


REF 542plus Connectivity Package

Operational Manual

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Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page	2
			en	A	No. of p.	127

Contents

1. Introduction	8
1.1 General overview	8
1.2 Definitions, Acronyms, and Abbreviations	9
2. Product Overview	9
2.1 Features of the Product.....	10
2.2 Features List	10
2.3 Pre-Requisites and Requirements	10
2.3.1 Hardware Requirements	10
2.3.2 Software Requirements	11
2.3.3 Supported IEDs	11
2.3.4 Logical node mapping for IEDs	11
2.4 Installation.....	16
2.4.1 Pre – Requisites	16
2.4.2 Installation Steps	16
2.4.3 UnInstallation	21
2.5 Intended Audience / Users / Groups	22
3. REF 542plus Connectivity Package Applications	23
3.1 REF 542plus ConnPack Files and Folders	23
3.1.1 Standard ConnPack Folders	23
3.1.2 SCL Tool	27
3.2 REF 542plus object Type Creation	27
3.2.1 Configuring REF 542plus ConnPack in Connectivity Package Manager.....	27
3.2.2 Creating/Managing Projects in PCM 600	28
3.2.3 Creating REF 542plus Object in PCM 600	34
3.3 Communication Wizard.....	37
3.3.1 Working with Communication Wizard.....	37
3.3.2 Working with Communication Structure	41
3.4 SCL Configuration Wizard.....	42
3.4.1 Creating SCL File in SCL Tool	43
3.4.2 Editing Created SCL File	48
3.4.3 Viewing Logical Device in the Communication Structure	52
3.5 SCL File Import/Export.....	54
3.5.1 SCL File Import	54
3.5.2 SCL File Export	59
3.6 Parameter Setting Connectivity Package.....	62
3.6.1 Opening Parameter Setting Tool	63
3.6.2 Reading Parameter from IED	65
3.6.3 Writing Parameter into IED.....	66
3.6.4 Close Parameter Setting Tool	67
3.7 Import ECM.....	68
3.8 Disturbance Handling Connectivity Package	69
3.8.1 Opening Disturbance Handling Tool.....	69
3.8.2 Read Recordings Information.....	70
3.8.3 Read Recordings from IED	72
3.8.4 Delete Record from IED	73
3.8.5 View DR Graph	74
3.8.6 Close DR Tool.....	74
3.9 FTP Upload/Download.....	75
3.9.1 Open FTP Upload/Download tab in SCL Tool.....	75
3.9.2 FTP Download.....	76
3.9.3 FTP Upload	78
3.10 REF 542plus Connectivity Package Error and Exception Handling	80
3.10.1 PCM 600	80
3.10.2 Parameter Setting Connectivity Package	81
3.10.3 Disturbance Handling Connectivity Package.....	82
4. SAB600 Support	82
4.1 RF542plus object Type Creation.....	82

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	en	A	Page
		9ARD170952-009			3
					No. of p.
					127

4.1.1	Configuring REF 542plus ConnPack in Connectivity Package Manager.....	82
4.1.2	Creating/Managing Projects in SAB 600	84
4.1.3	Creating REF 542plus Object in SAB600	90
4.2	Working with SAB600 for REF 542plus.....	93
4.2.1	SCL File Import and Parameter Setting in SAB600.....	93
4.2.2	DR Upload.....	114
4.2.3	Viewing Alarms, Events and Measurements in SAB600	122
5.	Administration & Configurations Details	125
5.1	Parameterization	125
5.2	Application Framework / Product Architecture	125
5.3	User Interface	125
5.4	User Role	125
5.5	Functionality & its Descriptions	126
5.6	Performances, Fine Tuning & Optimizations.....	126
6.	Appendix.....	126
7.	References.....	126
8.	Index.....	127
9.	Revision	127


Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	4
				No. of p.	127

Table of Figures

Figure 2-1 REF 542plus Installer Package Contents-----	17
Figure 2-2 Setup Wizard – Welcome Screen -----	17
Figure 2-3 Setup Wizard – License agreement Screen -----	18
Figure 2-4 Setup-Wizard – Installer Exit confirmation Dialog -----	18
Figure 2-5 Setup-Wizard - Folder Selection Dialog-----	19
Figure 2-6 Setup-Wizard - Installation Confirmation Dialog -----	20
Figure 2-7 Setup-Wizard - Installation Progress Dialog -----	21
Figure 2-8 Setup-Wizard - Installation Complete Dialog -----	21
Figure 2-9 REF 542plus in Add and Remove Programs-----	22
Figure 3-1 Installed folders of REF 542plus ConnPack -----	23
Figure 3-2 Parameter Description Folder Contents -----	24
Figure 3-3 Documents Folder Contents -----	26
Figure 3-4 Icons Folder Contents -----	27
Figure 3-5 Connectivity Package Manager Desktop Icon-----	27
Figure 3-6 Connectivity Package Manager on Programs menu-----	28
Figure 3-7 REF 542plus ConnPack in Update Manager-----	28
Figure 3-8 PCM600 Desktop Icon -----	28
Figure 3-9 PCM600 on Programs Menu -----	29
Figure 3-10 PCM600 without Plant Structure -----	29
Figure 3-11 Open/Manage Project menu -----	30
Figure 3-12 Open/Manage Project Dialog -----	30
Figure 3-13 New project Dialog-----	31
Figure 3-14 Open/Manage Project Dialog with created project -----	31
Figure 3-15 Plant structure with Project Name -----	32
Figure 3-16 Menu Navigation for Region/Substation creation -----	32
Figure 3-17 Menu navigation for Voltage Level creation-----	32
Figure 3-18 Menu navigation for Bay creation-----	33
Figure 3-19 Voltage Level Context menu -----	33
Figure 3-20 Voltage Level Properties -----	33
Figure 3-21 Menu navigation for REF 542plus Creation -----	34
Figure 3-22 Object Type Window -----	35
Figure 3-23 Object window for Feeder Terminal-----	36
Figure 3-24 Plant Structure with REF 542plus object type -----	37
Figure 3-25 REF 542plus Context menu – Communication Wizard Highlighted-----	38
Figure 3-26 Communication Protocol Sélection Page -----	39
Figure 3-27 IEC 61850 Communication Protocol Configuration -----	40
Figure 3-28 Communication Configuration Complete Page-----	41
Figure 3-29 Project Explorer Context menu-----	42
Figure 3-30 Communication Structure – with Sub network-----	42
Figure 3-31 Communication Structure – with REF 542plus Object-----	42
Figure 3-32 REF 542plus Context menu – SCL Configuration Wizard Highlighted-----	43
Figure 3-33 SCL Tool – SCL Generation tab -----	44
Figure 3-34 Mapping of Substation information between PCM600 and Substation Relationship and Time Setting-----	45
Figure 3-35 Generate SCL/ECM - Button-----	46
Figure 3-36 Dialog for User Confirmation to save GUD data -----	46
Figure 3-37 GUD File name Input Dialog box-----	46
Figure 3-38 Progress bar status on creation of SCL file -----	47
Figure 3-39 Information Dialog for Completion SCL File generation-----	47
Figure 3-40 Option Dialog – To view/Import SCL File -----	48
Figure 3-41 Option Dialog – To view/Import SCL File -----	48
Figure 3-42 SCL File Import Tab view -----	49
Figure 3-43 REF 542plus Node Context Menu-----	49
Figure 3-44 REF 542plus Node Context Menu-----	50
Figure 3-45 SCL File Export Dialog in SCL Tool-----	50
Figure 3-46 SCL (Export) File Name save Dialog in SCL Tool-----	50
Figure 3-47 SCL File Export Progress bar in SCL Tool -----	51
Figure 3-48 SCL File Import Option Dialog in PCM 600 -----	51
Figure 3-49 SCL File Import Progress in PCM600 -----	52
Figure 3-50 Imported Protection Functions in PCM 600 -----	52
Figure 3-51 Communication Structure with Imported Logical Devices -----	53


Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	5
				No. of p.	127

Figure 3-52 Logical Device Context Menu-----	53
Figure 3-53 Logical Device Properties-----	54
Figure 3-54 REF 542plus Context menu – Import... verb Highlighted-----	55
Figure 3-55 File Type Information Dialog in SCL File Import-----	56
Figure 3-56 Import Dialog-----	56
Figure 3-57 Possible Import File Types -----	57
Figure 3-58 Import File Dialog with File name-----	57
Figure 3-59 SCL File Import Options in PCM 600-----	57
Figure 3-60 SCL File Import Progress-----	58
Figure 3-61 Communication Structure with Logical Devices-----	58
Figure 3-62 Logical Device Context Menu-----	59
Figure 3-63 Logical Device Properties-----	59
Figure 3-64 REF 542plus Context menu – Export... verb Highlighted -----	60
Figure 3-65 File Type Description in SCL File Export-----	61
Figure 3-66 Export Dialog in SCL File Export-----	61
Figure 3-67 Possible Export File Types -----	61
Figure 3-68 Export Dialog with File Name -----	62
Figure 3-69 Plant Structure with Protection Functions-----	63
Figure 3-70 REF 542plus Context menu – Parameter Setting verb Highlighted-----	64
Figure 3-71 Parameter Setting Tool-----	64
Figure 3-72 Parameter Setting Tool-----	65
Figure 3-73 Inrush Blocking Parameters - Parameter Setting Tool -----	65
Figure 3-74 Selected Max Current Value in Inrush Blocking Parameters-----	65
Figure 3-75 Submenus of IED main menu-----	65
Figure 3-76 Option Dialog for Read Parameters-----	66
Figure 3-77 Submenus of IED main menu-----	66
Figure 3-78 Option Dialog for Write Parameters -----	67
Figure 3-79 PST – Close Button -----	67
Figure 3-80 PST Save Dialog box -----	67
Figure 3-81 ECM Import-----	68
Figure 3-82 ECM Import Dialog -----	69
Figure 3-83 ECM Imported -----	69
Figure 3-84 REF 542plus Context menu – Disturbance Handling verb Highlighted -----	70
Figure 3-85 Disturbance Handling Tool -----	70
Figure 3-86 Context menu in DHT. -----	71
Figure 3-87 Available DR Records in IED -----	71
Figure 3-88 Available DR Records in IED -----	72
Figure 3-89 DR Record Details of All Records-----	72
Figure 3-90 DR - Delete Recordings -----	73
Figure 3-91 DR - Delete Recordings from IED-----	73
Figure 3-92 DR - Delete Recordings from local folder-----	74
Figure 3-93 Create Report Button in Toolbar -----	74
Figure 3-94 DR Tool – Close Button Highlighted -----	74
Figure 3-95 REF 542plus Context menu – FTP Upload/Download verb Highlighted-----	75
Figure 3-96 FTP Download/Upload Tab in SCL Tool-----	76
Figure 3-97 Browse For Folder Dialog in FTP Download-----	77
Figure 3-98 FTP Download – Displaying IP Address -----	77
Figure 3-99 FTP Download – Displaying IP Address -----	78
Figure 3-100 Information Message to Confirm the FTP Download-----	78
Figure 3-101 Information Message to confirm FTP Upload -----	79
Figure 3-102 Information Dialog when no Communication and IED ConnPack-----	80
Figure 3-103 Information Dialog when no Communication ConnPack -----	80
Figure 3-104 Information Dialog when no IED ConnPack -----	81
Figure 3-105 Delete Not Allowed - Error Message -----	81
Figure 3-106 Time out Error Message-----	81
Figure 3-107 Invalid Format Error Message-----	82
Figure 3-108 Value Not in Range Error Message-----	82
Figure 3-109 Communication Error Message in DR -----	82
Figure 4-1 Update Manager Desktop Icon-----	83
Figure 4-2 Connectivity Package Manager on Programs menu-----	83
Figure 4-3 Connectivity Package Manager-----	83
Figure 4-4 REF 542plusConnectivity Package Manager-----	84



Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	6
				No. of p.	127

Figure 4-5 SAB600Desktop Icon-----	84
Figure 4-6 SAB600on Programs Menu-----	85
Figure 4-7 SAB 600-----	85
Figure 4-8 Open/Manage Project menu-----	86
Figure 4-9 Open/Manage Project Dialog-----	86
Figure 4-10 New project Dialog-----	87
Figure 4-11 Open/Manage Project Dialog with created project -----	87
Figure 4-12 Communication structure with Project Name -----	88
Figure 4-13 Menu Navigation for Gateway creation-----	88
Figure 4-14 Menu navigation for IEC61850 OPC Server creation-----	89
Figure 4-15 Menu navigation for IEC 61850 Subnetwork-----	90
Figure 4-16 Menu navigation for REF 542plus Creation-----	90
Figure 4-17 Object Type Window-----	91
Figure 4-18 Object Type window for Feeder Terminal-----	92
Figure 4-19 Communication Structure with REF 542plus object type -----	93
Figure 4-20 REF 542plus Context menu – SCL Import... verb Highlighted-----	94
Figure 4-21 SCL Import Dialog-----	95
Figure 4-22 SCL File selection to Import-----	96
Figure 4-23 Import File Information in SCL File Import-----	97
Figure 4-24 Select Substation Information Dialog for Substation Name -----	97
Figure 4-25 Select Substation Information Dialog for Voltage Level-----	98
Figure 4-26 Select Substation Information Dialog for Bay -----	98
Figure 4-27 REF 542 Plus Properties-----	99
Figure 4-28 REF 542plus Properties-----	100
Figure 4-29 Select Parameters-----	101
Figure 4-30 Set SPA Address-----	102
Figure 4-31 SAB600Properties menu-----	102
Figure 4-32 Set IP Address of Gateway (SAB 600)-----	103
Figure 4-33 Select Management Information Dialogue-----	103
Figure 4-34 Management Information Dialog-----	104
Figure 4-35 Update Configuration using Management Information Dialog-----	105
Figure 4-36 Reload Configuration using Management Information Dialog-----	106
Figure 4-37 Update and Reload Configuration using Management Information Dialog-----	107
Figure 4-38 Open SAB600web HMI-----	108
Figure 4-39 Username and Password Information -----	109
Figure 4-40 SAB600HMI -----	110
Figure 4-41 Enable Write Information-----	111
Figure 4-42 Set Parameter's value -----	112
Figure 4-43 Write to IED-----	113
Figure 4-44 Refresh the values-----	113
Figure 4-45 Read the parameters-----	114
Figure 4-46 REF 542plus Object Type Properties -----	115
Figure 4-47 DR Related Properties-----	115
Figure 4-48 SAB600Properties menu-----	116
Figure 4-49 Set IP Address of Gateway (SAB 600)-----	116
Figure 4-50 Select Management Information Dialog -----	117
Figure 4-51 Management Information Dialog-----	118
Figure 4-52 Open SAB600web HMI-----	119
Figure 4-53 Username and Password Information -----	120
Figure 4-54 SAB600HMI -----	121
Figure 4-55 Dialog to confirm DR File save -----	121
Figure 4-56 Dialog to Save the DR File-----	122
Figure 4-57 SAB600 HMI for Alarms -----	123
Figure 4-58 SAB600 HMI for Events -----	124
Figure 4-59 SAB600 HMI for Measurements-----	125

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	7
				No. of p.	127

1. Introduction

1.1 General overview

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

The intent of this document is to bring out the REF 542plus Connectivity Package features and the user related activity needed to interact with the REF 542plus Connectivity Package in order to communicate 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 un-installation of REF 542plus Connectivity packages.

[Communication Wizard](#)

This section describes the functionality description of the Communication Wizard.

[SCL Configuration Wizard](#)

This section describes the functionality description of the SCL Configuration Wizard.

[SCL File import and Export](#)


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

[Parameter Setting ConnPack](#)

This section describes the functionality description of the Parameter Setting Connectivity Package.

[Disturbance Handling ConnPack](#)

This section describes the functionality description of the Disturbance Handling Connectivity Package.


Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	9ARD170952-009	Lang.	Rev. ind.	Page	8
		en	A	No. of p.	127

1.2 Definitions, Acronyms, and Abbreviations

<u>Term/Abbreviation</u>	<u>Description</u>
IED	Intelligent Electronic Device
PCM600	Protection and Control IED Manager 600
SA	Substation Automation
PST	Parameter Setting Tool
COMTRADE	IEEE C37.111-1991 or IEC 60255-24 Specified format for disturbance related recordings
DR	Disturbance Record
SCL	Substation Configuration Language
ConnPack	Connectivity Package
ICD	I(ED) C(ability) D(escription), type of SCL file
IEC	International Electrotechnical Commission
IEC61850	Standard for Communications and Networks in Substation Automation
IED	Intelligent Electronic Device Devices containing advanced measurement, protection and control functionality based on digital signal processors such as meters, relays and trip units. In this article IED means a physical IEC 61850 device that behaves as its own communication node in the IEC 61850 protocol.
IP	Internet Protocol

2. Product Overview

REF 542plus Connectivity Packages will contain REF 542plus IED specific support in PCM 600&SAB600-CET and their tool components. The PCM600/SAB600-CET, in this case, will be the user of the ConnPacks.

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	9
				No. of p.	127

2.1 Features of the Product

- The project involves creation of connectivity packages for REF 542plus IEDs to various PCM600 & SAB600-CET components.
 - Transparent SPA (SPA over TCP-IP) will be used for communication between PCM600 and REF 542plus.
 - FTP protocol will be used to get the COMTRADE file from the REF 542plus.
- The above set of PCM component tools will be released to be used with REF 542plus release 3.0 and Ethernet board 3.0 SP1.

2.2 Features List

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

- Object Type
- Configuration Wizard (CW) – to prepare 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 Handling Tool (DHT) – to access REF 542plus fault recordings

Out of the above, the PST and DHT are online tools which require connectivity between PCM600 Version 2.4 and REF 542plus.

2.3 Pre-Requisites and Requirements

2.3.1 Hardware Requirements

Minimum Specification

Windows XP SP2

Pentium 3, 500 MHz

128 MB RAM

40 MB disk space


Recommended Specification

Windows XP SP2 /Windows7

Pentium 4 2.4 GHz

512 MB RAM

50 MB of Free Disk Space

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	10
		en	A	No. of p.	127

2.3.2 Software Requirements

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

1. .Net Framework 2.0
2. PCM600 version 2.4 SAB600-CET Version 3.5.
3. IEC 61850 Connectivity Package

2.3.3 Supported IEDs

Supported system products, protocols and tools for medium voltage IED Connectivity Package.

REF 542plus Connectivity Package
Protection and Control IED Manager PCM600 Version 2.4
Station Automation Build SAB600Version 3.5
MicroSCADA ProSYS 600 Version 9.0 or later

2.3.4 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 IED configuration into SCL file (.CID/.ICD). When the SCL file is imported, for example, to Communication Engineering Tool (CET) for SAB600/MicroSCADA, one can observe the logical devices (LD) and logical nodes (LN) configured in the REF 542plus SCL file.


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 maximum 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, refer section 7.5. 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.

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




Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	11
				No. of p.	127


<u>Description as per IEC61850-7-4</u>	<u>LN Prefix</u>	<u>LN Class)</u>	<u>LN Instance number</u>	<u>Description of REF 542plus function</u>
<u>Ethernet Board</u>				
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
<u>REF 542plus</u>				
Logical node zero		LLN0		Logical node zero
Physical device information		LPHD	1	Physical device information
Control set Information	ACTSET	GGIO	80	Set1/Set2 Selection
<u>REF 542plus Measurands</u>				
Measurement	UI	MMXU	1,2	
<u>REF 542plus Protections</u>				
Instantaneous overcurrent	INRB	PIOC	50	Inrush Blocking
Generic process I/O	INRB	GGIO	50	Inrush Blocking
Instantaneous overcurrent	INRH	PIOC	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 Directional,

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	12
				No. of p.	127

				High Set
Generic process I/O	DHOI	GGIO	54	Overcurrent Directional, High Set
Time overcurrent	DIRL	PTOC	55	Overcurrent Directional, Low Set
Generic process I/O	DLOI	GGIO	55	Overcurrent Directional, 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
<u>Description as per IEC61850-7-4</u>	<u>LN Prefix</u>	<u>LN Class)</u>	<u>LN Instance number</u>	<u>Description of REF 542plus function</u>
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	Earthfault Non Directional, High Set
Generic process I/O	EFNDH	GGIO	66	Earthfault Non Directional, High Set
Time overcurrent	EFNDL	PTOC	67	Earthfault Non Directional, Low Set
Generic process I/O	EFNDL	GGIO	67	Earthfault Non Directional, Low Set
Time overcurrent	EFINV	PTOC	68	Earthfault IDMT Normal Inverse
Generic process I/O	EFIOI	GGIO	68	Earthfault IDMT Normal Inverse
Time overcurrent	EFINV	PTOC	69	Earthfault IDMT Very Inverse
Generic process I/O	EFIOI	GGIO	69	Earthfault IDMT Very Inverse
Time overcurrent	EFINV	PTOC	70	Earthfault IDMT Very Inverse
Generic process I/O	EFIOI	GGIO	70	Earthfault IDMT Very Inverse
Time overcurrent	EFINV	PTOC	71	Earthfault IDMT Long time Inverse
Generic process I/O	EFIOI	GGIO	71	Earthfault IDMT Long time Inverse

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	13
				No. of p.	127

Time overcurrent	EFDH	PTOC	72	Earthfault Directional, High Set
Generic process I/O	EFDH	GGIO	72	Earthfault Directional, High Set
Time overcurrent	EFDL	PTOC	73	Earthfault Directional, High Set
Generic process I/O	EFDL	GGIO	73	Earthfault Directional, High Set
Sensitive directional earth fault	EFD	PSDE	88	Sensitive Earthfault Directional
Sensitive directional earth fault	EFD	GGIO	88	Sensitive Earthfault Directional
Time overcurrent	EFD	PTOC	190-199	Earthfault Directional Sector
Generic process I/O	EFDI	GGIO	190-199	Earthfault 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
<u>Description as per IEC61850-7-4</u>	<u>LN Prefix</u>	<u>LN Class)</u>	<u>LN Instance number</u>	<u>Description of REF 542plus function</u>
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

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	14
				No. of p.	127

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
Motor restart inhibition	MSTUP	PMRI	80	Motorstart Protection
Generic process I/O	MSTUP	GGIO	80	Motorstart Protection
Motor starting time supervision	RBLK	PMSS	86	Blocked 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
<u>Description as per IEC61850-7-4</u>	<u>LN Prefix</u>	<u>LN Class)</u>	<u>LN Instance number</u>	<u>Description of REF 542plus function</u>
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
Thermal overload	FRQS	PTOF	84	Frequency Supervision
Generic process I/O	FRQS	GGIO	84	Frequency Supervision
Synchronism-check or synchronising	SCHK	RSYN	85	Synchro Check
Time overcurrent	SRSNC	PTOC	89	Switching Resonance
Generic process I/O	SRSNC	GGIO	89	Switching Resonance
Generic process I/O	HHRM	GGIO	93	High Harmonic
Generic process I/O	FRN1	GGIO	150-155	Frequency Protection Net1
Generic process I/O	FRN2	GGIO	160-165	Frequency Protection Net2
Autoreclosing	ARCL	RREC	250	Auto Reclose 2
Generic process I/O	ARCL	GGIO	250	Auto Reclose 2
Protection Trip Conditioning	BR	PTRC	98	Protection Trip Conditioning

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	15
				No. of p.	127

<u>REF 542plus Primary Switches</u>				
Interlocking	Circuit Breaker = CB, Disconnecter = DCO, Earthing Switch = ESW	CILO	Same as SPA channel number	
Switch controller	Circuit Breaker = CB, Disconnecter = DCO, Earthing Switch = ESW	CSWI	Same as SPA channel number	
Circuit breaker	Circuit Breaker = CB	XCBR	Same as SPA channel number	
Circuit switch	Disconnecter = DCO, Earthing Switch = ESW	XSWI	Same as SPA channel number	
<u>REF 542plus General Status and Control</u>				
Generic process I/O	To be filled up using user inputs	GGIO	Same as SPA channel number	

2.4 Installation

2.4.1 Pre – Requisites


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

- 1 .Net Framework 2.0/3.5
2. PCM600 version 2.3/2.4 and SAB600-CET Version 3.5 or COM600 version3.2

