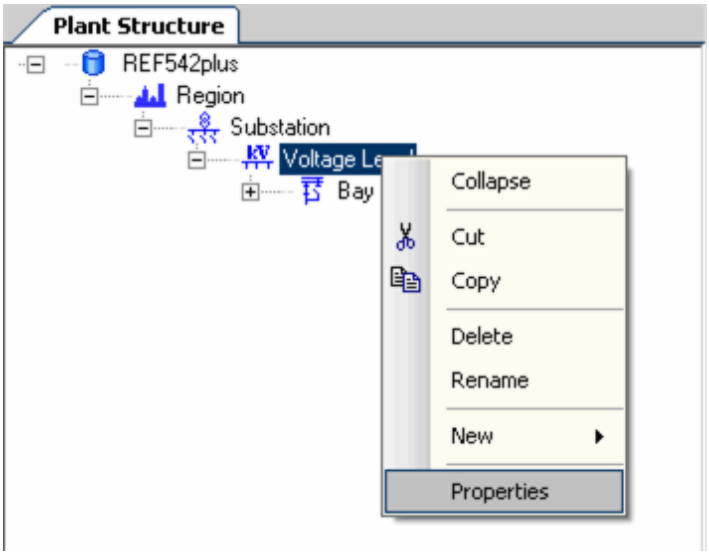


Fig. 3.2.2.2.-5 Voltage Level shortcut menu

- Select Properties to access the Voltage Level properties. In the properties, Voltage Range is transferred to SCL Tool when SCL Tool is invoked through "SCL Configuration Wizard."

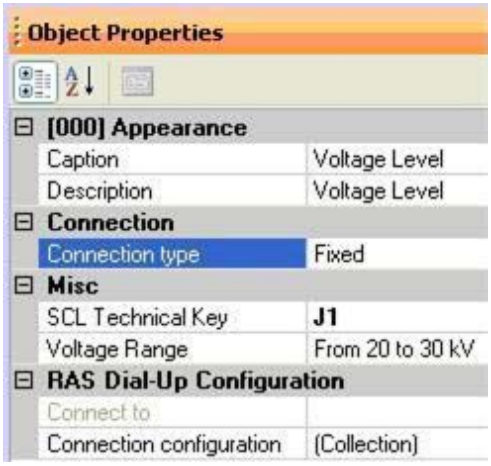
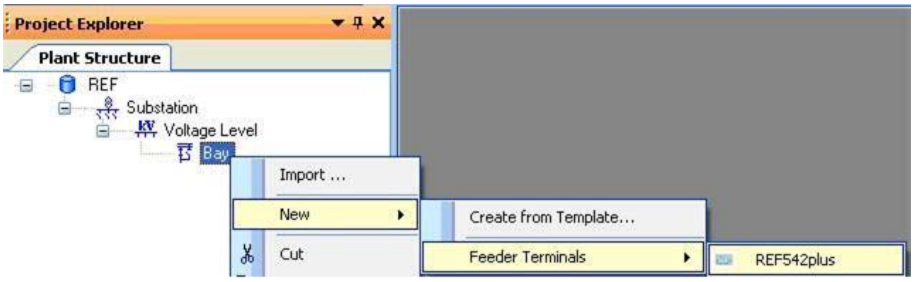


Fig. 3.2.2.2.-6 Voltage Level properties

3.2.3. Creating REF 542plus objects in PCM600

The REF 542plus Object type can be created either through the Bay node's shortcut menu or in the Object type window.

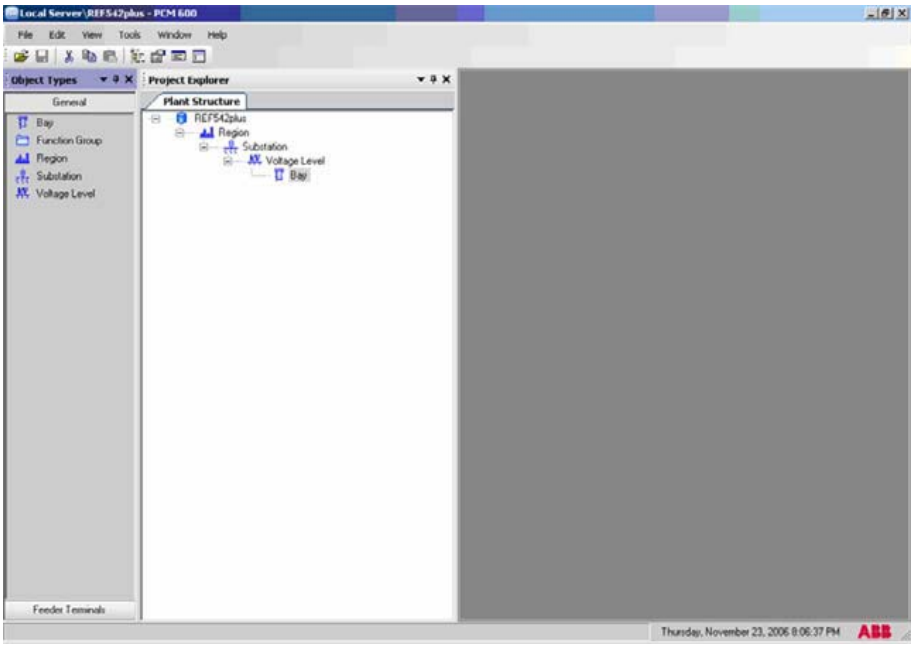
- Right-click the Bay node in the tree structure.
- Select **New**, then select **Feeder Terminals** and then **REF 542plus**. The REF 542plus Object type is created under the Bay node.



A100236

Fig. 3.2.3.-1 Menu navigation for creating REF 542plus

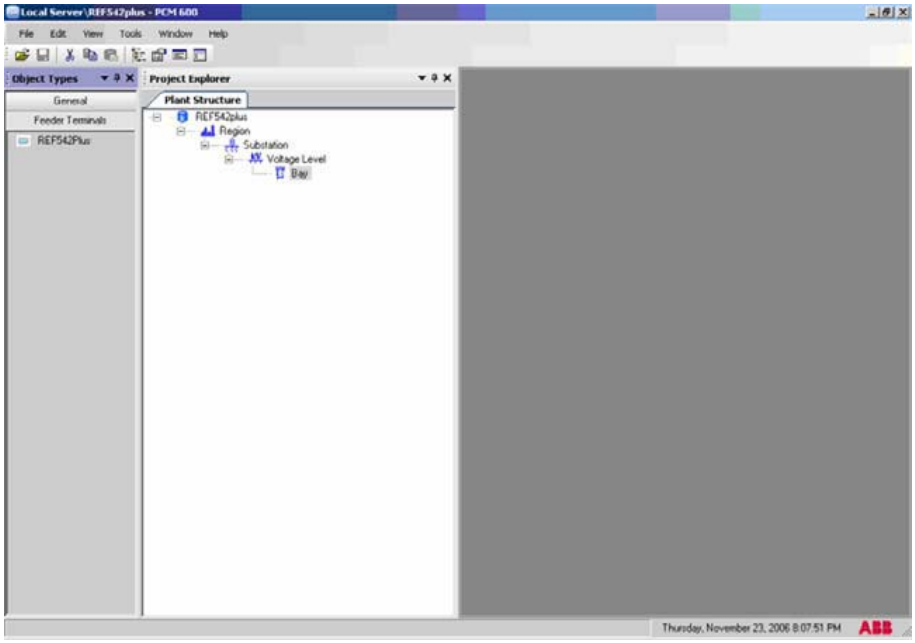
- Open the Object Type window by clicking **Object Type** on the **View** menu.



A100238

Fig. 3.2.3.-2 Object Type window

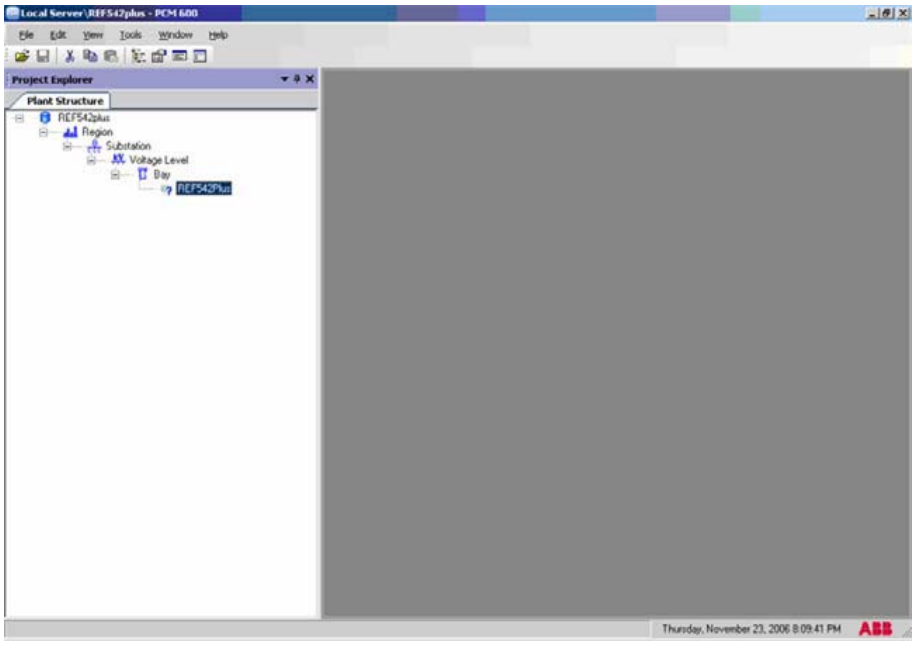
- Click **Feeder Terminals** to view the REF 542plus object.



A100240

Fig. 3.2.3.-3 Object Type window for feeder terminal

- Drag and drop the REF 542plus object to the Bay node to create the object type in the tree structure.



A100242

Fig. 3.2.3.-4 Tree structure with the REF 542plus object type

3.3. Communication Wizard

IP Address, IED protocol and communication provider, which all are required to make a communication with REF 542plus, have to be configured. Communication wizard helps configure the IP address of the REF 542plus.

3.3.1. Working with Communication Wizard

- Right-click the REF 542plus object type and select **Communication Wizard**.

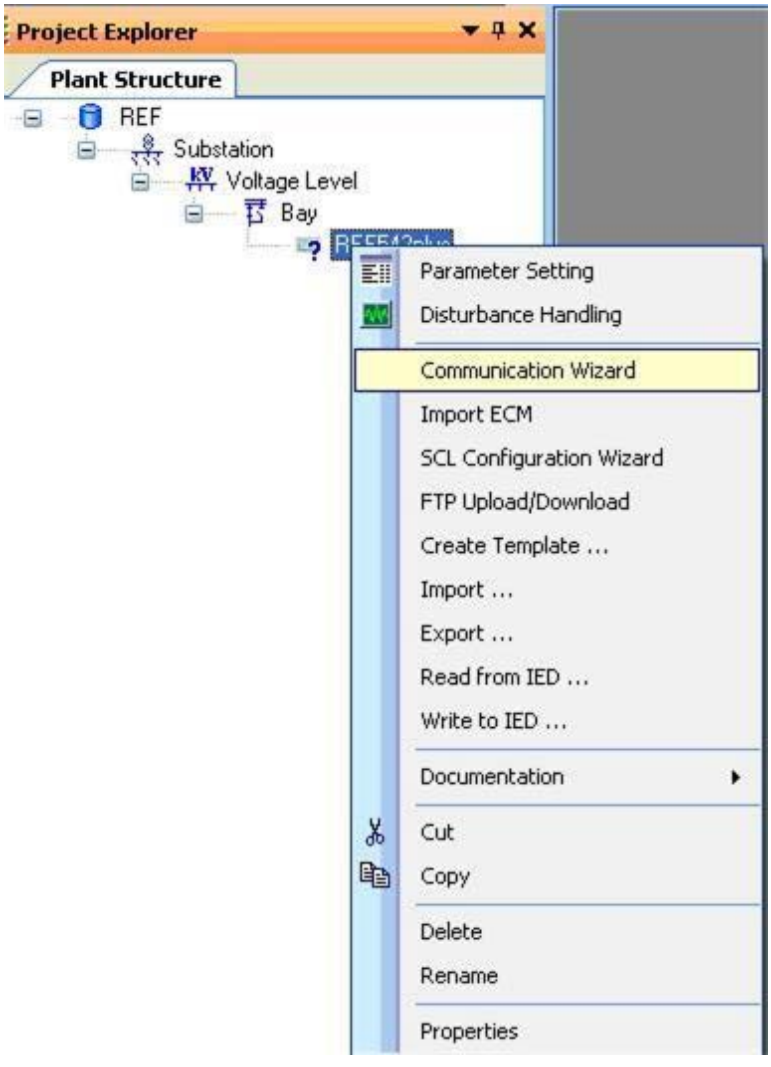


Fig. 3.3.1.-1 REF 542plus shortcut menu – Communication Wizard

The Communication Wizard dialog opens. It shows "IED protocol" for communication and "Communication Provider." REF 542plus uses "IEC61850" as the IED protocol, and the communication provider is "PCM600." The fields are displayed as user information but their values cannot be changed.

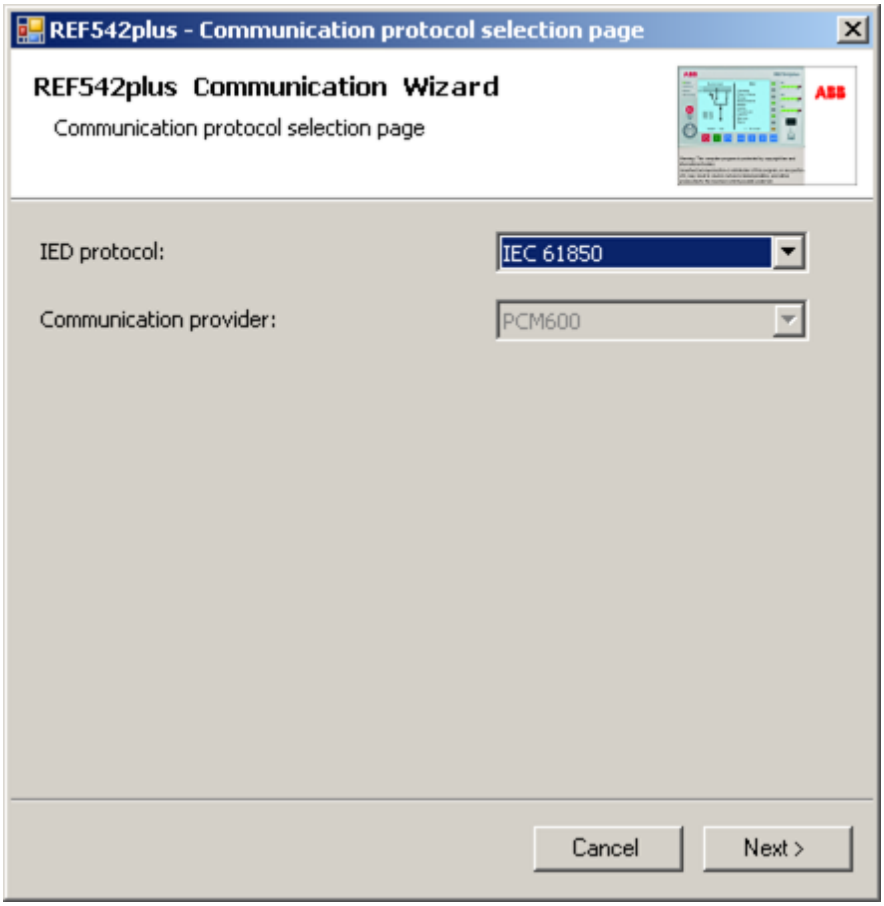


Fig. 3.3.1.-2 Communication protocol selection page

- Click **Next** to continue, or click **Cancel** at any stage to close the Communication Wizard. The following dialog appears.

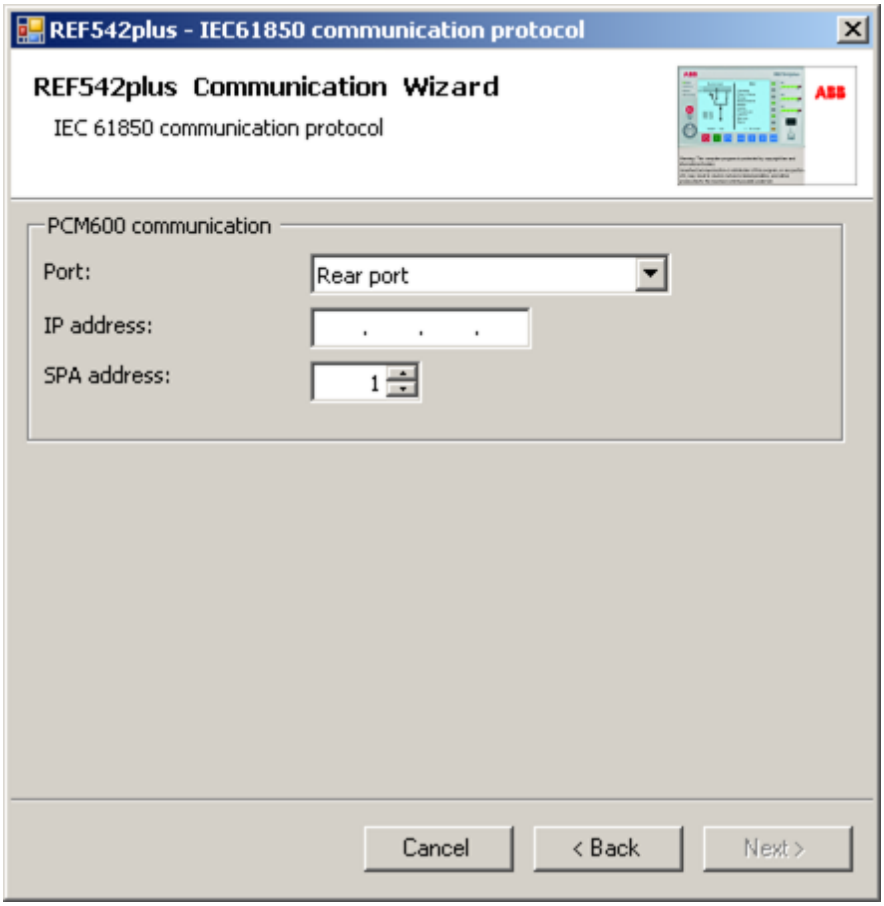


Fig. 3.3.1.-3 IEC 61850 Communication protocol configuration

Enter the IP address, for example, 10.140.79.125. REF 542plus uses 99 as Transparent SPA Address, so the information is displayed.

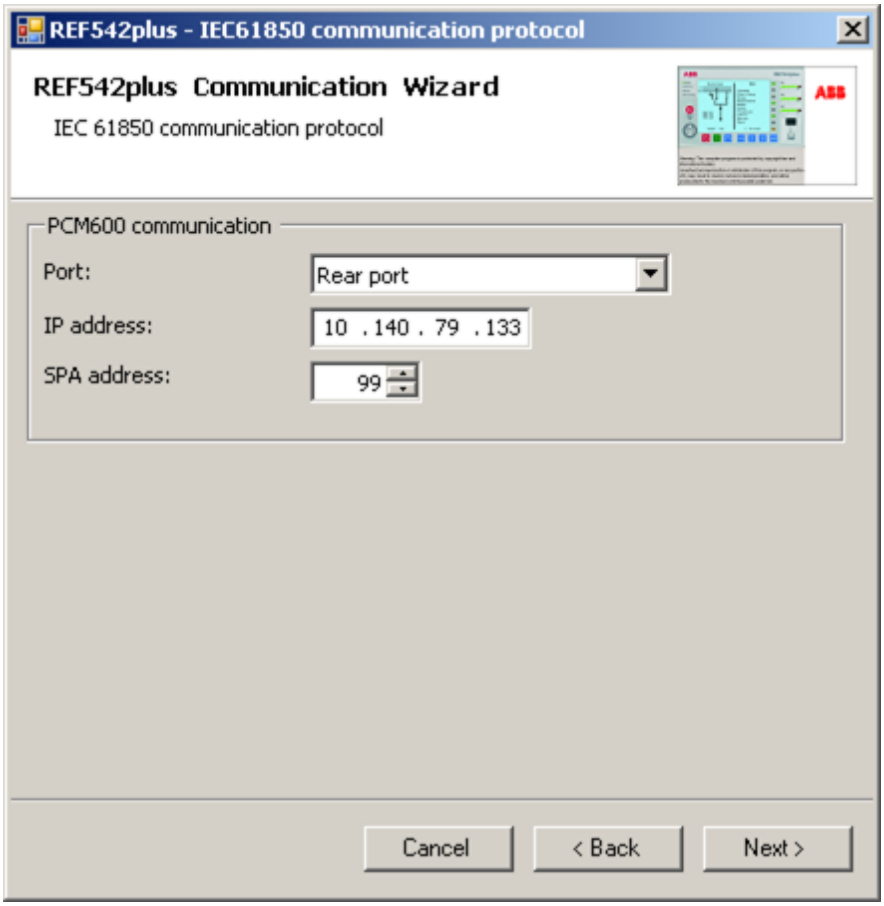


Fig. 3.3.1.-4 IEC 61850 Communication protocol configuration

- Click **Next** to continue. The following dialog appears.

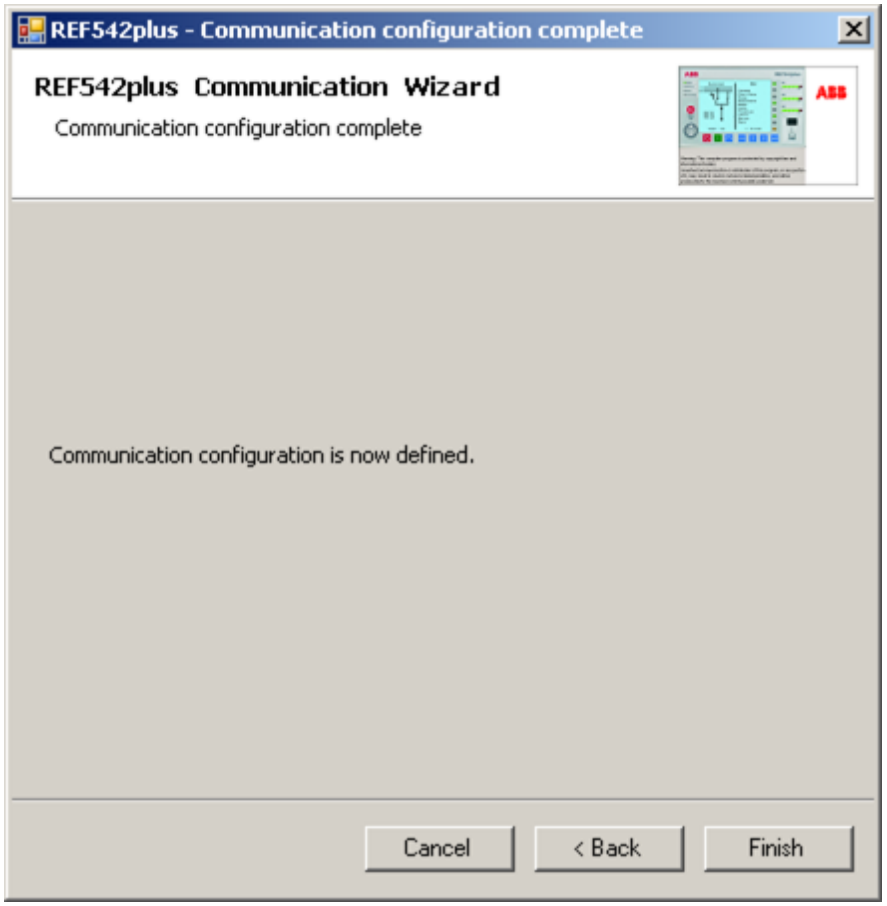


Fig. 3.3.1.-5 Communication configuration completed

- Click **Finish** to complete the configuration wizard, or click **Back** to navigate back to change the IP address, for example.

3.3.2. Working with communication structure

After the communication configuration has been finished, PCM600 automatically creates the required communication structure for the selected REF 542plus object type. The communication structure can be viewed in PCM600 as follows:

- Right-click on the Project Explorer field and select **Communication** to open the communication wizard.

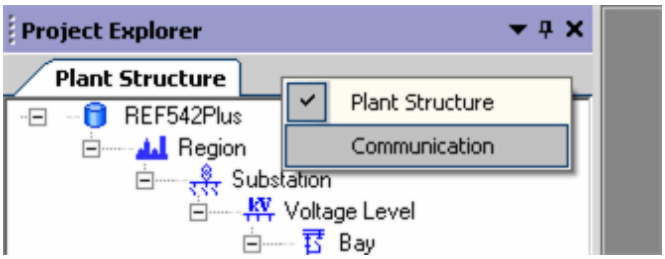


Fig. 3.3.2.-1 Project Explorer shortcut menu

- Navigate to the SubNetwork node from the REF 542plus project node in the IEC 61850 OPC Server tree structure.

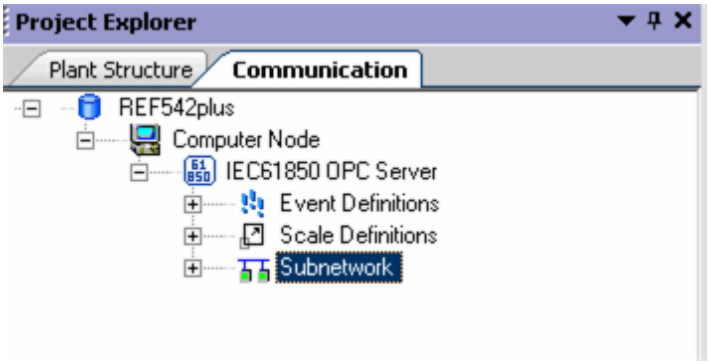


Fig. 3.3.2.-2 Communication structure with Subnetwork

- Expand Subnetwork by clicking the subnetwork node. The object type named as REF542plus that was chosen when created with the communication wizard is also displayed in the Communication tree.

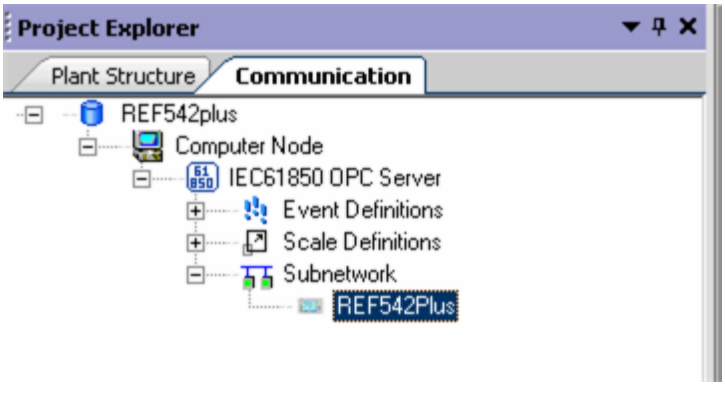


Fig. 3.3.2.-3 Communication structure with the REF 542plus object

3.4. SCL configuration wizard

The details of the SCL file can be configured in the SCL configuration wizard and the SCL file can then be created.

The user manual of REF 542plus explains in detail how to enter or edit the parameters and create the SCL file in SCL Tool.

This section briefly explains the user interaction required to create the SCL file in the SCL configuration wizard and also how the created SCL file can be imported into PCM600 for using the protection function in PST.

3.4.1. Creating SCL files in SCL Tool

- Right-click the REF 542plus object in the tree structure and select **SCL Configuration Wizard**.