2.4.2 Installation Steps

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

1. The “REF 542plus Connectivity Package” installation package has the following two items.

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	16
				No. of p.	127

Name	Size
ABB REF542plus Connectivity Package Ver. 3.0.msi	23,101 KB

Figure 2-1 REF 542plus Installer Package Contents

2. Start the .msi file.
3. The ABB REF542plus Connectivity Package Ver. 3.0 installation dialog box opens.

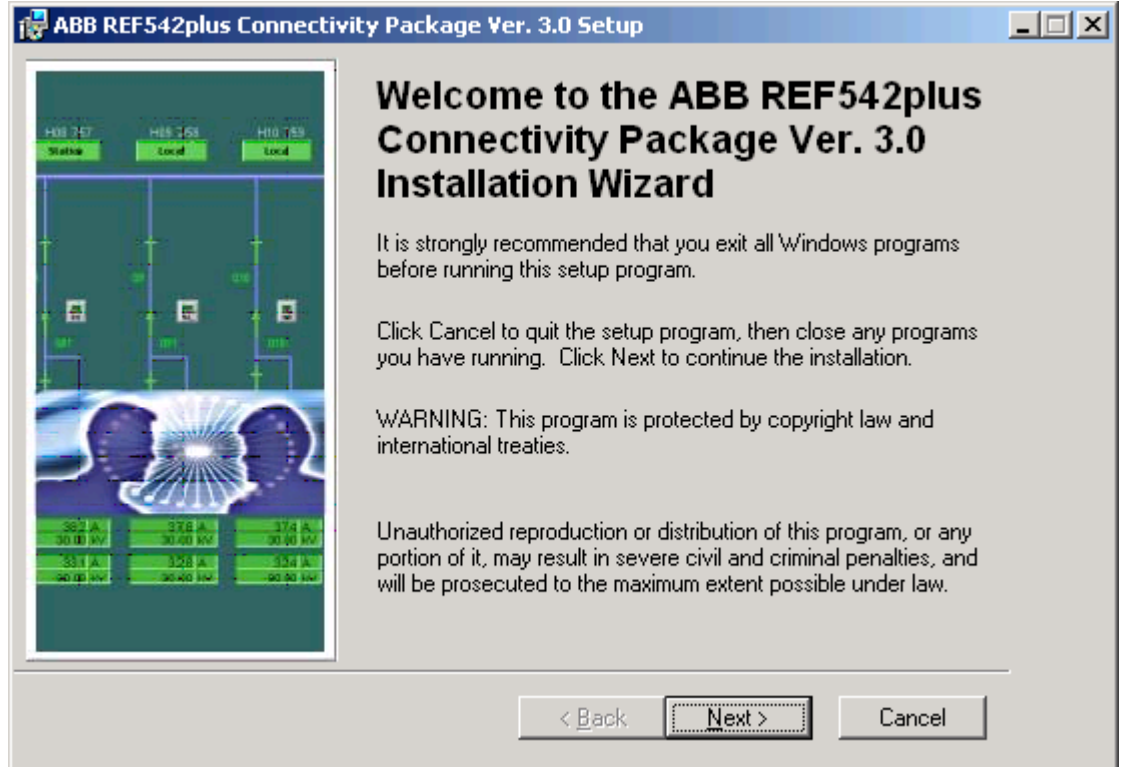



Figure 2-2 Setup Wizard – Welcome Screen

4. Click next to go to next dialog box

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	17
		en	A	No. of p.	127

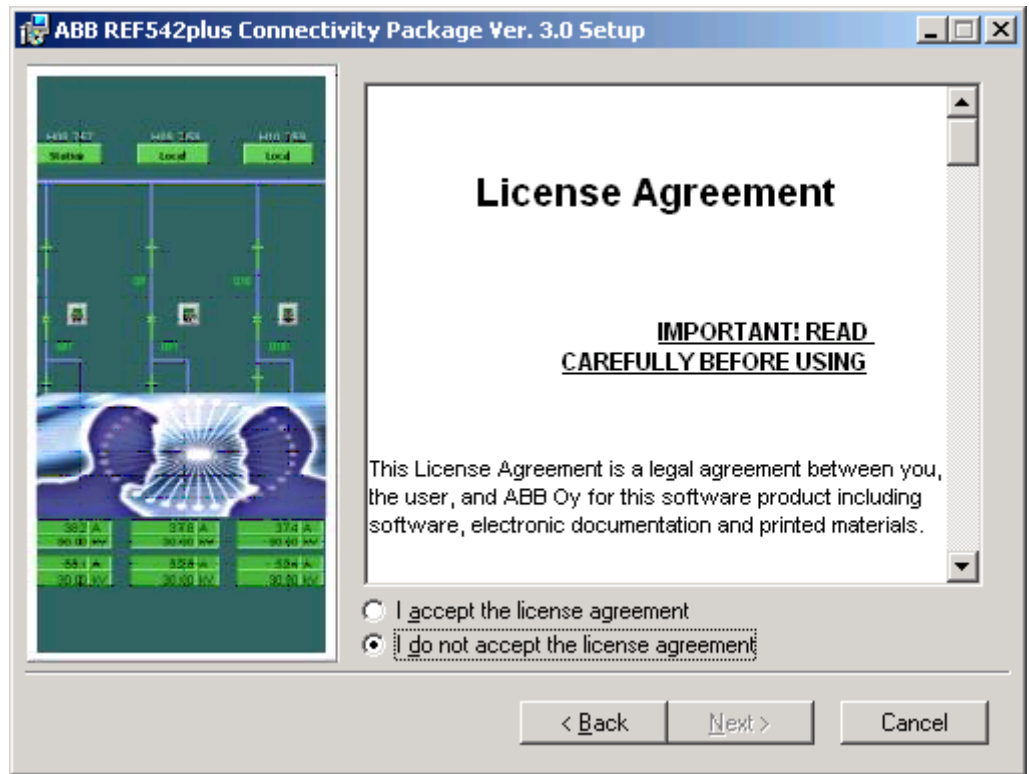


Figure 2-3 Setup Wizard – License agreement Screen

5. Click **Exit SetUP** to exit the installation from any dialog box during installation.

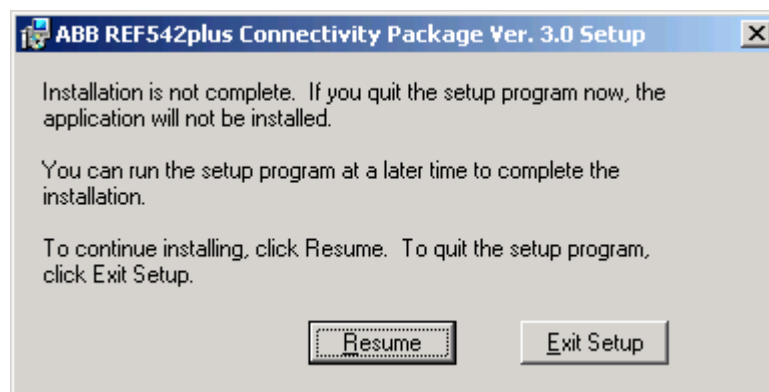


Figure 2-4 Setup-Wizard – Installer Exit confirmation Dialog

6. Click '**Resume**' in the cancel confirmation dialog box to continue the installation.
7. Accept the license agreement for continue the installation
8. Click next to go to next dialog box.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	18
				No. of p.	127

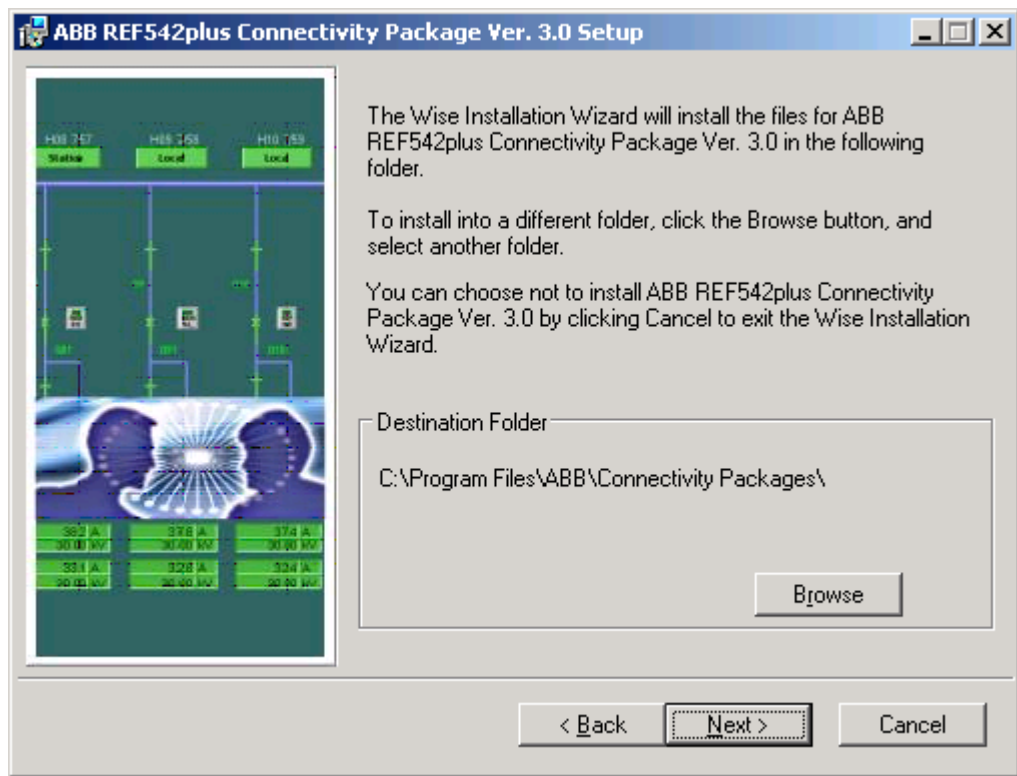


Figure 2-5 Setup-Wizard - Folder Selection Dialog

9. Selected folder name in which the REF542plus ConnPack Application is to be installed will come. Use Browse button to select the different folder name. Otherwise click next to continue
10. Click **Next** to go to next page to confirm the installation.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	19
				No. of p.	127

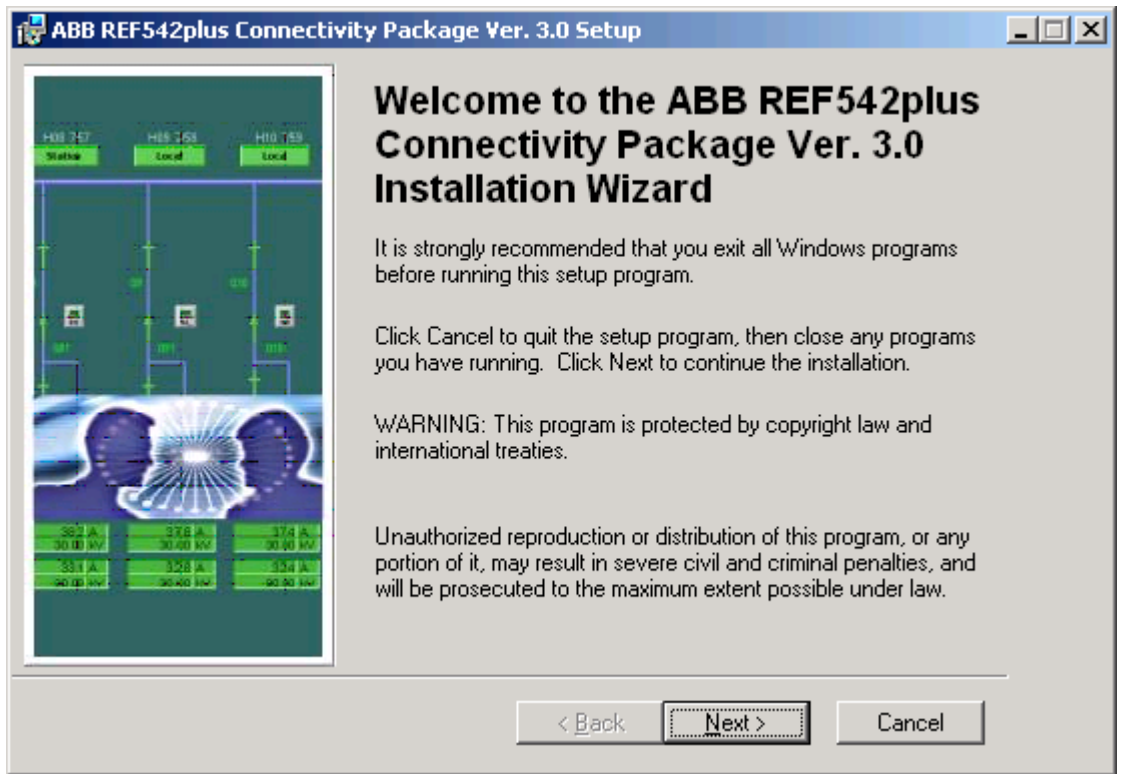
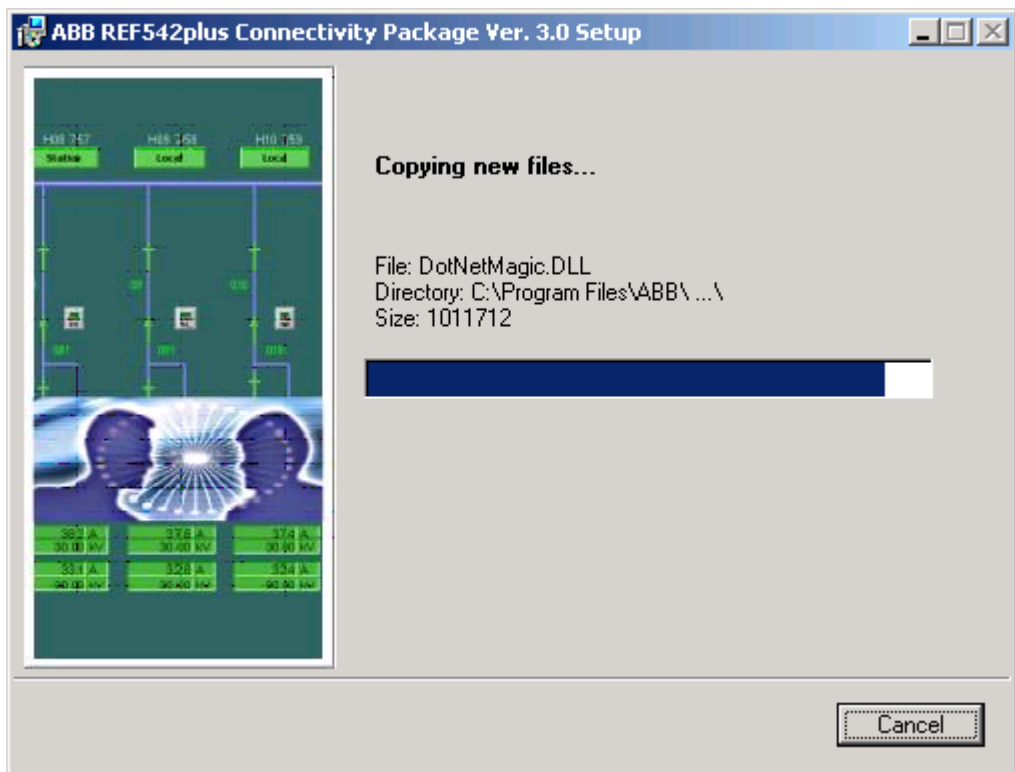


Figure 2-6 Setup-Wizard - Installation Confirmation Dialog

- Click **Next** to confirm the installation. Progress of the installation is displayed.



Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	20
				No. of p.	127

Figure 2-7 Setup-Wizard - Installation Progress Dialog

- After the installation of the REF 542plus Connectivity Package, Installer displays the “Installation Complete” dialog box.



Figure 2-8 Setup-Wizard - Installation Complete Dialog


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

2.4.3 UnInstallation

Uninstalling of the REF 542plus Connectivity Package is same as that for any standard windows application

The un-installation steps are given below:

- Open the “**Add and Remove Programs**” dialog by selecting **Start > Settings > Control Panel > Add or Remove Programs** in the Windows task bar.

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	21
				No. of p.	127

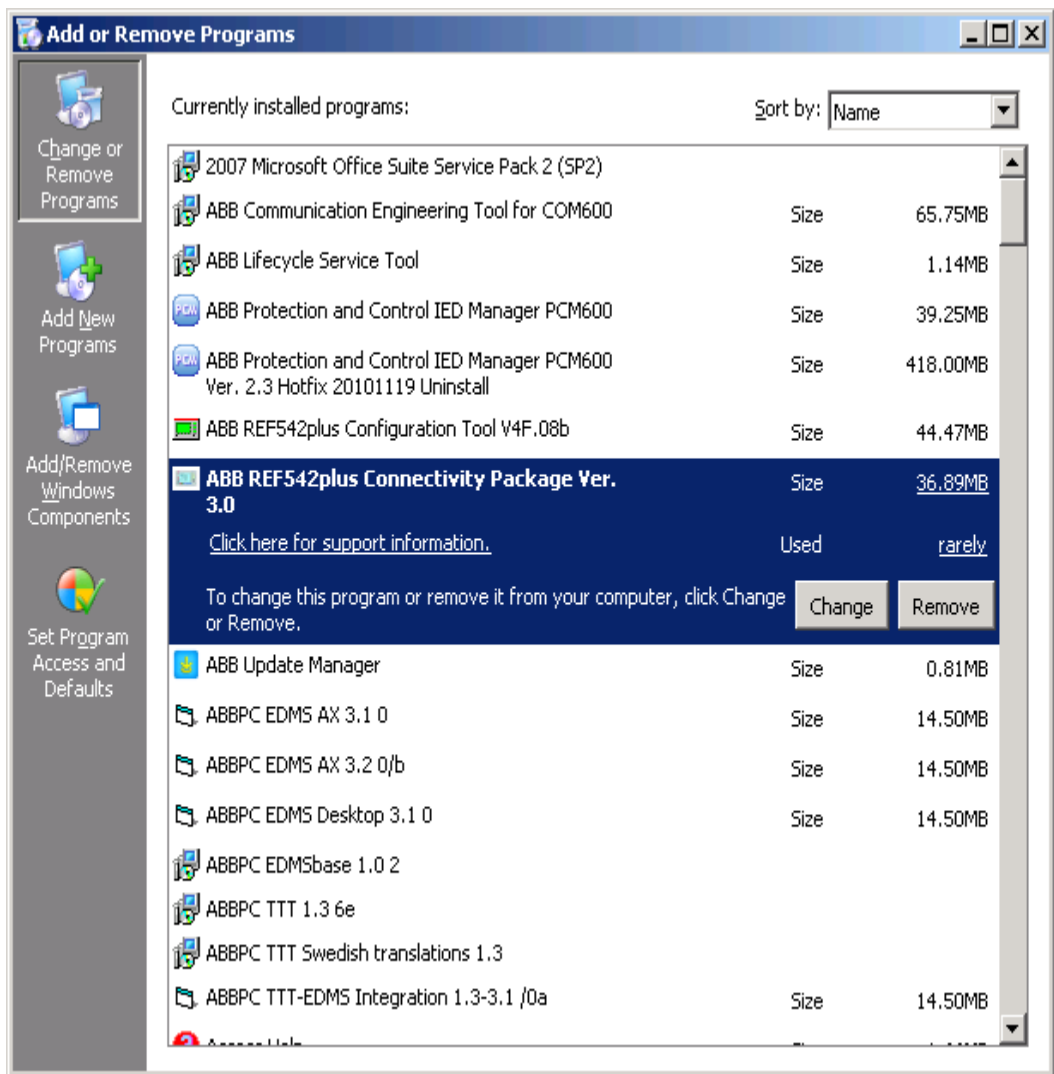



Figure 2-9 REF 542plus in Add and Remove Programs

2. Select the REF 542plus Connectivity Package and click **Remove**. All the installed items from installed folder will be removed after un-installation for the REF542plus ConnPack.

2.5 Intended Audience / Users / Groups

This document is intended to explain complete user interaction and the functionality of the REF 542plus Connectivity Package.

This is mainly used by the Operator who intended to use the PCM600 Version 2.4 SAB600-CET and the standard tools to interact with REF 542plus. The next section describes the user interactions that are required for operating standard/REF 542plus specific tools of PCM600.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	22
		en	A	No. of p.	127

3. REF 542plus Connectivity Package Applications

3.1 REF 542plus ConnPack Files and Folders

It is important to know of some critical folders and files that get installed by the REF 542plus Connectivity Package installer.

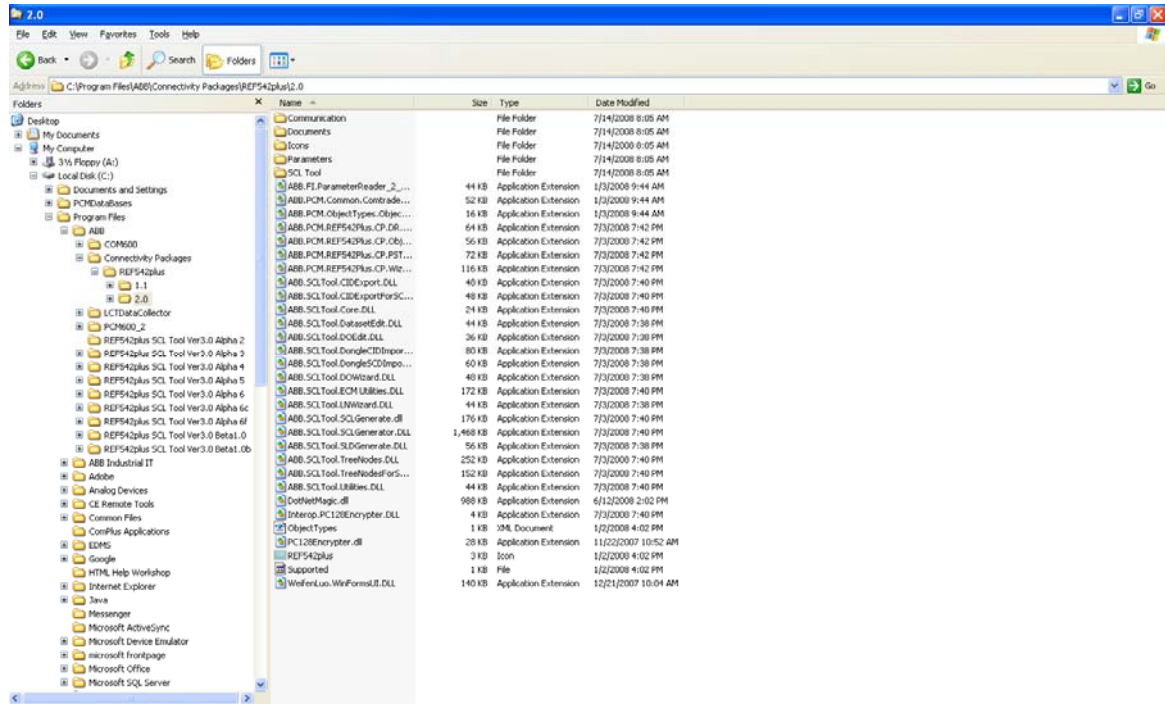


Figure 3-1 Installed folders of REF 542plus ConnPack


3.1.1 Standard ConnPack Folders

It contains the type data files and other required configuration files/folders for REF 542plus Connectivity Packages. These folders are standard folders for any Connectivity Package.

3.1.1.1 Parameter Description

It contains the XML files corresponding to the protection functions that are available in the REF 542plus. These files are called as “PST Type data” which are used to display the parameters for a particular protection function.

Each protection function has a corresponding resource file that will be used to pick up the parameter details (like name and etc) for language handling purpose. This folder contains sub folders for having resource files as per language that is been supported in REF 542plus.

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	23
				No. of p.	127

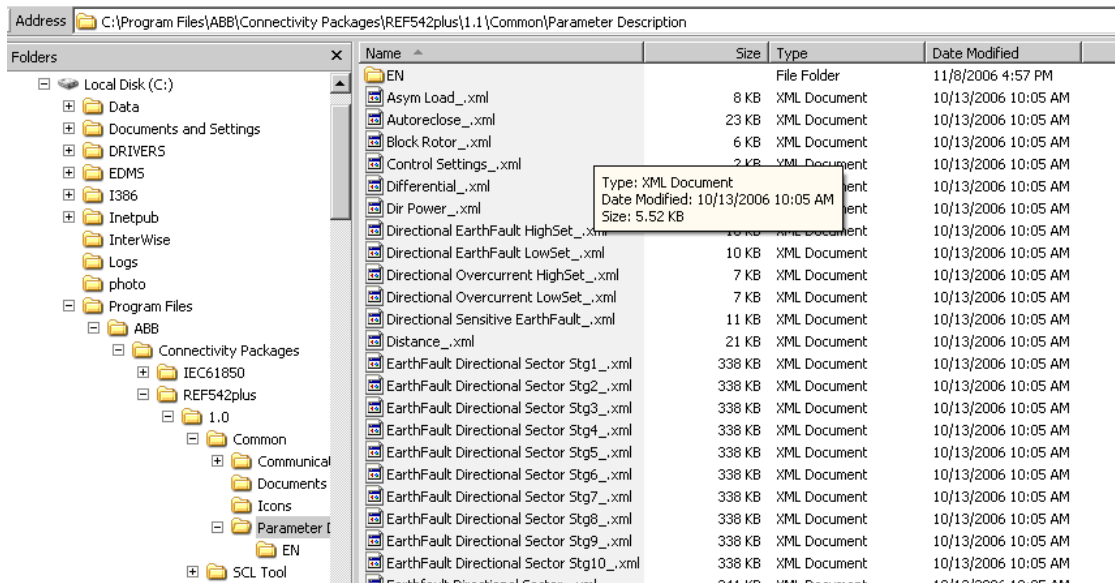




Figure 3-2 Parameter Description Folder Contents

The following table shows the protection function names and their corresponding xml file.

SNo	Type	File name	Functional Group		
1	Current protection functions	Inrush_.xml	Inrush blocking		
		Inrush Harmonic_.xml	Inrush harmonic		
		Overcurrent Instantaneous_.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	Earthfault non-directional, high set		
		Directional EarthFault LowSet_.xml	Earthfault non-directional, low set		
		IDMT EarthFault_.xml	Earthfault IDMT Normal Inverse		
		IDMT EarthFault_.xml	Earthfault IDMT Very Inverse		
		IDMT EarthFault_.xml	Earthfault IDMT Extremely Inverse		
		IDMT EarthFault_.xml	Earthfault IDMT Long time Inverse		
		EarthFault HighSet_.xml	Earthfault directional, high set		
		EarthFault LowSet_.xml	Earthfault directional, low set		
		Directional Sensitive EarthFault_.xml	Sensitive Earthfault directional		
Earthfault Directional Sector_.xml	Earthfault directional sector				
Directional Overcurrent Stg1_	Directional Overcurrent				
Directional Overcurrent Stg2_	Directional Overcurrent				
Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009		Lang.	en
		Page	24		Rev. ind.
No. of p.			127		

		Directional Overcurrent Stg3_	Directional Overcurrent
		Directional Overcurrent Stg1_	Directional Overcurrent
		Directional Overcurrent Stg1_	Directional Overcurrent
		Directional Overcurrent Stg1_	Directional Overcurrent
		Directional Overcurrent Stg1_	Directional Overcurrent
		Directional Overcurrent Stg1_	Directional Overcurrent
		EarthFault Directional Stg1	EarthFault Directional
		EarthFault Directional Stg2	EarthFault Directional
		EarthFault Directional Stg3	EarthFault Directional
		EarthFault Directional Stg4	EarthFault Directional
		EarthFault Directional Stg5	EarthFault Directional
		EarthFault Directional Stg6	EarthFault Directional
		EarthFault Directional Stg7	EarthFault Directional
		EarthFault Directional Stg8	EarthFault 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	EarthFault Non Directional
		EarthFault Non Directional Stg2	EarthFault Non Directional
		EarthFault Non Directional Stg3	EarthFault Non Directional
		EarthFault Non Directional Stg4	EarthFault Non Directional
		EarthFault Non Directional Stg5	EarthFault Non Directional
		EarthFault Non Directional Stg6	EarthFault Non Directional
		EarthFault Non Directional Stg7	EarthFault Non Directional
		EarthFault Non Directional Stg8	EarthFault 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 LowSet_.xml	Residual overvoltage definite time low
3	Motor protection function	Thermal Overload_.xml	Thermal Overload
		Motor Start_.xml	Motorstart protection
		Block Rotor_.xml	Blocked rotor protection
		Nr Starts_.xml	Number of Starts

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	25
				No. of p.	127

4	Differential protection function	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	Synchro Check
		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
		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		
5	Autoreclose	Autoreclose_.xml	Autoreclose

3.1.1.2 Documents

This folder has documents that are related to REF 542plus. Presently it contains “REF 542plus-Protection Manual” & “REF 542plus- Operational Manual”.

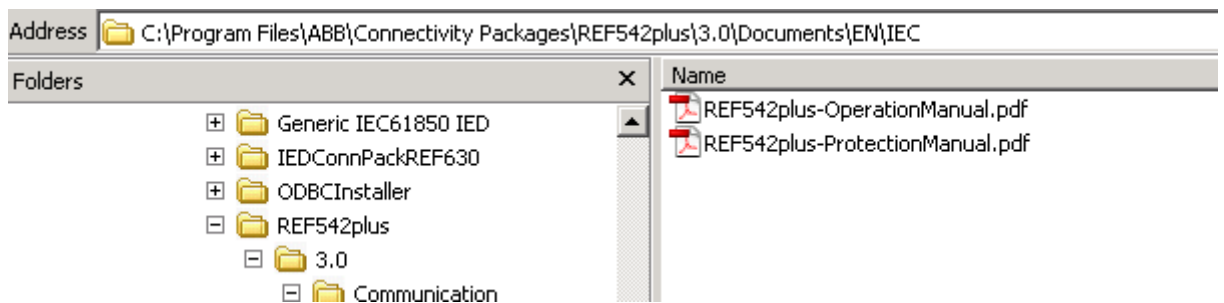



Figure 3-3 Documents Folder Contents

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	9ARD170952-009	Lang.	Rev. ind.	Page	26
		en	A	No. of p.	127

3.1.1.3 Icons

This folder has the REF 542plus icon that is been used to display REF 542plus Object Type Icon in PCM600.

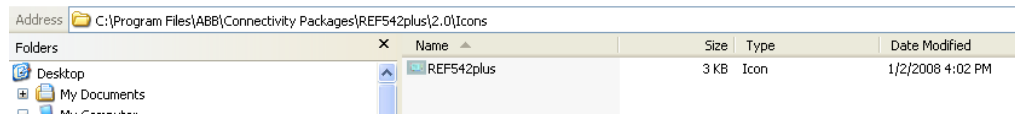


Figure 3-4 Icons Folder Contents

3.1.1.4 Communication Description

It has files that are needed for IEC61850 communication.

3.1.2 SCL Tool

This folder has all the files/folders that are required to create SCL files. Please refer the SCL Tool user manual (Reference: 4) for further details.

3.2 REF 542plus object Type Creation

After the installation of REF 542plus Connectivity Packages, the following steps needs to be performed to enable the creation of REF 542plus object type in PCM 600.This REF 542plus object type is required for invoking the standard tools of PCM600.

3.2.1 Configuring REF 542plus ConnPack in Connectivity Package Manager

The REF 542plus Connectivity package in Connectivity Package manager needs to be configured or enabled to work with REF 542plus object type in PCM 600.

- Close the PCM600 application if it is has been opened.
- Open the Connectivity Package Manager by double clicking on the Connectivity Package Manager shortcut on the desktop (or) clicking on Start -> Programs→ ABB→Update Manager → Update Manager.

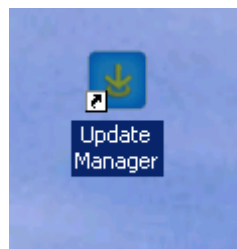



Figure 3-5 Connectivity Package Manager Desktop Icon

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	27	
					No. of p.	127

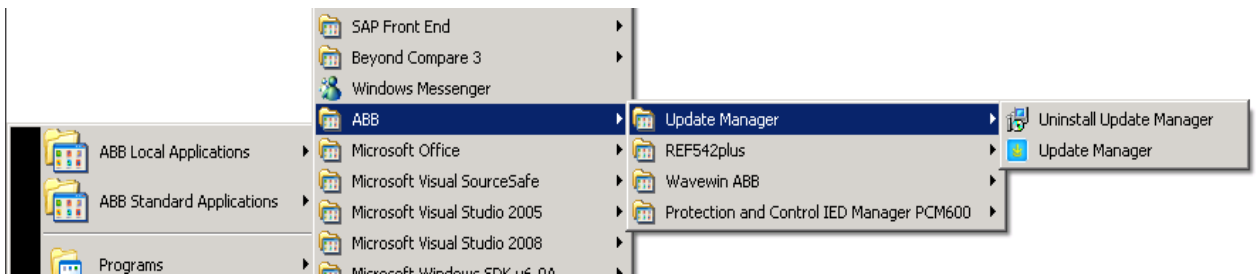


Figure 3-6 Connectivity Package Manager on Programs menu

- Observe that the Update Manager opens.

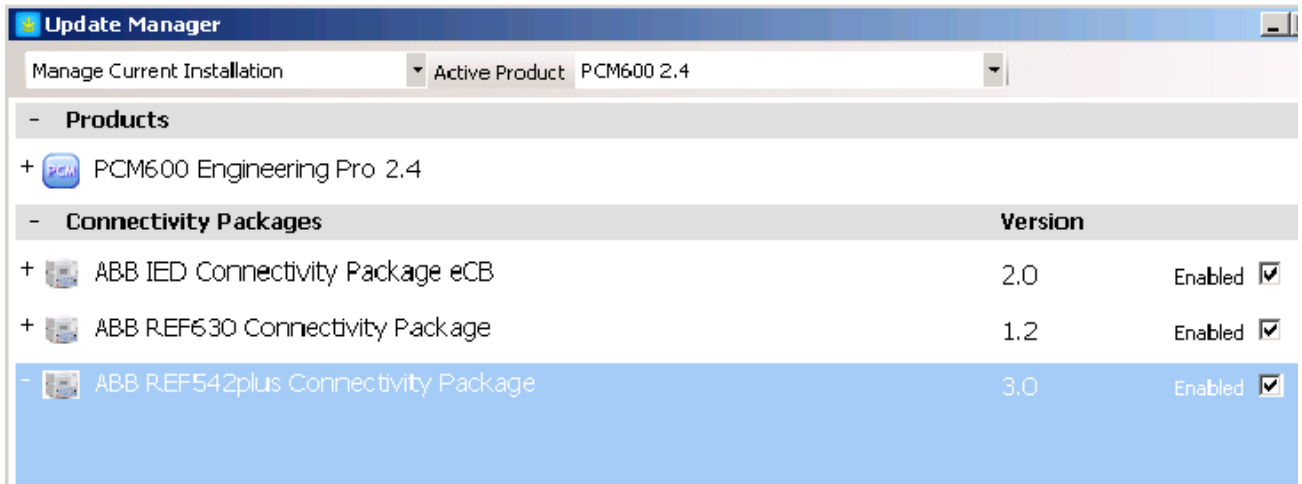


Figure 3-7 REF 542plus ConnPack in Update Manager

- Expand the “REF 542plus Connectivity Package” node by clicking on the node.
- Check the 3.0 version check box to enable REF 542plus connectivity package in PCM600. (Suppose it is not enabled / checked; the user can’t create the REF 542plus Object type in PCM 600.)
- Close the Update manager by clicking on Close symbol.

3.2.2 Creating/Managing Projects in PCM 600


Use existing/new project of PCM600 to create the REF 542plus object type in PCM600. Follow the steps to manage a project in PCM600.

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



Figure 3-8 PCM600 Desktop Icon

- PCM600 can also be opened from Start → Programs → ABB → Protection and Control IED Manager PCM600 → PCM600.

Doc Kind	User Manual	Project ID	INP.9598				
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	en	Rev. ind.	A	Page	28
						No. of p.	127

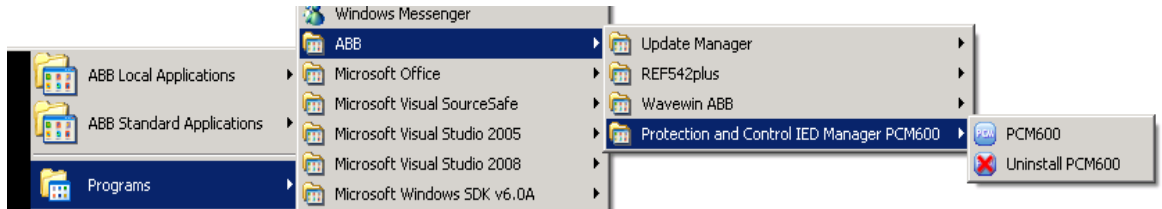


Figure 3-9 PCM600 on Programs Menu

- Observe that PCM600 screen appears. Suppose PCM600 has any opened project, it shows the plant structure of that project. Otherwise it shows empty contents like the below screen.

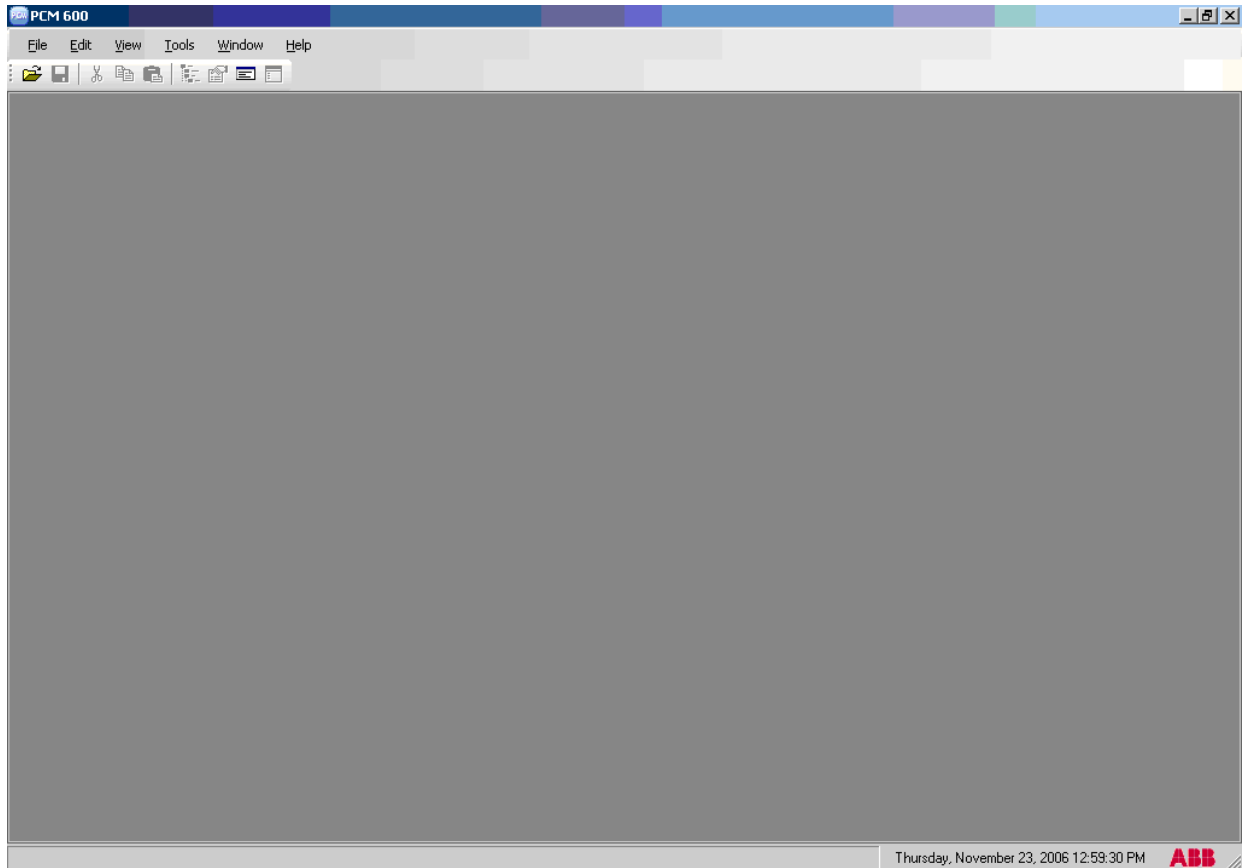



Figure 3-10 PCM600 without Plant Structure

- Open File→Open/Manage project to create a new or managing an existing project.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

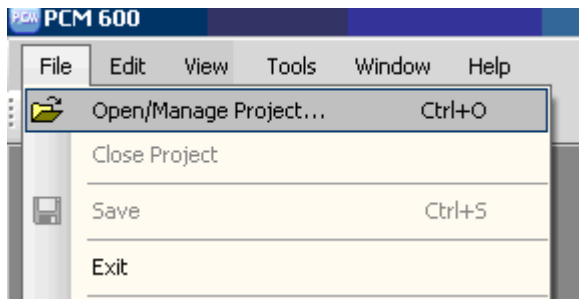


Figure 3-11 Open/Manage Project menu

- Observe that “Open/Manage Project” dialog appears. This dialog is used to do the following operations
 - Creating New project
 - Deleting a project
 - Importing a project
 - Exporting a project
 - Opening a project

In the following section, we will see how to create a project or open an existing project.

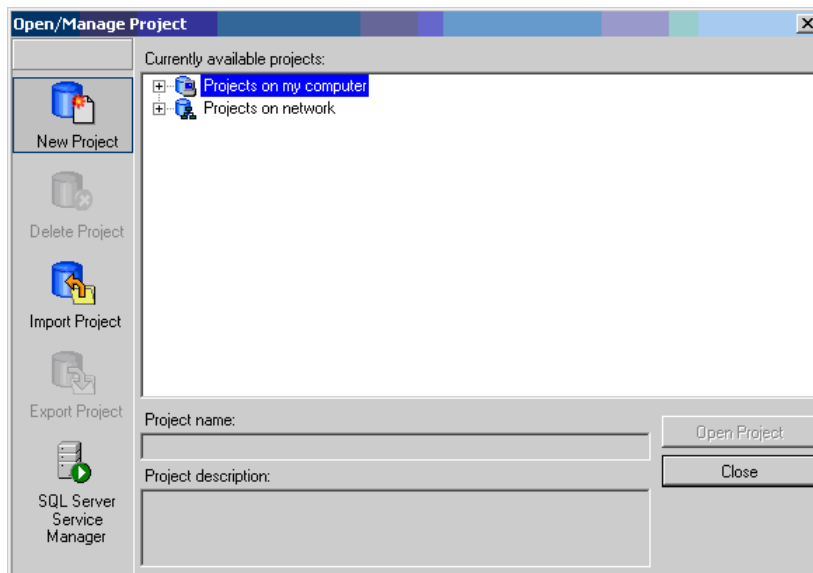


Figure 3-12 Open/Manage Project Dialog

3.2.2.1 Create New Project

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

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	Lang.	Rev. ind.	Page
		9ARD170952-009			en
					No. of p.
					127

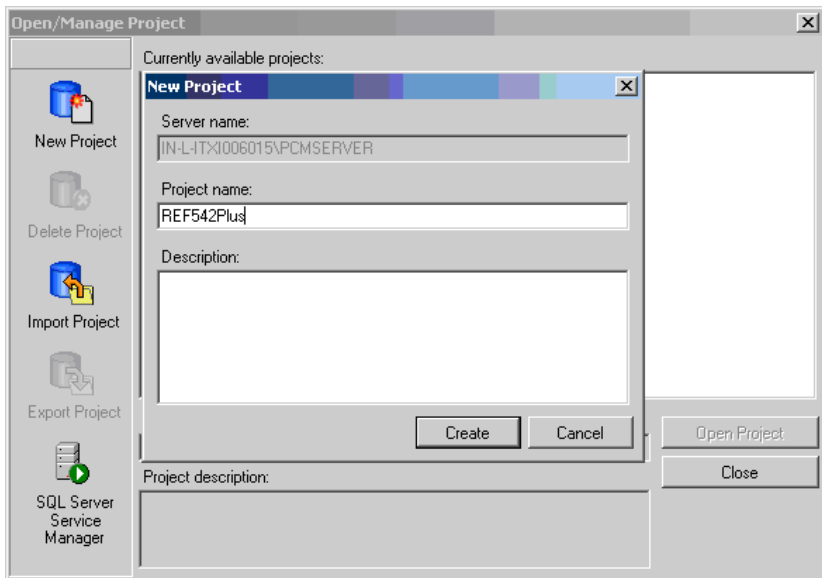


Figure 3-13 New project Dialog

- Click “Create” to create a new project.
- Once the project is created, it will be displayed in the “Projects on my computer” tree structure.

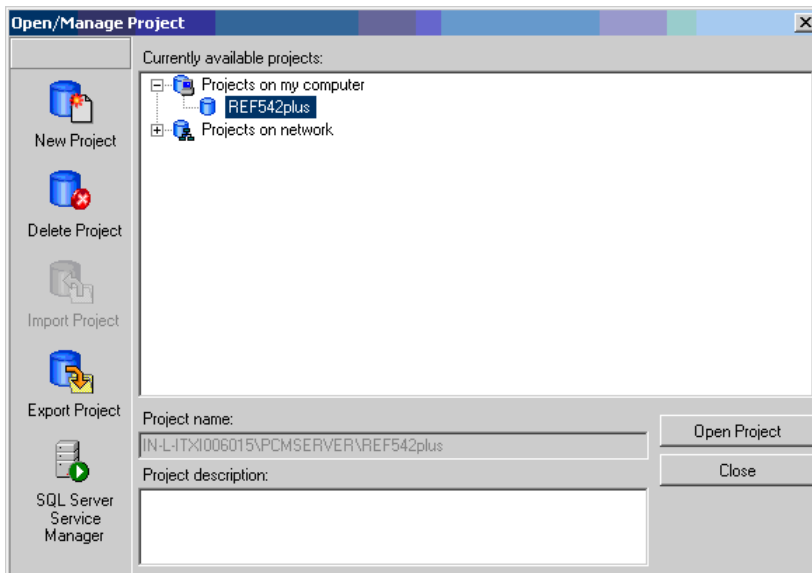


Figure 3-14 Open/Manage Project Dialog with created project

3.2.2.2 Open Existing Project

- To open an existing project from My Computer or Network, use Open/Manage Project Dialog.
- To open a created project, Click on the project name to select the project, then click “Open Project” to open the project.
- Delete/open/Export options are also available for the selected project.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.		A	Page
				No. of p.	127

- After clicking “Open project”, PCM600 opens the plant structure of the project. (Plant structure will be empty for newly created projects).

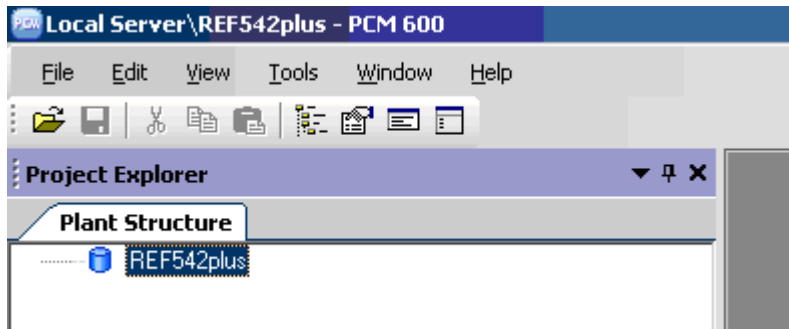


Figure 3-15 Plant structure with Project Name

- Create a substation/Region by opening the context menu of “REF 542plus” project. Click on the New→General→Substation context menu.

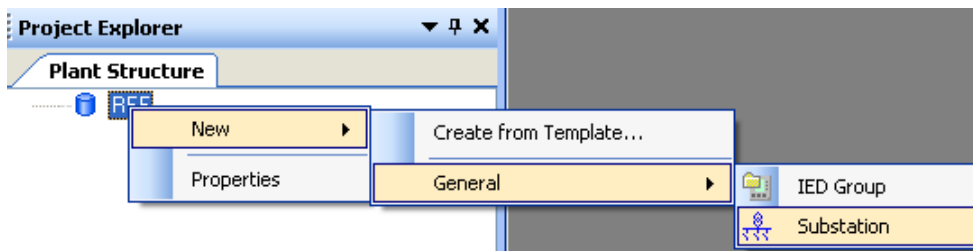


Figure 3-16 Menu Navigation for Region/Substation creation

- Observe that it creates the “Substation” node in the REF 542plus plant structure.
- Create Voltage Level node in the plant structure through the context menu of “Substation” (It is shown in the below screen).

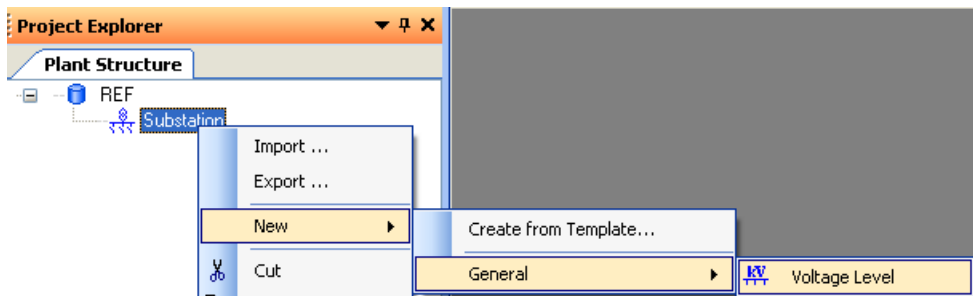


Figure 3-17 Menu navigation for Voltage Level creation

- Create a Bay node using the context menu of “Voltage Level” in the plant structure.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	
				Page	32
				No. of p.	127

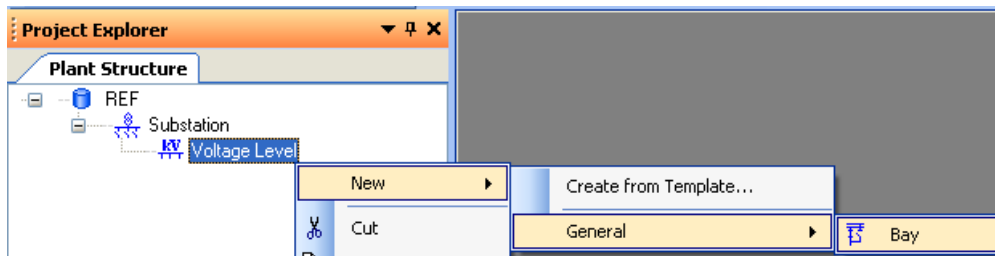


Figure 3-18 Menu navigation for Bay creation

- Right Click on the “Voltage Level” context menu, it shows the following pop up menus

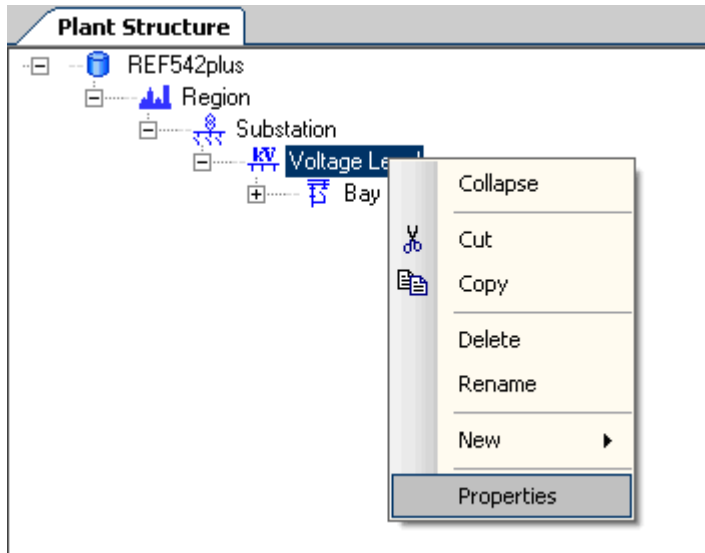


Figure 3-19 Voltage Level Context menu

- Click on the Properties menu, to view the Voltage Level properties. In these properties, “Voltage Range” property will be transferred to SCL Tool when user invokes the SCL Tool through “SCL Configuration Wizard”.