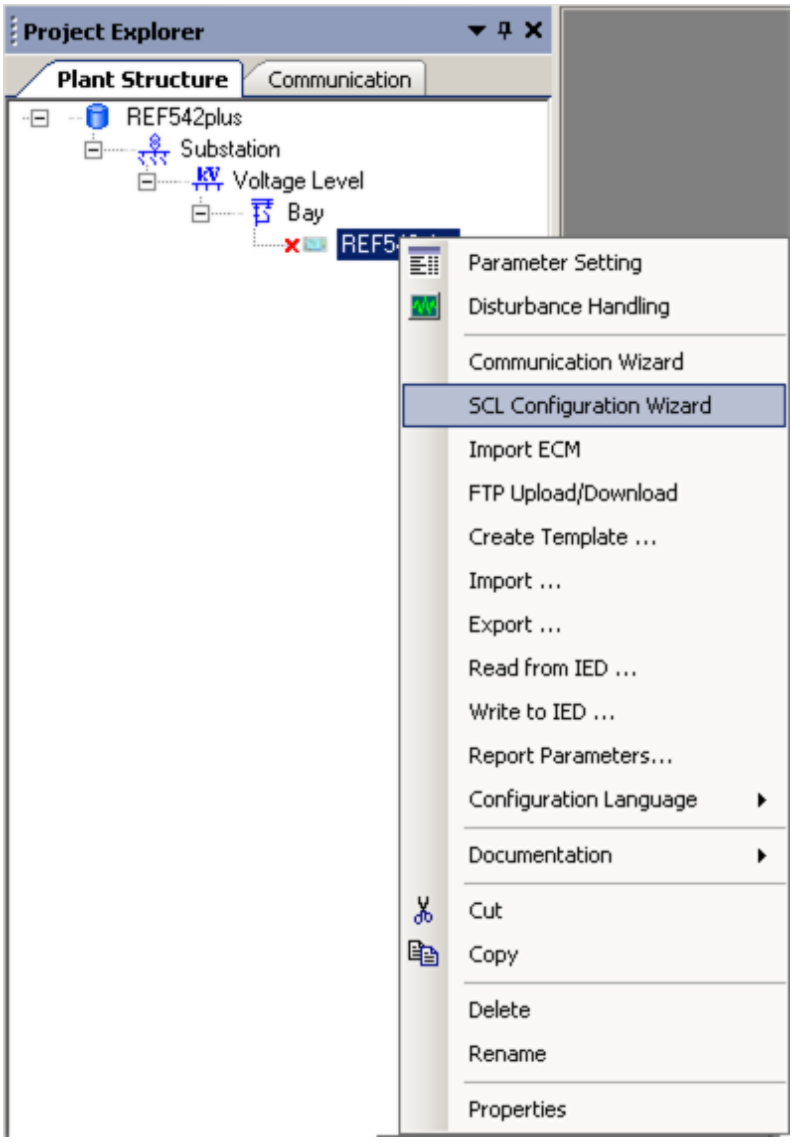
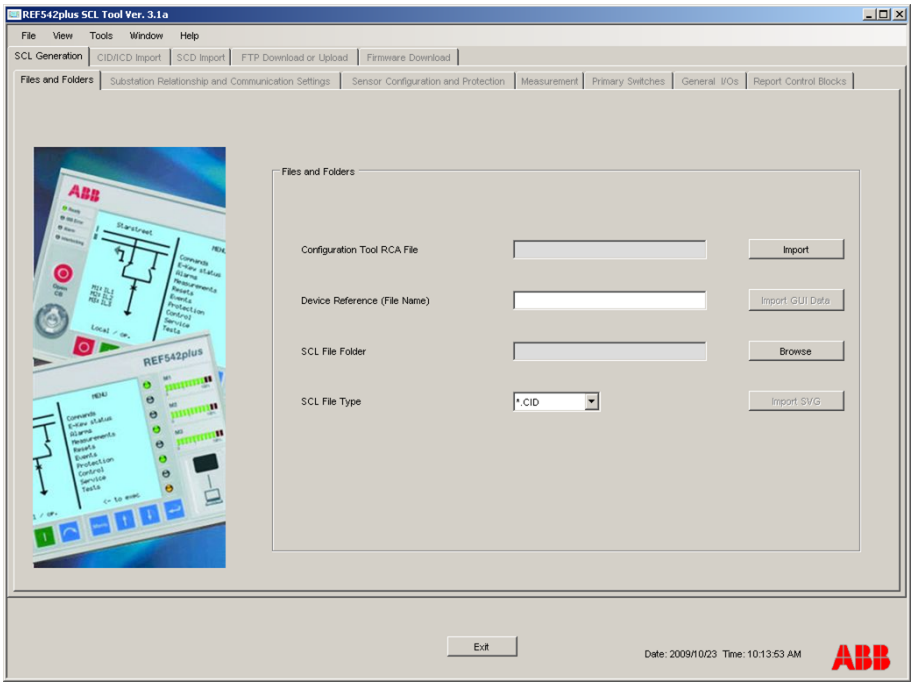


Fig. 3.4.1.-1 REF 542plus shortcut menu – SCL Configuration Wizard

SCL Tool opens. The purpose of SCL Configuration Wizard is to create an SCL file, so the SCL Generation tab is open when displaying the SCL Tool from the REF 542plus Object type. Additionally, navigation to other tabs is restricted by making them unavailable.



A100264

Fig. 3.4.1.-2 SCL Tool with only the SCL Generation tab available

- See the SCL Tool user manual about the use of the Files and Folders tab. When the required fields in the Files and Folders tab have been filled, navigation to other tabs under the SCL Generation tab is allowed.

The configured substation details from the PCM600 are transferred into SCL Tool when SCL Configuration Wizard is invoked.

The substation, voltage range, bay name and IED name in the PCM600 tree structure are imported to SCL Tool automatically. The imported substation information is displayed in the Substation Relationship and Time Settings tab. The transferred fields' data cannot be edited in SCL Tool.

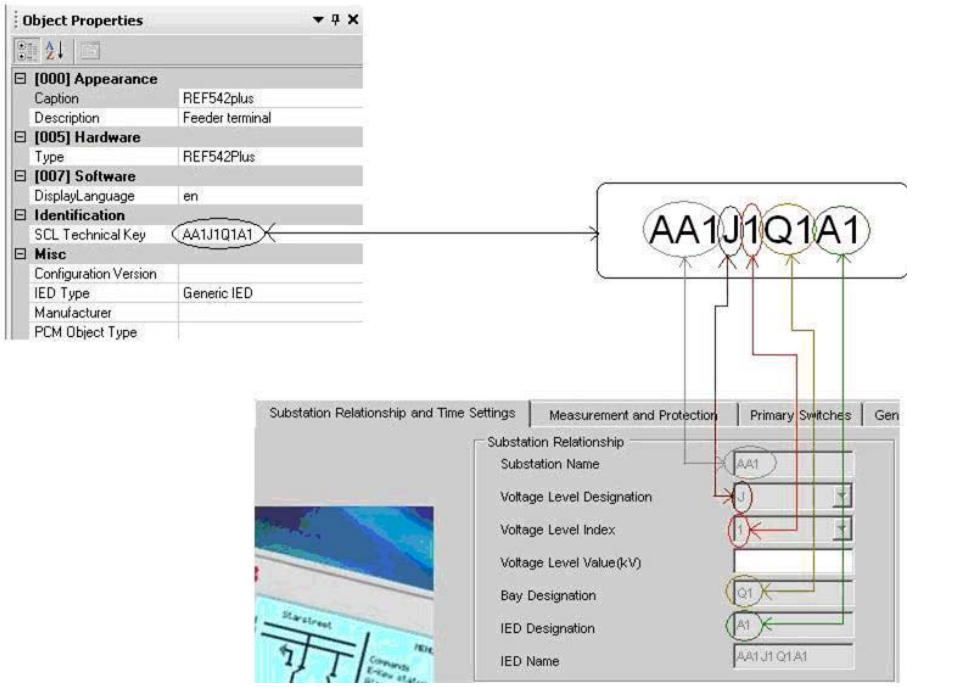
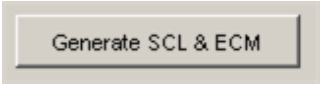


Fig. 3.4.1.-3 Mapping of substation information between PCM600 and the Substation Relationship and Time Settings tab

Voltage Range property of the Voltage Level node in PCM600 is converted into equivalent designation as per IEC 61346.

Voltage designation	Voltage range
B	Over 420 kV
C	From 380 to 420 kV
D	From 220 to 380 kV
E	From 110 to 220 kV
F	From 60 to 110 kV
G	From 45 to 60 kV
H	From 30 to 45 kV
J	From 20 to 30 kV
K	From 10 to 20 kV
L	From 6 to 10 kV
M	From 1 to 6 kV
N	Under 1 kV

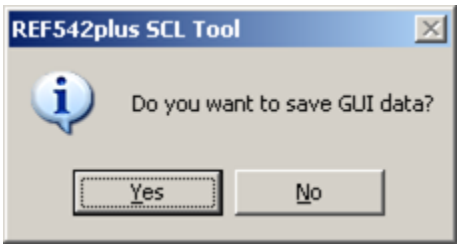
- See the SCL tool user manual to create and test an SCL file in REF 542plus SCL Tool.
- After entering the value for creating the SCL file (click "SCL Generation," then "Report Control Block"), click **Generate SCL & ECM** to create the SCL file.



A100268

Fig. 3.4.1.-4 Generate SCL & ECM

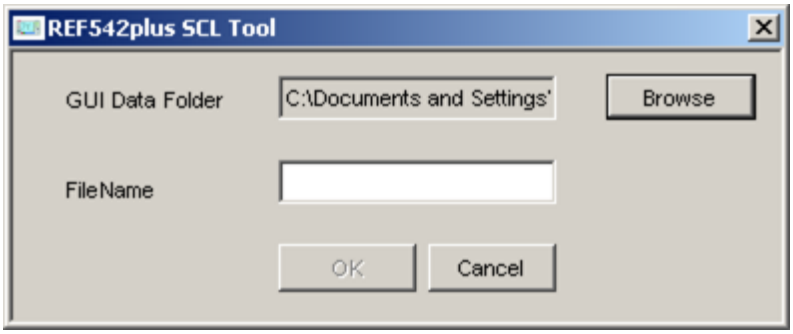
A dialog window prompts to save the entered data.



A100270

Fig. 3.4.1.-5 Dialog for user confirmation to save the GUD data

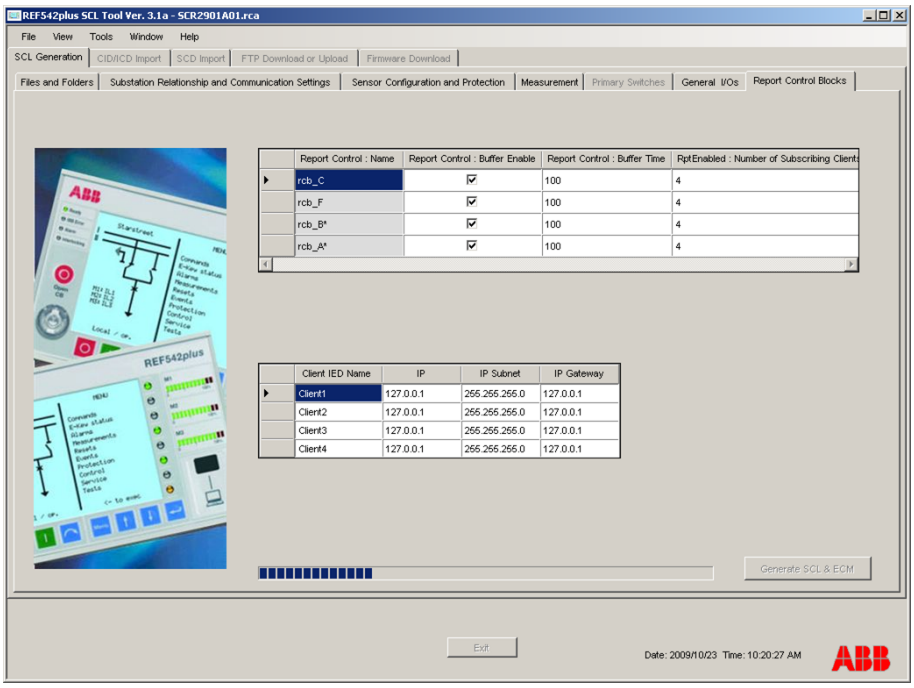
- Click **Yes** to save the entered data in GUI.
- Enter the file name in the text box when another dialog window appears and prompts to name the file (*.GUD).



A100272

Fig. 3.4.1.-6 GUD file name input dialog

- Click **OK** to save the user data. A progress bar is shown, indicating that the SCL file preparation is in progress.



A100274

Fig. 3.4.1.-7 Progress bar for the creation of the SCL file

A dialog window appears when the progress bar is full, indicating that the SCL file has been generated and validated against the SCL.xsd and CommonSA.xsd schemas.

A100276

Fig. 3.4.1.-8 Dialog window for the completion of the SCL file generation

Another dialog window with options appears.

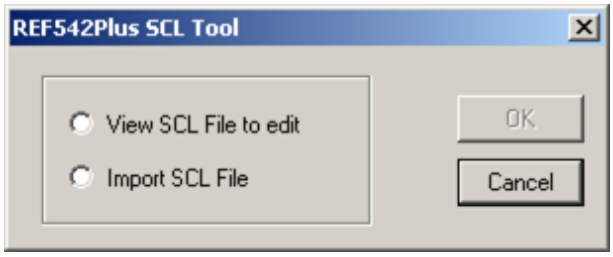


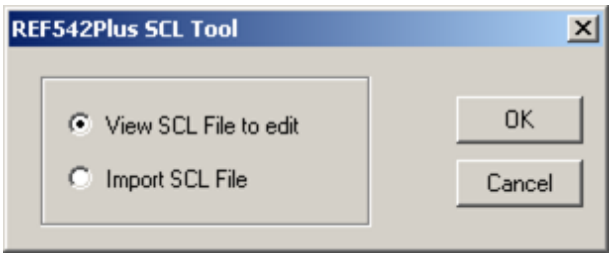
Fig. 3.4.1.-9 Option dialog window for viewing or importing the SCL file

- Select Import SCL File and click **OK** to import the SCL file into PCM600.

3.4.2. Editing SCL files

The SCL file can be viewed also in the tree structure to add or edit DOI or LN.

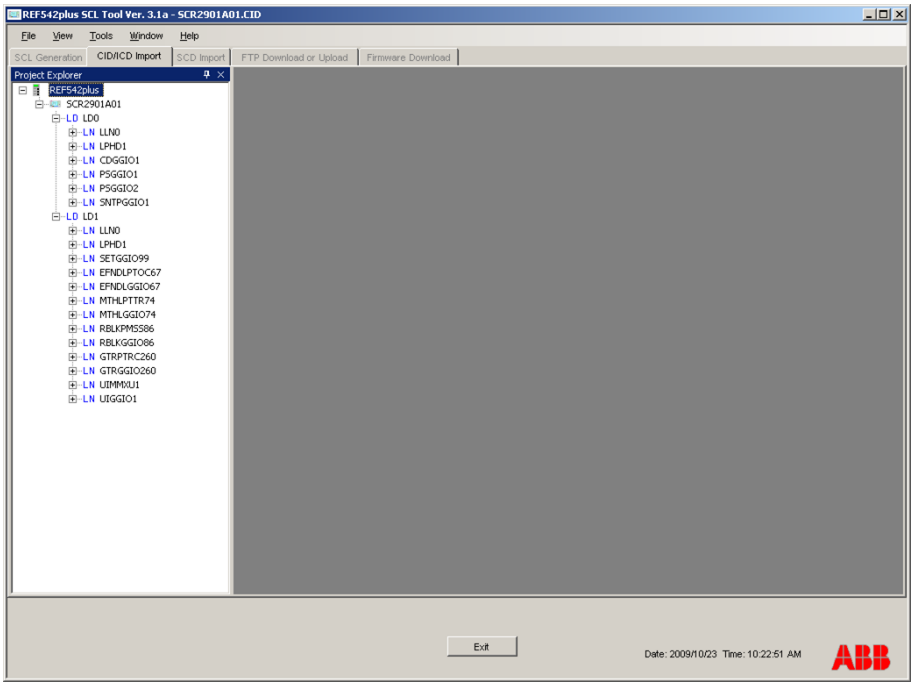
- Select View SCL File to edit to view the generated SCL file in the tree view.



A100280

Fig. 3.4.2.-1 Option dialog window for viewing or importing the SCL file

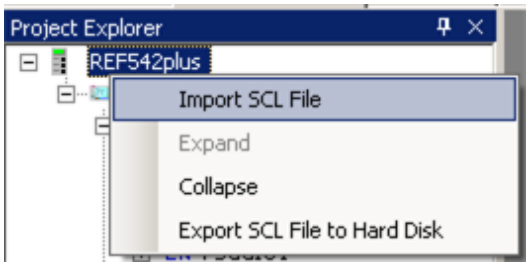
- Click **OK**. The created SCL file is automatically imported and shown in the tree view.



A100282

Fig. 3.4.2.-2 SCL File Import tab

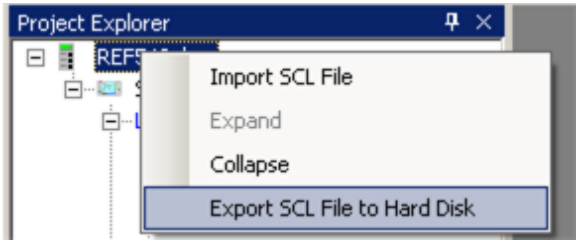
- See the SCL Tool user manual for details about working with the SCL Import tab. When all the wanted modifications have been made, the SCL file can be exported.
- Right-click the first node to open the shortcut menu.



A100284

Fig. 3.4.2.-3 REF 542plus node shortcut menu

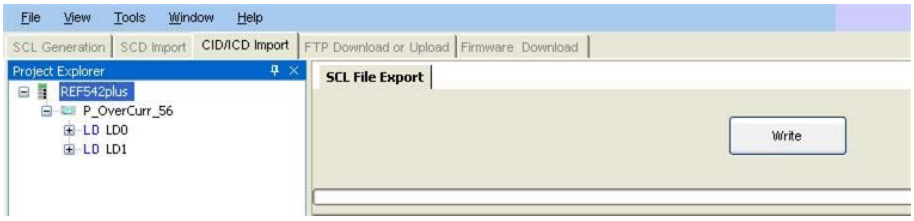
- Select **Export SCL File to Hard Disk**.



A100286

Fig. 3.4.2.-4 REF 542plus node shortcut menu

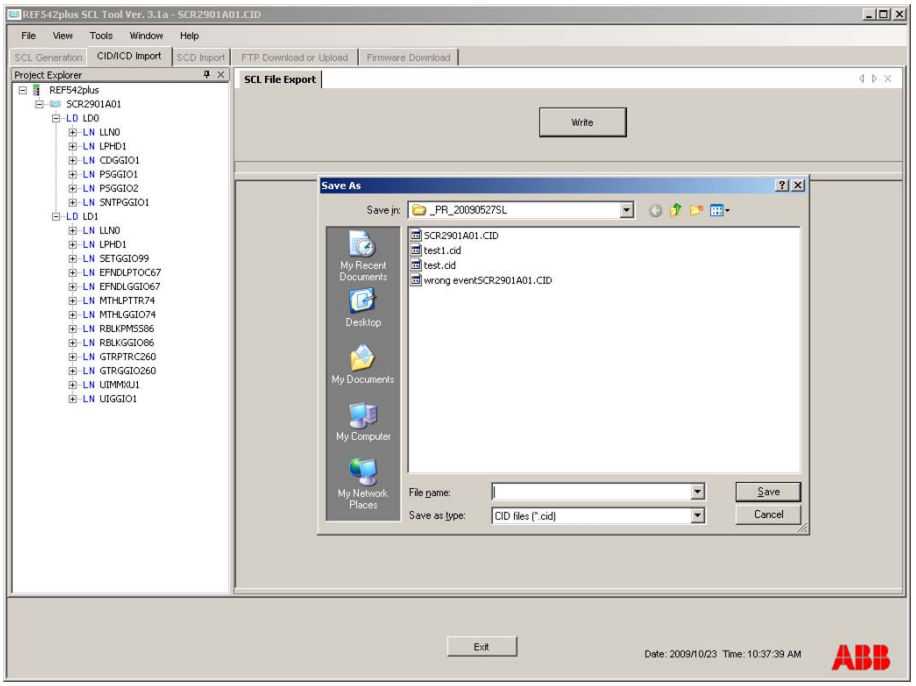
The SCL File Export tab appears on the right side of Project Explorer.



A100288

Fig. 3.4.2.-5 SCL File Export tab in the SCL tool

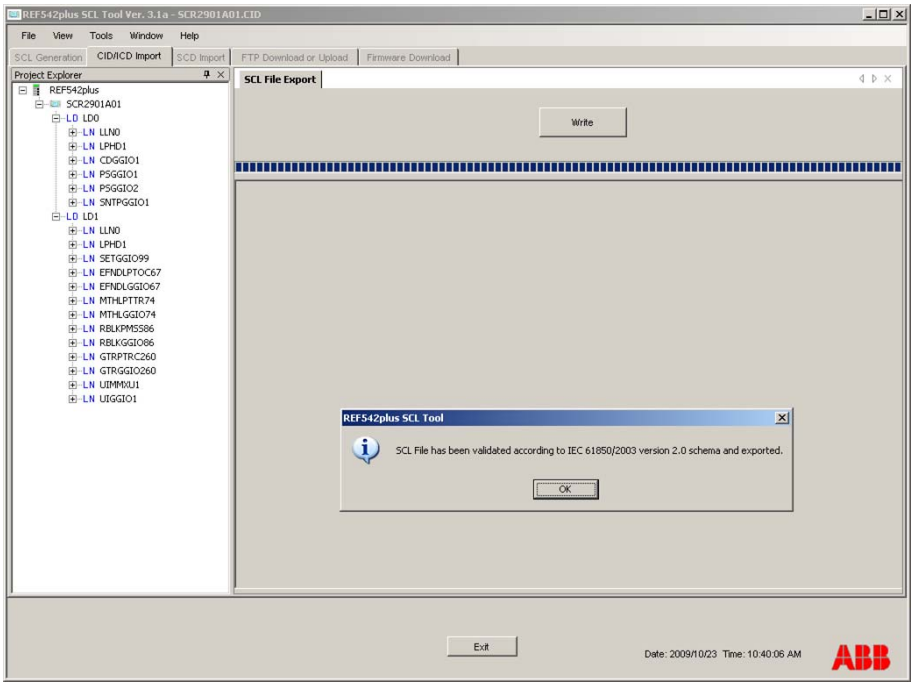
- Click **Write** to open the folder selection and file definition window.



A100290

Fig. 3.4.2.-6 SCL (Export) File Name save dialog in SCL Tool

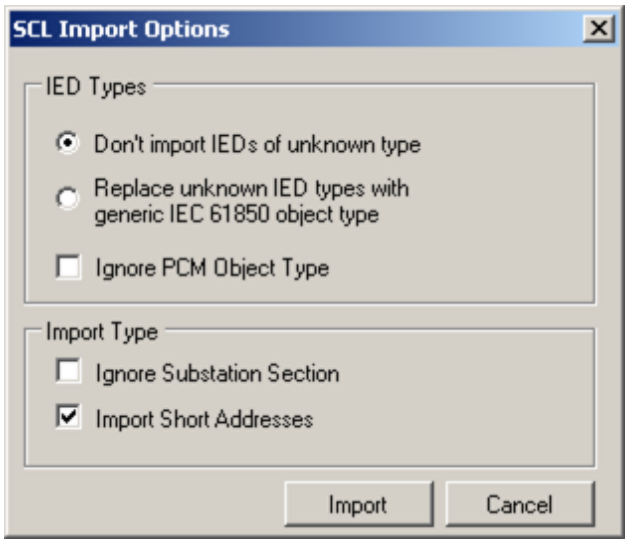
- Click **Save** to start generation of the ICD/CID file. When completed, a dialog window appears, informing that the SCL file is exported and validated against the SCL schema.



A100292

Fig. 3.4.2.-7 SCL File Export progress bar in SCL Tool

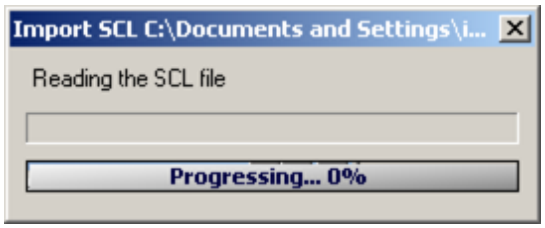
- Click **OK**. The opening dialog window has five options. Selecting "Don't import IEDs of unknown types" lets PCM600 ignore the file types, whereas "Replace unknown IED types with generic IEC 61850 object type" lets PCM600 display them as generic IEC 61850 IEDs in the tree structure. Selecting "Ignore Substation section" lets PCM600 ignore the section while updating the tree structure, whereas "Import Short Addresses" lets PCM600 import the short addresses in the file that is being imported. More information can be found in the corresponding PCM600 Tool manual.



A100294

Fig. 3.4.2.-8 SCL File Import option dialog in PCM600

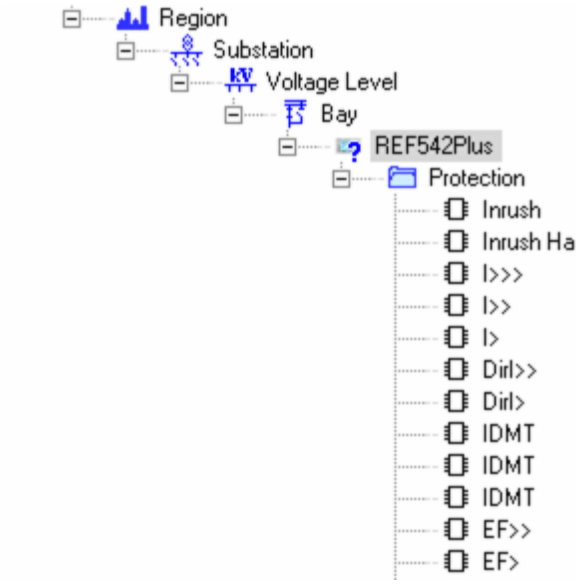
- Select any of the options and click **Import**.



A100296

Fig. 3.4.2.-9 SCL File Import progress in PCM600

The protection functions are imported to PCM600. PST can be used for reading and writing the parameters of the protection functions.

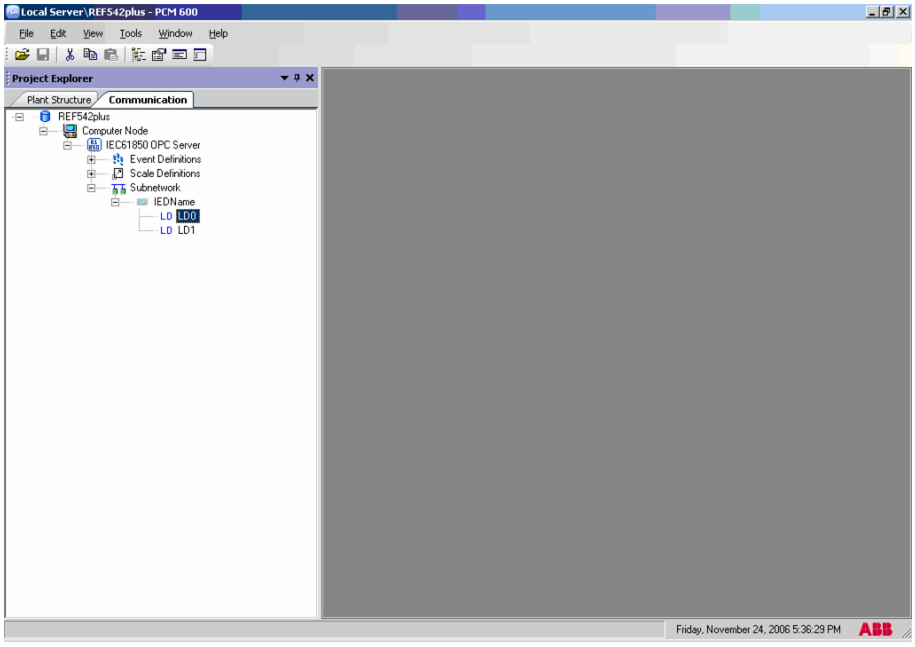


100298

Fig. 3.4.2.-10 Imported protection functions in PCM600

3.4.3. Viewing logical devices in the communication structure

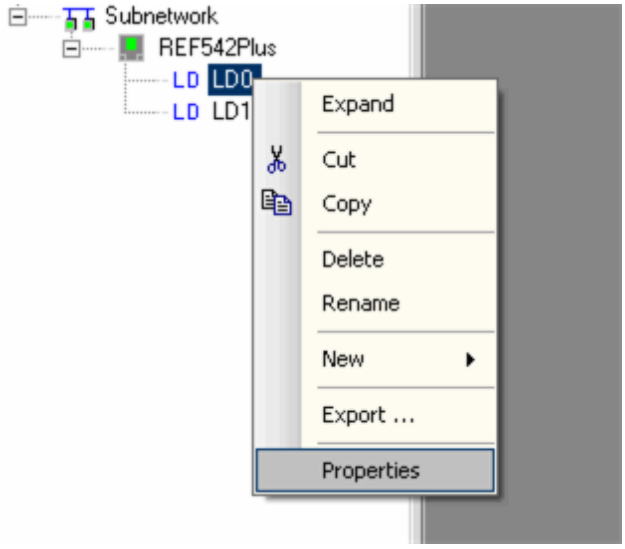
- Click the Communication tab in Project Explorer. Logical Device nodes are created under REF 542plus in the Communication tab.



A100300

Fig. 3.4.3.-1 Communication structure with the imported logical devices

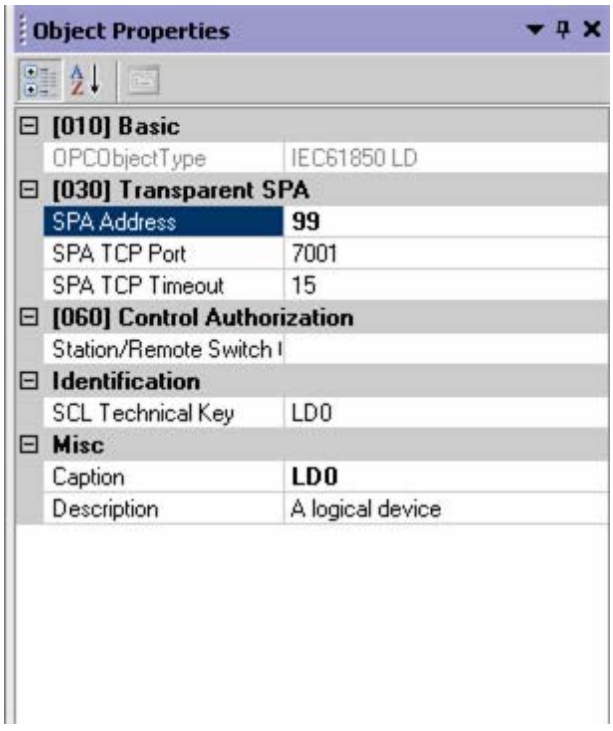
- Right-click "LD0" or "LD1" for the shortcut menu.



A100302

Fig. 3.4.3.-2 Logical device shortcut menu

- Click **Properties** to see the object properties. The SPA address is 99.



A100304

Fig. 3.4.3.-3 Logical device properties

3.5. SCL File import and export

SCL files' Import and Export functions are used to import the SCL files to PCM600 or export REF 542plus object type attributes and properties to the SCL file.