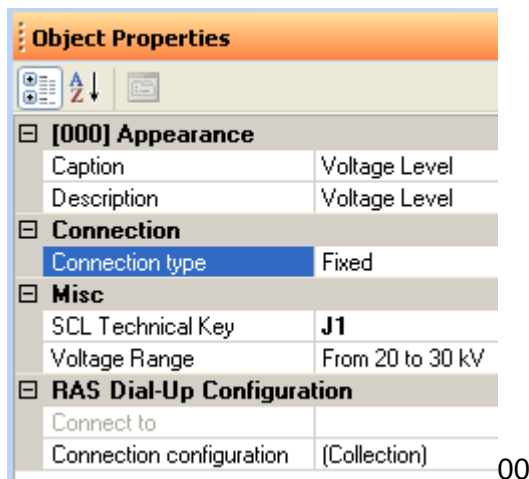



Figure 3-20 Voltage Level Properties

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

3.2.3 Creating REF 542plus Object in PCM 600

There are two ways to create the REF 542plus object type. One through the Bay's Context menu the other one is through the Object type's window.

- Right click on the Bay node in the plant structure.
- Observe that it opens the popup menu.
- Click on the New→Feeder Terminals→REF 542plus to create the object type.

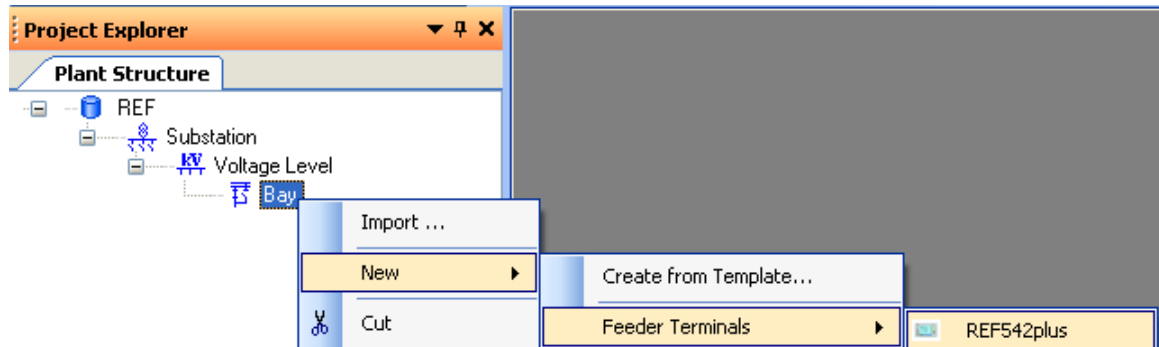


Figure 3-21 Menu navigation for REF 542plus Creation

- Observe that it creates REF 542plus Object type under Bay tree node.

Follow the below steps to create the REF 542plus Object Type in Object Type window.

- Open the Object Type window by clicking on View→Object Type.
- Observe that it opens the Object Type window.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	34
				No. of p.	127

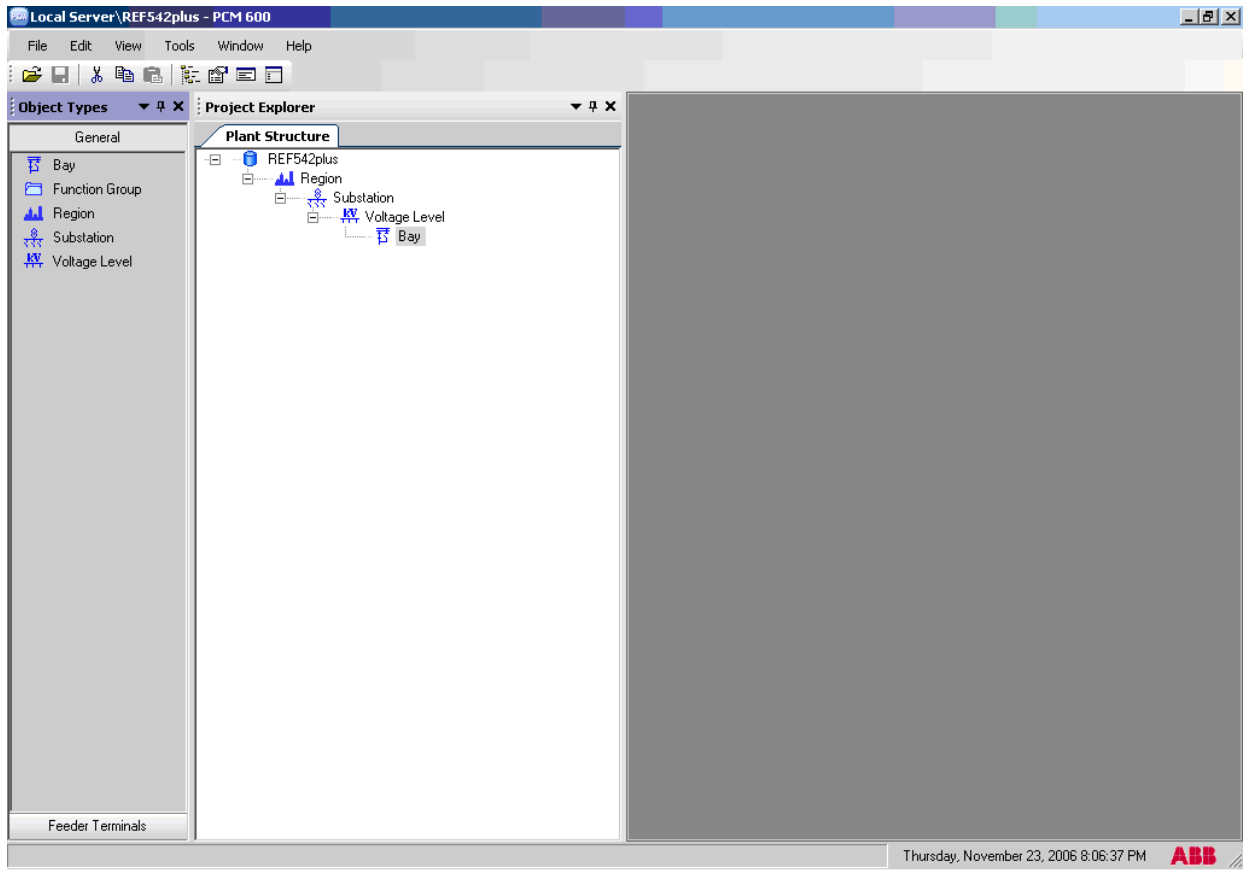


Figure 3-22 Object Type Window

- Click on the feeder Terminals, it will show REF 542plus object.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.		A	Page
				No. of p.	127

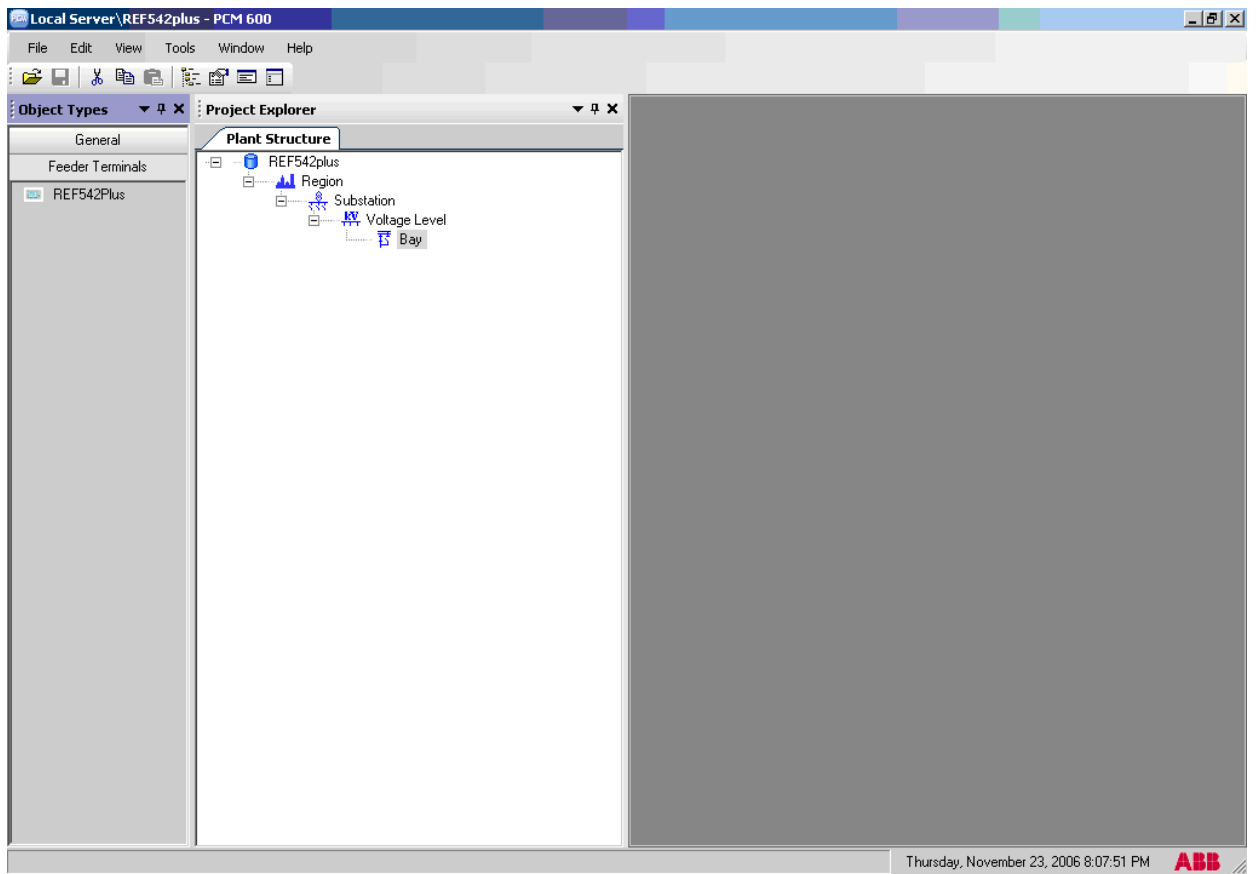



Figure 3-23 Object Type window for Feeder Terminal

- User can drag and drop the REF 542plus object into Bay to create the object type in the plant structure.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang. en	Rev. ind. A	Page	36
				No. of p.	127

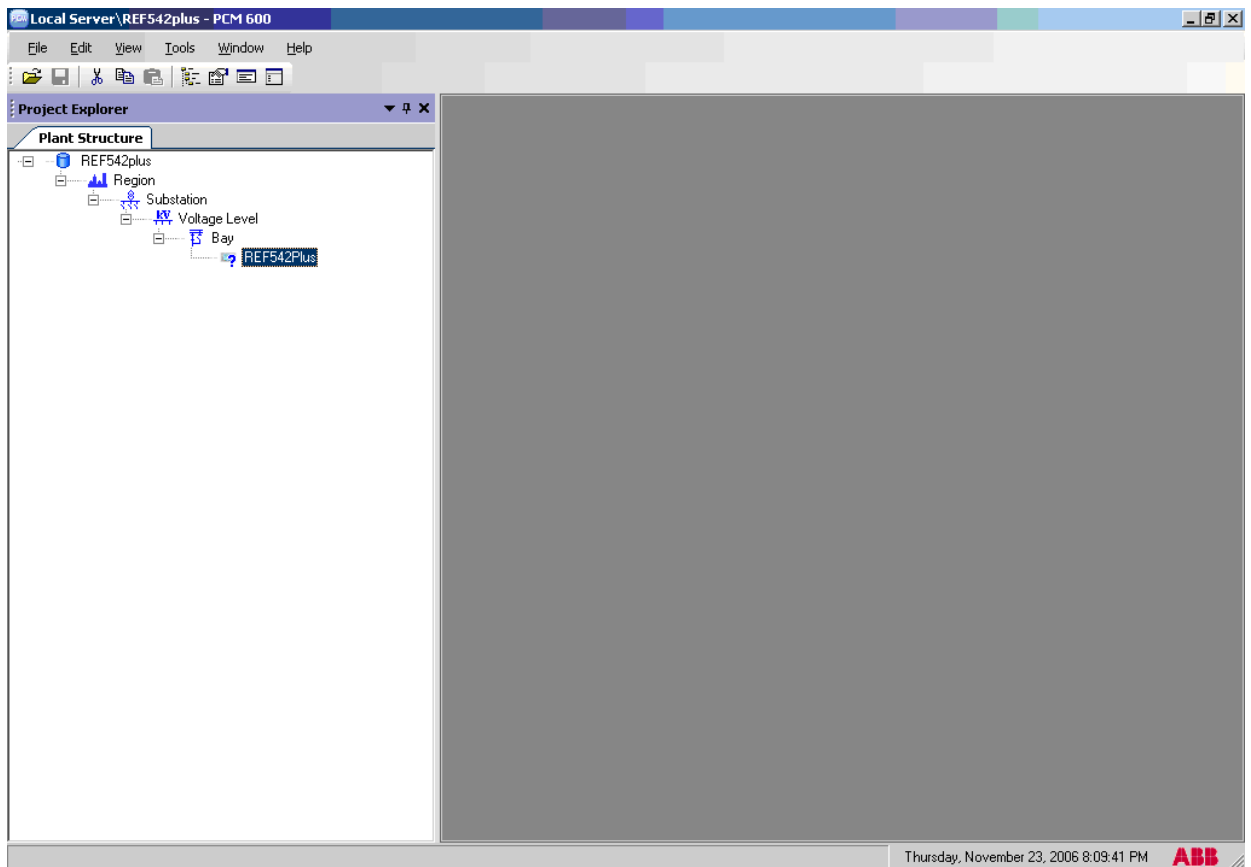


Figure 3-24 Plant Structure with REF 542plus object type

3.3 Communication Wizard

Configuring the IP Address, IED protocol and communication provider is a must to communicate with REF 542plus.

Communication wizard helps with the configuration of the IP address of the REF 542plus. The following steps explain the configuration of the above parameters using communication wizard.

3.3.1 Working with Communication Wizard

- Right click on the REF 542plus object type.
- Observe that the popup menu appears.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	Lang.	Rev. ind.	Page
		9ARD170952-009			en
					No. of p.
					127

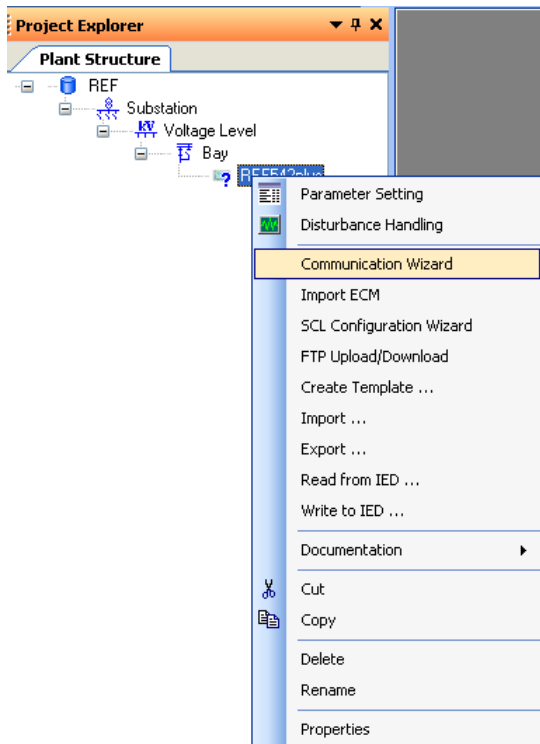



Figure 3-25 REF 542plus Context menu – Communication Wizard Highlighted

- Click on the “Communication Wizard” menu/verb.
- Observe that the ‘Communication Wizard” dialog box appears. The dialog box shows the “IED protocol” for communication and the “Communication Provider”. REF 542plus uses “IEC61850” as IED protocol and the communication provider is “PCM600”. Communication provider field is read-only as there are no other alternatives.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

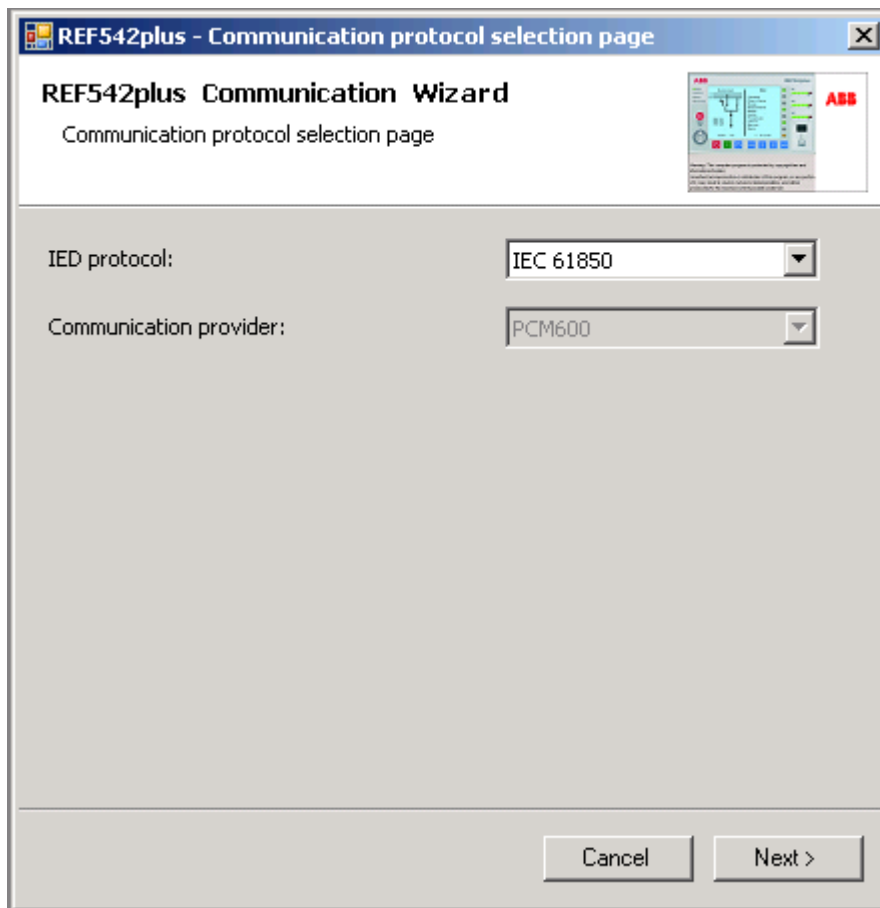



Figure 3-26 Communication Protocol Selection Page

- Click **Next** to continue. (Click **Cancel** to close the wizard at any stage of Communication wizard).
- Observe the following wizard appears.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

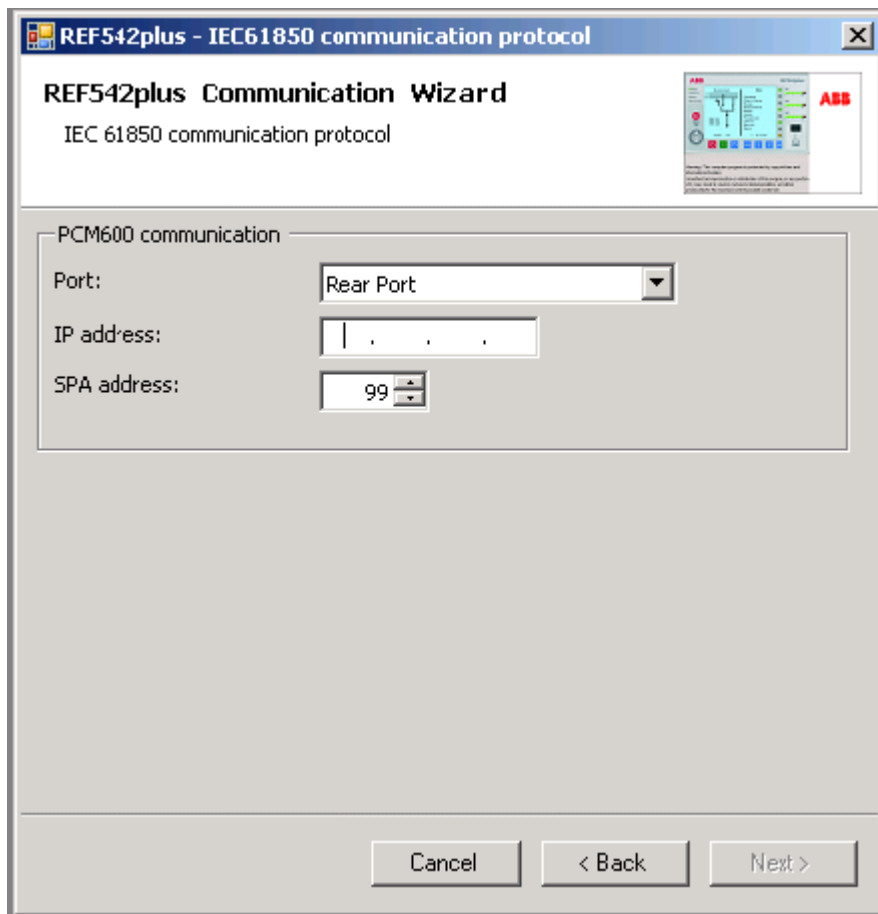



Figure 3-27 IEC 61850 Communication Protocol Configuration

- Enter the “REF 542plus” IP (e.g., 10.140.79.125) address. REF 542plus uses 99 as Transparent SPA Address. Hence the SPA Address is displayed for viewing purpose only.
- Click **Next** to go to next page.
- Observe that following wizard appears.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

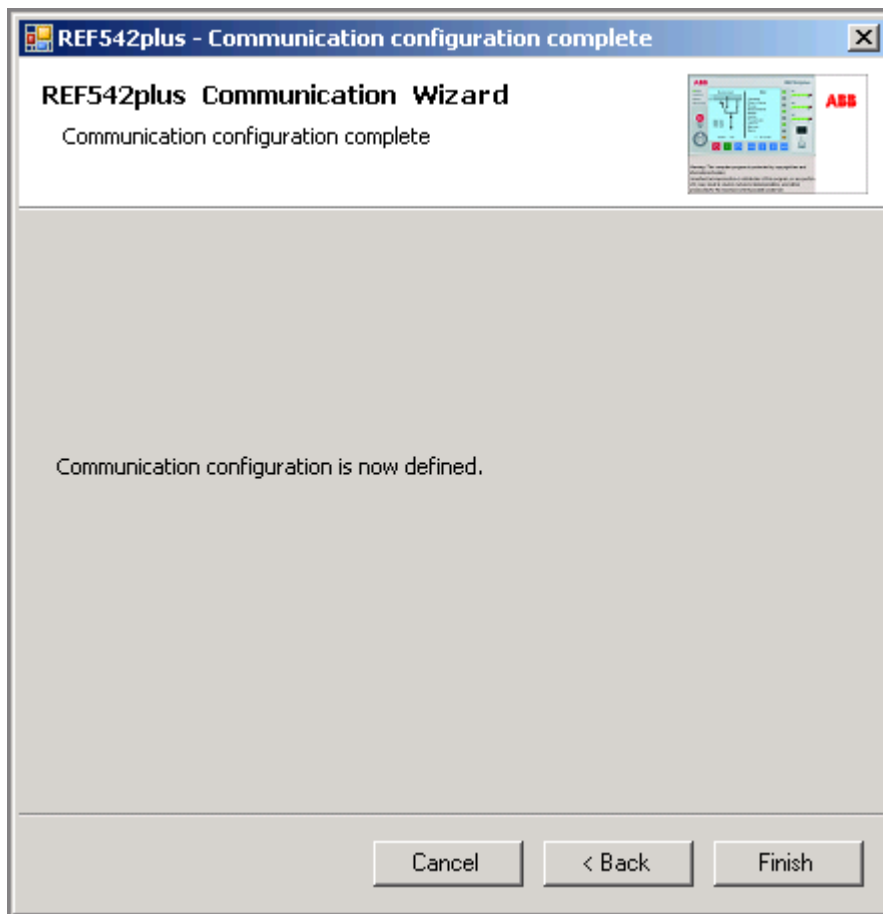



Figure 3-28 Communication Configuration Complete Page

- Click **Next** to confirm the creation of communication wizard.
- Observe that the following wizard appears.
- To change the configured IP address, click the **Back** button to navigate back through the wizard.
- Click **Finish** to complete the wizard.

3.3.2 Working with Communication Structure

When “Finish” button in the communication wizard is clicked, the PCM600 automatically creates the required communication structure for the selected REF 542plus object type. The following steps explain how to view the communication structure in the PCM600.

- Right click near the “Plant Structure” in the “Project Explorer”
- Observe that the following popup menu appears.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

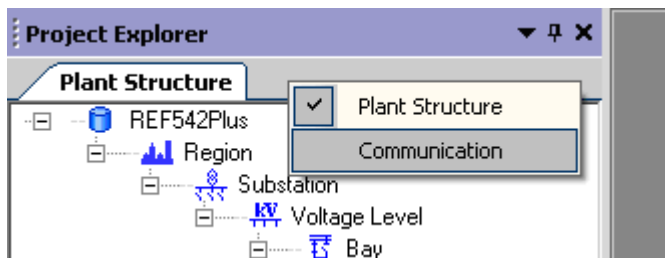


Figure 3-29 Project Explorer Context menu

- Click on the “Communication “ to open the communication wizard
- Navigate to the “SubNetwork” node from the REF 542plus project node in the IEC 61850 OPC Server tree structure.

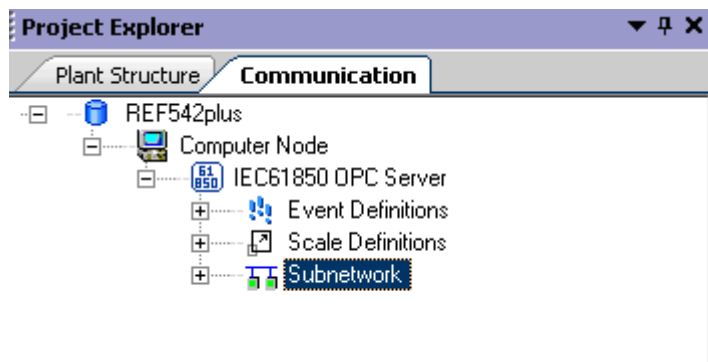


Figure 3-30 Communication Structure – with Sub network

- Expand the Sub network by clicking on the sub network node. The object type named as the REF 542plus was earlier chosen to create the communication wizard that will be displayed in Communication tree structure also.

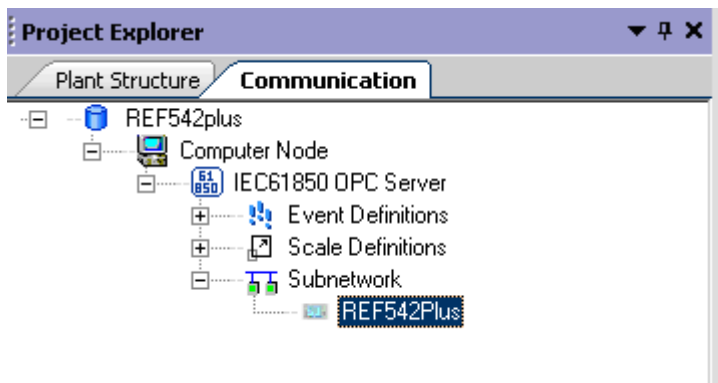


Figure 3-31 Communication Structure – with REF 542plus Object

3.4 SCL Configuration Wizard

Details of the SCL file can be configured from SCL configuration wizard after which an SCL File can be created.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	Lang.	Rev. ind.	Page
		9ARD170952-009			en
					No. of p.
					127

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

This section briefly explains the User interaction which is required to create the SCL file in the “SCL Configuration Wizard” and also it explains how the created SCL file can be imported into the PCM600 for using the Protection functions in PST.

3.4.1 Creating SCL File in SCL Tool

The following steps describe how to create SCL file by using REF 542plus SCL Tool.

- Right click on “REF 542plus” object in ‘Plant Structure’ to see the context menu of REF 542plus.
- Observe that the following popup menu appears.

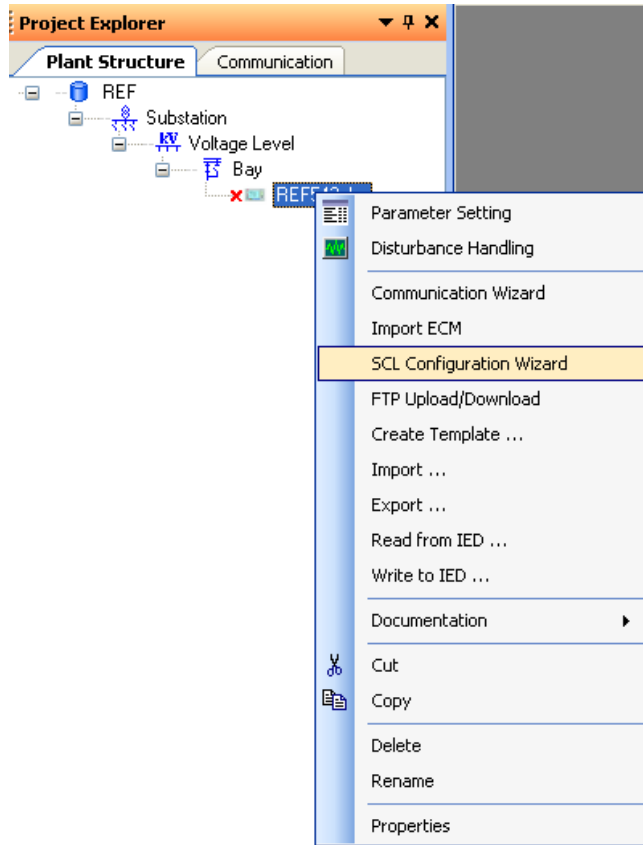


Figure 3-32 REF 542plus Context menu – SCL Configuration Wizard Highlighted

- Click on the “SCL Configuration Wizard” verb.
- Observe that the SCL Tool opens. The intention of the ‘SCL Configuration Wizard’ is to create SCL file. So the focus sets to “SCL Generation” tab while opening/displaying the SCL Tool from REF 542plus Object type. In addition to that the Navigation to other tabs (SCD Import, CID/ICD Import, FTP Download and Upload and Firmware Download) is restricted. Other tabs title’s text is dimmed to show restriction of the navigation.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.		A	
				Page	43
				No. of p.	127

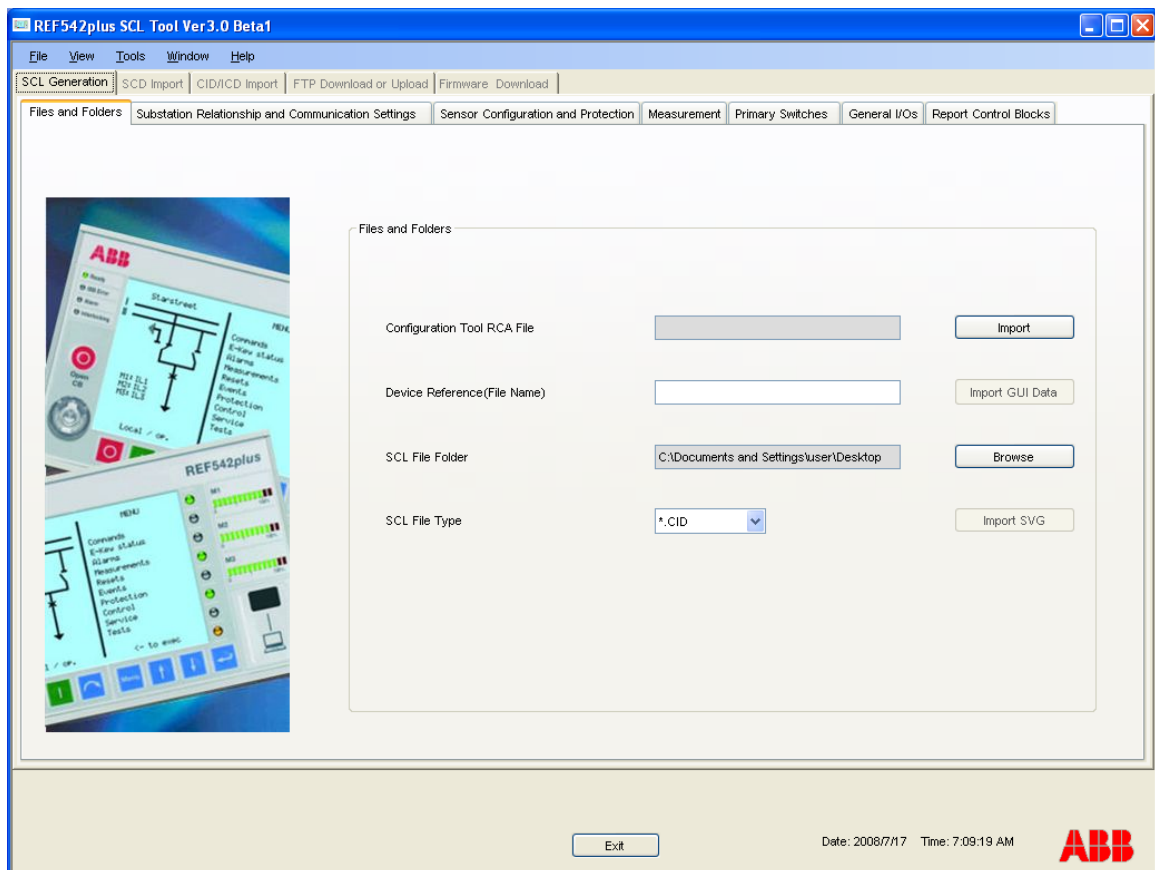



Figure 3-33 SCL Tool – SCL Generation tab

- Observe that Only “SCL Generation” tab is enabled.
- Please refer SCL Tool user manual (Reference Doc: 4) to work with the “Files and Folders” tab.
- Only when required values in the “Files and Folders” are filled, navigation to other tabs in the “SCL Generation” is possible.
- The configured substation details from the PCM600 are transferred into SCL Tool.
- The substation, voltage range, bay name and IED name in the PCM600 plant structure is imported into SCL Tool automatically. The imported substation information will be displayed in the “Substation Relationship and Time Setting” tab. The transferred field’s data in SCL Tool are read-only.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	44
		en	A	No. of p.	127

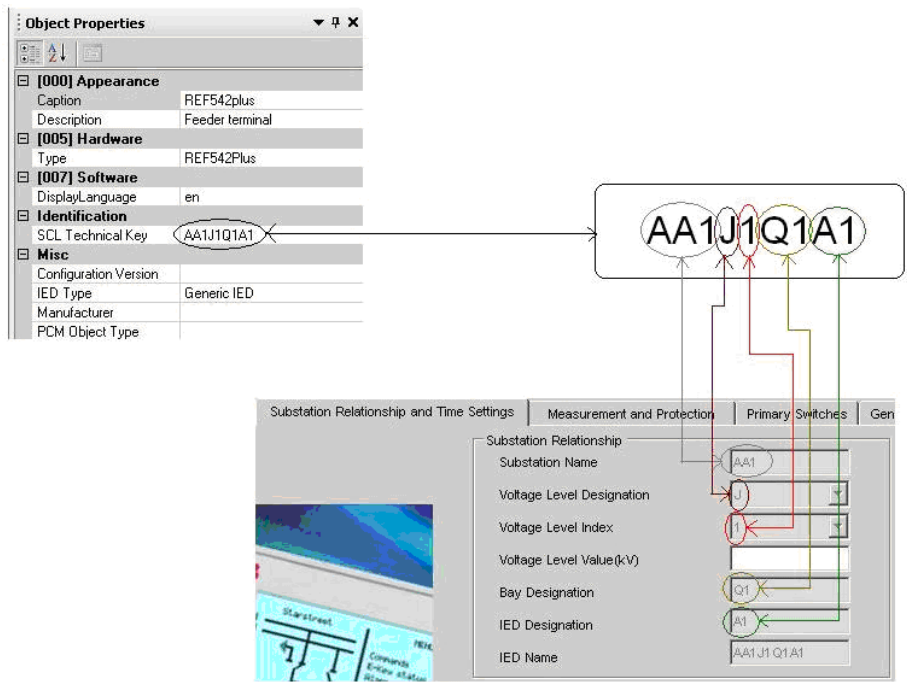


Figure 3-34 Mapping of Substation information between PCM600 and Substation Relationship and Time Setting

- Voltage Range property of Voltage Level node in PCM600 is converted into equivalent designation as per IEC 61346 as shown below in table.

Voltage Designation	Voltage Range
B	Over_420kV
C	From_380_To_420kV
D	From_220_To_380kV
E	From_110_To_220kv
F	From_60_To_110kv
G	From_45_To_60kv
H	From_30_To_45kv
J	From_20_To_30kv
K	From_10_To_20kv
L	From_6_To_10kv
M	From_1_To_6kv
N	Under_1kv

- Please refer “Reference 3” document to test/create SCL file in REF 542plus SCL Tool.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	45
				No. of p.	127

- After entering the value for creating SCL file, (“SCL Generation” → “Report Control Block”→) Click on **Generate SCL/ECM** to create SCL file.

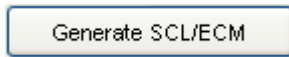


Figure 3-35 Generate SCL/ECM - Button

- Observe that a pop appears prompting user to save the user entered data.

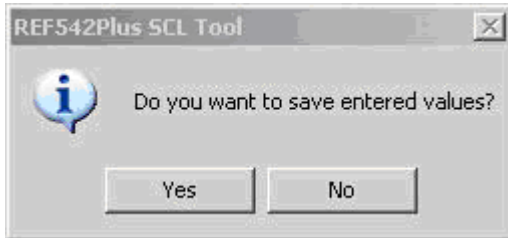


Figure 3-36 Dialog for User Confirmation to save GUD data

- Click **Yes** to save entered data in GUI. Another pop up appears prompting user to name the file (*.GUD).Enter the file name in the text box.

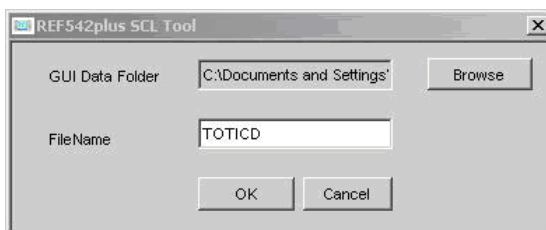



Figure 3-37 GUD File name Input Dialog box

- Click **OK** to save the user data.
- Observe that a progress bar appears indicating that SCL file preparation is in progress.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	46
		en	A	No. of p.	127

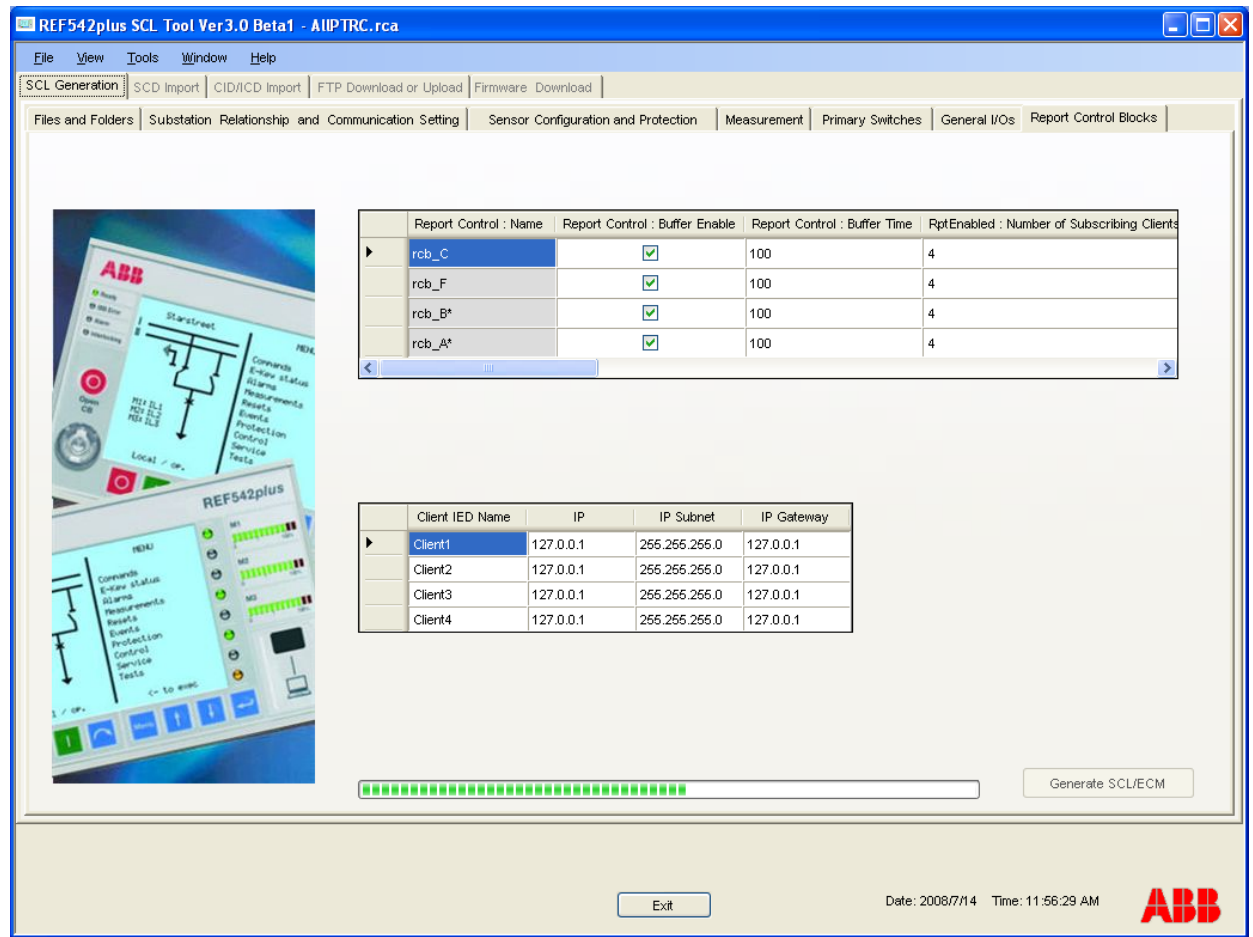


Figure 3-38 Progress bar status on creation of SCL file

- Observe that a pop up window appears after the progress bar 'runs' 100%, indicating that the SCL file has been generated and validated against SCL.xsd and CommonSA.xsd schemas.

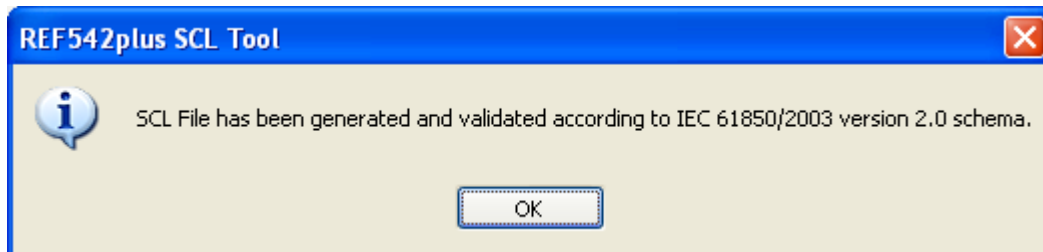


Figure 3-39 Information Dialog for Completion SCL File generation

- Observe that an option dialog box appears.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	47
				No. of p.	127

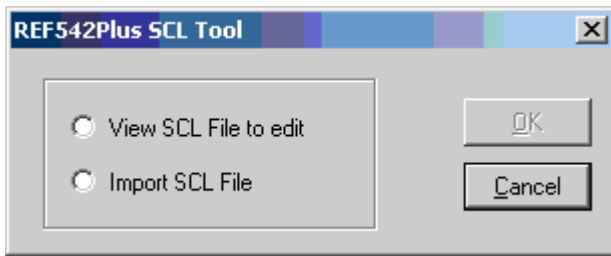


Figure 3-40 Option Dialog – To view/Import SCL File

- Choose “Import SCL File” and click **OK** to import the SCL file automatically into PCM 600.

3.4.2 Editing Created SCL File

To view the file in the tree structure and to add/edit DOI/LN, choose “View SCL File to edit.

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

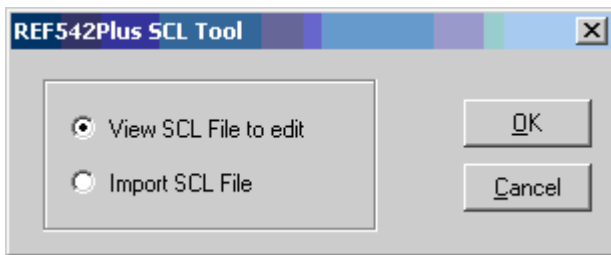



Figure 3-41 Option Dialog – To view/Import SCL File

- Click **Ok** and observe that it automatically imports the created SCL file and shows it in the tree view.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

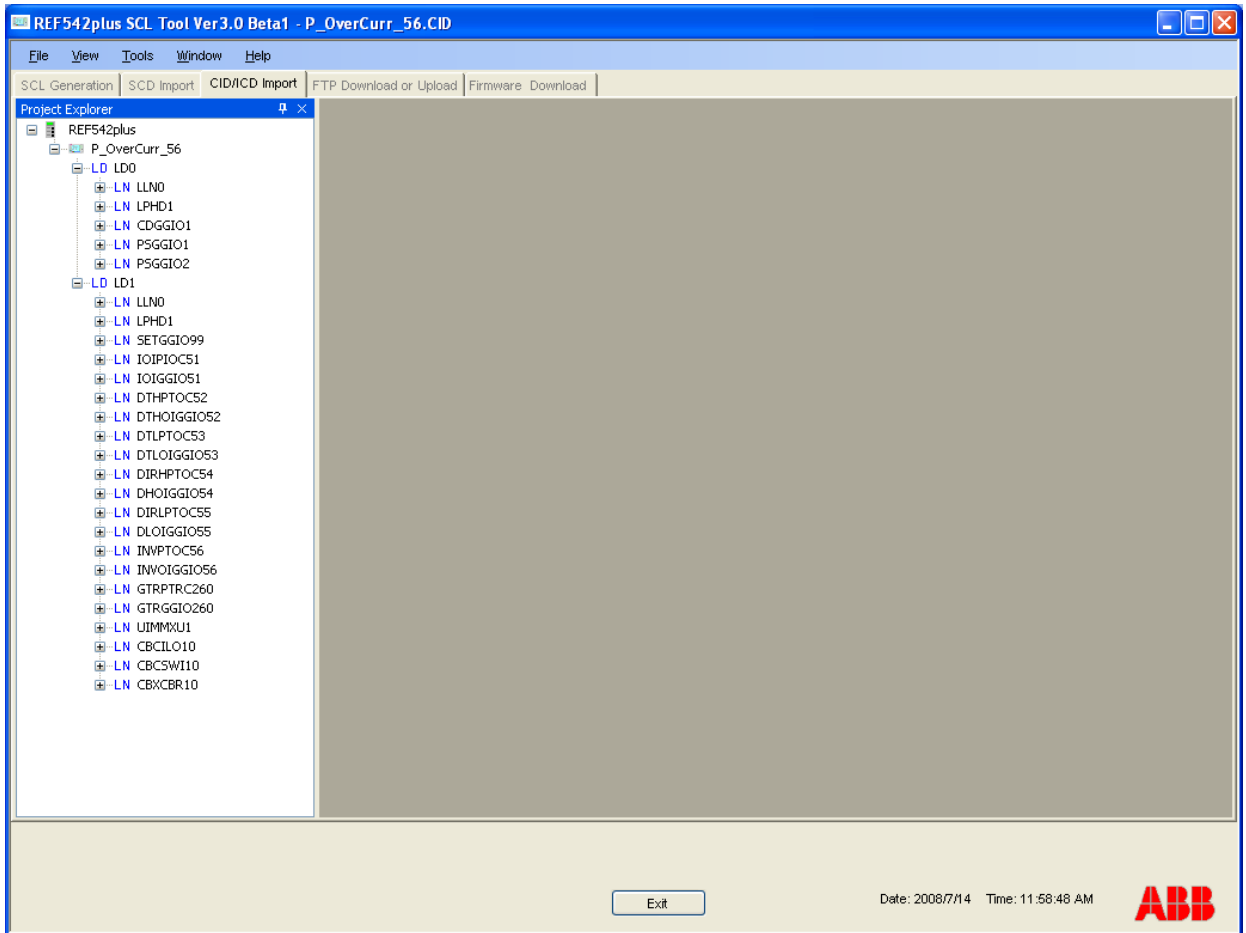


Figure 3-42 SCL File Import Tab view

- Please refer SCL Tool User manual (Reference Document No: 4) for details for working with SCL Import tab.
- After doing the modifications, export the SCL file.
- Right click on the first node and observe the following pop up menu.