3.5.1. Importing SCL files

Available SCL file can be imported directly to PCM600. The SCL configuration wizard helps create and import the SCL file to PCM600.

If the SCL file has already been created, the SCL file import can be used to create the protection function in the REF 542plus object in PCM600.

- Right-click the REF 542plus object type in Project Explorer and select **Import**.

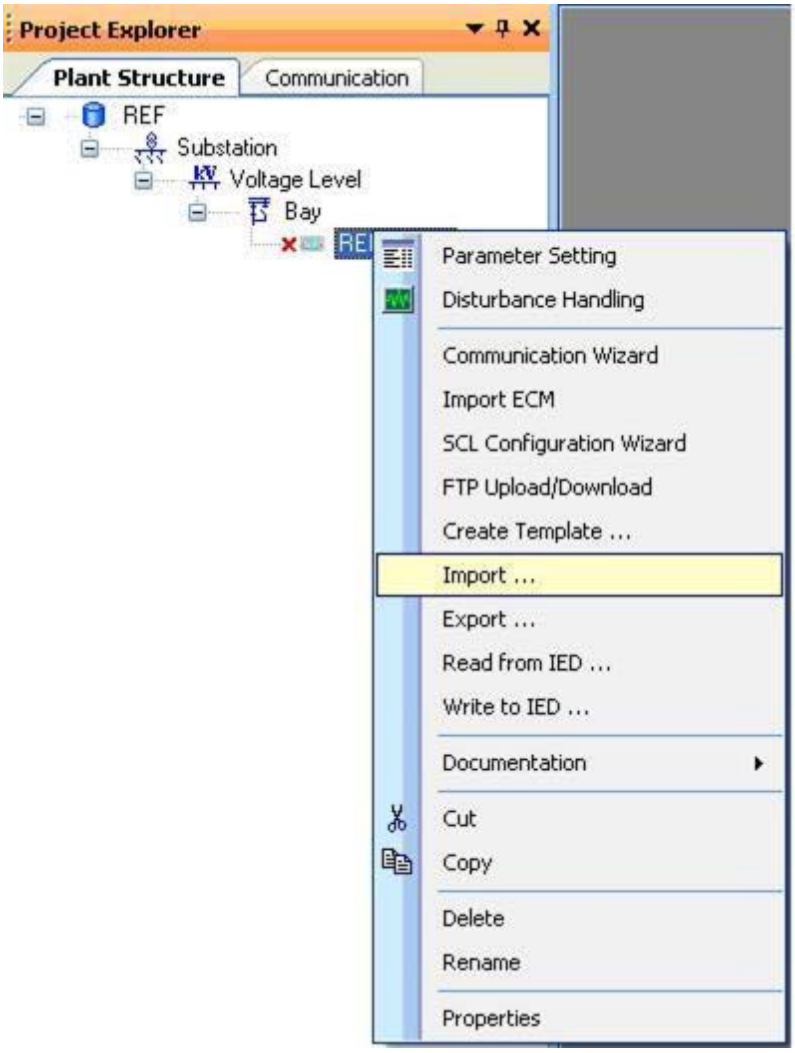
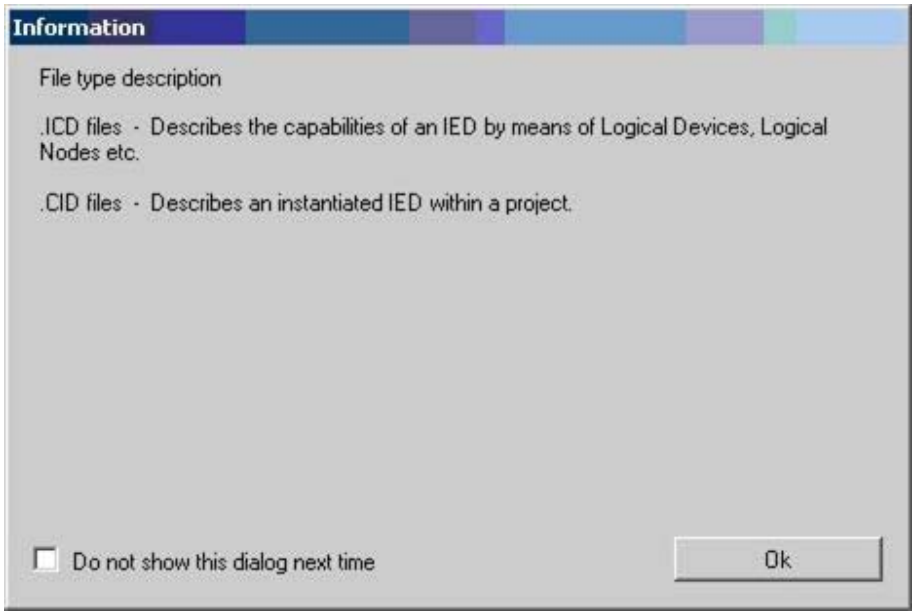


Fig. 3.5.1.-1 REF 542plus shortcut menu

A dialog window explaining the details of the SCL file type is shown.

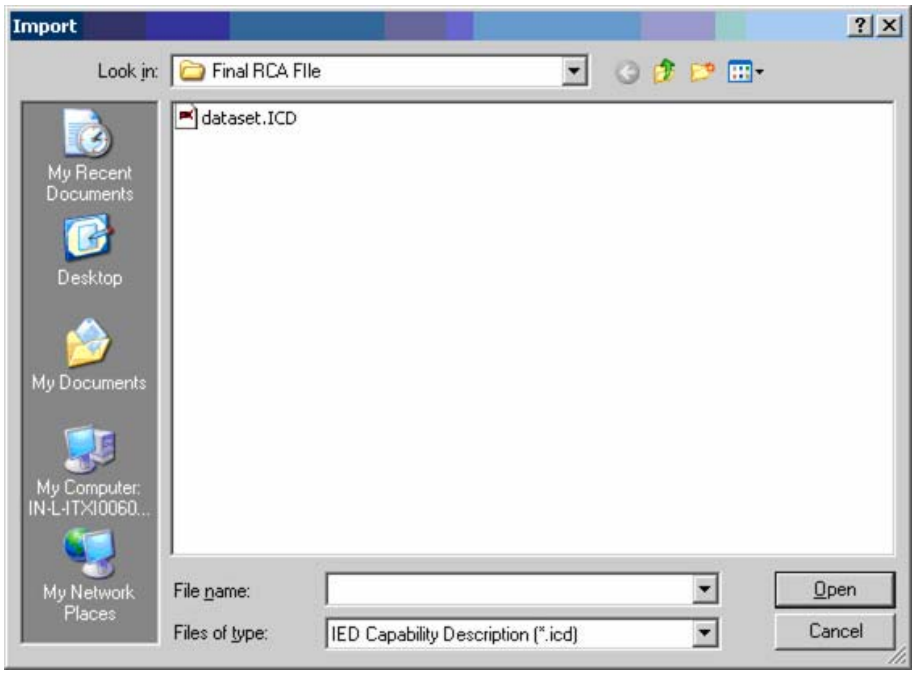


A100308

Fig. 3.5.1.-2 File type information dialog in the SCL file import

- Click **OK** to continue. The "Do not show this dialog next time" option can be selected.

  A dialog opens for selecting the SCL file.



A100310

Fig. 3.5.1.-3 Import dialog

- Select *.icd, *.cid or any other supported file type from this dialog box.

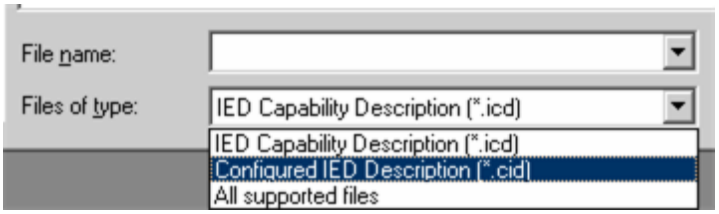


Fig. 3.5.1.-4 Possible import file types

- After selecting the file, click **Open** to import the file contents to PCM600.

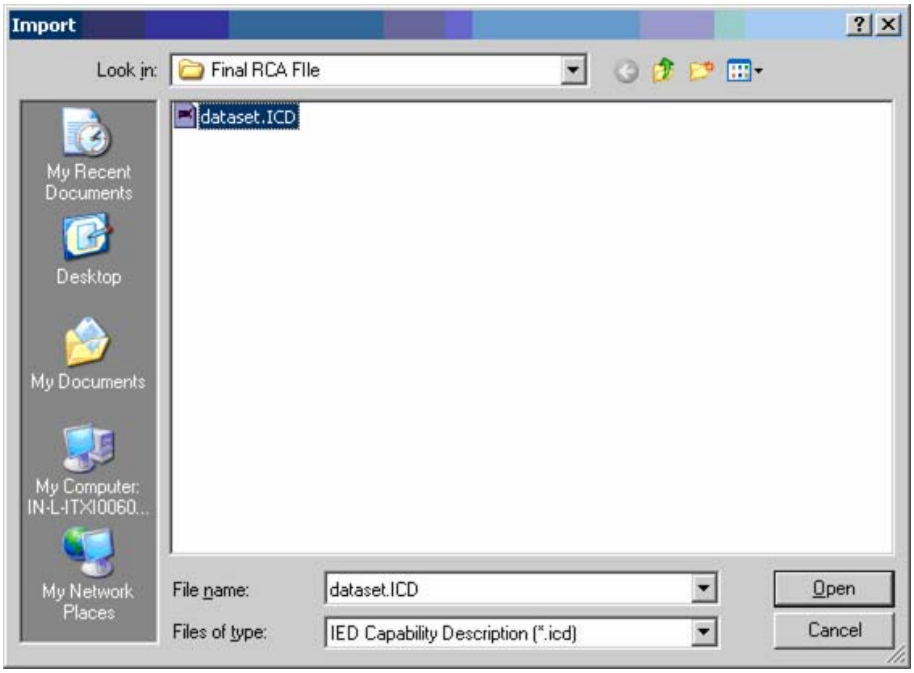
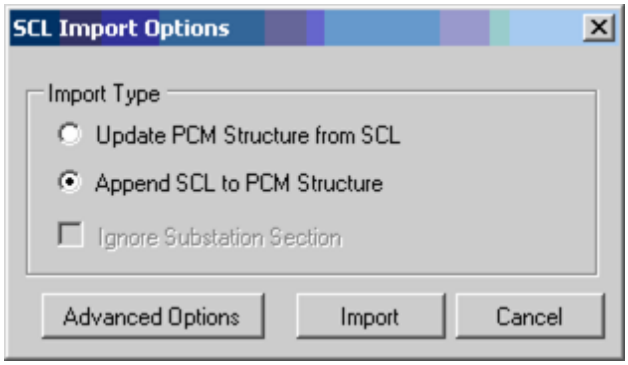


Fig. 3.5.1.-5 Import file dialog with File name

PCM600 displays a dialog window with two options. The Update option only updates the existing functions with the SCL file contents. The Append option appends the new protection into the REF 542plus object type.

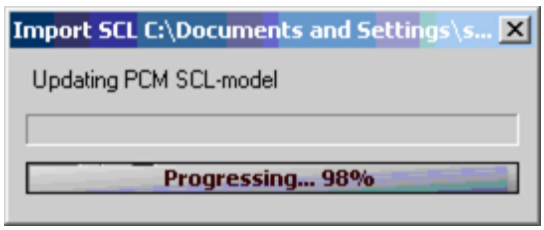


A100316

Fig. 3.5.1.-6 SCL file import options in PCM600

- Click **Import**.

  The SCL file contents are imported and displayed as a tree structure in the REF 542plus object type according to the selection. The importing progress is displayed in a dialog window.

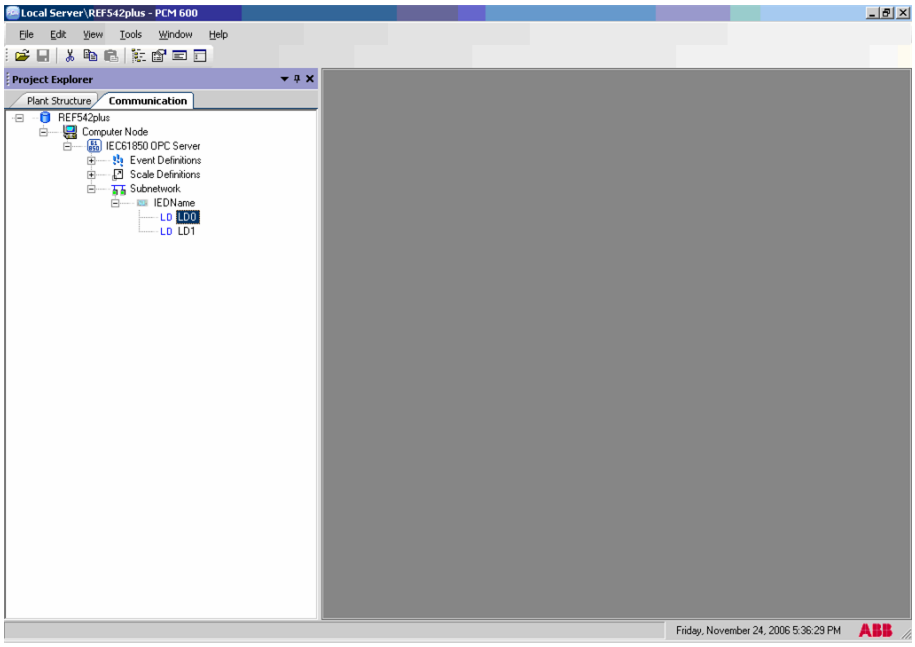


A100318

Fig. 3.5.1.-7 SCL file import progress

3.5.1.1. Viewing logical devices in the communication structure

- Click the Communication tab in Project Explorer. Logical Device nodes are created under REF 542plus in the Communication tree structure.



A100300

Fig. 3.5.1.1.-1 Communication structure with the logical devices

- Right-click "LD0" or "LD1" for the shortcut menu.

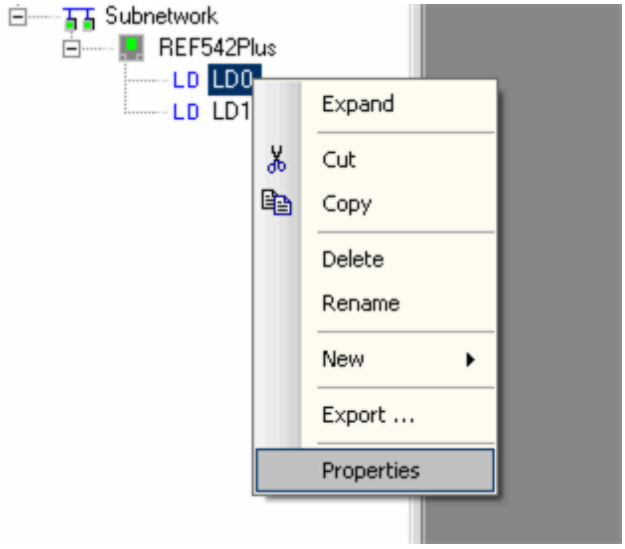


Fig. 3.5.1.1.-2 Logical device shortcut menu

- Click **Properties** to see the object properties. Type SPA address value "99" if it is not already given.

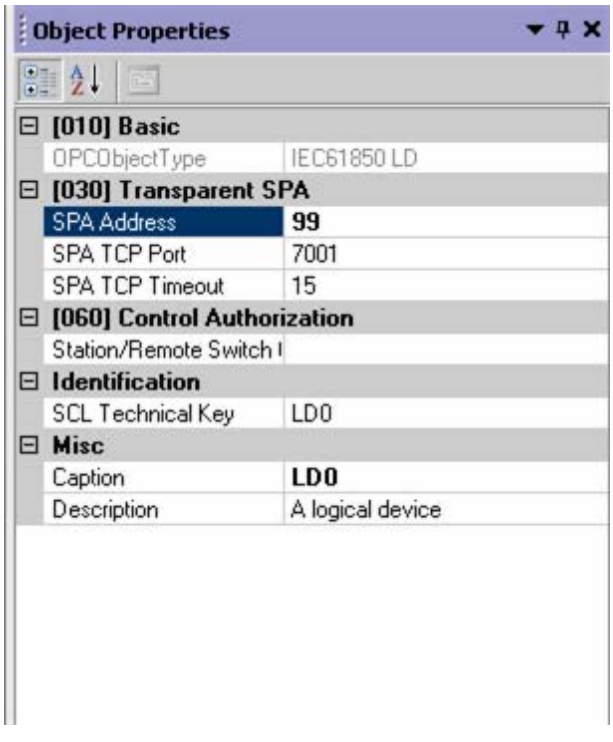


Fig. 3.5.1.1.-3 Logical device properties

3.5.2. Exporting REF 542plus attributes to SCL files

SCL File export is used to export the REF 542plus object type attributes and properties to the SCL file.

- Right-click REF 542plus object type in the Project Explorer field and select **Export**.

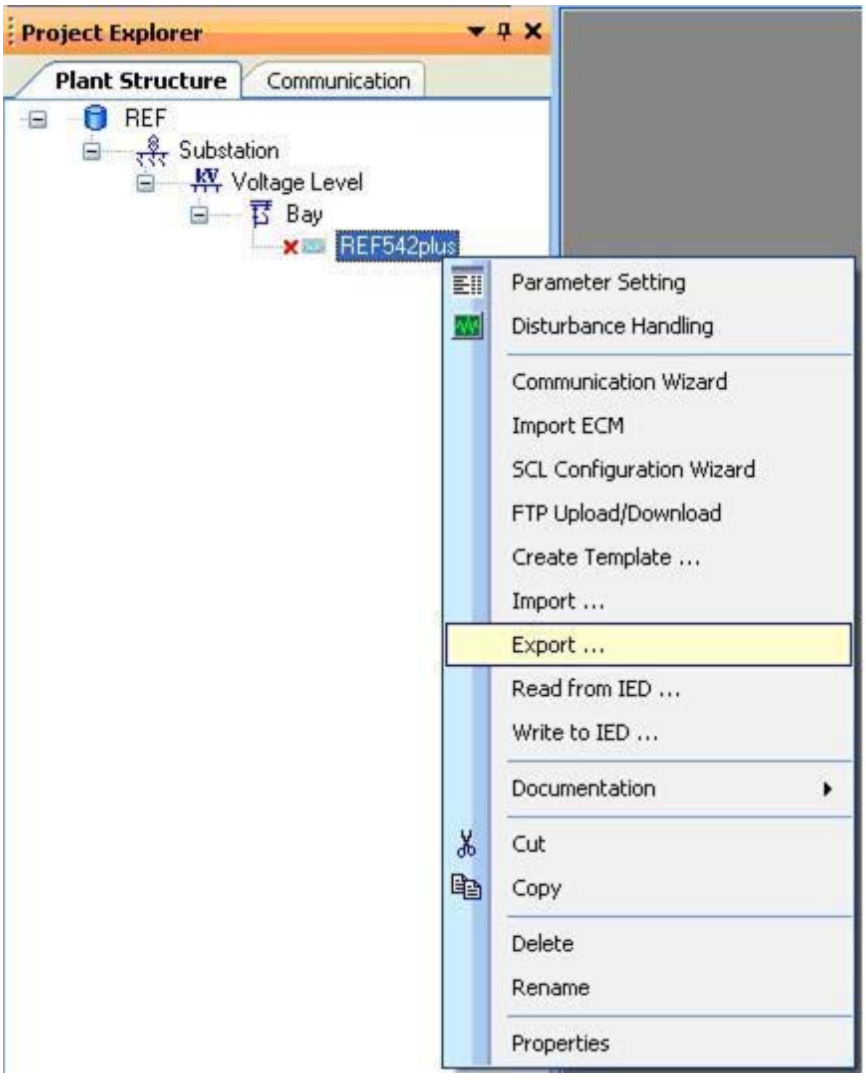
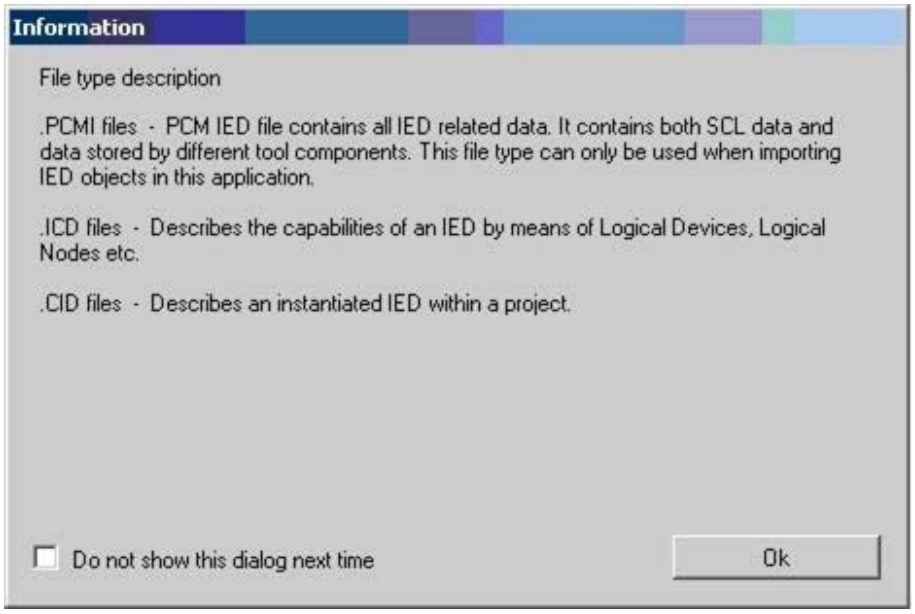


Fig. 3.5.2.-1 REF 542plus shortcut menu

A dialog window appears that explains the file types of the formats in which the PCM600 structure can be exported.

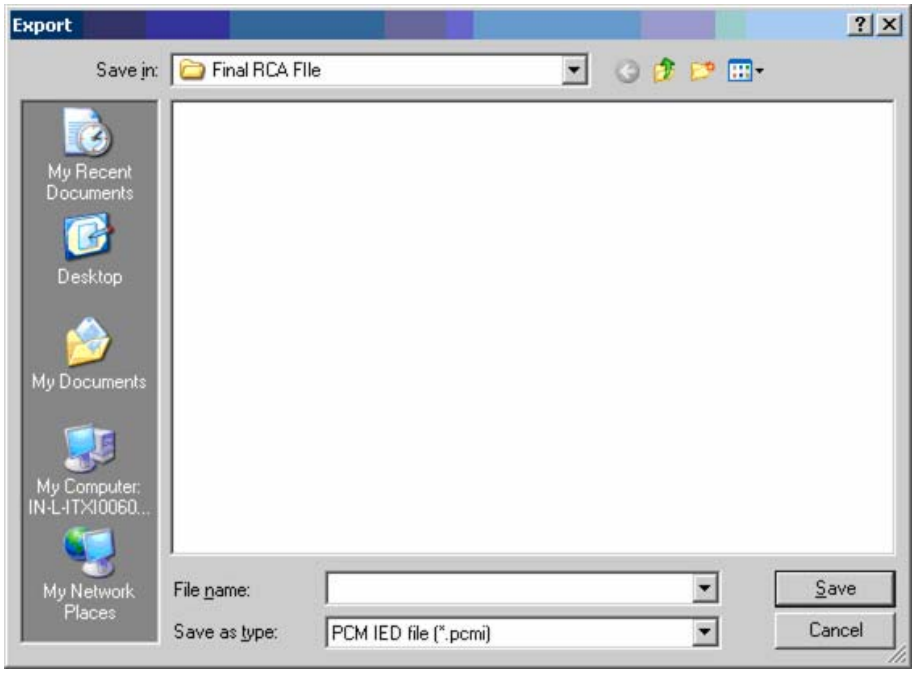


A100328

Fig. 3.5.2.-2 File type description in the SCL file type export

- Click **OK**. Also the "Do not show this dialog next time" option can be selected.

  The export dialog window opens.



A100330

Fig. 3.5.2.-3 Export dialog in the SCL file export

Any of the file types, *.pcm, *.icd or *.cid, can be selected.

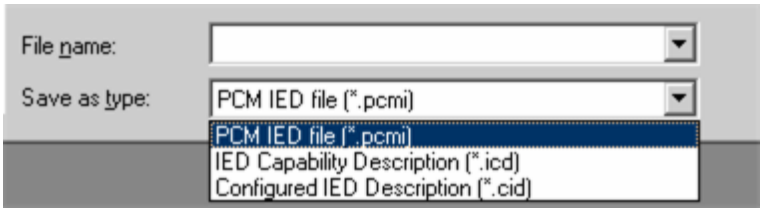


Fig. 3.5.2.-4 Possible export file types

- Enter the file name in the "File name" text box.
- Click **Save** to save the file.

  The object contents are exported to the file.

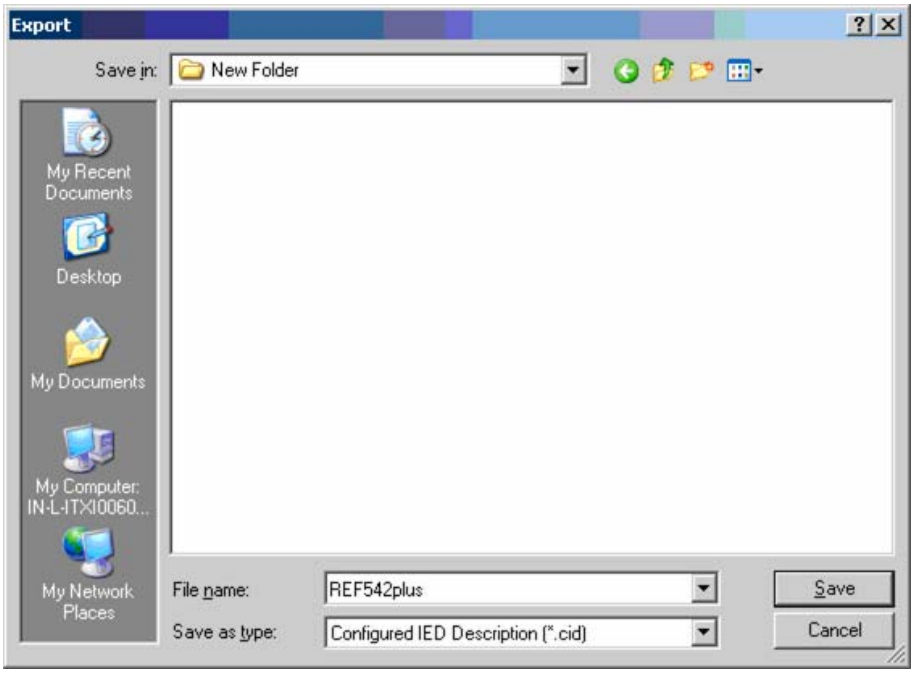
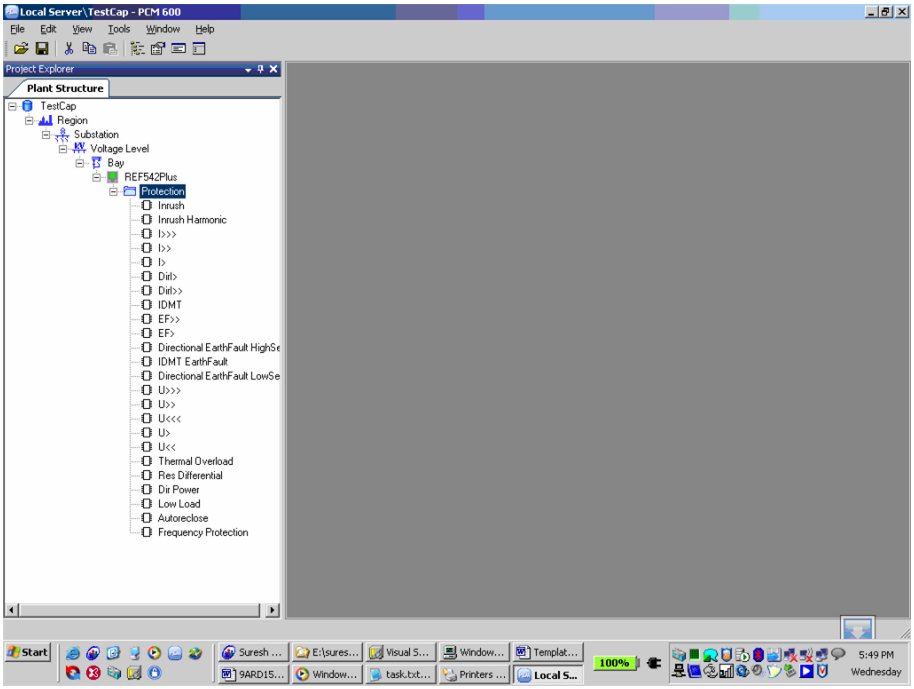


Fig. 3.5.2.-5 Export dialog with file name

3.6. Parameter Setting Connectivity Package

Parameter Setting Connectivity Package can be used for reading parameters from the IED and writing parameters to the IED.

Once the SCL file is imported, the available protection functions are listed in PCM600. PST can then be used for reading and writing the parameters of the protection functions.



A100336

Fig. 3.6.-1 Tree structure with protections functions

3.6.1. Opening Parameter Setting Tool

- Right-click the REF 542plus object type in Project Explorer and select **Parameter Setting**.