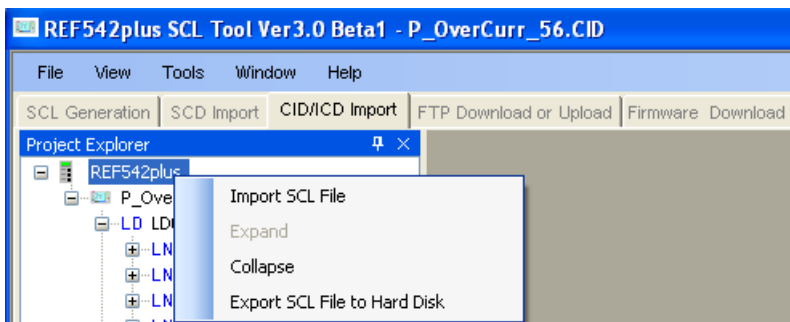



Figure 3-43 REF 542plus Node Context Menu

- Click on the “Export SCL File to Hard Disk” menu.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

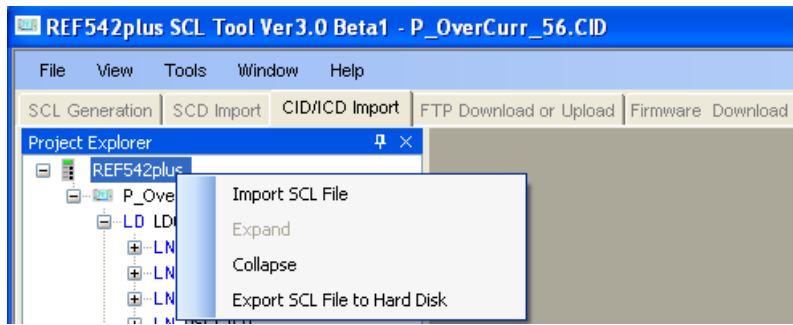


Figure 3-44 REF 542plus Node Context Menu

- Observe that the SCL File Export tab appears on the right side of the Project Explorer.

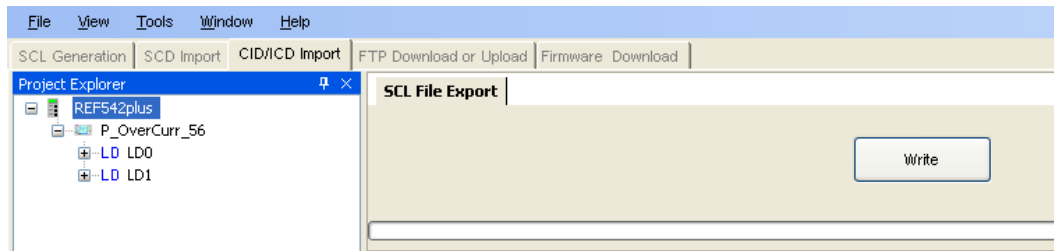


Figure 3-45 SCL File Export Dialog in SCL Tool

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

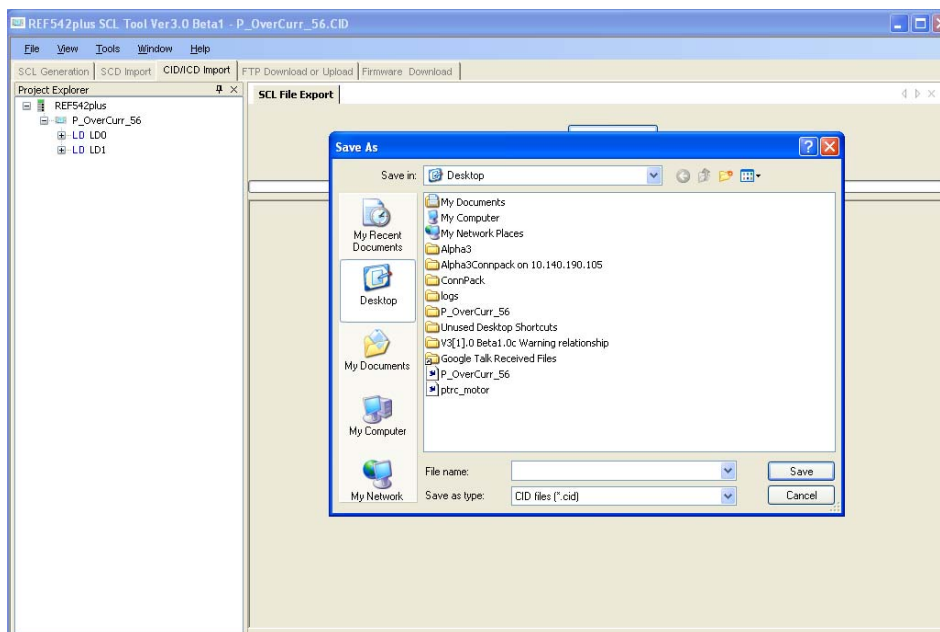



Figure 3-46 SCL (Export) File Name save Dialog in SCL Tool

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	50	
					No. of p.	127

- Click 'Save' to start generation of the ICD/CID file. On completion of the same, a pop window appears informing that the SCL file is exported and is validated against the SCL schema.

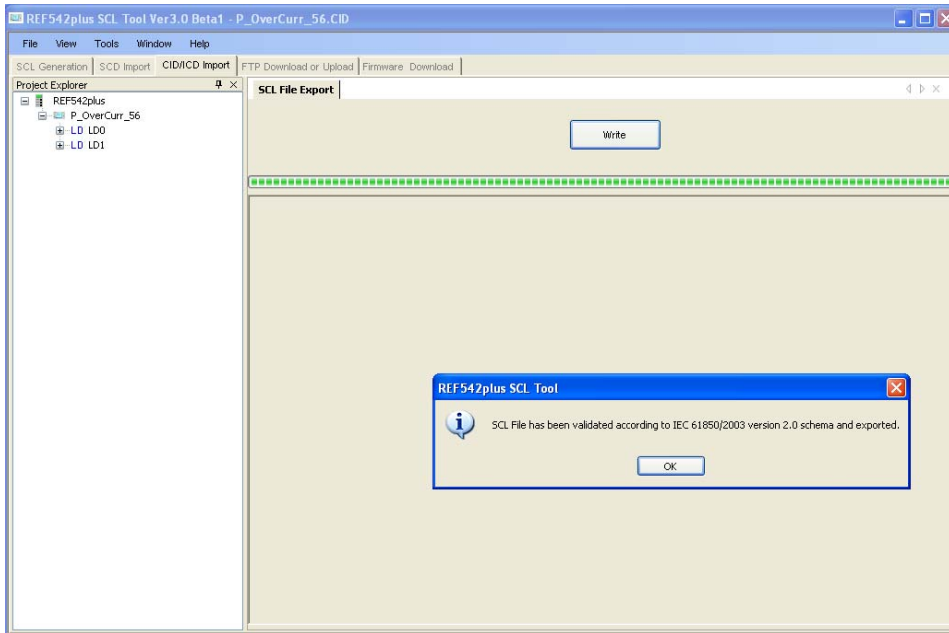


Figure 3-47 SCL File Export Progress bar in SCL Tool

- Click **Ok** and observe that the following message box appears.

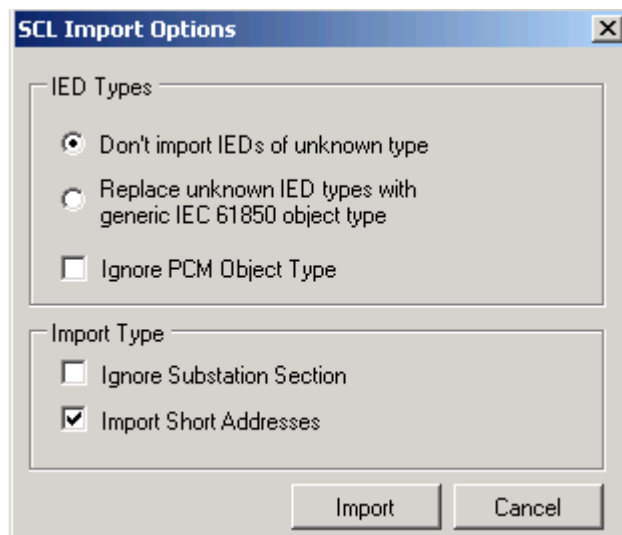


Figure 3-48 SCL File Import Option Dialog in PCM 600

- Select any one option and click **Import**

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	51
				No. of p.	127

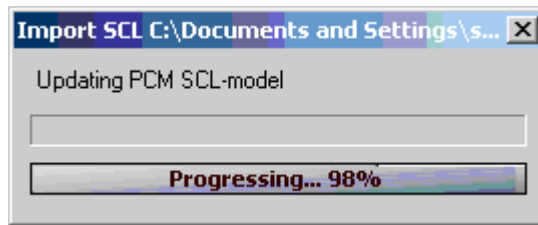


Figure 3-49 SCL File Import Progress in PCM600

- Observe the progress of import. After the completion of Import, the protection functions are imported into PCM600. Use PST for reading and writing the parameters of protection functions.

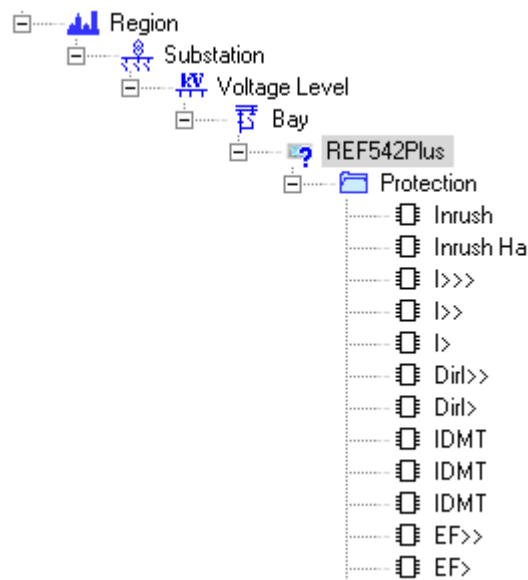



Figure 3-50 Imported Protection Functions in PCM 600

3.4.3 Viewing Logical Device in the Communication Structure

- Click on the “Communication” tab in the “Project Explorer”.
- Observe that Logical Devices are created under REF 542plus in the Communication tree structure.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	52
				en	A

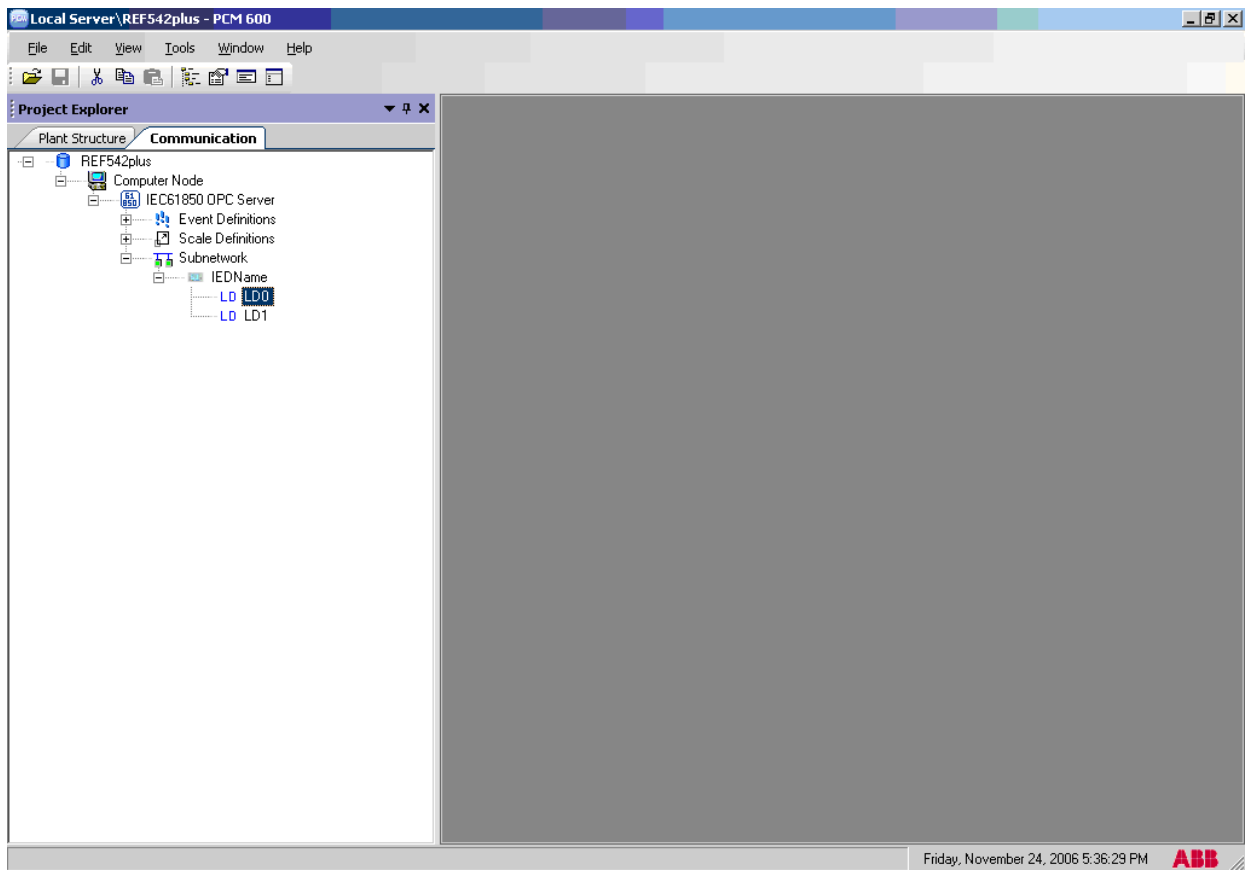


Figure 3-51 Communication Structure with Imported Logical Devices

- Right Click on LD0/LD1.
- Observe that the popup menu appears.

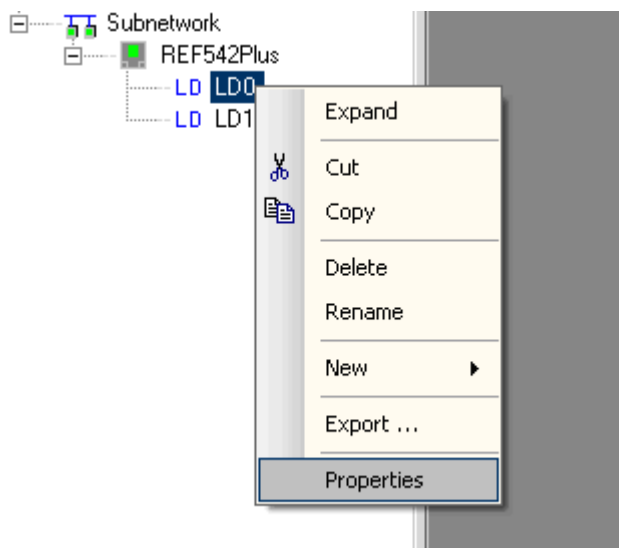


Figure 3-52 Logical Device Context Menu

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.		A	Page
				No. of p.	127

- Click on properties menu.
- Observe that property window opens. Observe that the SPA Address is 99.

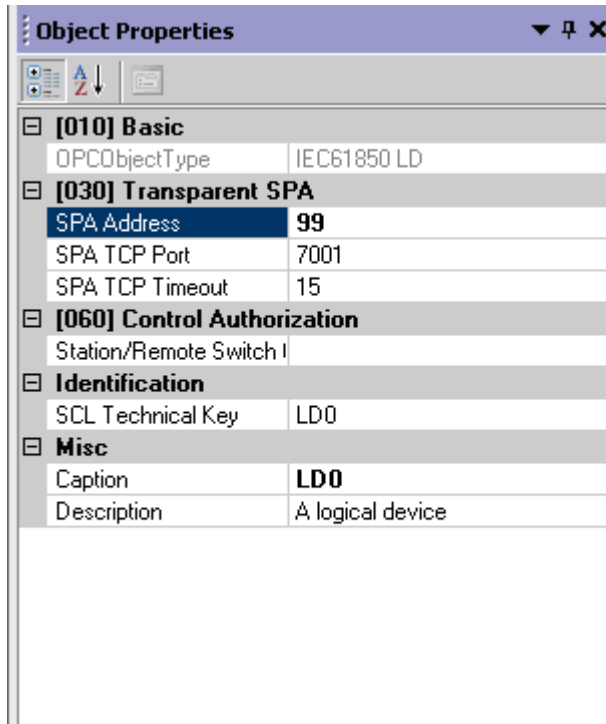


Figure 3-53 Logical Device Properties

3.5 SCL File Import/Export

SCL Files import and Export are used to import/export the SCL files to/from PCM 600.

3.5.1 SCL File Import

Importing the available SCL file directly into PCM600 is also possible. The SCL configuration wizard helps to create and import the SCL file into PCM 600.

Follow the steps below to import SCL File directly and to create the protection functions in REF 542plus object in PCM600.

- Right click REF 542plus object type in the 'Project Explorer'.
- Observe that the context menu appears.
- Click on the "Import..." verb.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	54
				No. of p.	127

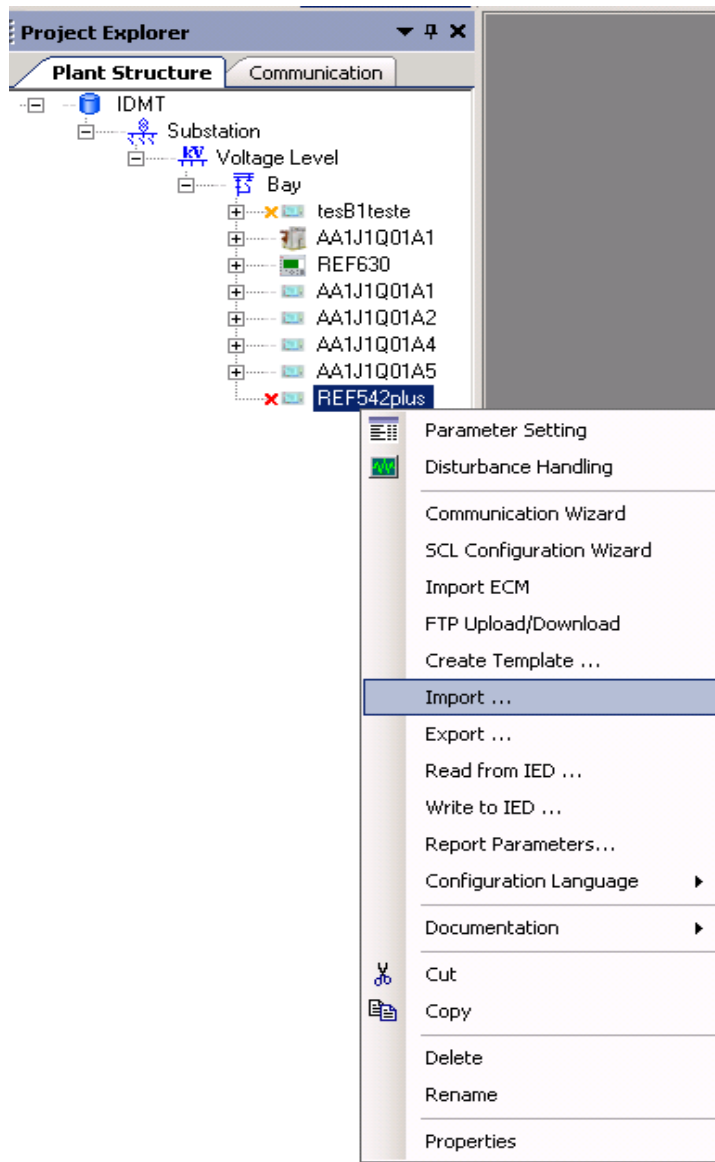



Figure 3-54 REF 542plus Context menu – Import... verb Highlighted

- Observe that it displays the information window which explains the details of the SCL file type.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	55
		en	A	No. of p.	127

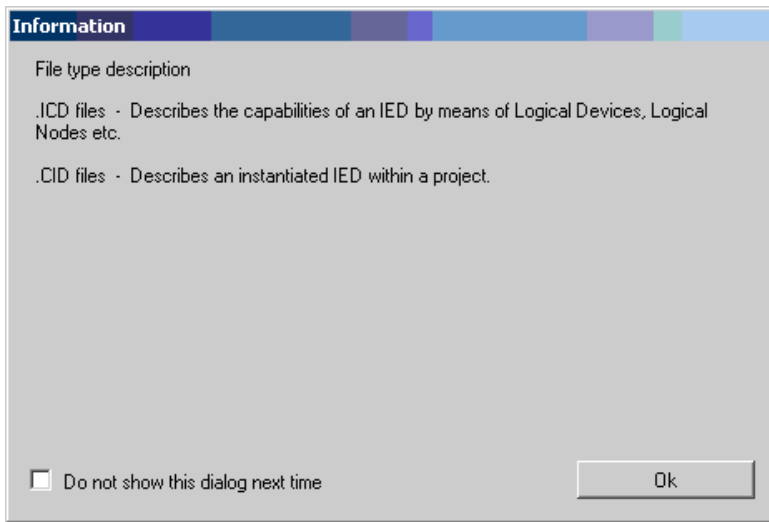


Figure 3-55 File Type Information Dialog in SCL File Import

- User can check the “Do not show this dialog next time” and then click **Ok**.
- Observe that it displays open dialog box to select the SCL file.

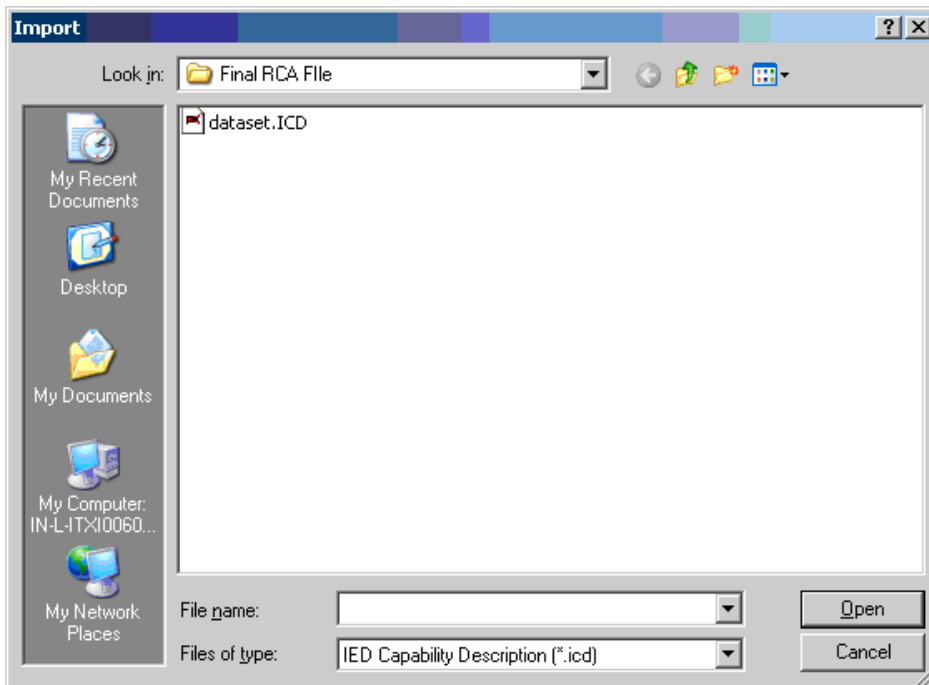


Figure 3-56 Import Dialog

- The user can select CID/ICD/Any other supported file from this dialog box.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	56
				No. of p.	127

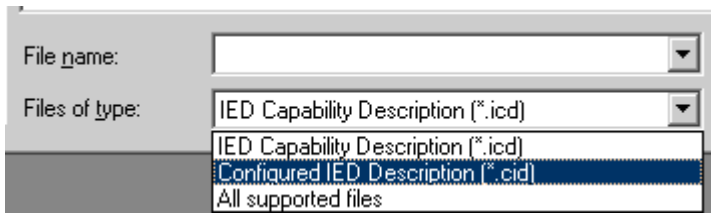


Figure 3-57 Possible Import File Types

- After selecting the file, click on the **Open** to import the file contents into PCM 600.