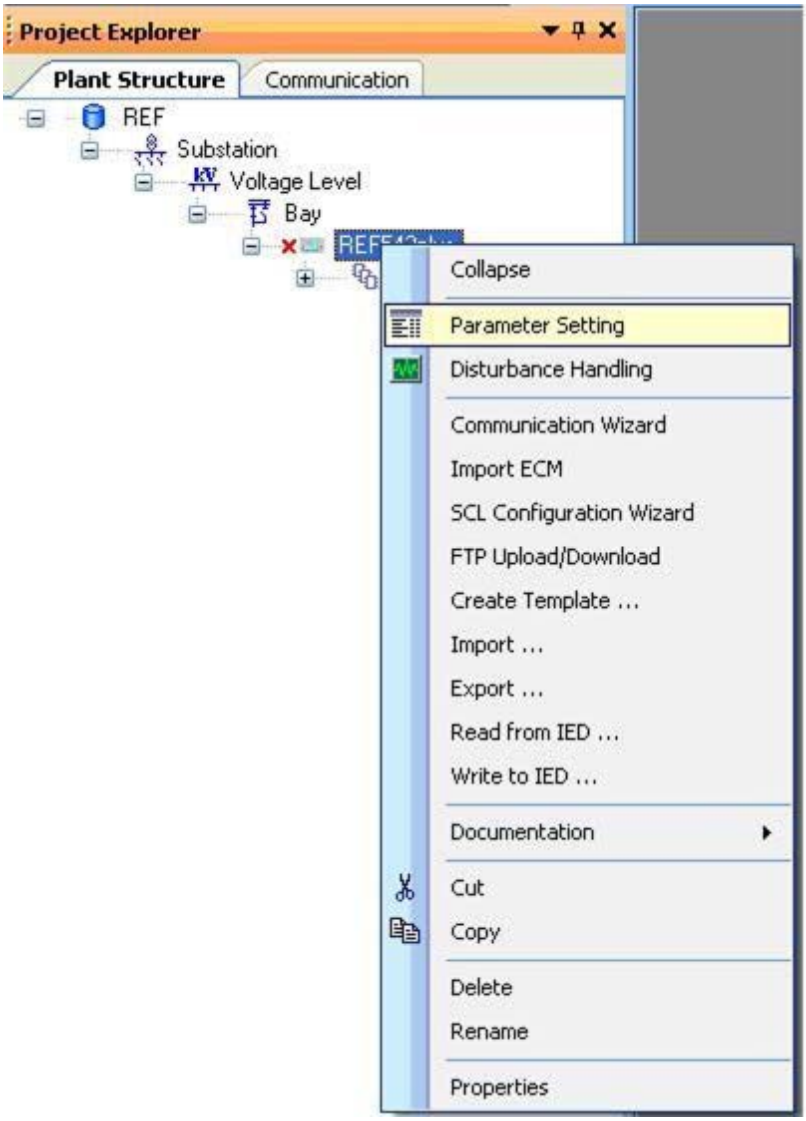


Fig. 3.6.1.-1 REF 542plus shortcut menu

Parameter Setting Tool opens.

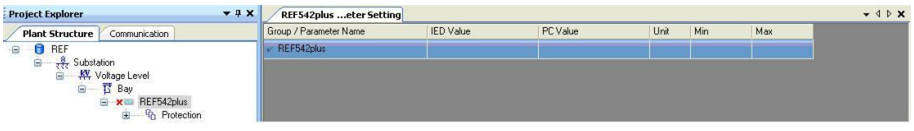
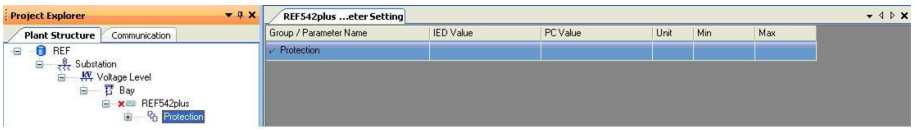


Fig. 3.6.1.-2 Parameter Setting Tool

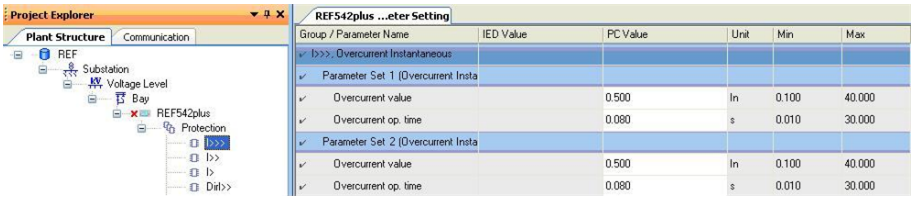
- Expand the Protection node in Project Explorer to view the available protection functions.



A100342

Fig. 3.6.1.-3 Parameter Setting Tool

- Select any of the protection functions, for example Overcurrent Instantaneous I>>>, in Project Explorer. The parameters for that function are automatically shown.



A100344

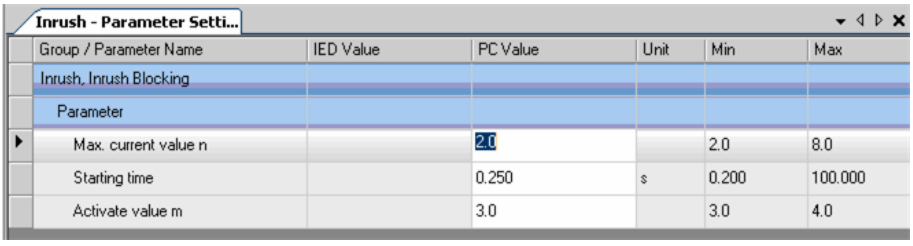
Fig. 3.6.1.-4 Inrush Blocking Parameters – Parameter Setting Tool

- Navigate through all other protection functions. The parameters for the functions are automatically shown.

3.6.2. Reading parameters from IED

Irush blocking is here taken as an example to explain the reading of a parameter from IED.

- Change the parameter in PC Value.



A100346

Fig. 3.6.2.-1 Selected Max current value in the Inrush blocking parameters

- Select **Read parameters from IED** on the **IED** menu.

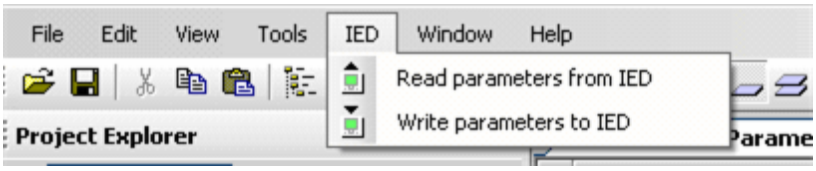


Fig. 3.6.2.-2 Submenus of the IED main menu

The Read parameters dialog window appears

- Choose the required options under "Parameter range" and select "Parameter options."

  If all the parameters of a protection function (Inrush Blocking) are to be read, Inrush, Inrush Blocking can be selected. Otherwise, only the parameter name which is to be read from the IED can be selected.

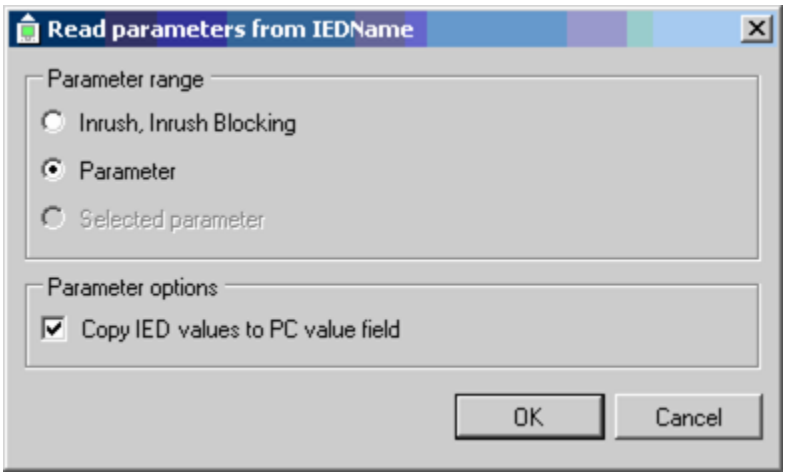


Fig. 3.6.2.-3 Dialog window for Read parameters

- Click **OK**.
- Wait until the communication has finished, that is, the progress bar has disappeared.
- Check that the PC and IED values have been modified in the Parameter View window.

3.6.3. Writing parameters to IED

- In Inrush Blocking, change the parameter value in the PC Value field.
- Click **Write parameters to IED** on the **IED** menu.

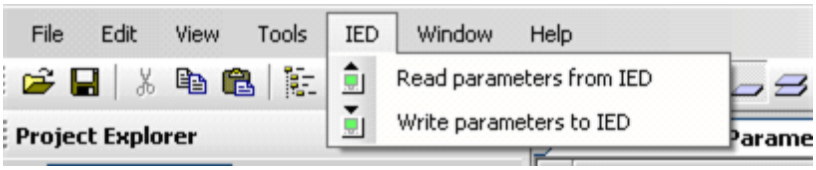


Fig. 3.6.3.-1 IED menu

Write parameters to REF 542plus dialog window opens.

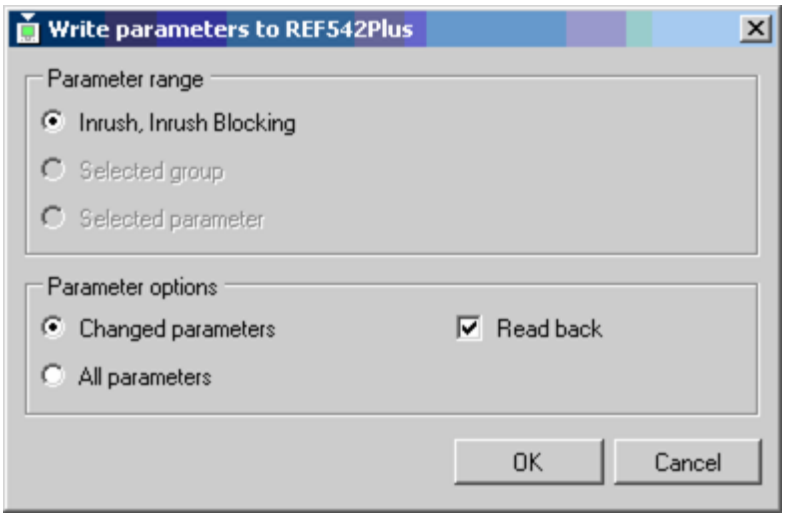


Fig. 3.6.3.-2 Write parameters window dialog

- Select the required options under "Parameter range" and "Parameters options."
- Click **OK**.
- Wait until the communication has finished, that is, the progress bar has disappeared.
- Check that the changed PC Values and IED parameter values are identical.

3.6.4. Closing Parameter Setting Tool

- Close Parameter Setting Tool by clicking the **Close** button.

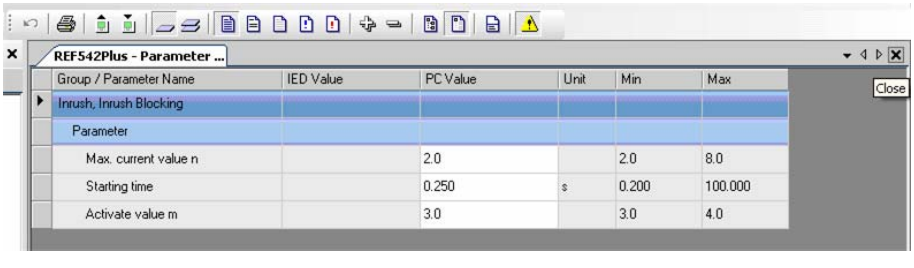
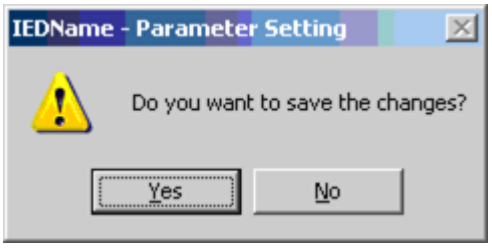


Fig. 3.6.4.-1 PST – close button

If a value has been changed, a dialog window is shown.



A100358

Fig. 3.6.4.-2 PST – saving dialog

- Click **Yes** to save the changes. Otherwise, click **No**.

3.7. Importing ECM

ECM import is used to set the FTP user name as "abb." The service password is set from the imported ECM file.

- Right-click the REF542plus node and select **Import ECM**.

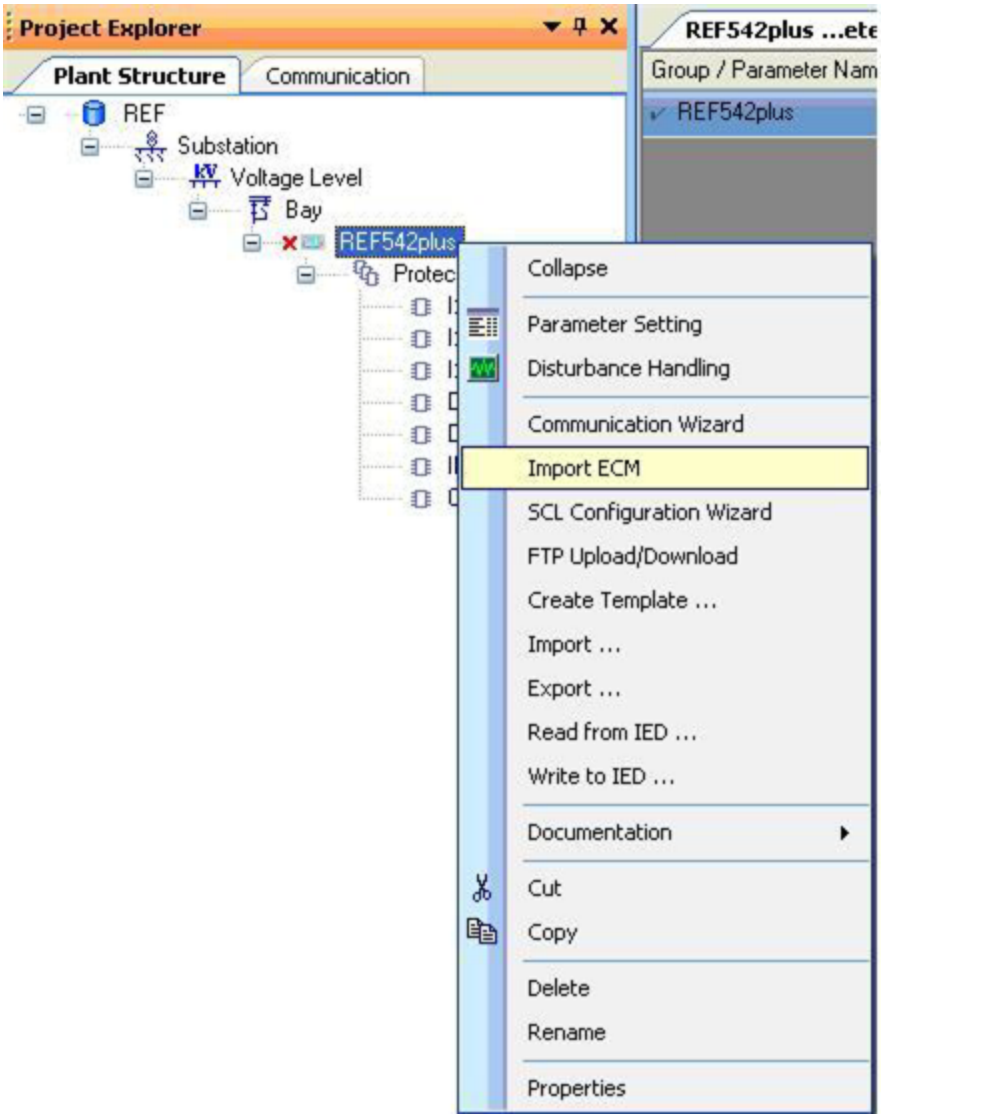


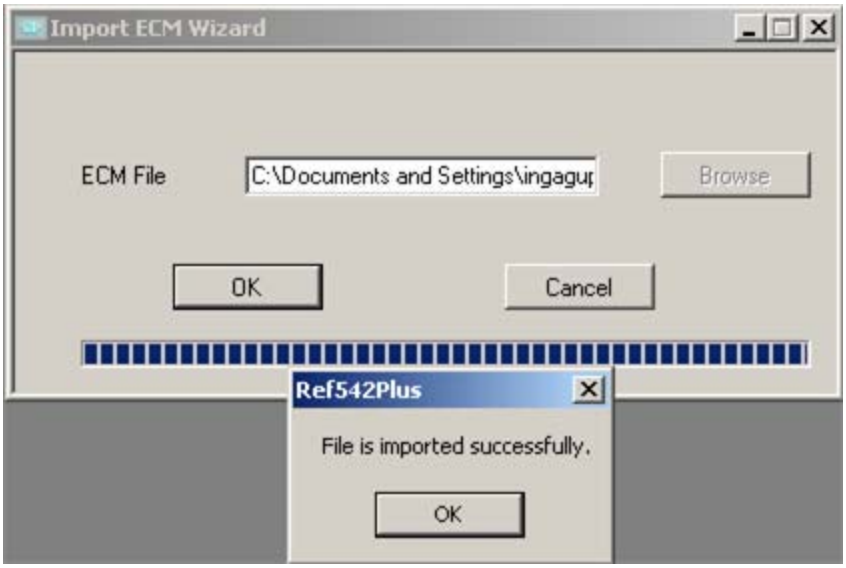
Fig. 3.7.-1 ECM import

The ECM import dialog for selecting the ECM file appears.

A100362

Fig. 3.7.-2 ECM import dialog

- Select the ECM file and click **OK** to be able to set the user name and password.



A100364

Fig. 3.7.-3 ECM file imported

3.8. Disturbance Handling Connectivity Package

Disturbance Handling Connectivity Package is used to read the disturbance record information from REF 542plus. It is also used to display the disturbance record details in GridView and the graph.

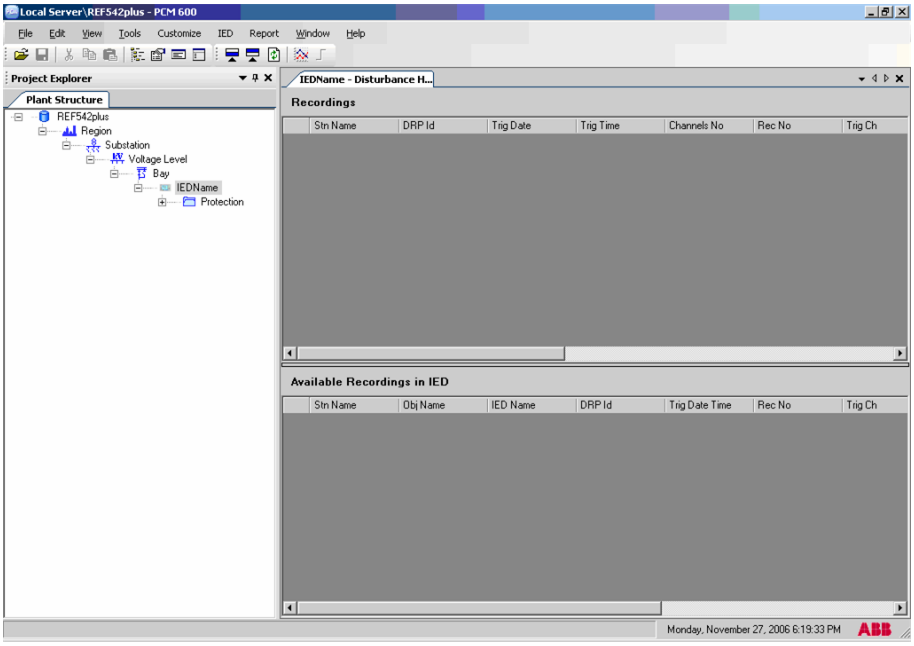
3.8.1. Opening Disturbance Handling Tool

- Right-click an object type in Project Explorer and select **Disturbance Handling**.

A100366

Fig. 3.8.1.-1 REF 542plus shortcut menu with Disturbance Handling

Disturbance Handling Tool opens. The DR tool has two sections: "Available Recordings in IED" shows the available recordings of the IED. The "Recordings" section shows the detailed information of a record.

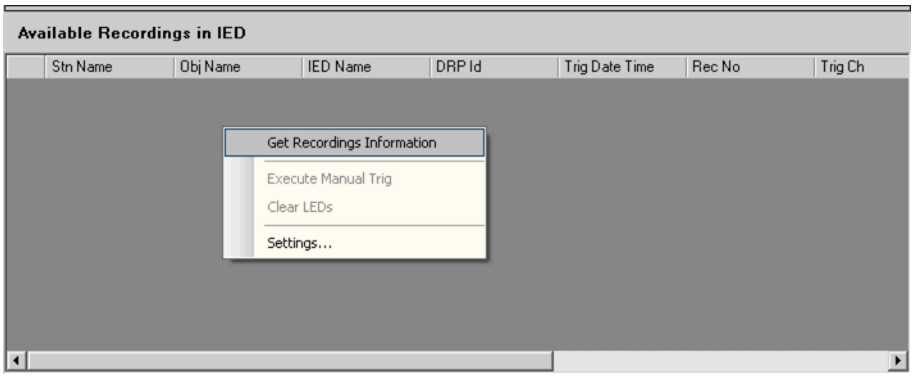


A100368

Fig. 3.8.1.-2 Disturbance Handling Tool

3.8.2. Getting recordings information

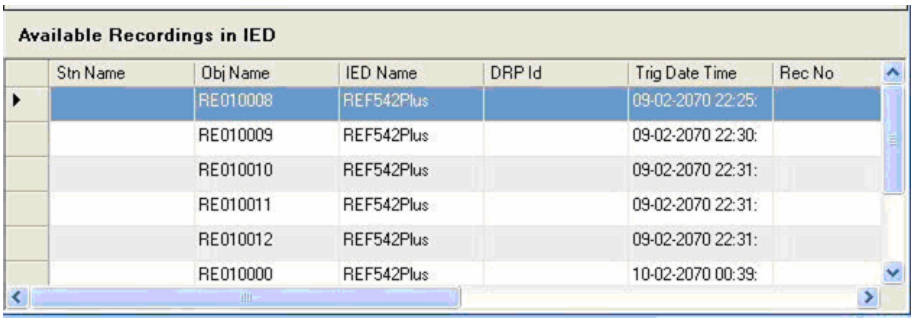
- Right-click the view area of "Available Recordings in IED" and select **Get Recordings Information**.



A100370

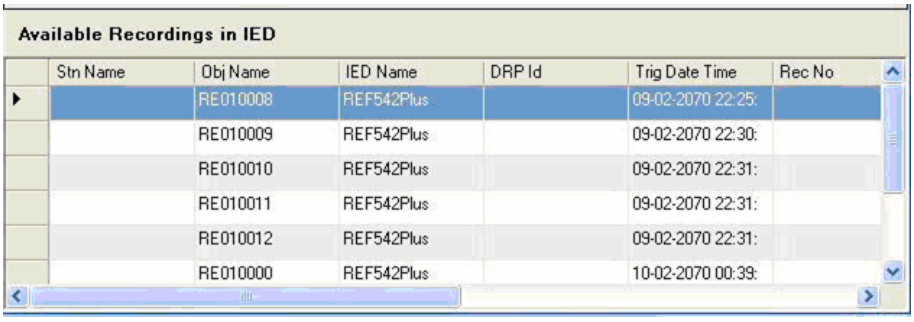
Fig. 3.8.2.-1 Shortcut menu of the "Available Recordings in IED" section

A list of the available recordings appears in the view, including the new, manually trigged recording.



A100372

Fig. 3.8.2.-2 Available DR records in IED



A100374

Fig. 3.8.2.-3 Available DR records in IED

- Right-click somewhere in the shown recordings and click **Select All Rows**. All available recordings are selected.

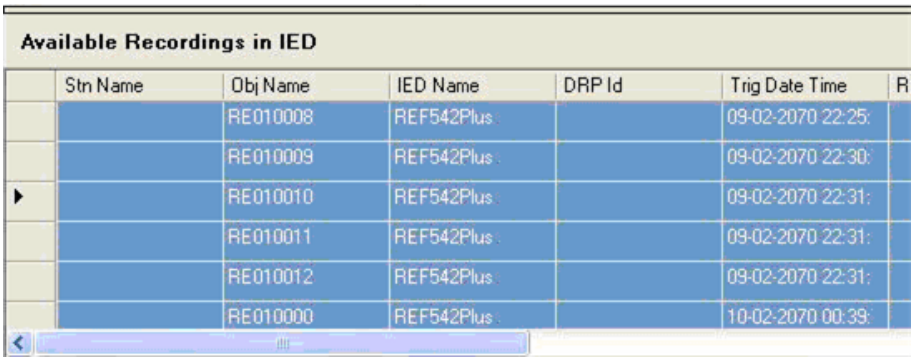


Fig. 3.8.2.-4 Available DR records in IED

3.8.3. Read record from IED

3.8.3.1. Reading selected records

- Right-click somewhere in the Available Recordings in IED section and click **Select Row**. The row is selected.
- Right-click the selected recording and select **Read Selected Recording in IED**.
- After the operation has finished, right-click the Recordings section and select **Refresh List**. Information about the selected record is displayed.

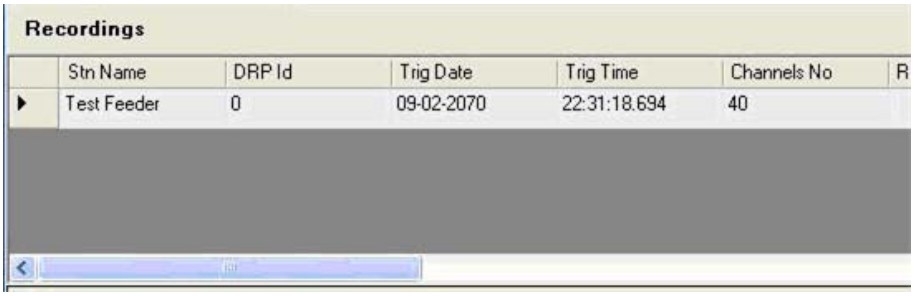


Fig. 3.8.3.1.-1 DR record details of the selected record

3.8.3.2. Reading selected recordings

- Right-click somewhere in the shows recordings in the Available Recordings in IED section.
- Select two rows.
- Right-click the selected recording and click **Read selected Recording in IED**.
- When the upload is finished, right-click the Recordings section and select **Refresh List**.

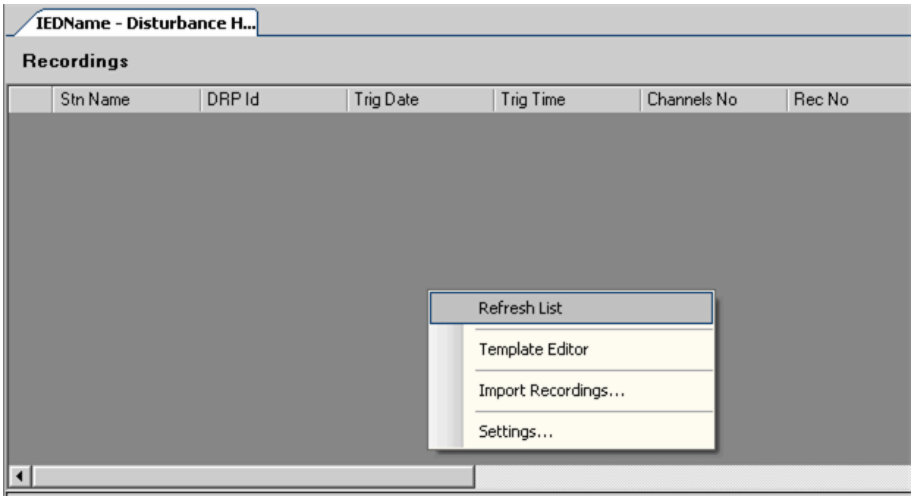


Fig. 3.8.3.2.-1 Shortcut menu in the Recordings section

Information about the uploaded recordings is shown.

3.8.3.3. Reading all records or selected recordings

- Right-click the shown recordings list in the Available Recordings in IED section.
- Select all rows.
- Right-click the selected recordings and click **Read Selected Recording in IED**.
- Click the refresh button when the uploading has been completed. Information about the two selected records is shown.

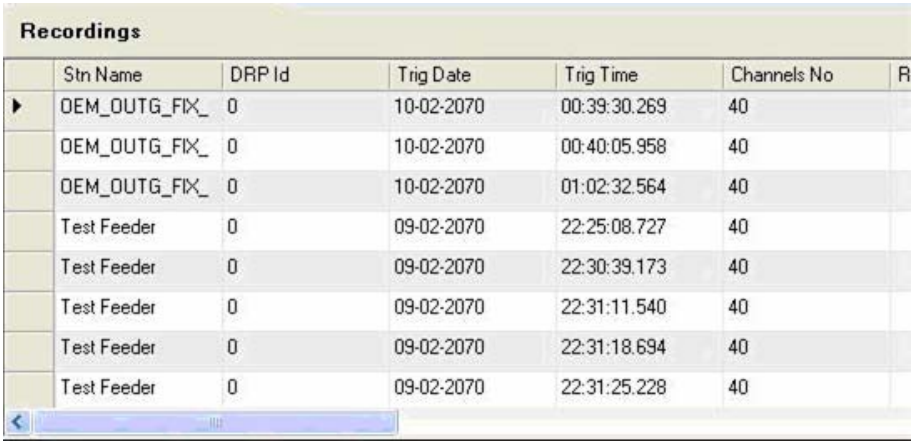


Fig. 3.8.3.3.-1 DR record details of all selected records

3.8.4. Deleting records from IED

3.8.4.1. Deleting record lists from IED

- Right-click somewhere in the shown recordings in the Available Recordings in IED and select **Clear List**. The records are cleared from the view.

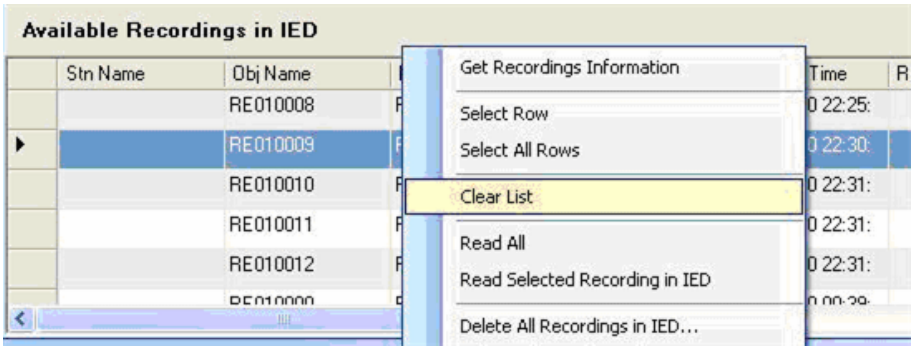


Fig. 3.8.4.1.-1 DR – Clear List

3.8.4.2. Deleting selected recordings from IED

- Click **Select Row**.
- Right-click somewhere in the shown recordings in the Available Recordings in IED section.
- Right-click any of the selected recordings and select **Delete Selected Recordings in IED**. The record is cleared from the view.

3.8.4.3. Deleting all recordings from IED

- Right-click the shown recordings in the Available Recordings in IED section and click **Select All Rows**.
- Right-click the selected recordings and click **Delete All Recordings in IED...**. The recordings are cleared from the view.

3.8.5. Viewing DR graphs

- Right-click any row on the Recordings section in the DR tool.
- Click the **Create Report** button on the toolbar.

Fig. 3.8.5.-1 Create Report button on the toolbar

A dialog window appears.

- Select the xml file and click **View Report** to see the DR graph.

3.8.6. Closing DR tool

- Click the **Close** button of the DR tool to close the tool.

A100388

Fig. 3.8.6.-1 DR Tool closing button

The window closes. There is no error or warning message in the output window.

3.9. FTP upload/download

FTP upload/download is used to upload CID files to the IED and download the files from the IED.

3.9.1. Opening FTP Upload or Download tab in SCL Tool

- Right-click the REF 542plus object type and select **FTP Upload/Download**.

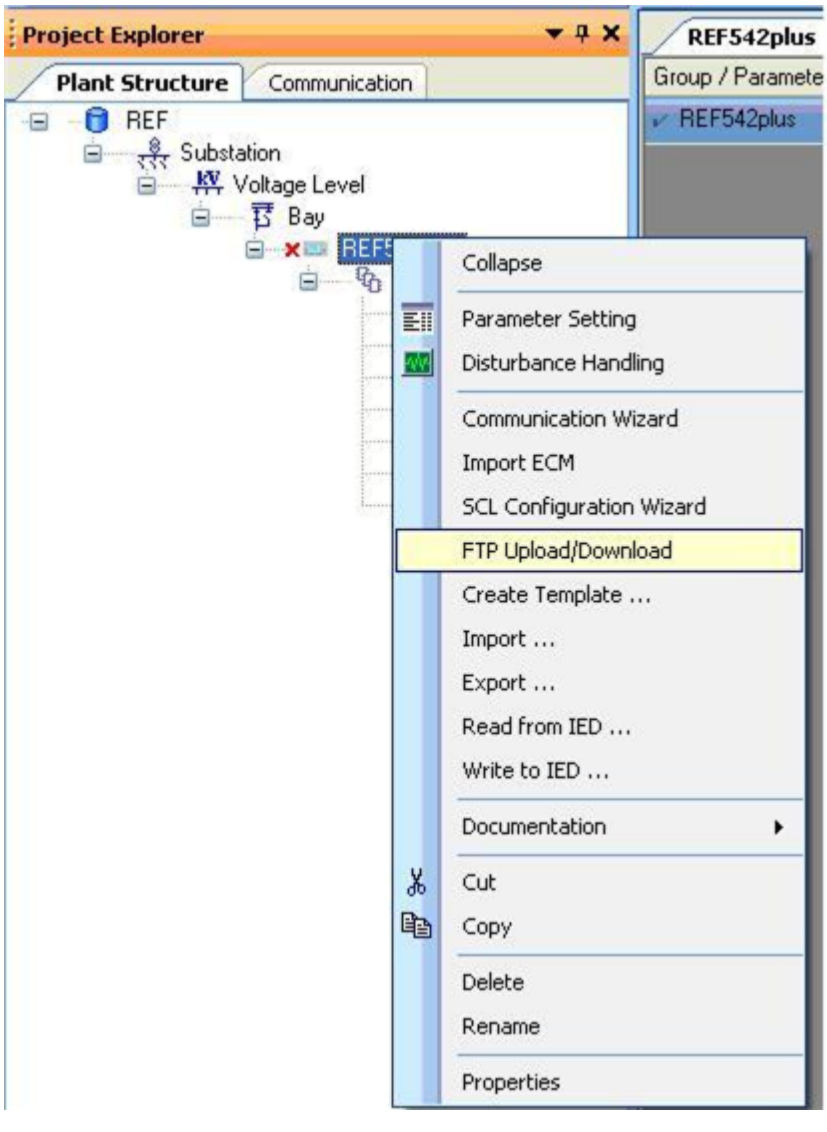
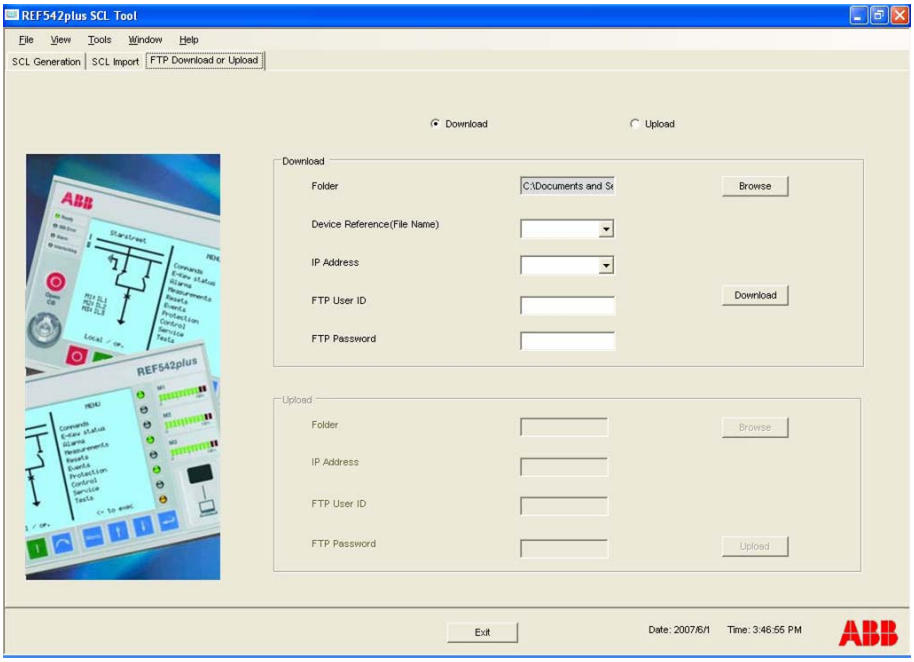


Fig. 3.9.1.-1 REF 542plus shortcut menu – FTP Upload/Download

SCL Tool opens with the FTP Upload or Download tab shown. The other tabs of the tool are unavailable.

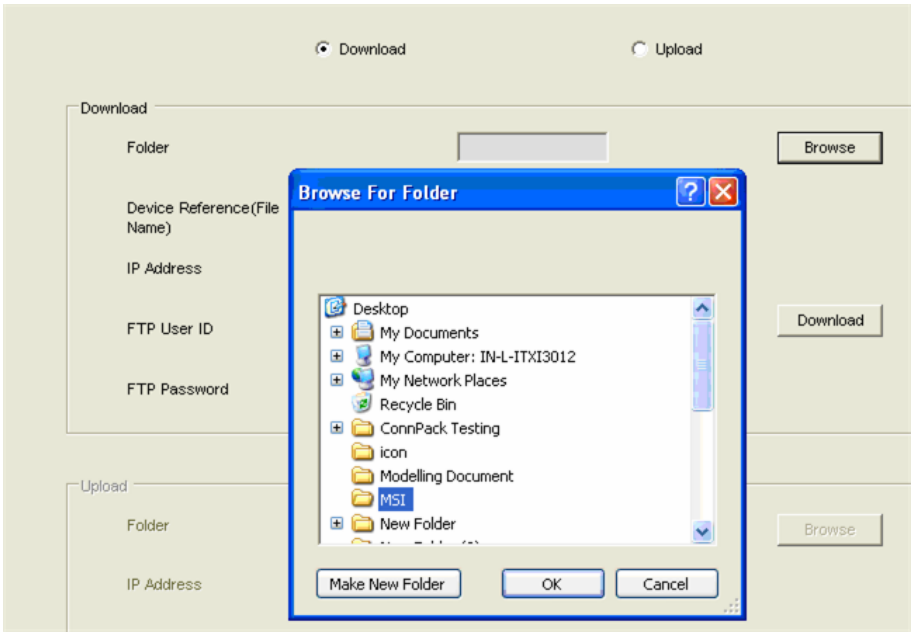


A100392

Fig. 3.9.1.-2 FTP Download or Upload tab in SCL tool

3.9.2. Downloading with FTP

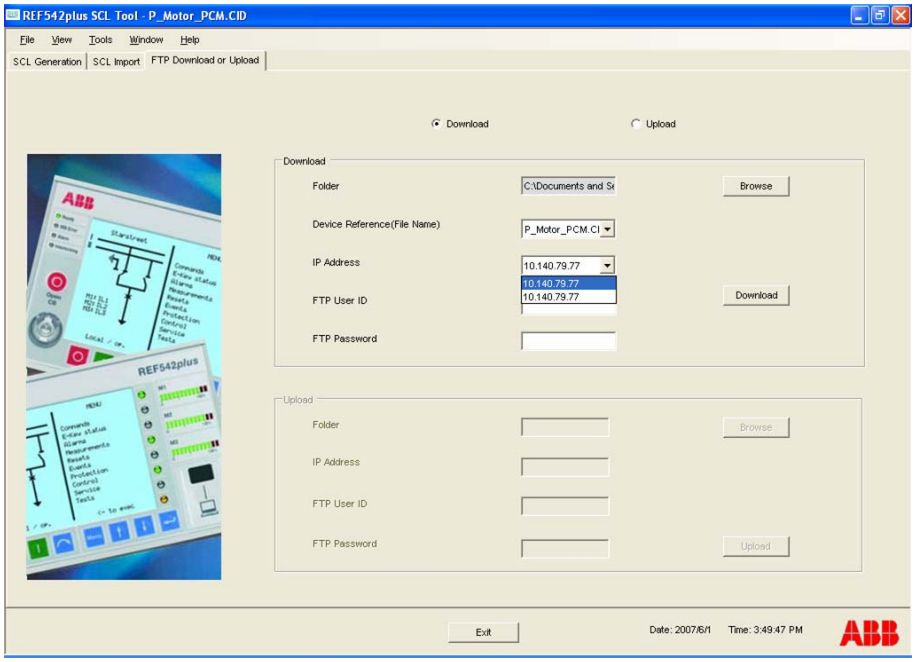
- Ensure the **Download** option is selected.
- Select the SCL folder where the REF 542plus SCL Tool generated CID files are to be stored by clicking **Browse**.



A100394

Fig. 3.9.2.-1 Dialog for browsing for folder

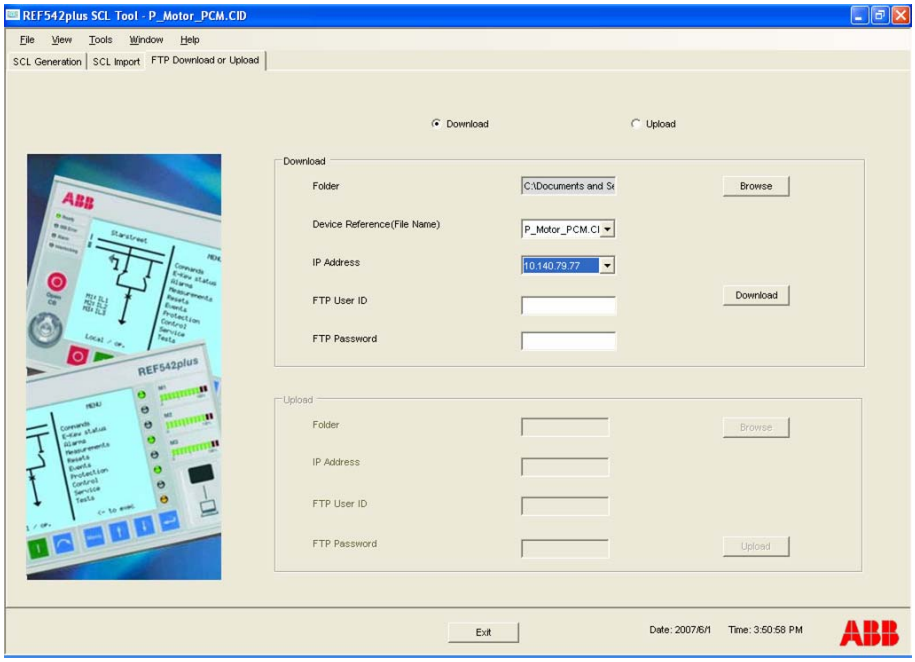
After selecting the required CID file, the IP addresses 1 and 2 appear automatically in the IP address drop-down box.



A100396

Fig. 3.9.2.-2 FTP download – displaying the IP addresses

- Select an IP address, either primary or secondary.

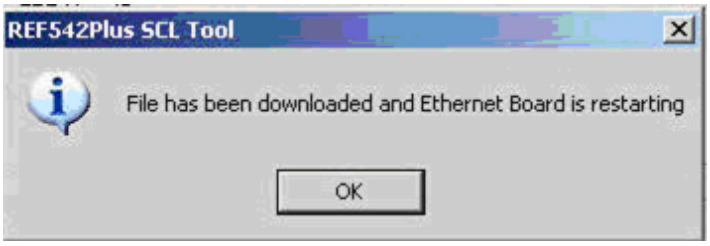


A100398

Fig. 3.9.2.-3 FTP download – displaying the IP address

- Enter user name and password ("abb" for REF 542plus EB).
- Click **Download** to initiate an FTP connectivity and start the CID file transfer from hard disk to the REF 542plus EB.

  Dialog window appears after a successful file transfer to indicate that SCL Tool is resetting the REF 542plus EB to recognize the newly loaded file.



A100400

Fig. 3.9.2.-4 Confirmation of the FTP download

3.9.3. Uploading with FTP

- Select the **Upload** option in the FTP Download or Upload tab.
- Select the destination folder for the file to be uploaded in the hard disk by clicking **Browse**.
- Enter the IP address of the REF 542plus EB.
- Enter user name and password (abb for the REF 542plus EB).

  Dialog window appears after a successful file transfer to the selected destination folder.

A100402

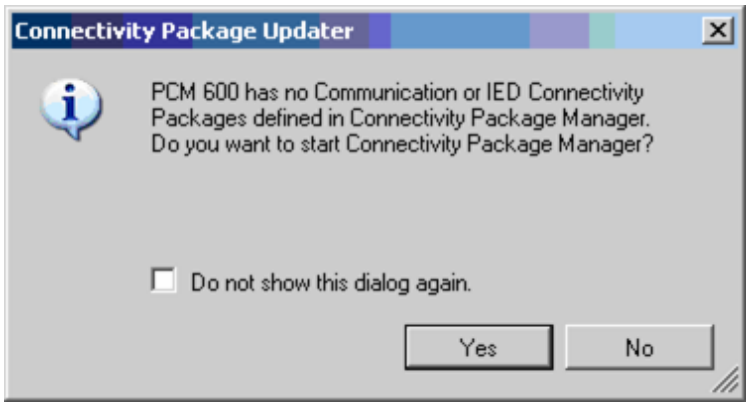
Fig. 3.9.3.-1 Confirmation of the FTP upload

3.10. REF 542plus Connectivity Package error and exception handling

3.10.1. PCM 600

PCM 600 detects the configured Communication and IED connectivity packages when PCM 600 is starting.

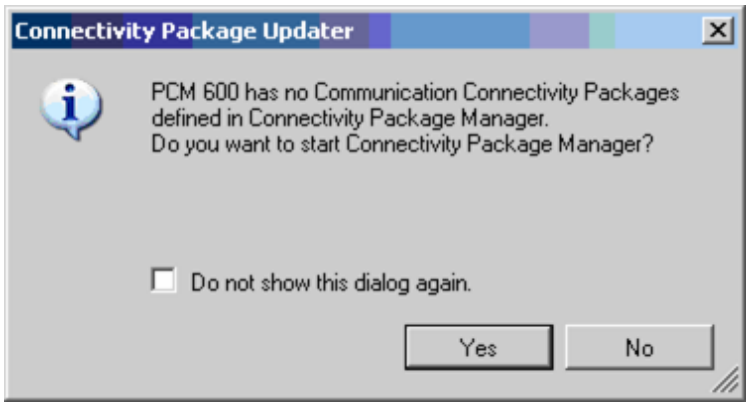
- If neither of the Communication and IED connectivity packages is available, the following notification appears.



A100404

Fig. 3.10.1.-1 Notification about unavailable communication and IED connectivity packages

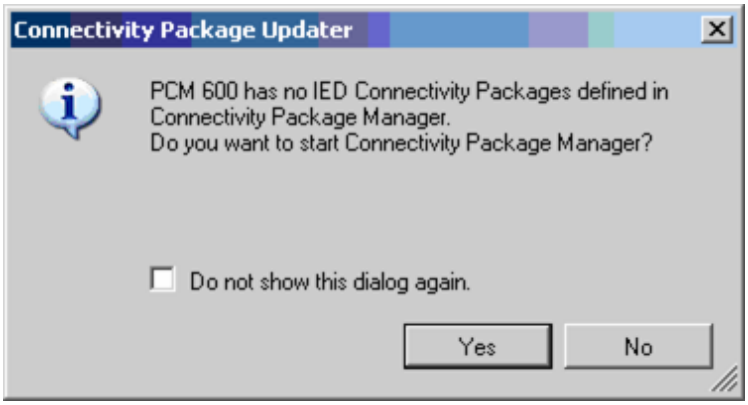
- If the Communication connectivity packages are not available or configured in Connectivity Manager, the following notification appears.



A100406

Fig. 3.10.1.-2 Notification about unavailable Communication connectivity packages

- If the IED connectivity packages are not available or configured in Connectivity Manager, the following notification appears.

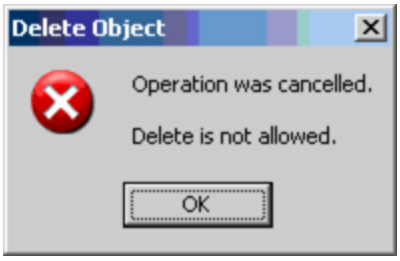


A100408

Fig. 3.10.1.-3 Notification about unavailable IED connectivity packages

3.10.2. Parameter Setting Connectivity Package

- Parameter Setting Connectivity Package does not allow the deletion of protection functions. The following error message appears if a protection function is tried to be deleted.



A100410

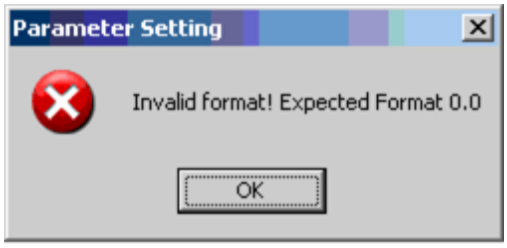
Fig. 3.10.2.-1 Deletion not allowed

- If PST does not enable connection to REF 542plus, the following error message is shown.

A100412

Fig. 3.10.2.-2 Time-out error message

- If data is entered in a wrong format, the following error message is shown.



A100414

Fig. 3.10.2.-3 Invalid data format error message

- If the entered value is not within the specified range, the following error message is shown.

A100416

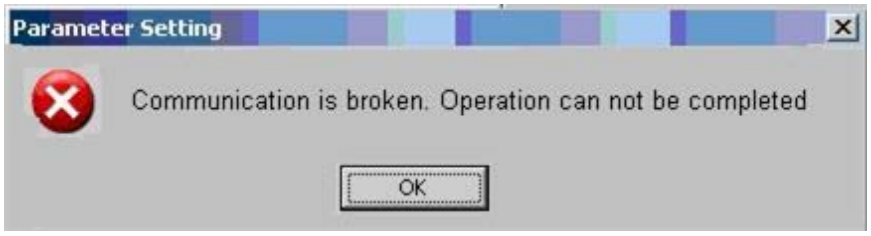
Fig. 3.10.2.-4 Value not within range error message

- If the entered IDMT curve parameter mode is not IDMT IEEE Custom, the following error message is shown.

A100418

Fig. 3.10.2.-5 IDMT curve parameter error message

- If communication is broken between reading or writing the parameter from the IED, the following error message is shown.



A100420

Fig. 3.10.2.-6 Breaking of communication error message

3.10.3. Disturbance Handling Connectivity Package

- DR tool displays the following error message when communication fails with REF 542plus.

A100422

Fig. 3.10.3.-1 Communication error in DR

- DR tool displays the following error message when communication is broken during uploading of file from the IED.

A100424

Fig. 3.10.3.-2 Broken communication error in DR

4. COM600 support

4.1. REF 542plus object type creation

After the installation of the REF 542plus Connectivity Packages, the creation of the REF 542plus object type must be enabled in COM600. The REF 542plus object type is required to invoke the standard tools of COM600.

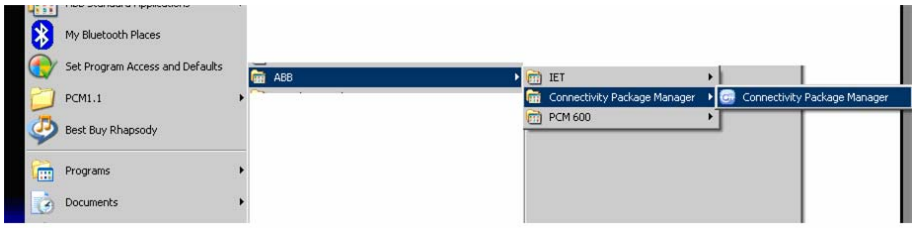
4.1.1. Configuring REF 542plus ConnPack in Connectivity Package Manager

The REF 542plus connectivity package must be configured and enabled in Connectivity Package Manager to work with the REF 542plus object type in COM600.

- Close COM600 if it is open.
- Open Connectivity Package Manager by double-clicking the shortcut on the desktop or by clicking **Programs**, then selecting **ABB** and then **Connectivity Package Manager**.

A100426

Fig. 4.1.1.-1 Connectivity Package Manager desktop icon



A100428

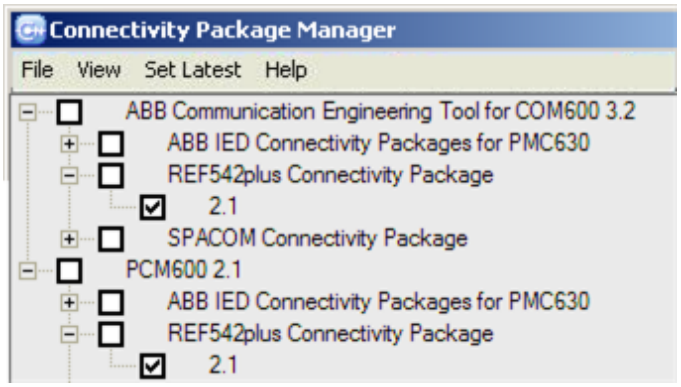
Fig. 4.1.1.-2 Connectivity Package Manager on the Programs menu

Connectivity Package Manager opens.

A100430

Fig. 4.1.1.-3 Connectivity Package Manager

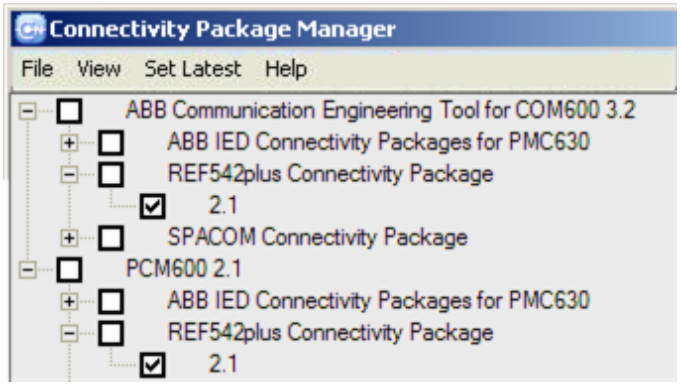
- Click the REF 542plus Connectivity Package node to expand it.



A100432

Fig. 4.1.1.-4 REF 542plus Connectivity Package Manager

- Select the version 2.1 check box to enable the REF 542plus connectivity package in COM600. If it is not selected, the REF 542plus object type cannot be created in COM600.



A100434

Fig. 4.1.1.-5 Enabling of the REF 542plus connectivity package

- Close Connectivity Package Manager by clicking **File** and then **Close menu**.

4.1.2. Managing projects in COM 600

Existing COM600 projects or a new project can be used to create the REF 542plus object type in COM 600.

- Open COM 600 by double-clicking the COM 600 shortcut on the desktop or by clicking **Programs**, then **ABB**, then **Communication Engineering Tool for COM 600** and then **COM 600**.

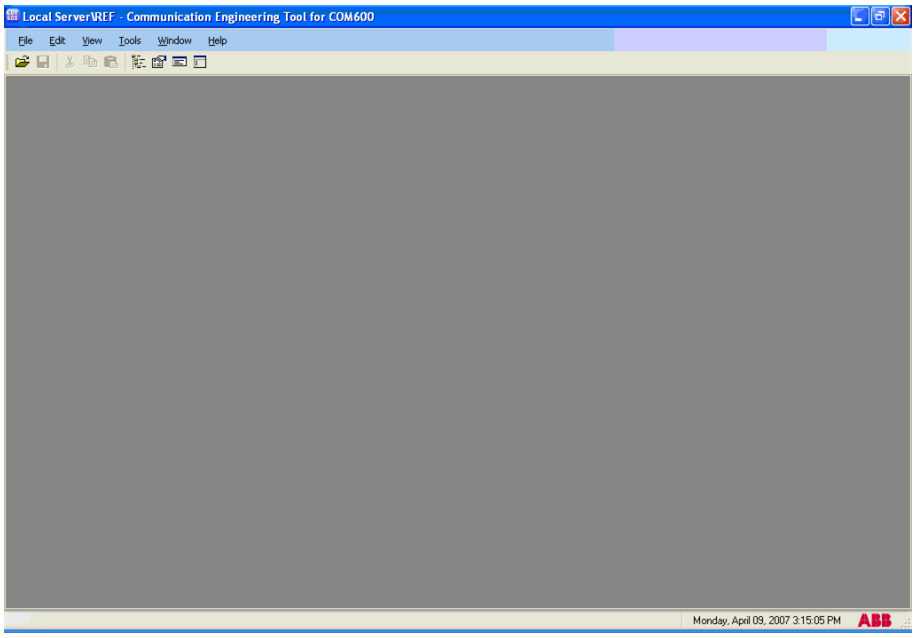
A100436

Fig. 4.1.2.-1 COM 600 desktop icon

A100438

Fig. 4.1.2.-2 COM 600 on the Programs menu

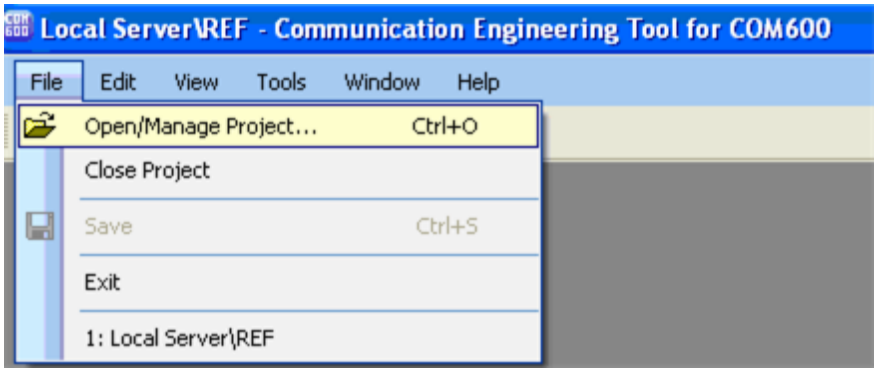
The COM 600 screen appears.



A100440

Fig. 4.1.2.-3 COM 600

- Click **Open/Manage Project...** on the **File** menu to create a new or manage an existing project.



A100442

Fig. 4.1.2.-4 Open/Manage Project menu

The Open/Manage dialog window appears. In this window, new projects can be created or existing projects can be opened, imported, exported or deleted.