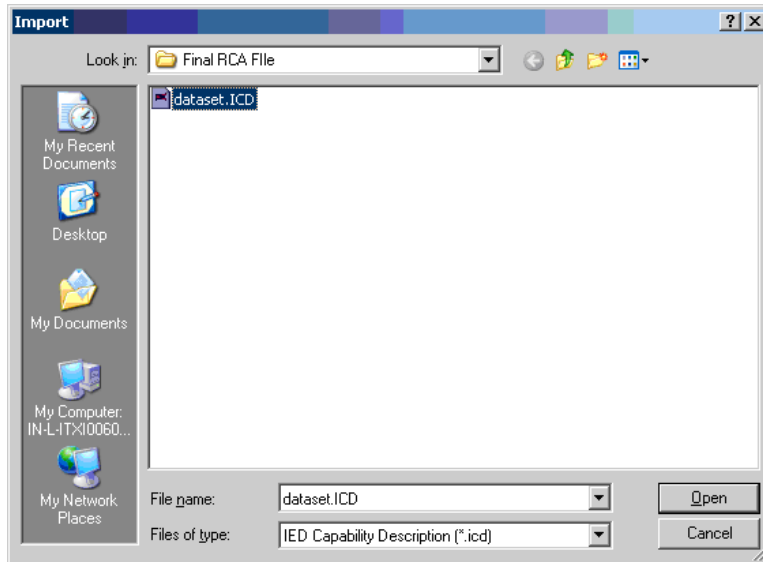


Figure 3-58 Import File Dialog with File name

- After clicking **Open**, PCM600 displays the following dialog box.

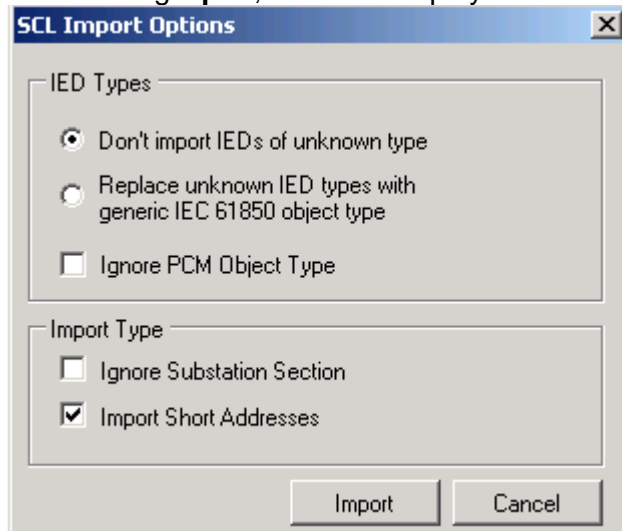



Figure 3-59 SCL File Import Options in PCM 600

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	57	
					No. of p.	127

- Click on the **Import**, SCL File contents will be imported and displayed as tree structure in REF 542plus object type depending on the selection of option. The progress of the import displayed in following dialog box.

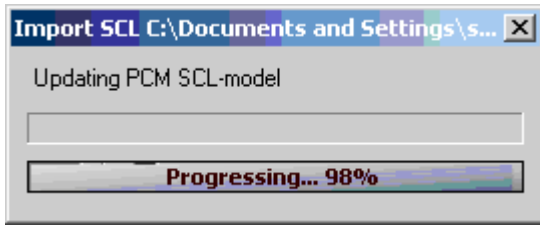


Figure 3-60 SCL File Import Progress

3.5.1.1 Viewing Logical Device in the Communication Structure

- Click on the "Communication" tab in the "Project Explorer".
- Observe that Logical Devices are created under REF 542plus in the Communication tree structure.

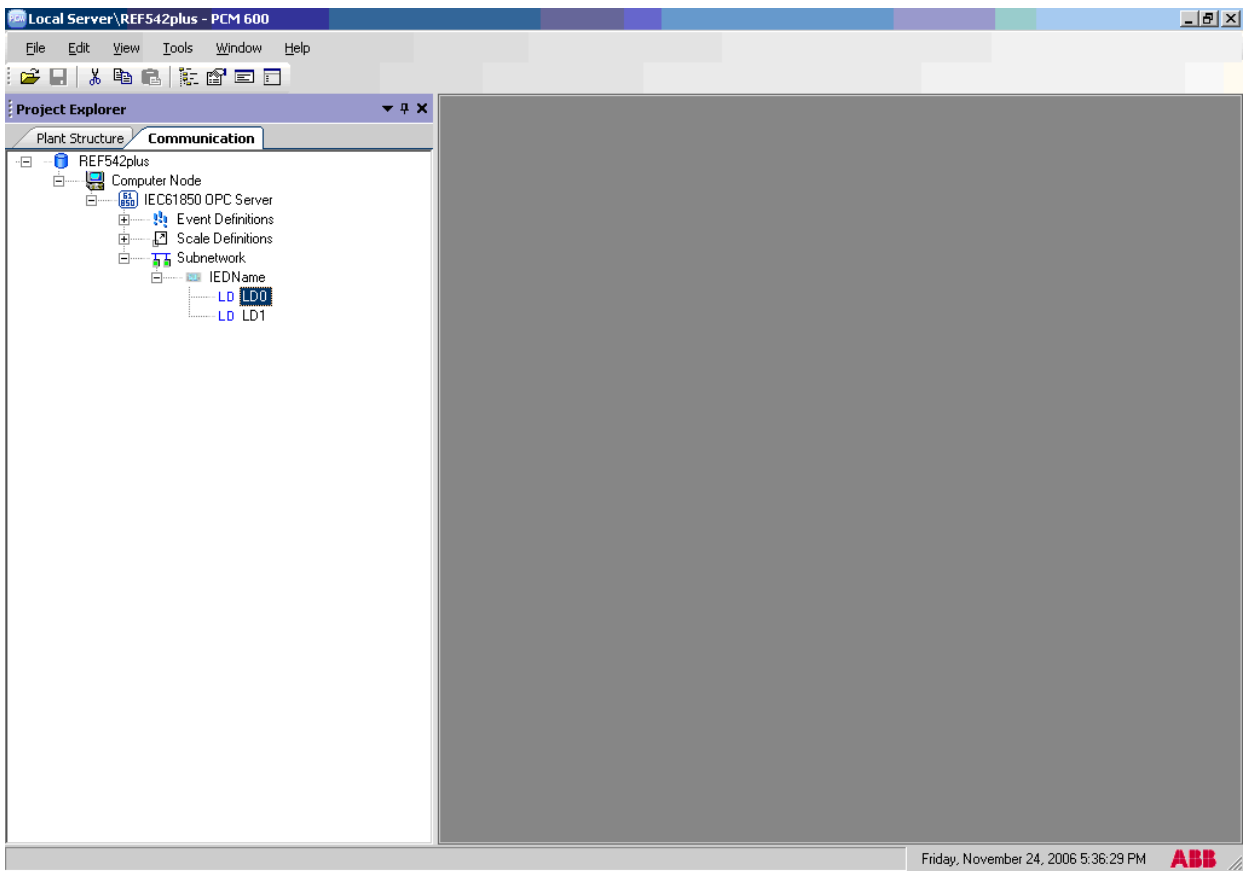



Figure 3-61 Communication Structure with Logical Devices

- Right Click on LD0/LD1.
- Observe that the popup menu appears.

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	58
				No. of p.	127

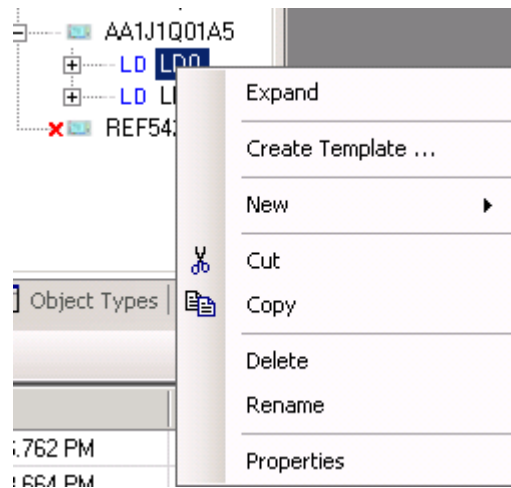


Figure 3-62 Logical Device Context Menu

- Click on properties menu.
- Observe that property window opens. Enter SPA Address as 99 if it is not entered.

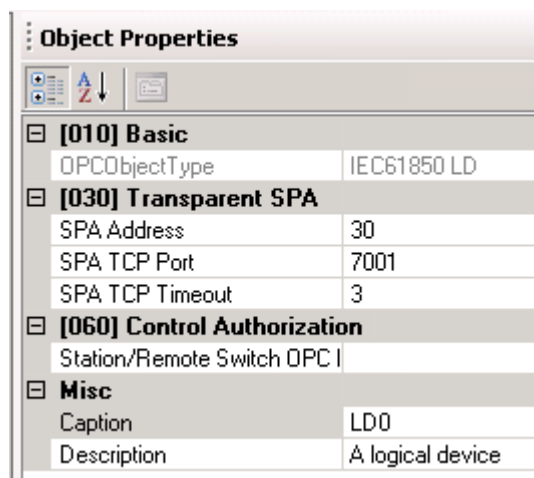



Figure 3-63 Logical Device Properties

3.5.2 SCL File Export

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

- Right click REF 542plus object type in the 'Project Explorer'.
- Observe that the context menu appears.
- Click on the "Export..." verb.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	59
		en	A	No. of p.	127

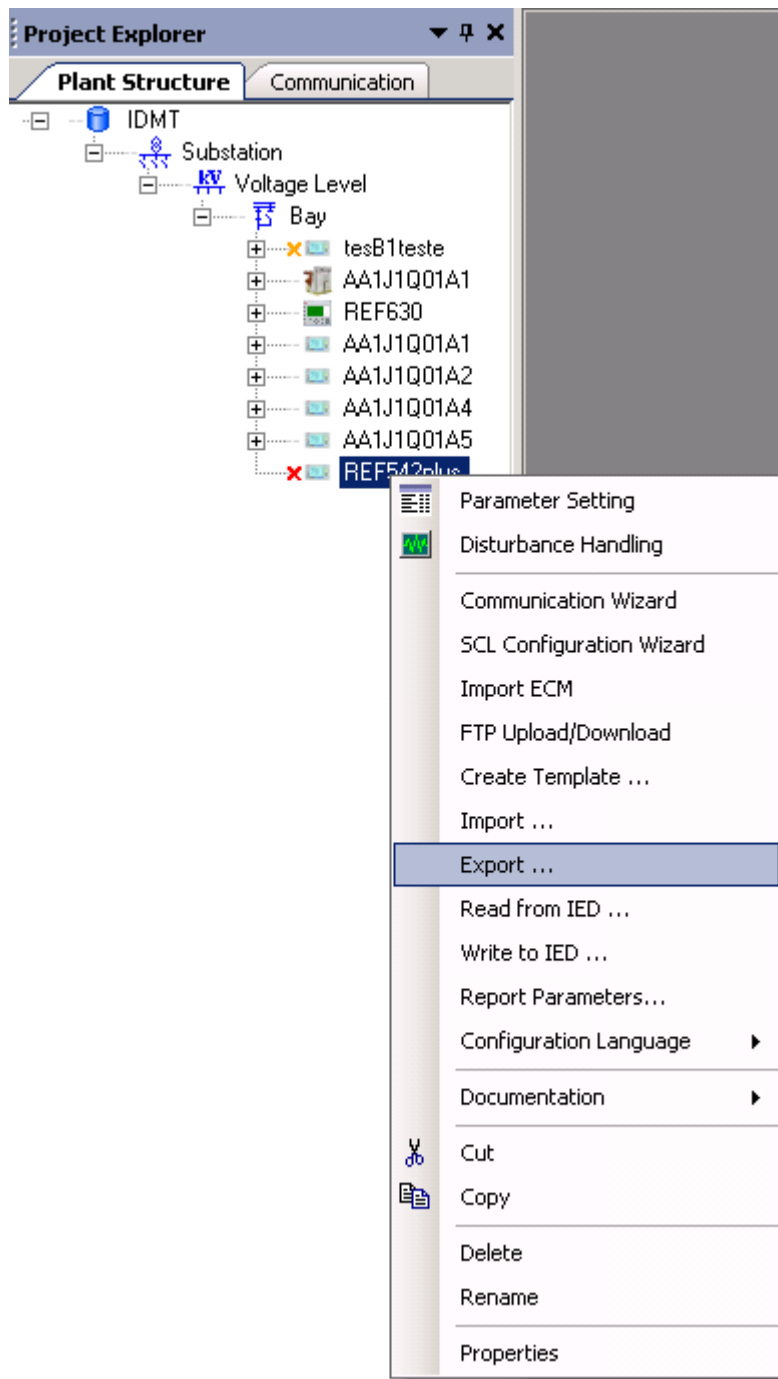



Figure 3-64 REF 542plus Context menu – Export... verb Highlighted

- It displays the information dialog box that explains the file types in which format the PCM600 structure can be exported. In this dialog box also user can check “Don’t show this dialog next time”, and then click ok.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	60	
					No. of p.	127

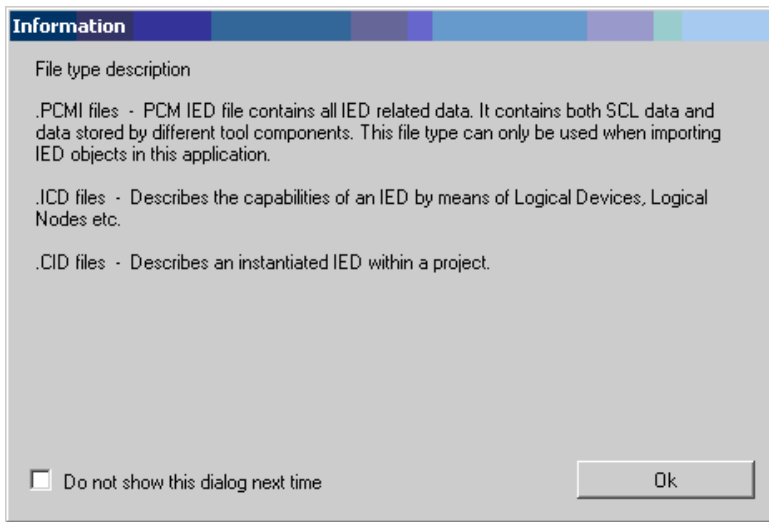


Figure 3-65 File Type Description in SCL File Export

- Observe that Export dialog box opens.

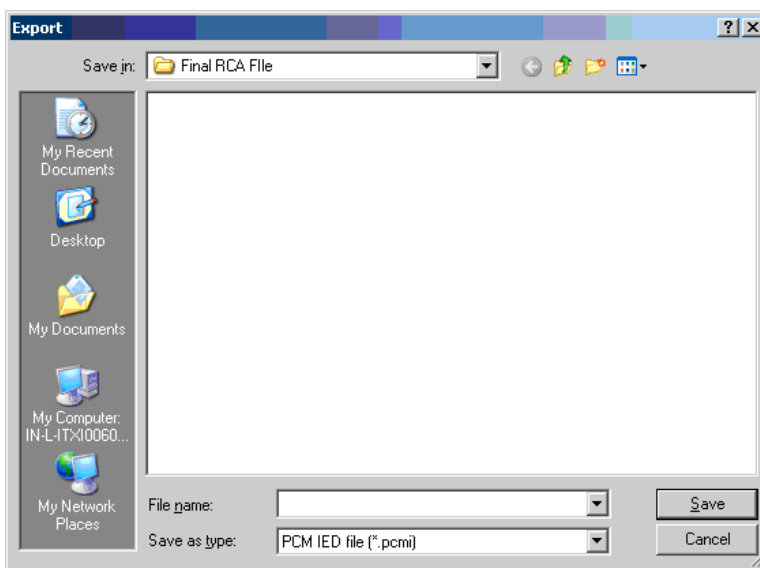


Figure 3-66 Export Dialog in SCL File Export

- Select any one of the file types shown in the below picture.

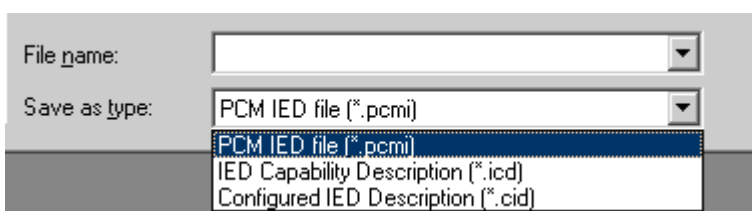


Figure 3-67 Possible Export File Types

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	61
				No. of p.	127

- Enter the file name in the “File Name” text box. Then click **Save** to save the file. The object contents will be exported into the file.

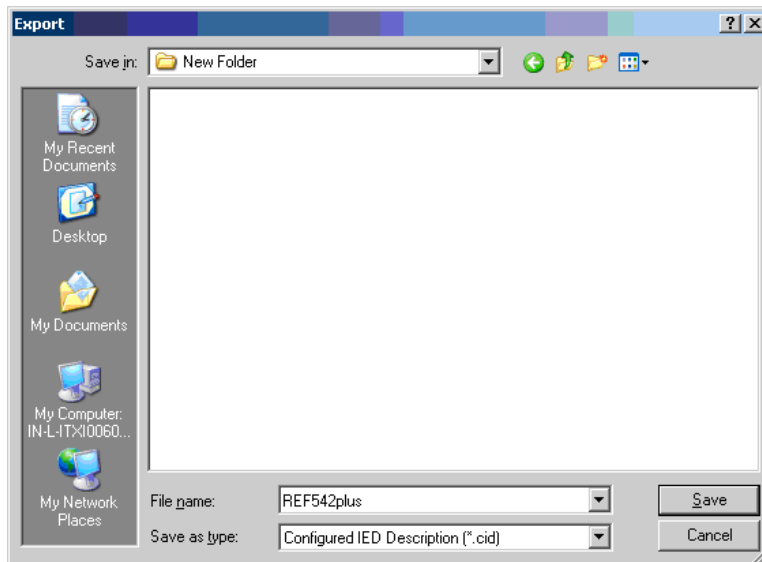


Figure 3-68 Export Dialog with File Name

3.6 Parameter Setting Connectivity Package

Parameter Setting Connectivity Package is used to read/ write the parameters from/to IED.

Once the SCL file is imported, the available protection functions are listed in the PCM 600. Now the PST is used to read/write parameters of the protection functions.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	en	Rev. ind.	Page
		9ARD170952-009			A
					No. of p.
					127

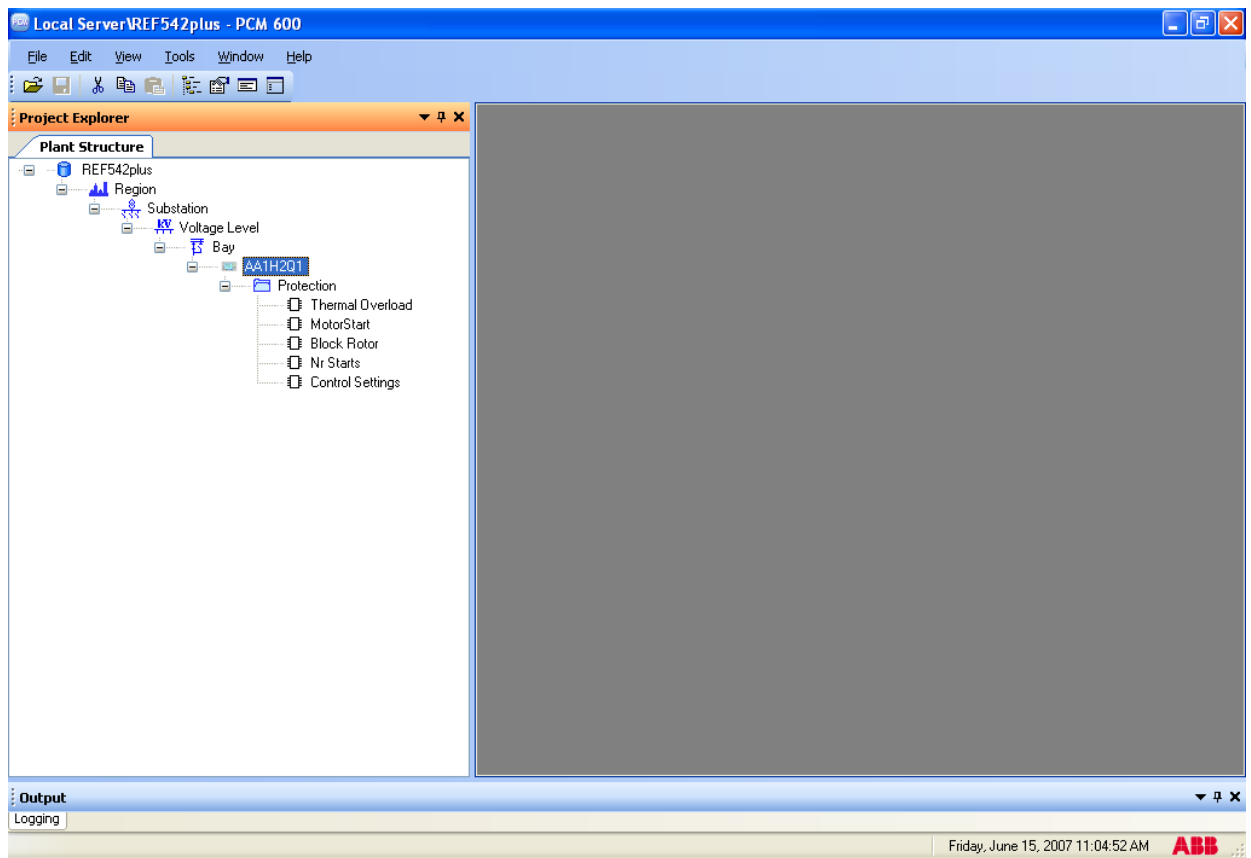


Figure 3-69 Plant Structure with Protection Functions

3.6.1 Opening Parameter Setting Tool

- Right click REF 542plus object type in the 'Project Explorer'
- A popup menu is displayed.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.		A	Page
				No. of p.	127

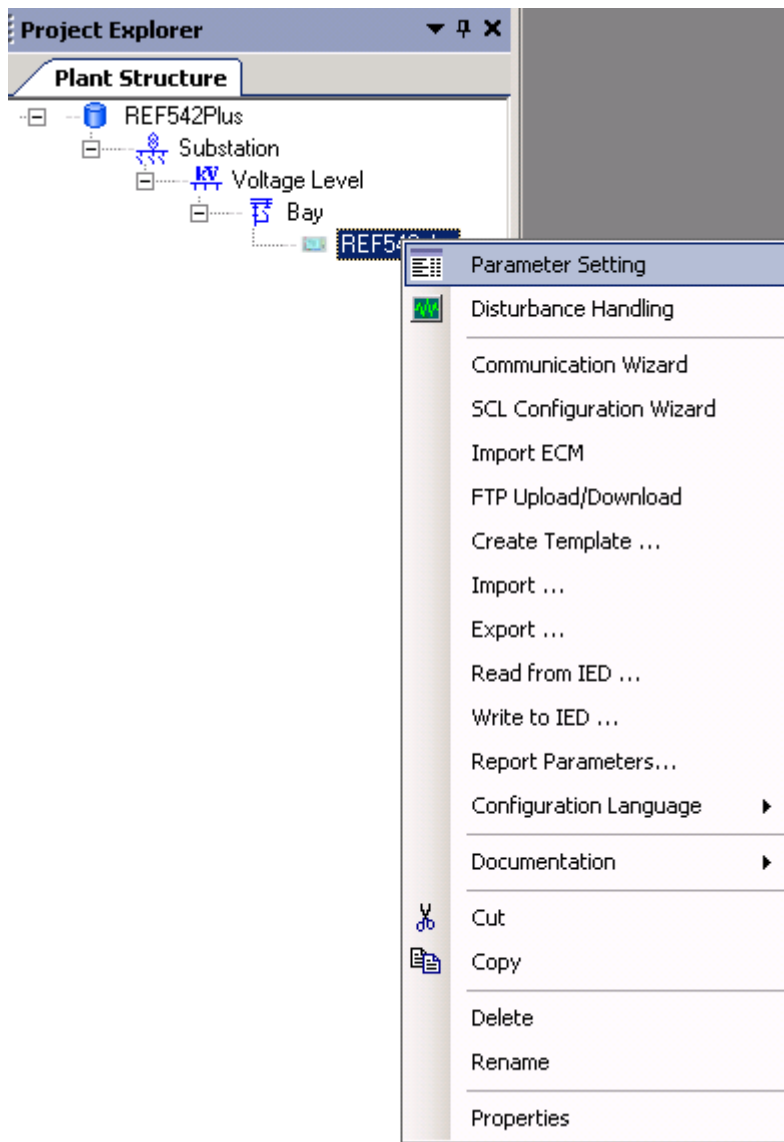


Figure 3-70 REF 542plus Context menu – Parameter Setting verb Highlighted

- Click 'Parameter Setting' in the pop up menu.
- Parameter Setting Tool is displayed.