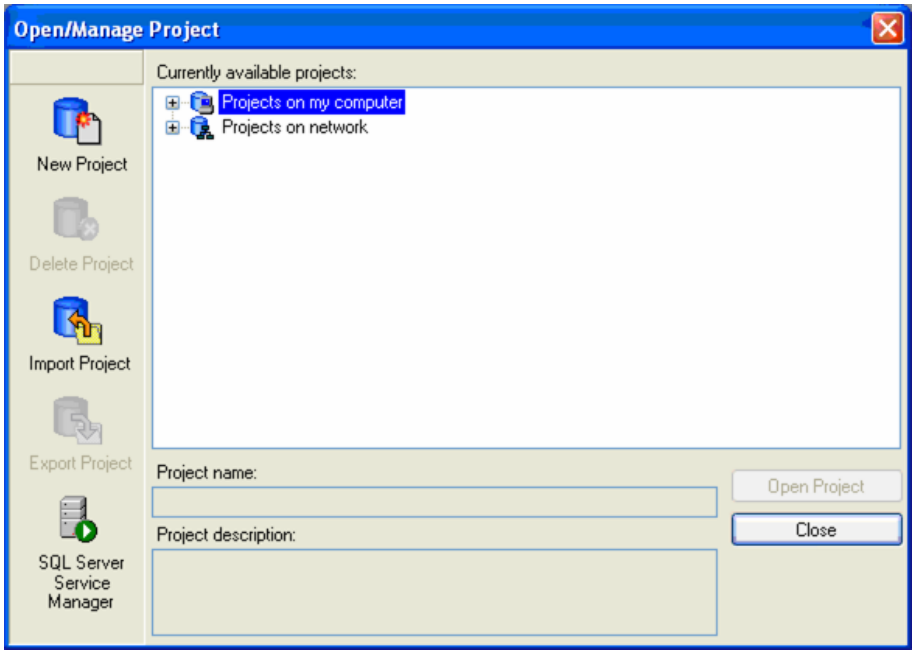


Fig. 4.1.2.-5 Open/Manage Project dialog

4.1.2.1. Creating new projects

- Click **New Project** in the Open/Manage Project window to create a new project. Enter the project name and a description of the project in the appearing New Project dialog window.

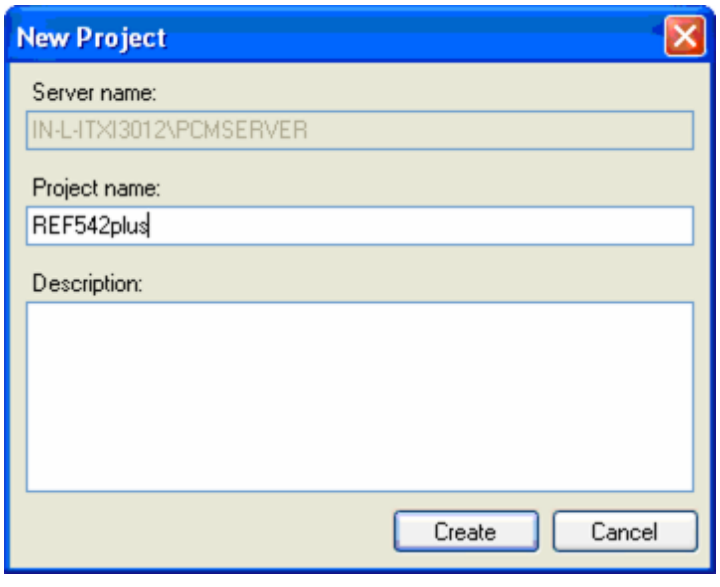


Fig. 4.1.2.1.-1 New project

- Click **Create** to create a new project.

Once the project is created, it is displayed in the **Project on my computer** tree structure.

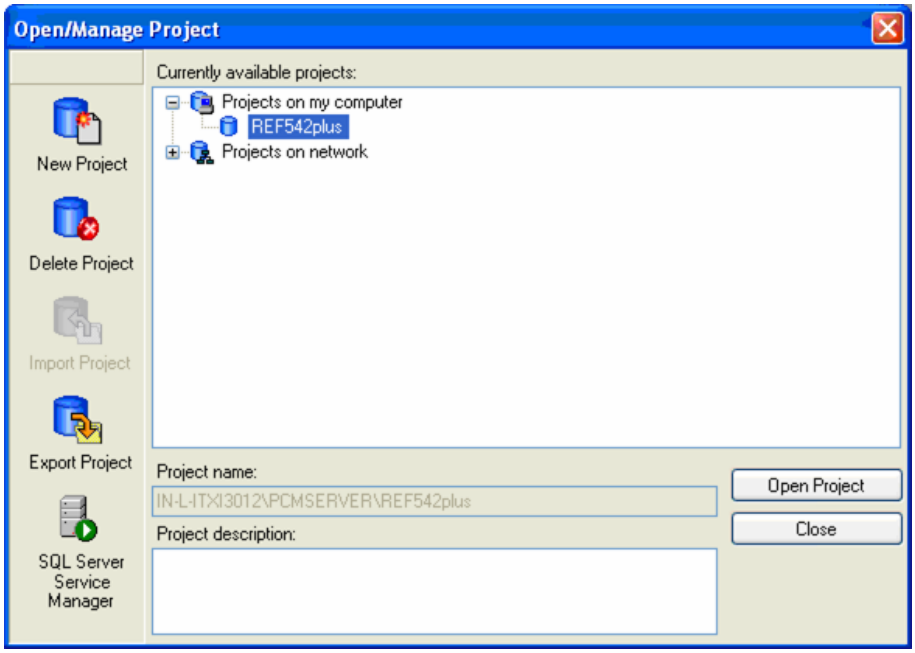


Fig. 4.1.2.1.-2 Open/Manage Project with a created project

4.1.2.2. Opening existing projects

Existing project can be opened from My Computer or Network through the Open/Manage Project dialog.

- To open a created project, click the project name to select the project and then click **Open Project**. Projects can also be exported or deleted here.

  COM 600 then opens the communication structure of the project. The structure is empty for new projects.

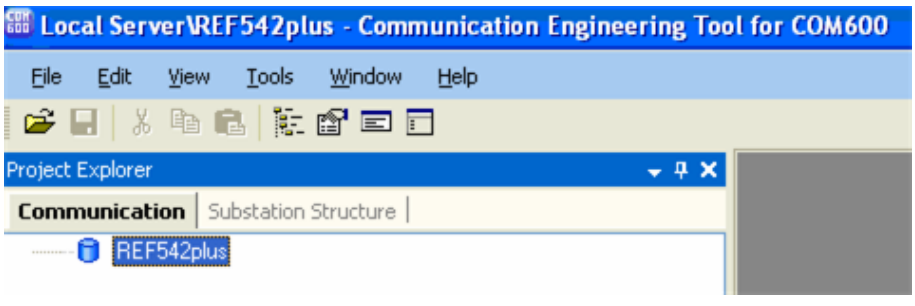


Fig. 4.1.2.2.-1 Communication structure with project name

- Create a gateway by opening the shortcut menu of the "REF 542plus" project. Select **New**, then **Communication** and then **Gateway**.

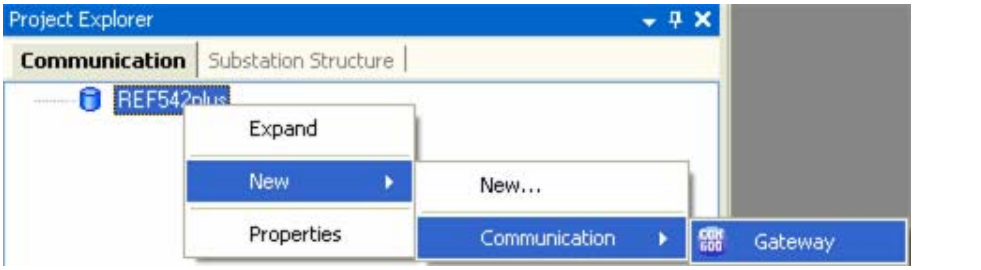


Fig. 4.1.2.2.-2 Shortcut menu navigation for gateway creation

The Gateway node is created in the REF 542plus communication structure.

- Create the IEC 61850 OPC Server node in the communication structure through the shortcut menu of the Gateway node.

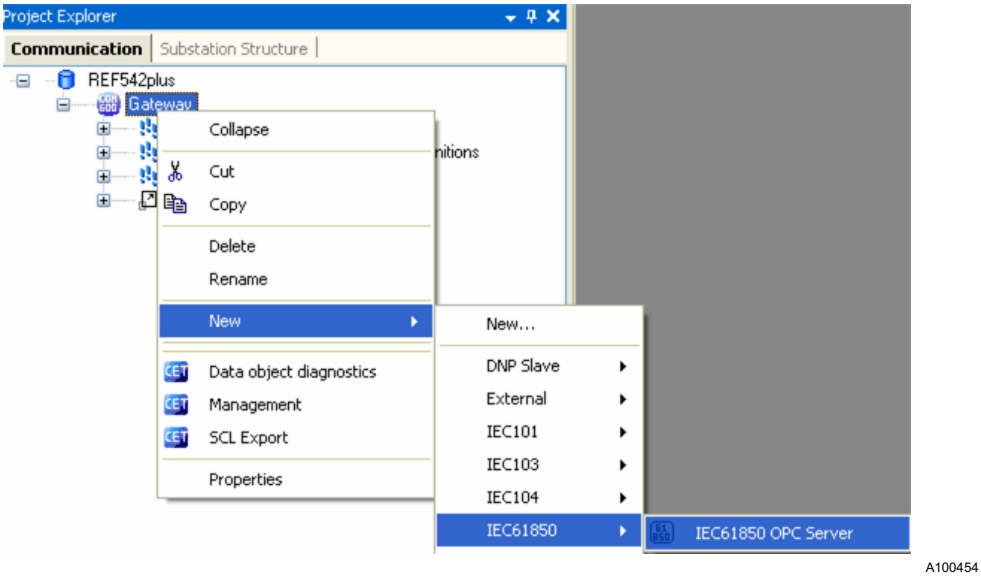


Fig. 4.1.2.2.-3 Menu navigation for the IEC61850 OPC Server creation

- Create the IEC 61850 Subnetwork node through the shortcut menu of the IEC 61850 OPC Server node in the tree structure.

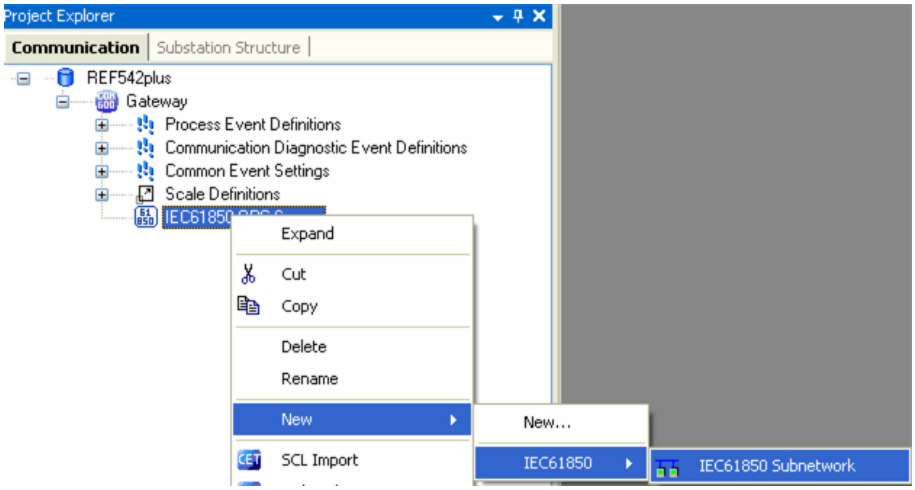


Fig. 4.1.2.2.-4 Menu navigation for IEC 61850 Subnetwork

4.1.3. Creating REF 542plus object in COM 600

The REF 542plus object can be created in two ways: either through the IEC 61850 Subnetwork's shortcut menu or through the object type window.

- Right-click the IEC 61850 Subnetwork node in the tree structure and select **New**, then **Feeder Terminals** and then **REF 542plus** to create the object type.

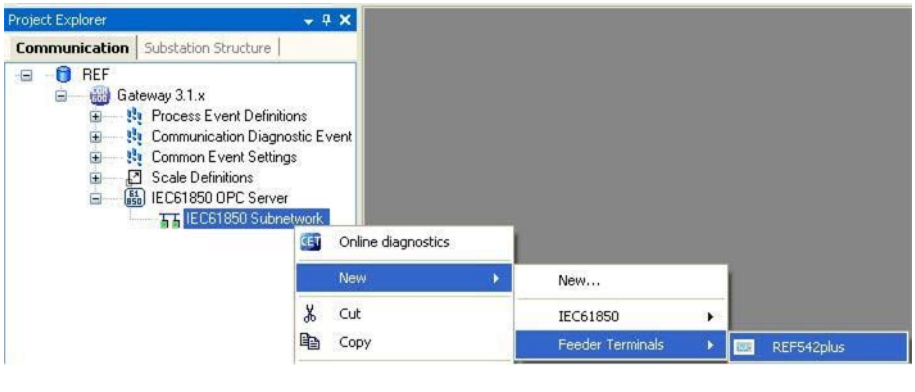
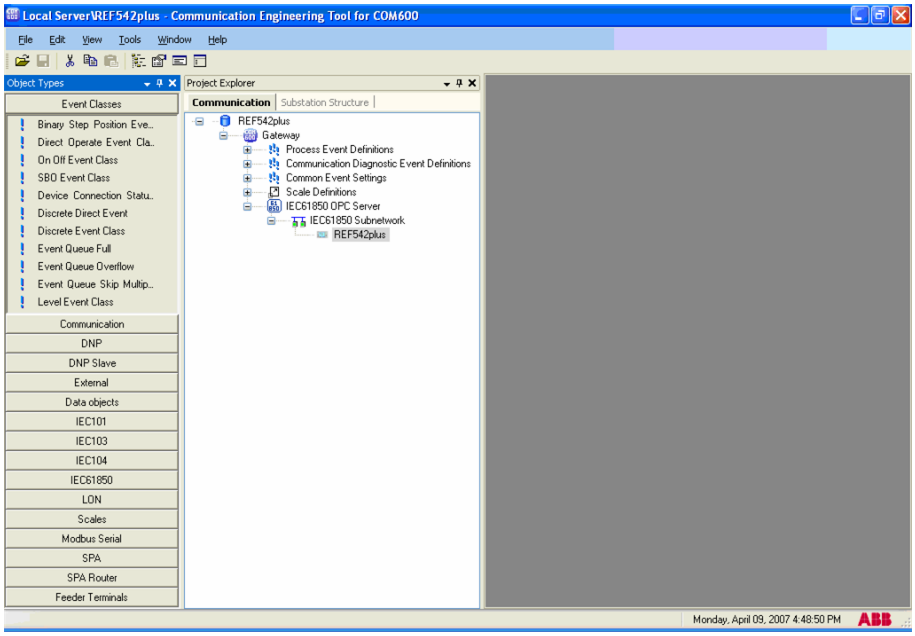


Fig. 4.1.3.-1 Menu navigation for the REF 542plus creation

The REF 542plus object type is created under the IEC 61850 Subnetwork tree node.

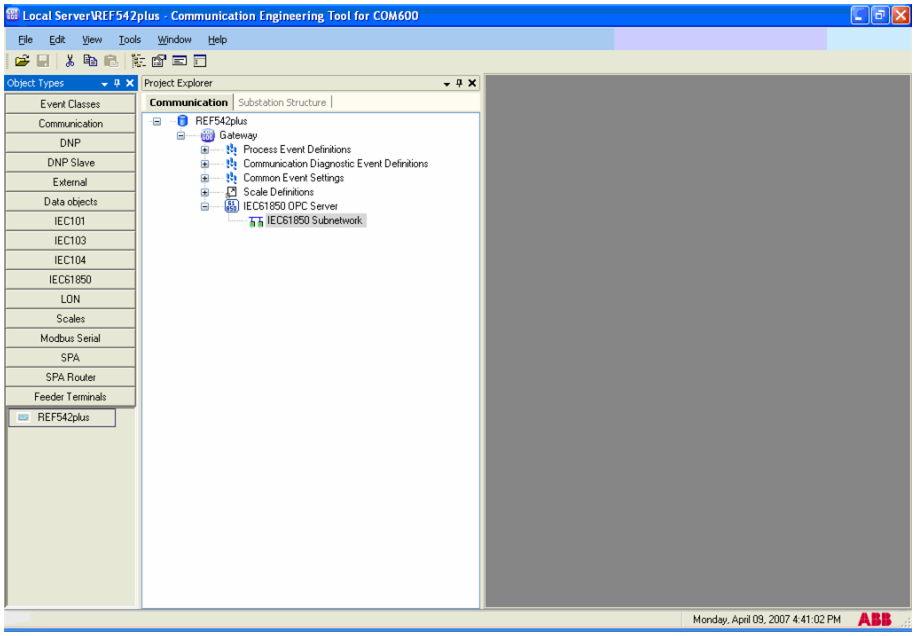
- For another way of opening the REF 542plus object type, open the Object Type window by clicking **Object Type** in the **View** menu. The Object Type window opens.



A100460

Fig. 4.1.3.-2 Object Type window

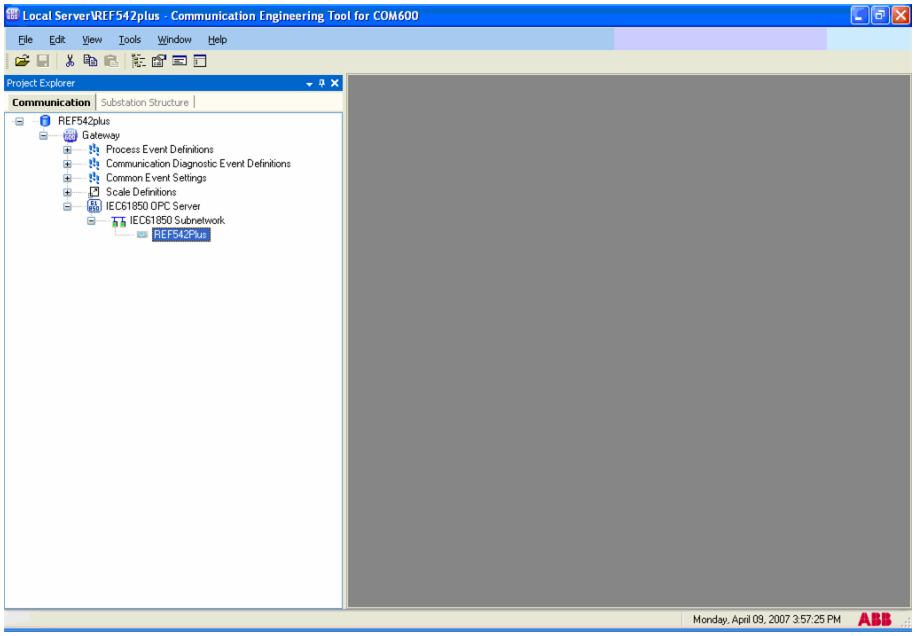
- Click **Feeder Terminals** to see the REF 542plus object.



A100462

Fig. 4.1.3.-3 Object type window for Feeder terminal

- Drag the REF 542plus object to Bay to create the object type in the communication structure.



A100464

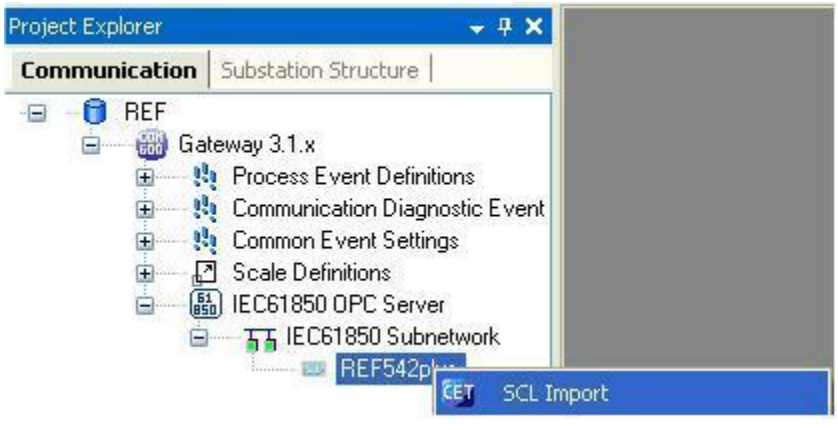
Fig. 4.1.3.-4 Communication structure with the REF 542plus object type

4.2. Working with COM 600 for REF 542plus

SCL files are imported to COM 600 with the SCL Files import. Also parameters can be set, DR can be uploaded and events and alarms can be viewed in COM 600.

4.2.1. Importing SCL files in COM 600

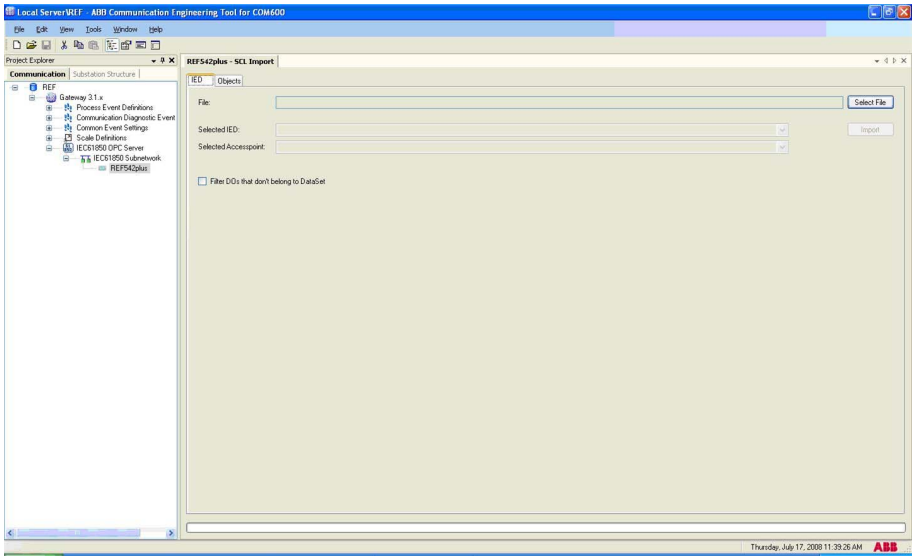
- To directly import the available SCL file to COM 600, right-click the REF 542plus object type in the Communication tab in Project Explorer and select **SCL Import**.



A100466

Fig. 4.2.1.-1 REF 542plus shortcut menu – SCL Import

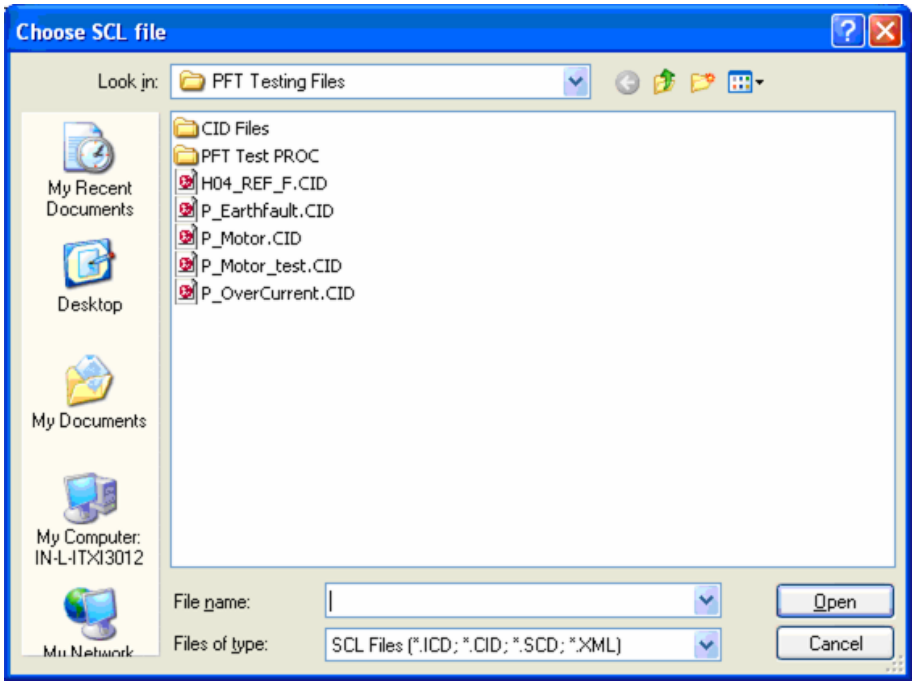
The SCL Import dialog window appears.



A100468

Fig. 4.2.1.-2 SCL Import dialog window

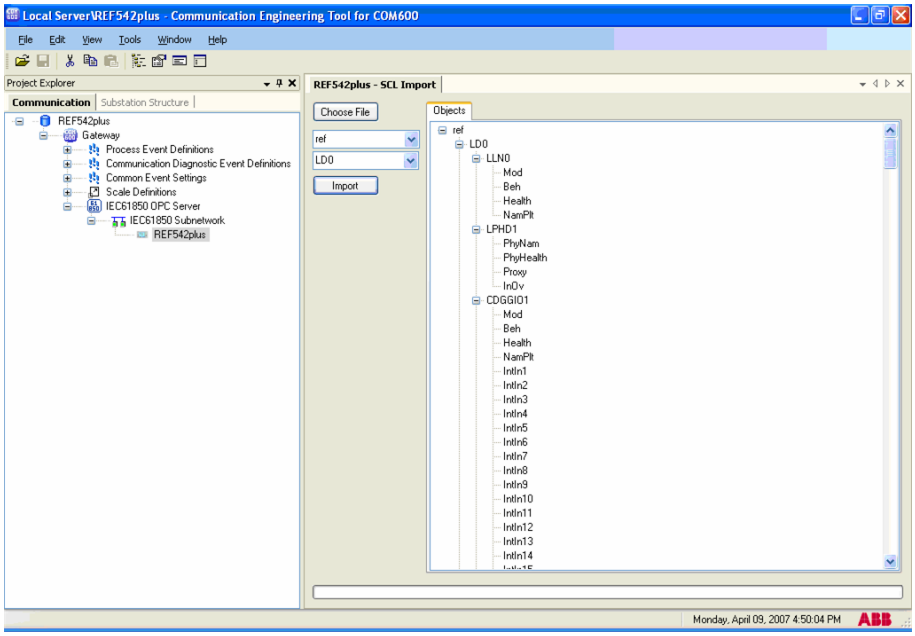
- Click **Select File** to open the Choose File dialog window for choosing the SCL file to import.



A100470

Fig. 4.2.1.-3 SCL file selection

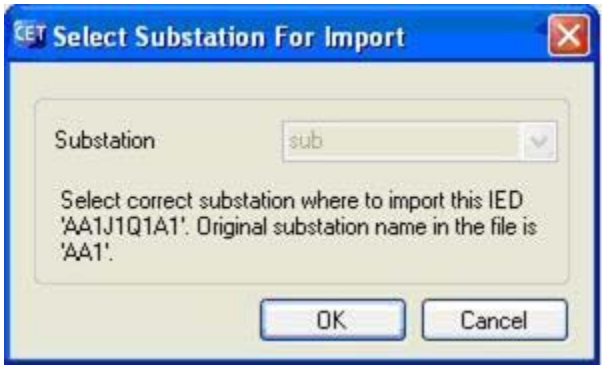
- Click **Import** to start the importing. The progress bar is displayed during the import.



A100472

Fig. 4.2.1.-4 File import information in the SCL file import

- Enter the substation name in the dialog window that appears during the import and click **OK**.



A100474

Fig. 4.2.1.-5 Substation name dialog

- Enter the voltage level in the dialog window that appears during the import and click **OK**.

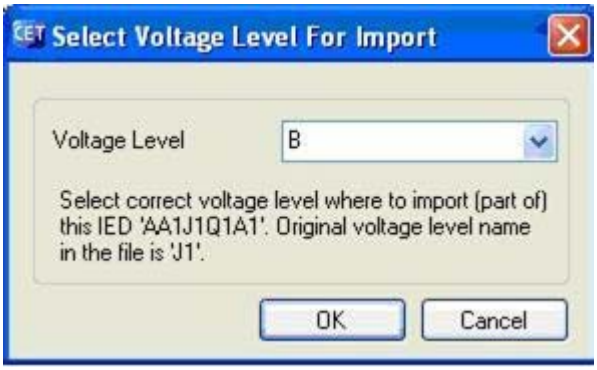
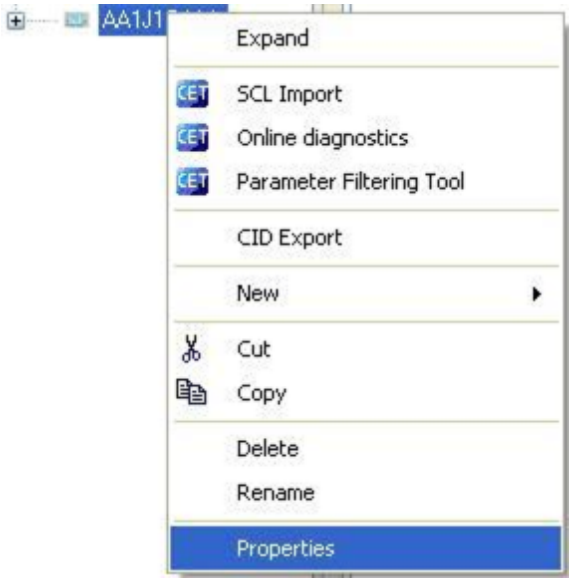


Fig. 4.2.1.-6 Voltage level dialog

- Enter the bay name in the dialog window that appears during the import and click **OK**.

Fig. 4.2.1.-7 Bay name dialog

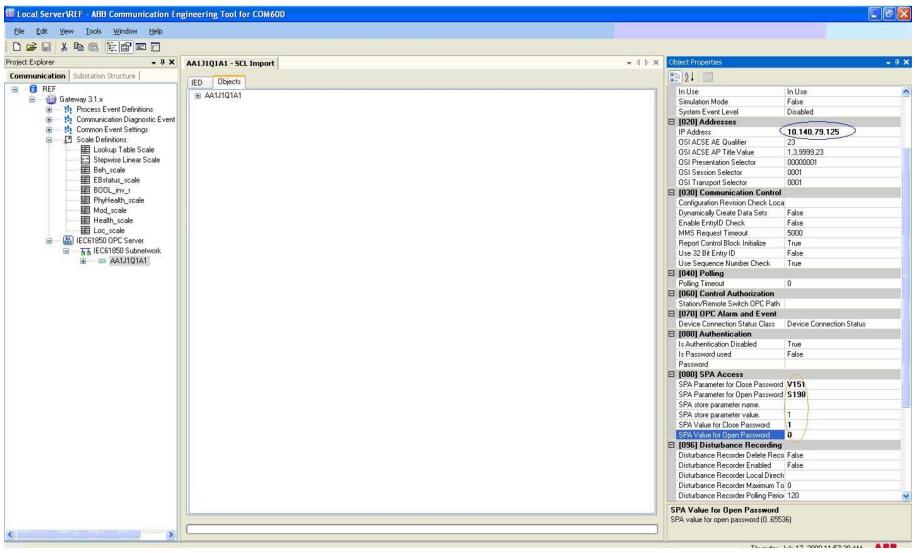
- Right-click the "ref" node and select **Properties** to view the REF 542plus properties.



A100480

Fig. 4.2.1.-8 REF 542plus shortcut menu – Properties

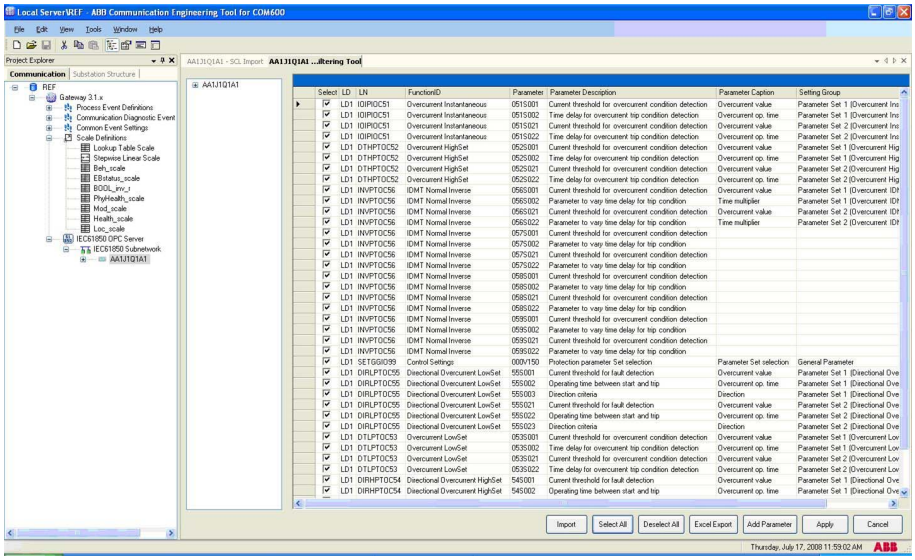
- Set the IP address of REF 542plus.
- Set the SPA Access properties as follows:
  - "SPA Parameter for Close Password" as V151
  - "SPA Parameter for Open Password" as S198
  - "SPA store parameter name"
  - "SPA store parameter value" as 1
  - "SPA Value for Close Password" as 1
  - "SPA Value for Open Password" as 0



A100482

Fig. 4.2.1.-9 REF 542plus Object Properties

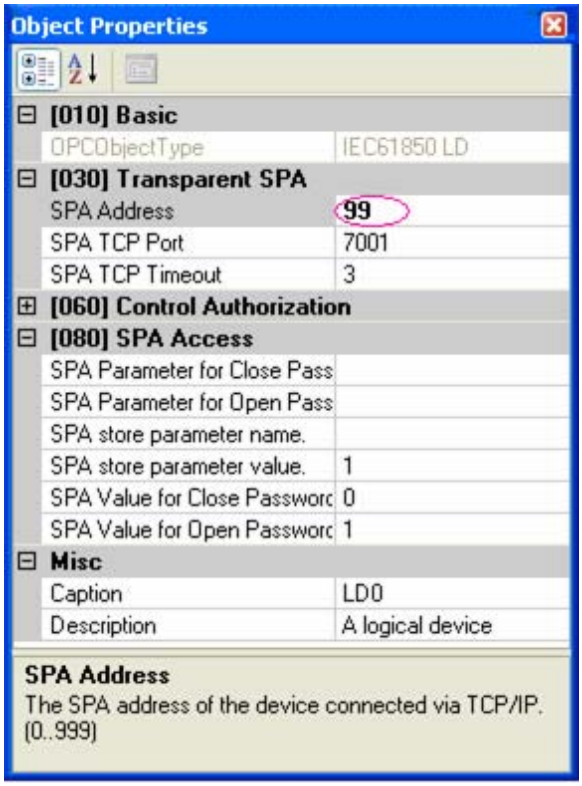
- Right-click the "ref" node and select Parameter Filtering Tool.



A100484

Fig. 4.2.1.-10 Parameter selection

- Select the parameters and click **Apply**.
- Set SPA Address as 99 for the LD0 and LD1 nodes by using the properties.



A100486

Fig. 4.2.1.-11 Set SPA Address

- Right-click the Gateway node and select **Properties**.

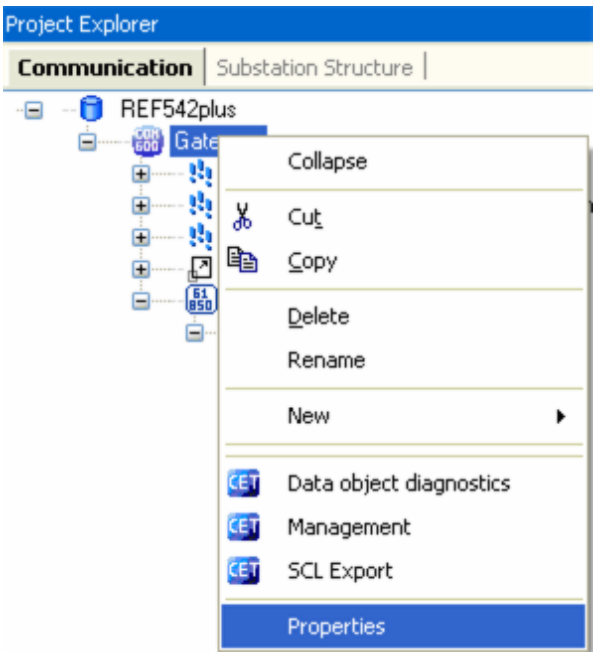


Fig. 4.2.1.-12 COM 600 (Gateway) shortcut menu – Properties

- Set the IP address for Gateway.

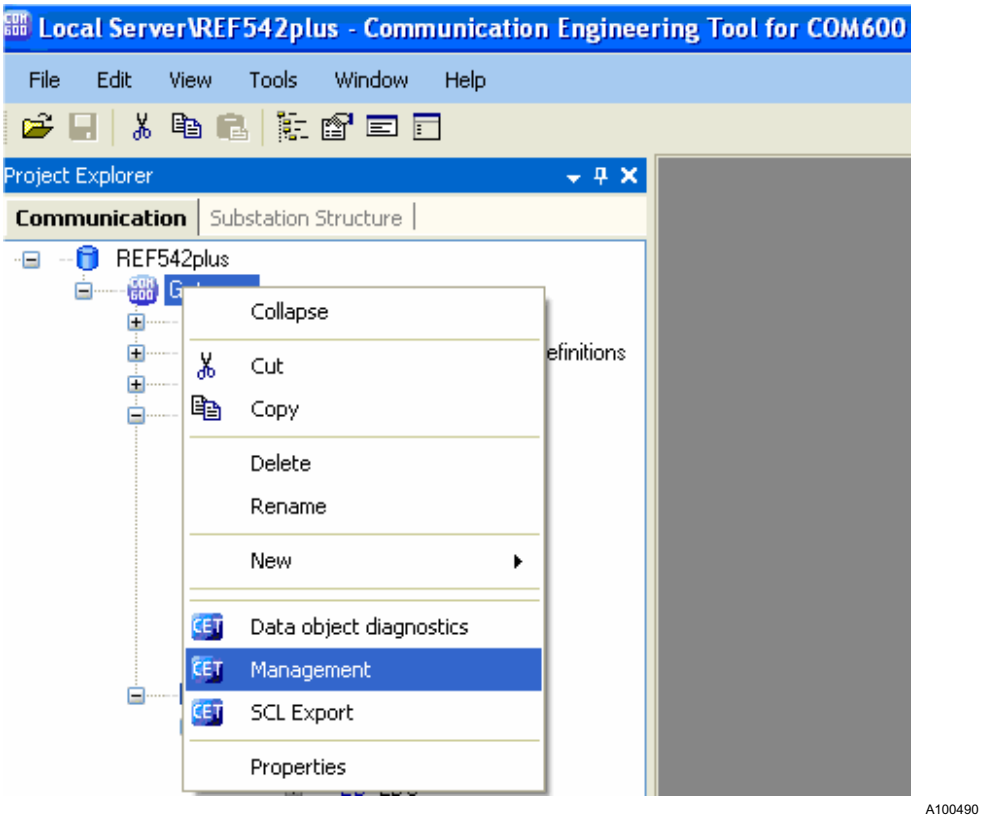


Fig. 4.2.1.-13 Set IP address for Gateway

- Right-click the Gateway node and select **Management**.

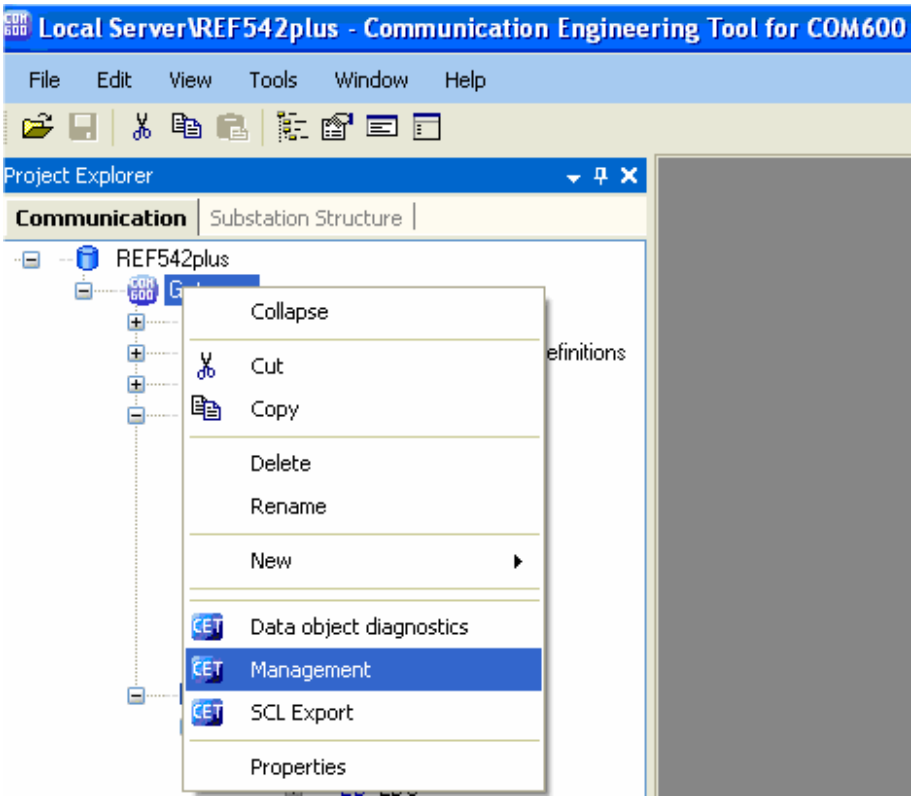


Fig. 4.2.1.-14 Gateway shortcut menu – Management

The Gateway – Management tab opens.

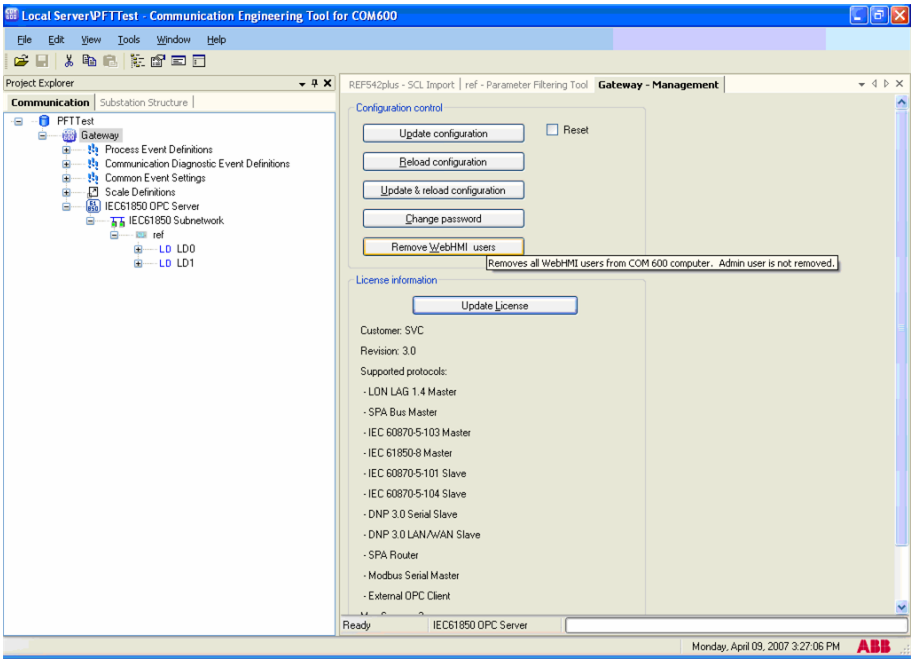
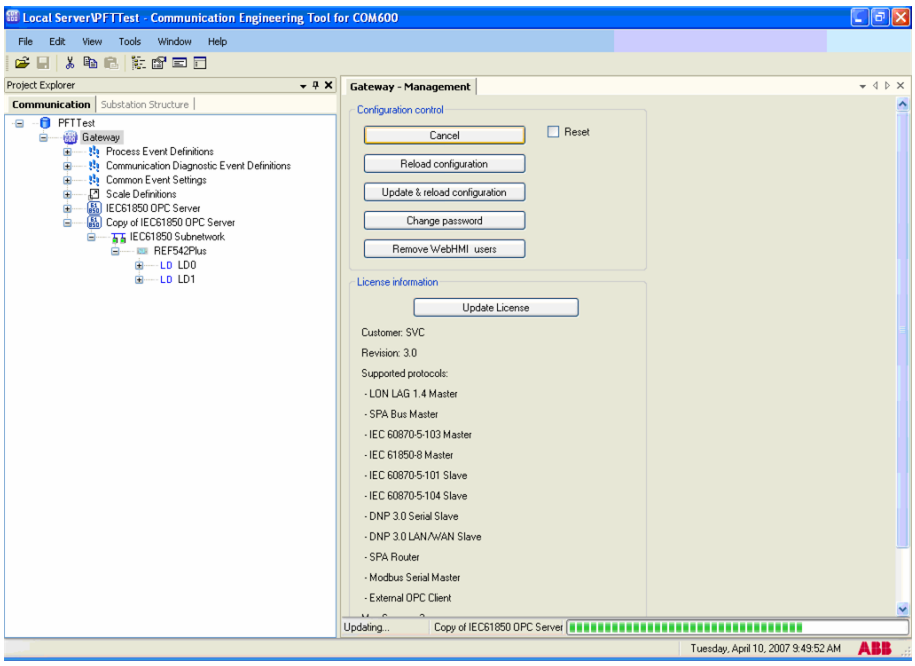


Fig. 4.2.1.-15 Gateway – Management tab

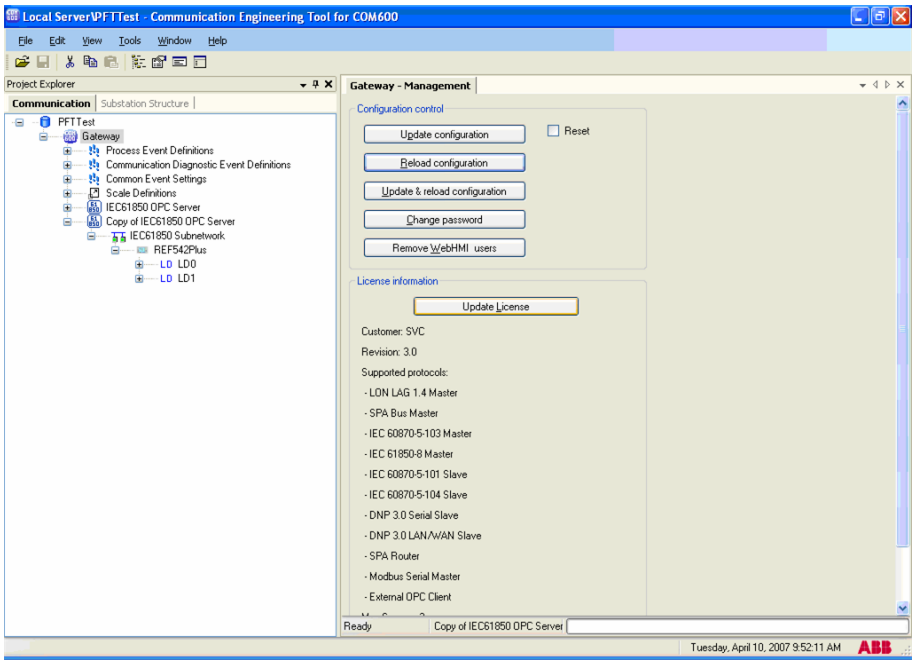
- Click **Update configuration**. A progress bar is displayed.



A100496

Fig. 4.2.1.-16 Update configuration using the Management tab

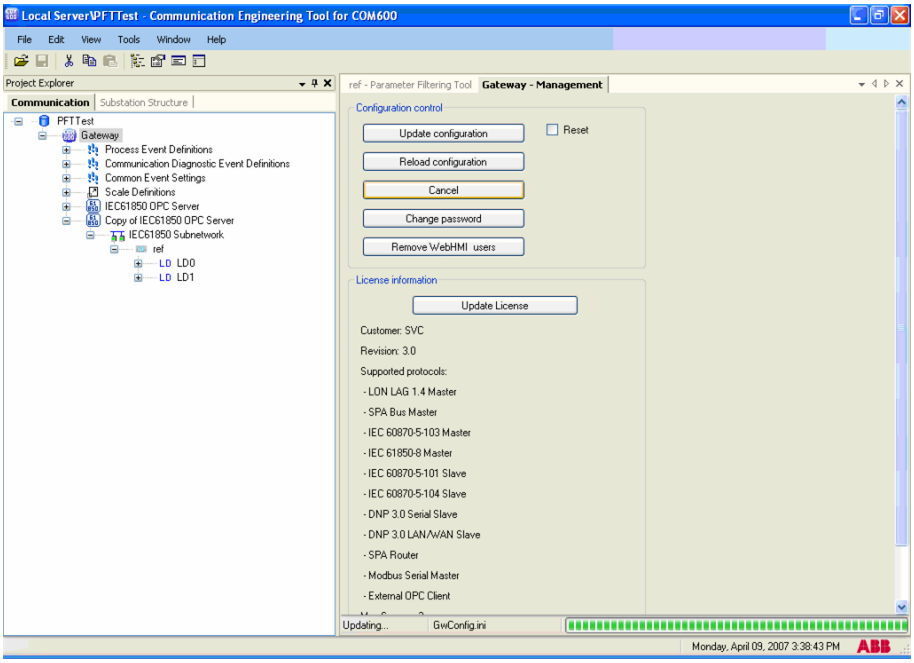
- Click **Reload configuration**. A progress bar is displayed.



A100498

Fig. 4.2.1.-17 Reload configuration using the Management tab

- Click **Update and reload configuration**. A progress bar is displayed.



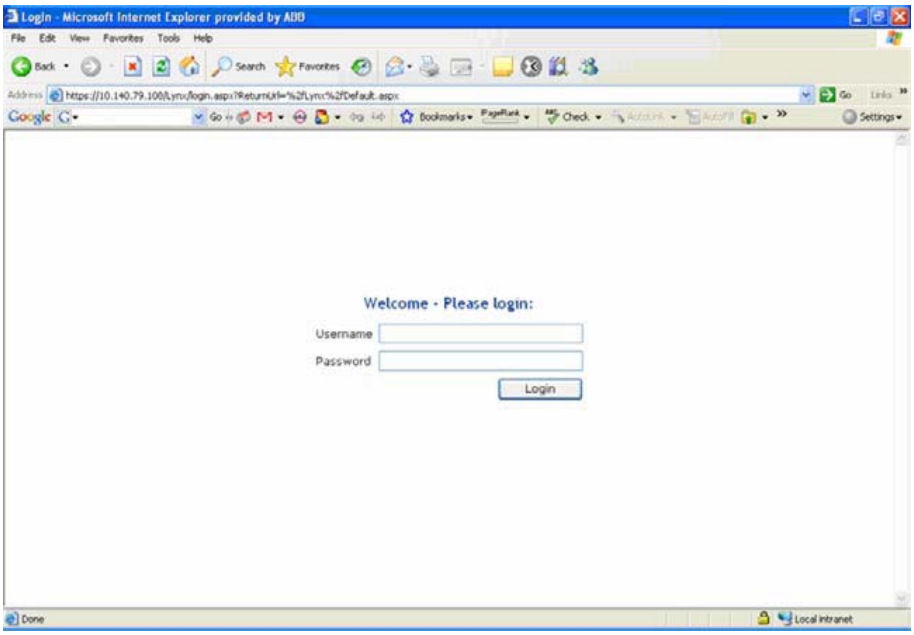
A100500

Fig. 4.2.1.-18 Update and reload configuration using the Management tab

4.2.1.1. Parameter setting in COM 600

- Open the web page, for example http://10.140.79.108 if the IP address of COM 600 is that, by using Internet Explorer.

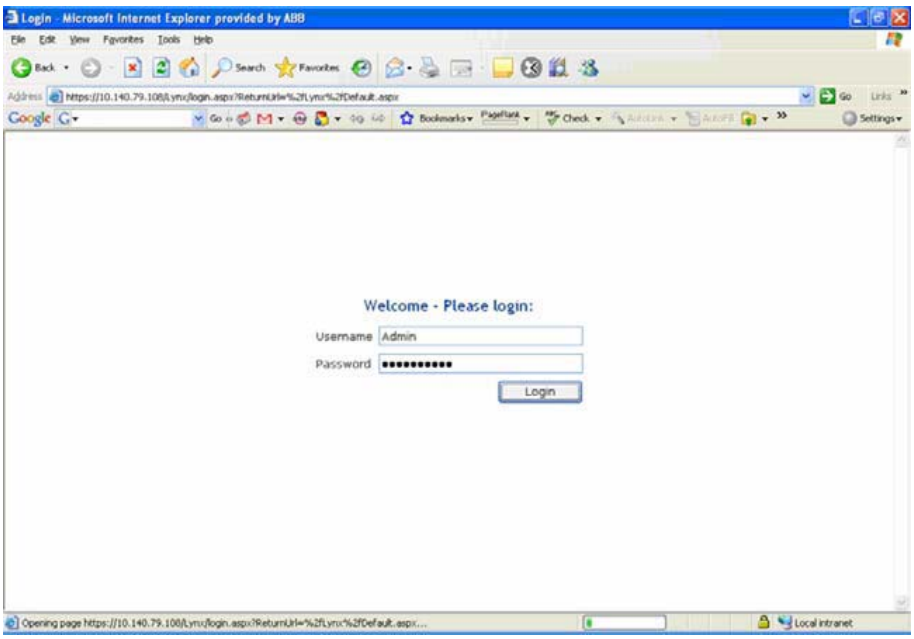
  A login page opens for the COM 600 authentication.



A100502

Fig. 4.2.1.1.-1 COM 600 web HMI

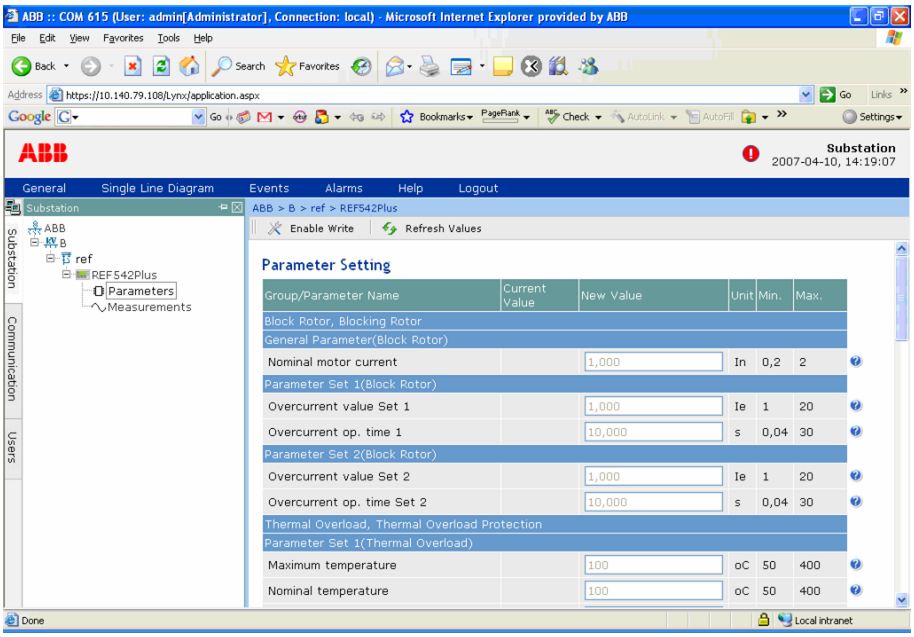
- Enter user name and password and click **Login** to log in to COM 600.



A100504

Fig. 4.2.1.1.-2 User name and password information

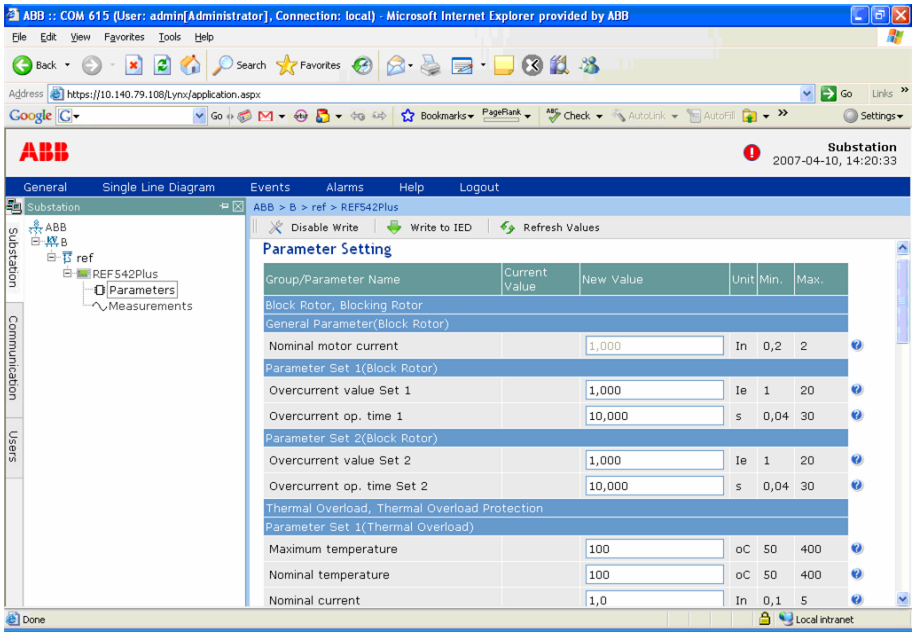
The COM 600 web HMI has the selected parameters from the COM 600 CET.



A100506

Fig. 4.2.1.1.-3 COM 600 HMI

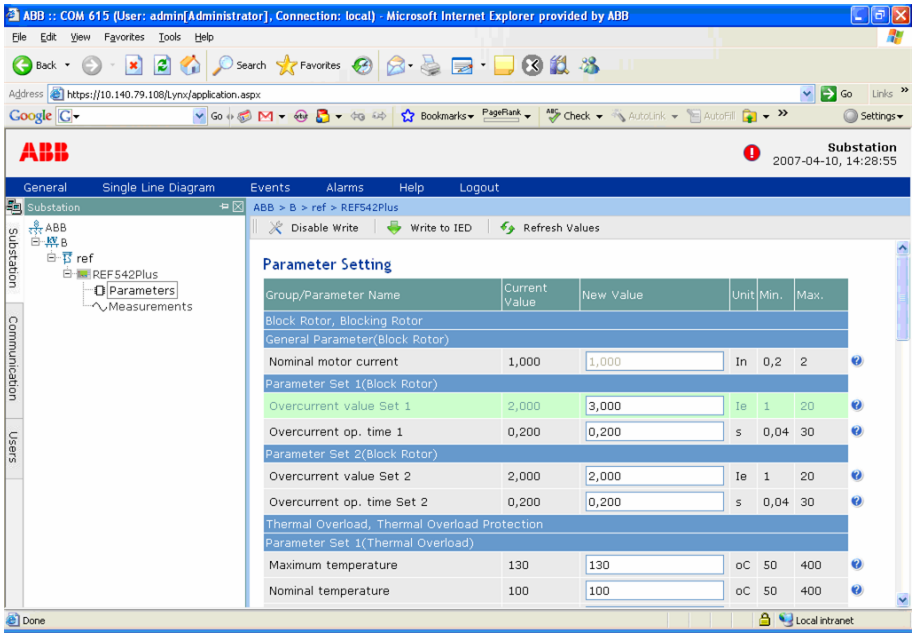
- Click **Enable Write** to write the parameters.



A100508

Fig. 4.2.1.1.-4 Writing enabled

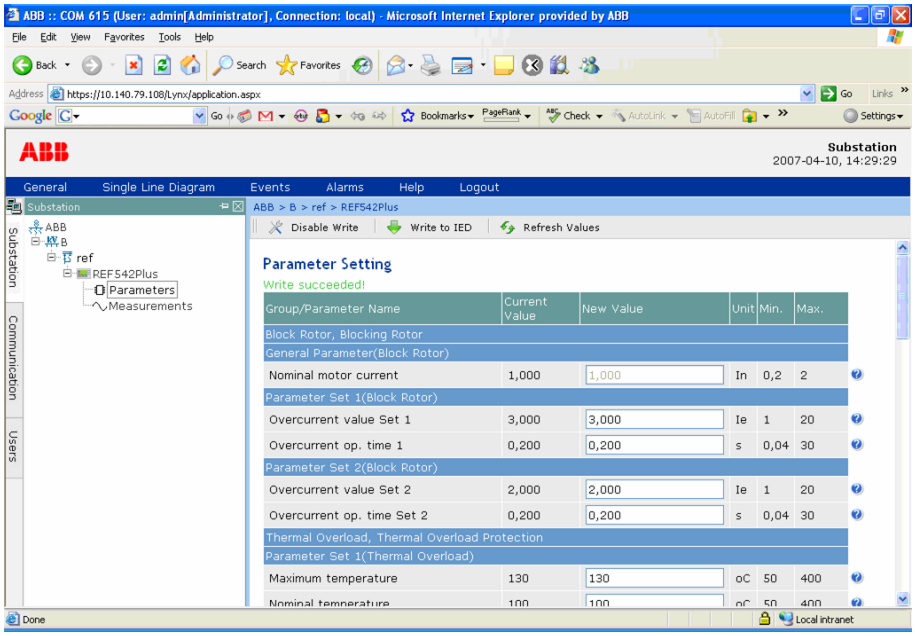
- Enter the value of the parameter to be written in REF 542plus in the "New Value" column. Valied values are marked in green and invalid in red.



A100510

Fig. 4.2.1.1.-5 Set parameter values

- Click **Write to IED** to write the parameter in the IED (REF 542plus).



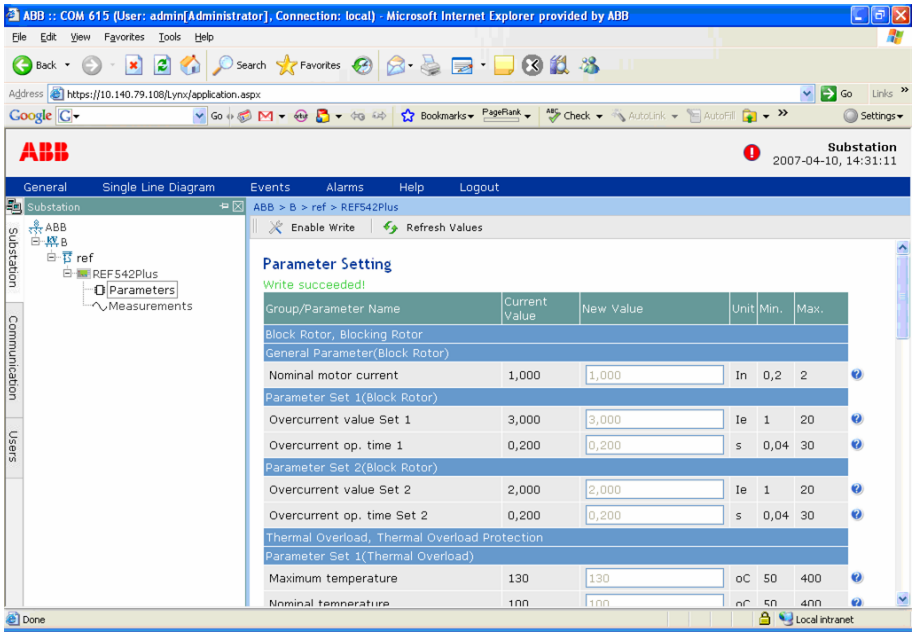
A100512

Fig. 4.2.1.1.-6 Write to IED

- Click **Refresh Values** to read all the current values of the parameters in the IED. The values appear in the "New Value" column.

A100514

Fig. 4.2.1.1.-7 Values refreshed notification



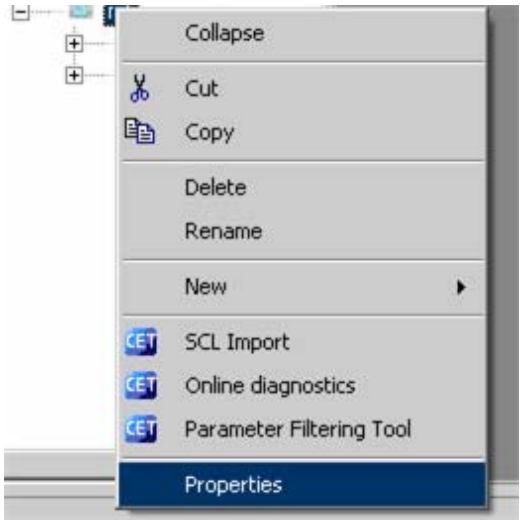
A100516

Fig. 4.2.1.1.-8 Parameters

4.2.2. Uploading DR files

DR files can be uploaded through COM 600.

- Right-click the REF 542plus object type in the Communication tab in Project Explorer of the COM 600 CET and select **Properties**.

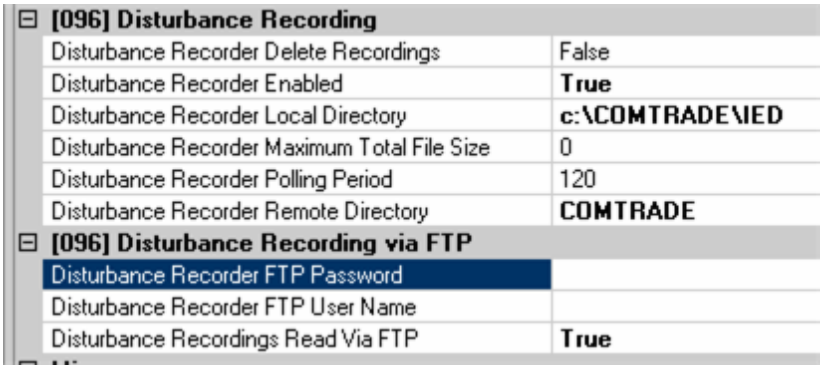


A100518

Fig. 4.2.2.-1 REF 542plus object type properties

The property grid is shown.

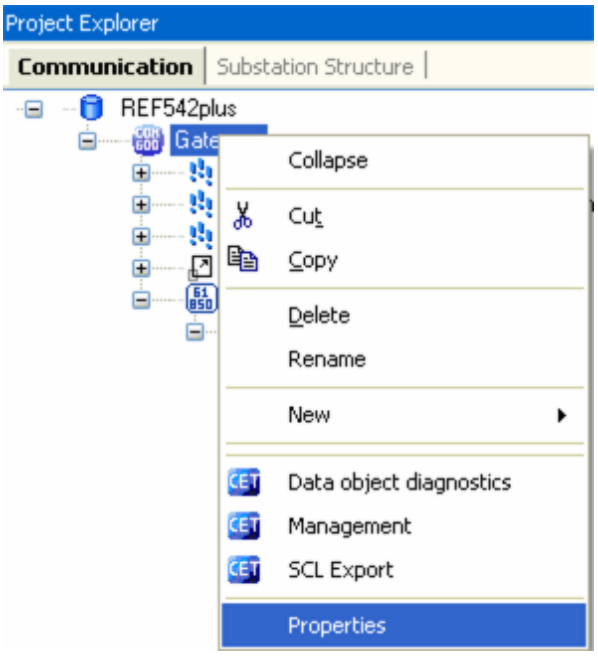
- Enter the following DR related properties in the property grid:



A100520

Fig. 4.2.2.-2 DR related properties

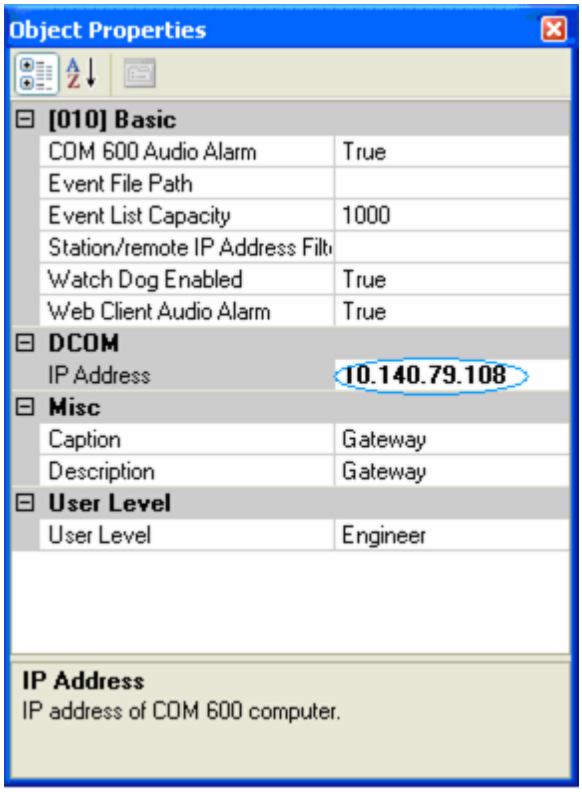
- Enter the user name and password for FTP in the Disturbance Recording via FTP section in the property grid.
- Right-click the Gateway node and select **Properties**.



A100522

Fig. 4.2.2.-3 COM 600 shortcut menu – Properties

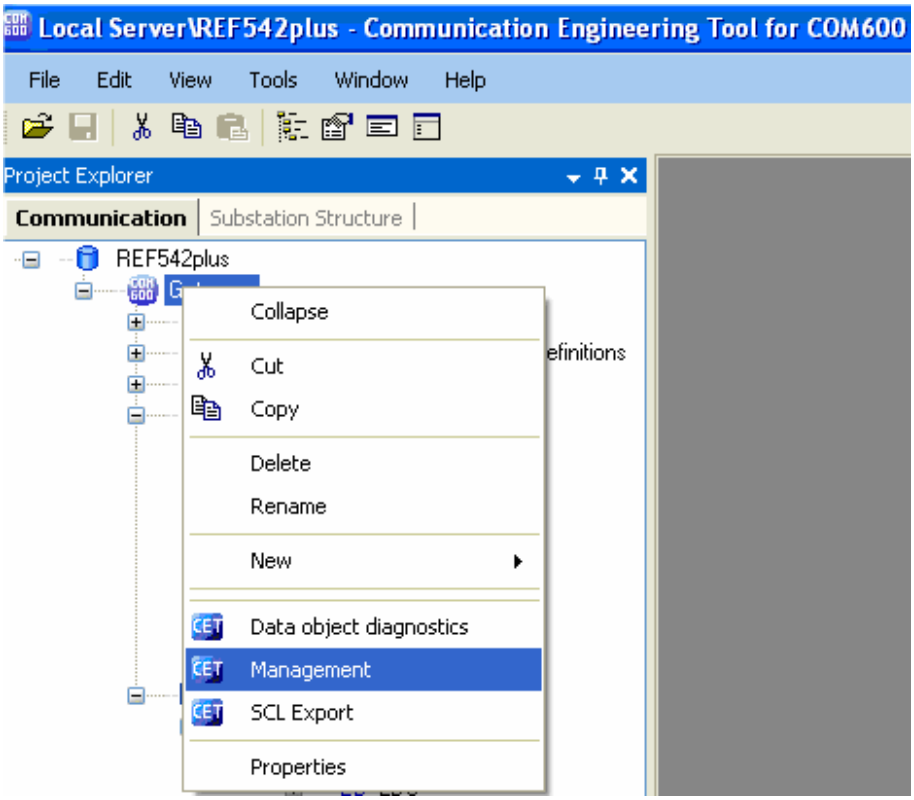
- Set the IP address for Gateway (COM 600).



A100524

Fig. 4.2.2.-4 Setting the IP address for Gateway

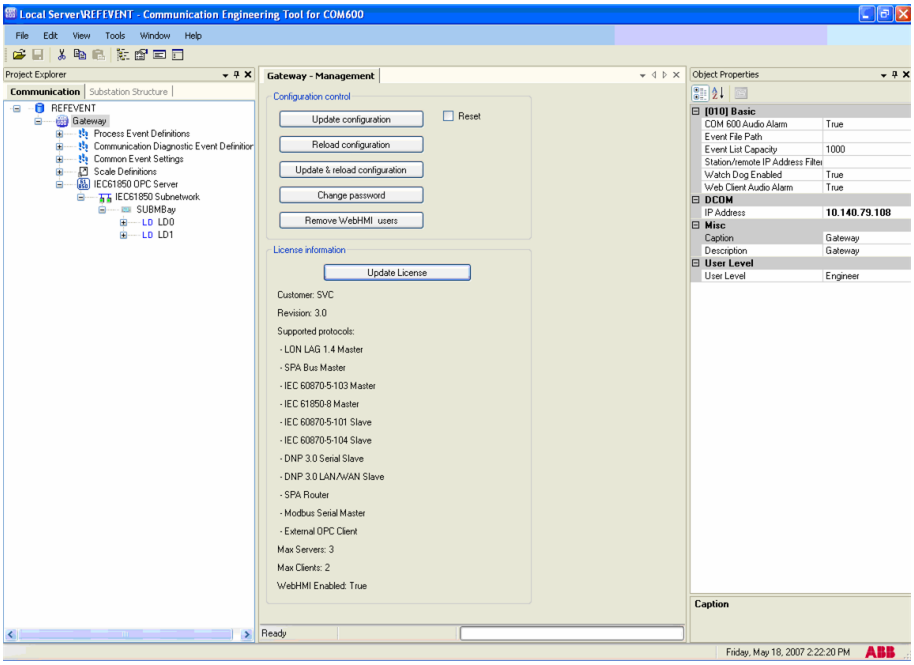
- Right-click the Gateway node and select **Management**.



A100526

Fig. 4.2.2.-5 Gateway shortcut menu – Management

The Gateway – Management tab opens.

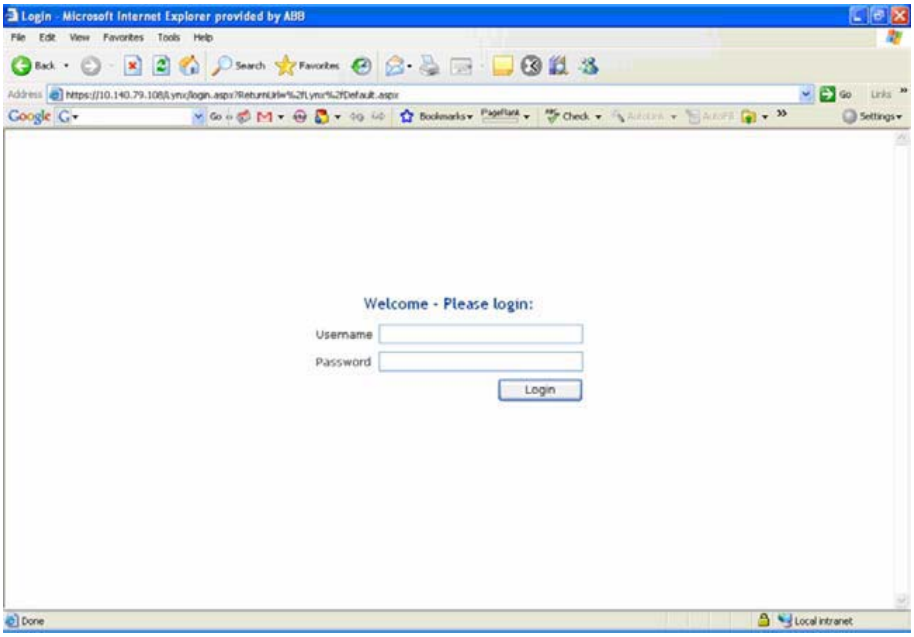


A100528

Fig. 4.2.2.-6 Gateway – Management tab

- Click **Update configuration**. A progress bar is displayed.
- Click **Reload configuration**. A progress bar is displayed.
- Click **Update & reload configuration**. A progress bar is displayed.
- Open the web page, for example http://10.140.79.180 if the IP address for COM 600 is that, by using Internet Explorer.

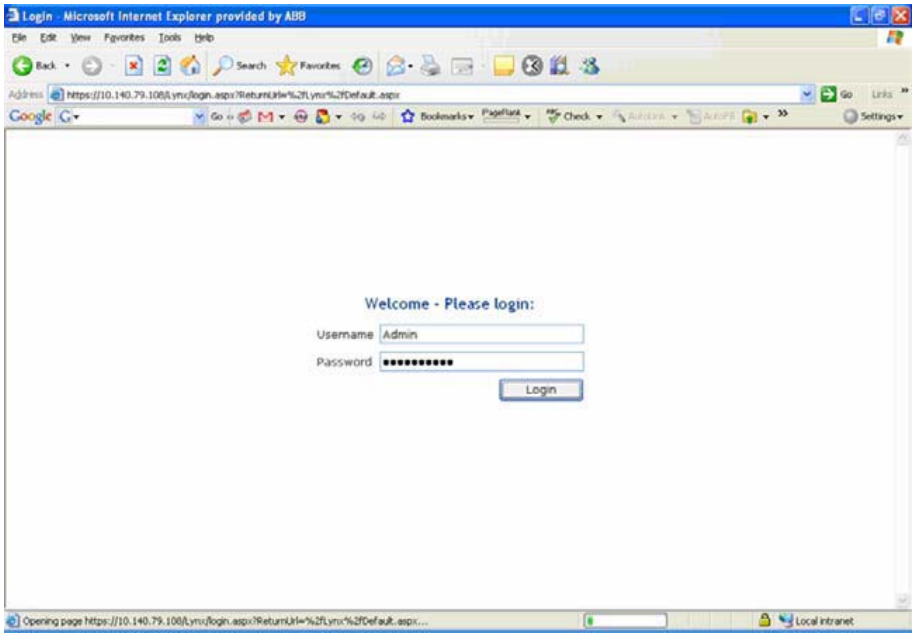
  The login page is displayed for the COM 600 authentication.



A100530

Fig. 4.2.2.-7 Opening of the COM 600 web HMI

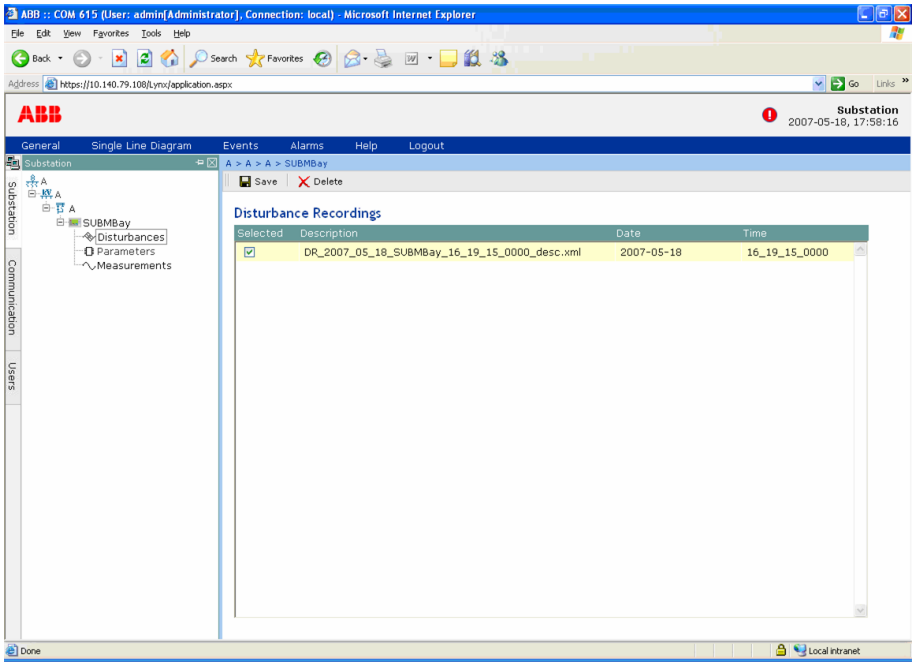
- Enter user name and password.
- Click **Login** to log in to COM 600.



A100532

The COM 600 web HMI opens if the login is successful.

- Click the Disturbances node.



A100534

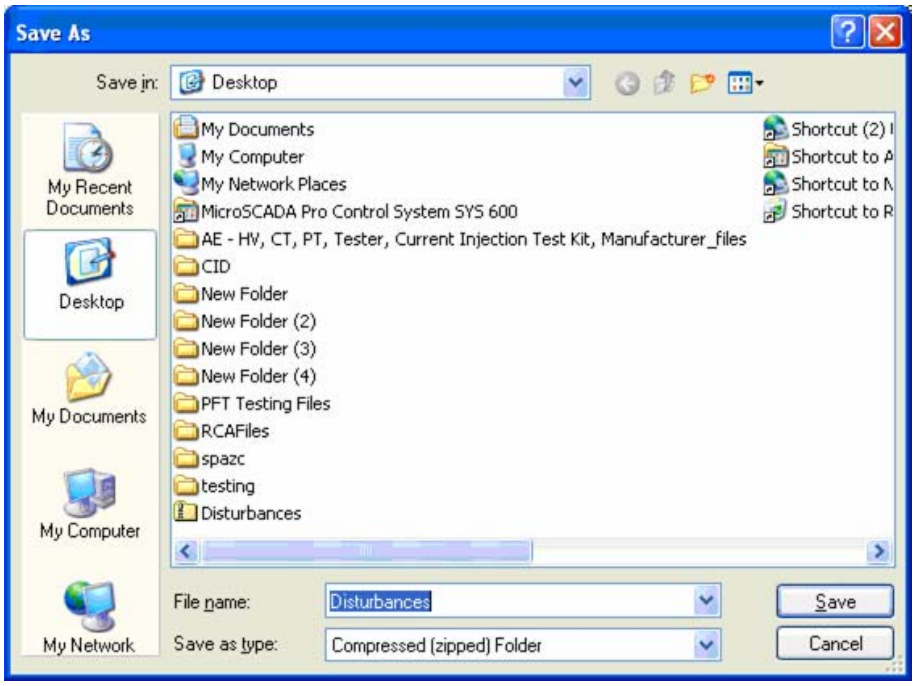
Fig. 4.2.2.-8 COM 600 HMI

The DR files are displayed.

- Select the record from the check box.
- Click **Save**.

- In the appearing dialog window, click **Save**.

  A dialog window appears, prompting for the saving location and file name for the DR file.



A100538

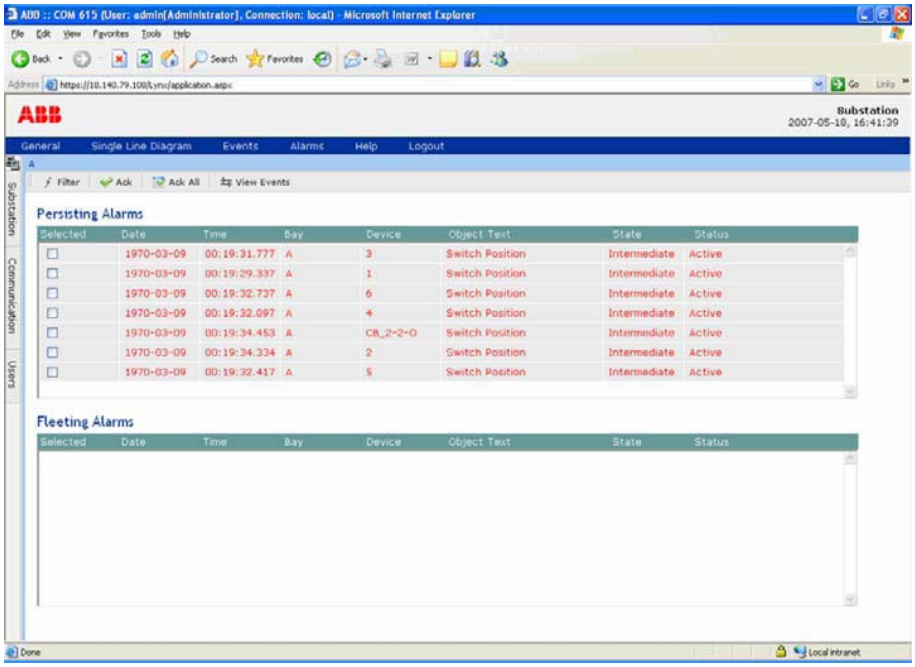
Fig. 4.2.2.-9 Dialog window for saving DR files

- Save the file by clicking **Save**.

  The file is compressed and saved as a .zip file, containing the .dat and .cfg files.

4.2.3. Viewing alarms, events and measurements in COM 600

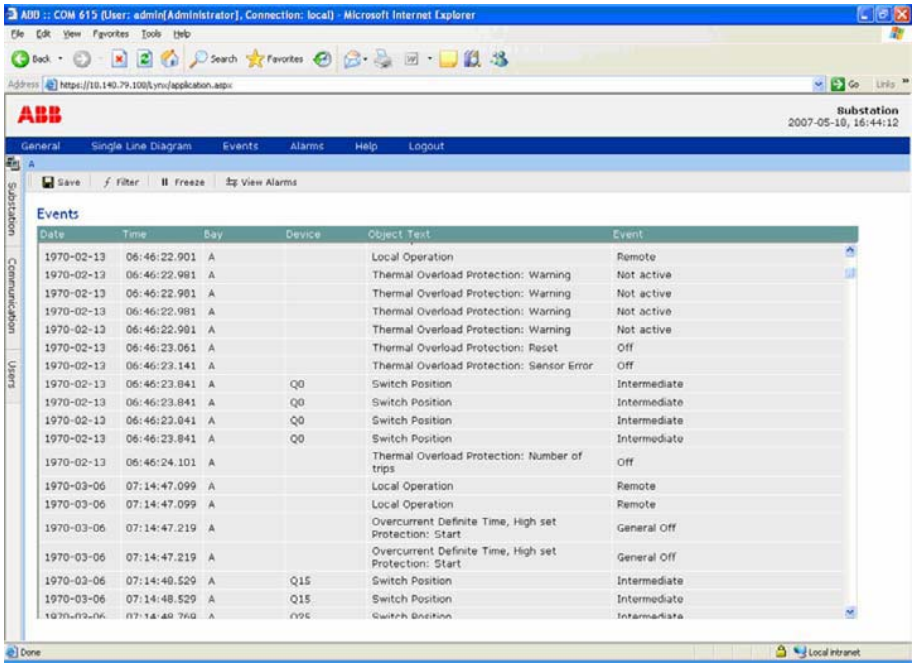
- In the COM 600 web page, click **Alarms** in the title bar. The Alarms page is shown.



A100540

Fig. 4.2.3.-1 COM 600 HMI for Alarms

- Click Events in the title bar. The Events page is shown.

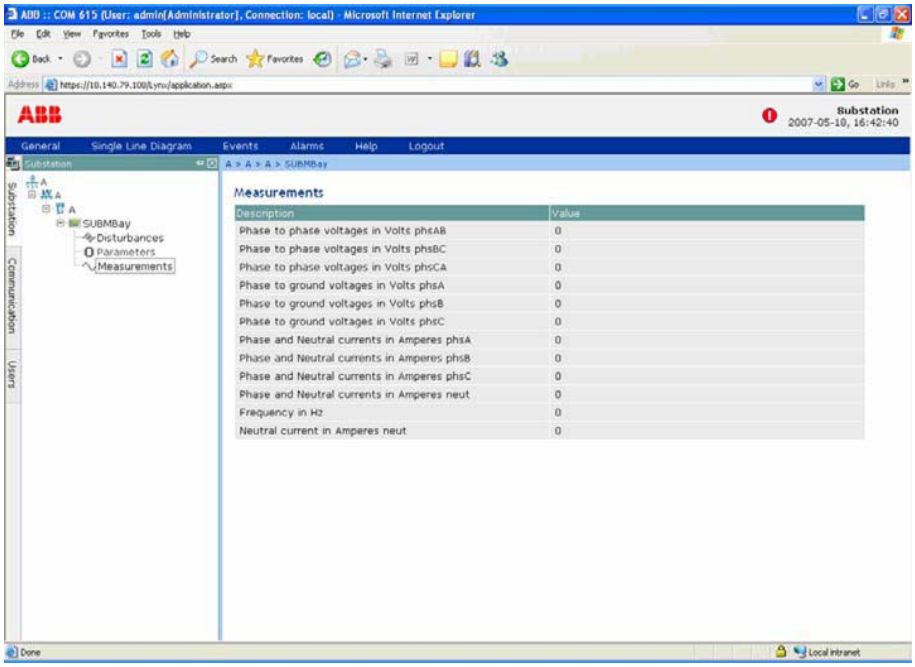


A100542

Fig. 4.2.3.-2 COM 600 HMI for Events

- Click the Measurements subnode which is located under the IED node on the web page.

  The measurement description and value are shown.



A100544

Fig. 4.2.3.-3 COM 600 HMI for measurements

5. Terminology

Term	Description
IED	Intelligent Electronic Device
SA	Substation Automation
COMTRADE – IEEE C37.111–1991 or IEC 60255–24	Specified format for disturbance-related recordings
SCL	Substation Configuration Language
PCM 600	Protection and Control IED Manager 600
PST	Parameter Setting Tool
DR	Disturbance Record
ConnPack	

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