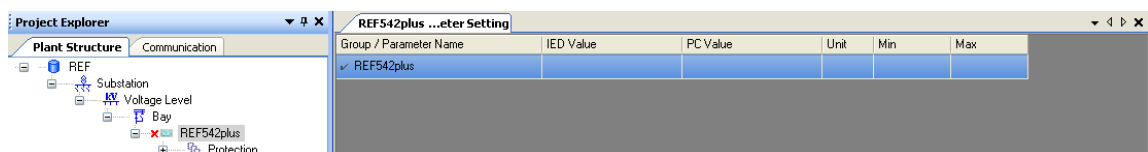



Figure 3-71 Parameter Setting Tool

- Select the 'Protection' (Functional group) in the 'Project Explorer' and expand the node to view the available Protection functions.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

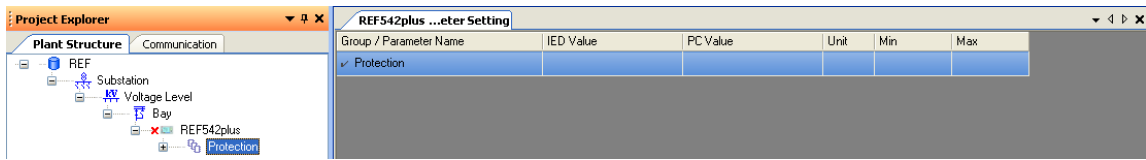


Figure 3-72 Parameter Setting Tool

- Select any one-protection function (Inrush) in the project explorer. Parameters for that function are automatically displayed.

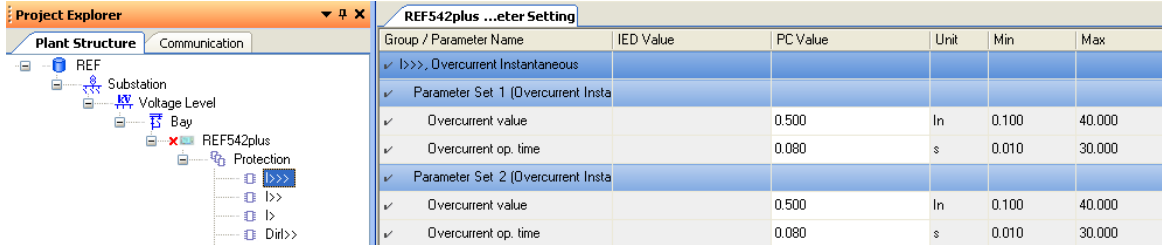


Figure 3-73 Inrush Blocking Parameters - Parameter Setting Tool

3.6.2 Reading Parameter from IED

The following steps are used to read the parameters from IED. Inrush Blocking is taken as example to explain the read parameter from IED.

- Change the parameter in PC Value.

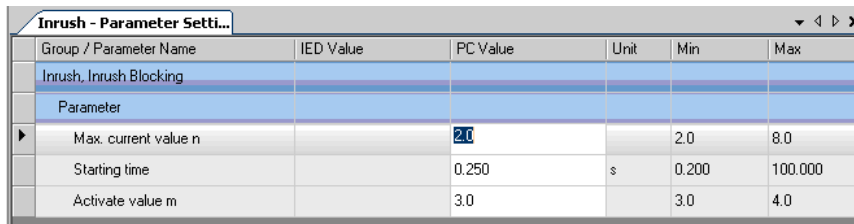


Figure 3-74 Selected Max Current Value in Inrush Blocking Parameters

- Choose "Read parameters from IED" menu item on the "IED" menu.

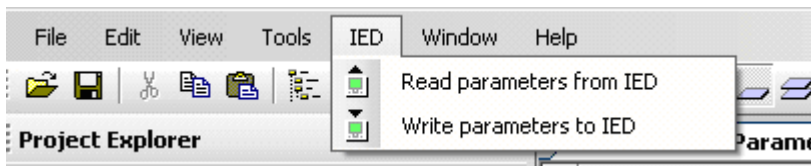



Figure 3-75 Submenus of IED main menu

- Read parameters dialog appears. Choose the required options under parameter range and check parameter option. (Suppose want to read all the parameter of Protection function (Inrush Blocking), select the "Inrush, Inrush Blocking". Otherwise select the parameter name in which you want to read the parameter from IED.)

Doc Kind	User Manual	Project ID	INP.9598					
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en	Rev. ind.	A	Page	65
							No. of p.	127

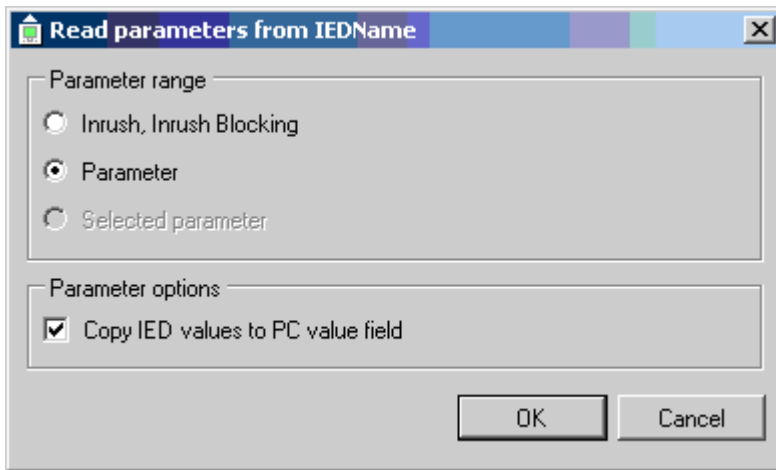


Figure 3-76 Option Dialog for Read Parameters

- Click **OK**.
- Wait until the communication has succeeded, i.e. the progress bar have disappeared.
- PC and IED Values have been modified in the Parameter View window

3.6.3 Writing Parameter into IED

- In Inrush Blocking, Change parameter value in PC Value field.
- Choose the "Write parameters to IED" item on the menu "IED".

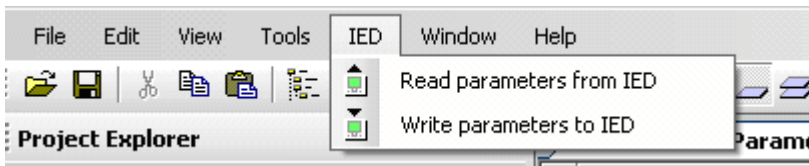



Figure 3-77 Submenus of IED main menu

- Write parameter dialog appears and choose the required options under parameter range and parameter options.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

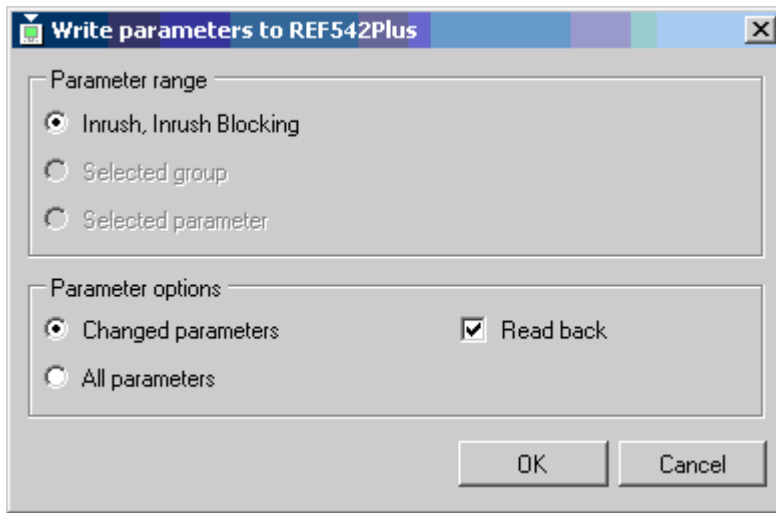


Figure 3-78 Option Dialog for Write Parameters

- Click **OK**.
- Wait until the communication has succeeded, i.e. the progress bar have disappeared.
- Changed PC Values and IED parameters values are identical.

3.6.4 Close Parameter Setting Tool

- Close the Parameter Setting Tool by clicking the button that in the below.

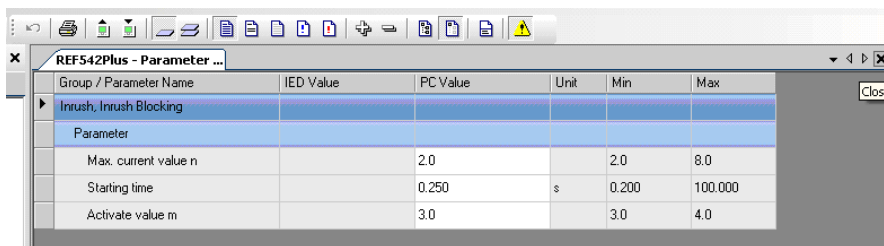


Figure 3-79 PST – Close Button

- Suppose any value has changed, it shows a below dialog box.

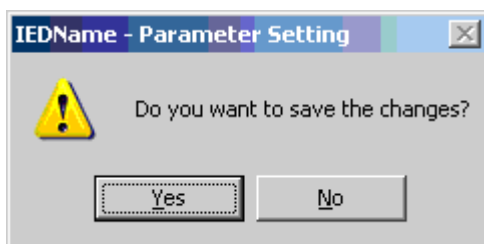



Figure 3-80 PST Save Dialog box

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

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

3.7 Import ECM

ECM import is used to set the FTP user name as “abb” and service password is set from the imported ECM file.

- Click on “Import ECM” verb.

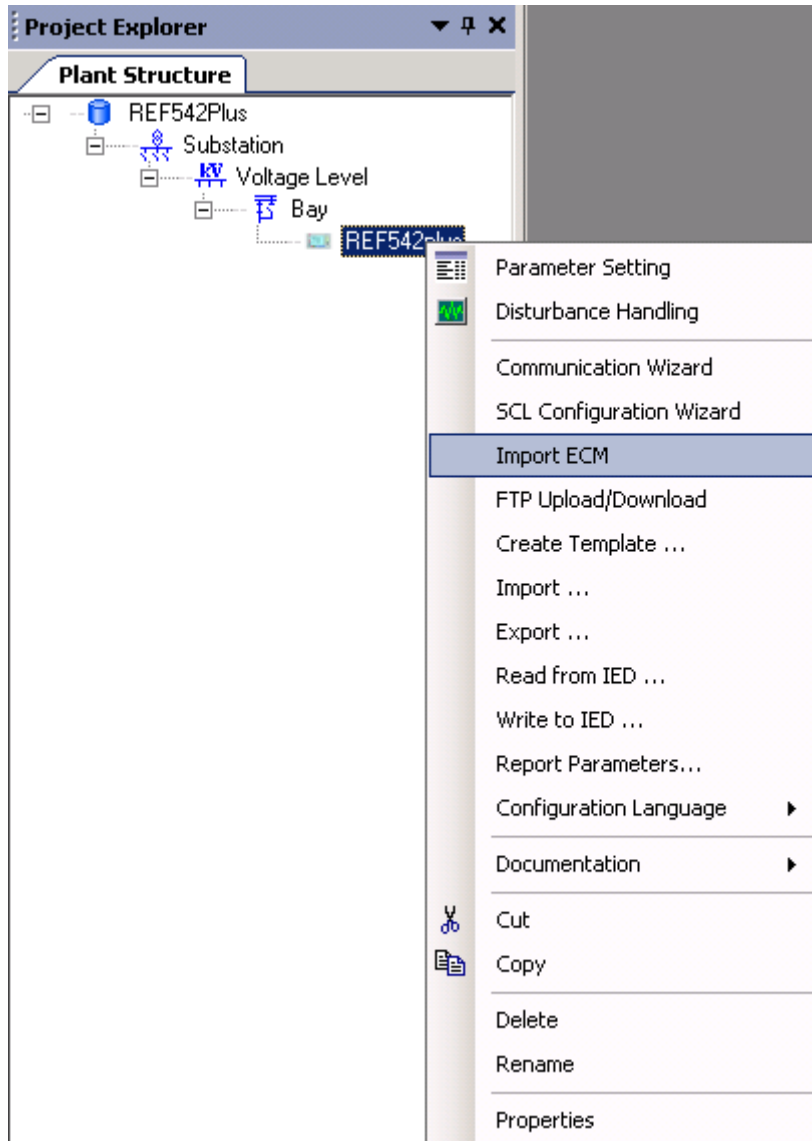


Figure 3-81 ECM Import

- ECM Import dialog pops up to select ECM file.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.		A	Page
				No. of p.	127



Figure 3-82_ECM Import Dialog

- Select ECM file and click on OK to set the user name and password.

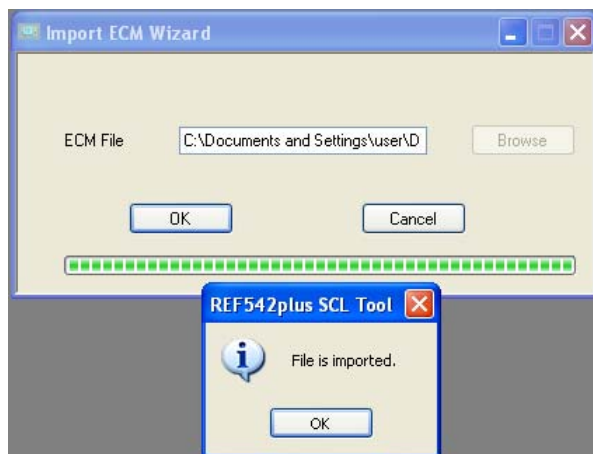


Figure 3-83_ECM Imported


3.8 Disturbance Handling Connectivity Package

Disturbance Handling Connectivity Package is used to read the Disturbance Record information from REF 542plus. Also it is used to display the Disturbance record details in Grid View and the graph. If FTP user name and password are set then ECM Import dialog opens automatically to set the user name and password as explained in section 3.7

The following section explains the details of user interactions and the functionality of DR ConnPack.

3.8.1 Opening Disturbance Handling Tool

- Right click object type in the 'Project Explorer'
- A popup menu is displayed.
- Click 'Disturbance Handling' in the popup menu.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

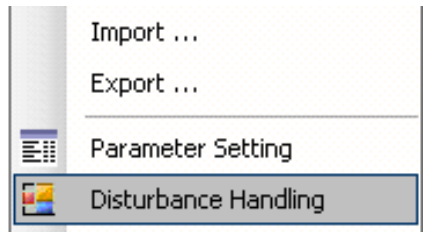


Figure 3-84 REF 542plus Context menu – Disturbance Handling verb Highlighted

- The DR Tool is opened as shows below.

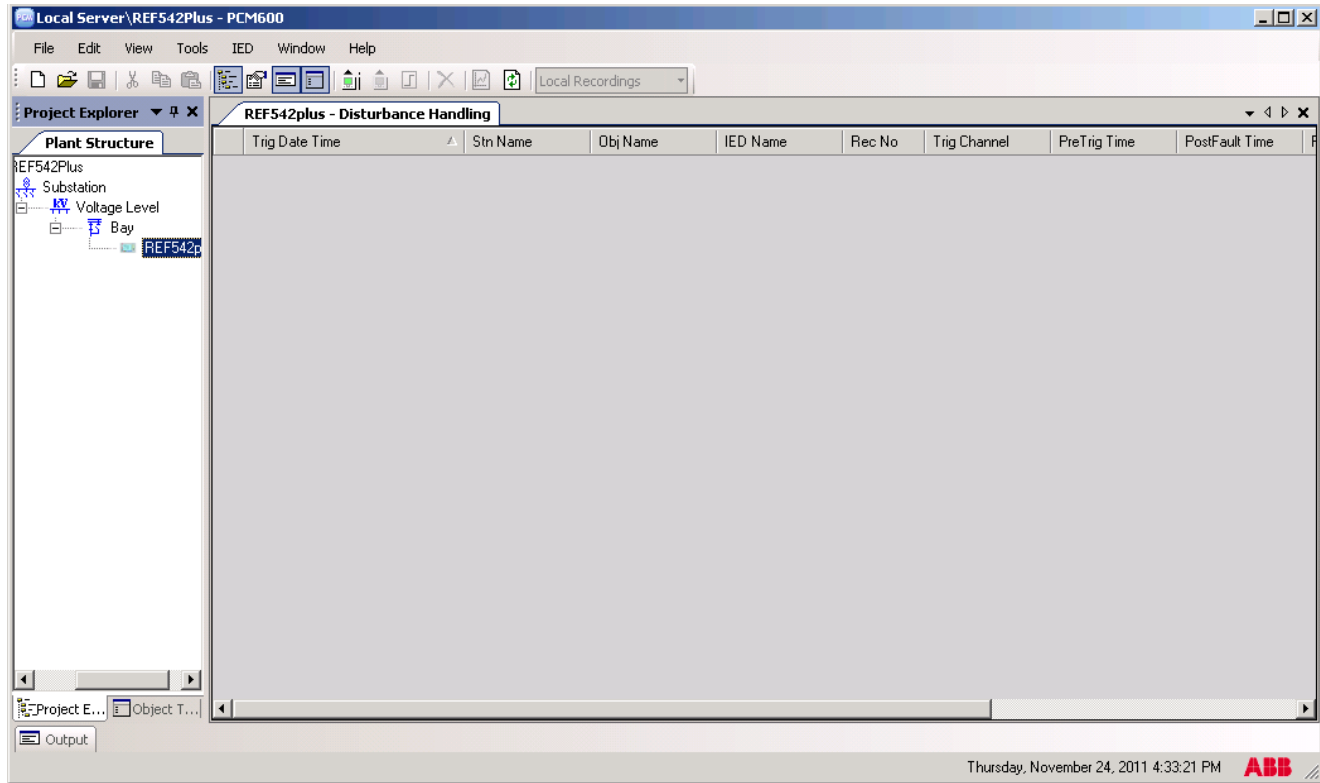


Figure 3-85 Disturbance Handling Tool

3.8.2 Read Recordings Information

- Right-click in the view area of Disturbance Handling Tool.

Doc Kind	User Manual	Project ID	INP.9598			
ABB	ABB Corporate Research Center Bangalore	Doc. no.	Lang.	Rev. ind.	Page	
		9ARD170952-009			en	A
					No. of p.	127

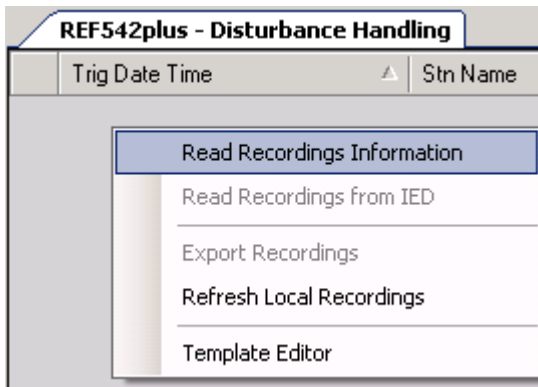




Figure 3-86 Context menu in DHT.

- Choose 'Read Recordings Information' to get the available records from IED.
- List of available recordings appears in the view, including the new manually triggered record with  icon enabled.

AA1J1Q01A1 - Disturbance Handling							
	Trig Date Time	Strn Name	Obj Name	IED Name	Rec No	Trig Channel	Pre Trig Time
	20.10.2011 0:38:36 873	Einspeisung	137	tesB1teste			1500
	20.10.2011 0:40:20 956	Einspeisung	137	tesB1teste			1500
	21.10.2011 0:20:37 637	Einspeisung	137	tesB1teste			1500
	15.11.2011 14:53:51 454	INCOMING FEE...	137	tesB1teste			100
	15.11.2011 14:54:43 677	INCOMING FEE...	137	tesB1teste			100
	15.11.2011 14:55:13 035	INCOMING FEE...	137	tesB1teste			100
	15.11.2011 14:55:18 274	INCOMING FEE...	137	tesB1teste			100
	16.11.2011 0:13:50 252	INCOMING FEE...	137	tesB1teste			100
	16.11.2011 0:13:52 069	INCOMING FEE...	137	tesB1teste			100
	16.11.2011 0:13:59 254	INCOMING FEE...	137	tesB1teste			100

Figure 3-87 Available DR Records in IED




- Right-click somewhere on the shown recordings.
- Choose 'Select All Rows'.
- All available recordings are selected

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.		A	
				Page	71
				No. of p.	127

AA1J1Q01A1 - Disturbance Handling								
	Trig Date Time	Stn Name	Obj Name	IED Name	Rec No	Trig Channel	Pre Trig Time	
 	20.10.2011 0:38:36 873	Einspeisung	137	tesB1teste			1500	
 	20.10.2011 0:40:20 956	Einspeisung	137	tesB1teste			1500	
 	21.10.2011 0:20:37 637	Einspeisung	137	tesB1teste			1500	
 	15.11.2011 14:53:51 454	INCOMING FEE...	137	tesB1teste			100	
 	15.11.2011 14:54:43 677	INCOMING FEE...	137	tesB1teste			100	
 	15.11.2011 14:55:13 035	INCOMING FEE...	137	tesB1teste			100	
 	15.11.2011 14:55:18 274	INCOMING FEE...	137	tesB1teste			100	
 	16.11.2011 0:13:50 252	INCOMING FEE...	137	tesB1teste			100	
 	16.11.2011 0:13:52 069	INCOMING FEE...	137	tesB1teste			100	
 	16.11.2011 0:13:59 254	INCOMING FEE...	137	tesB1teste			100	

Figure 3-88 Available DR Records in IED

3.8.3 Read Recordings from IED

- Right-click somewhere on the view area of Disturbance Handling Tool and choose “Read Recordings from IED” .
- List of available local recordings appears in the view, with  icon enabled.
- If a record exists in both IED and local folder both the IED/computerl mode icons will be enabled as given  else either of the IED/computer icons will be enabled as shown .






















AA1J1Q01A1 - Disturbance Handling								
	Trig Date Time	Stn Name	Obj Name	IED Name	Rec No	Trig Channel	Pre Trig Time	
 	20.10.2011 0:38:36 873	Einspeisung	137				1500	
 	20.10.2011 0:40:20 956	Einspeisung	137				1500	
 	21.10.2011 0:20:37 637	Einspeisung	137				1500	
 	15.11.2011 14:53:51 454	INCOMING FEE...	137				100	
 	15.11.2011 14:54:43 677	INCOMING FEE...	137				100	
 	15.11.2011 14:55:13 035	INCOMING FEE...	137				100	
 	15.11.2011 14:55:18 274	INCOMING FEE...	137				100	
 	16.11.2011 0:13:50 252	INCOMING FEE...	137				100	
 	16.11.2011 0:13:52 069	INCOMING FEE...	137				100	
 	16.11.2011 0:13:59 254	INCOMING FEE...	137				100	

Figure 3-89 DR Record Details of All Records

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	72
				No. of p.	127

3.8.4 Delete Record from IED

3.8.4.1 Delete all the records from IED

- Right-click somewhere on the view area of Disturbance Handling Tool and choose “Delete Recordings”.

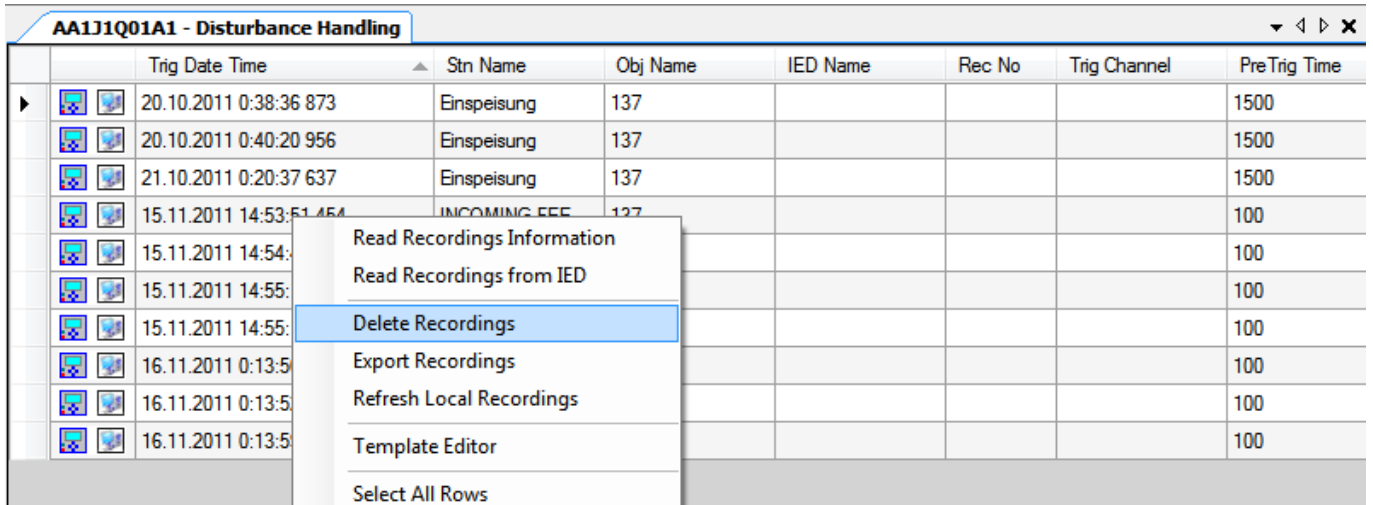



Figure 3-90_DR - Delete Recordings

- Select 'IED' check box, records will be cleared from the IED and the IED icon  will be in disabled state.

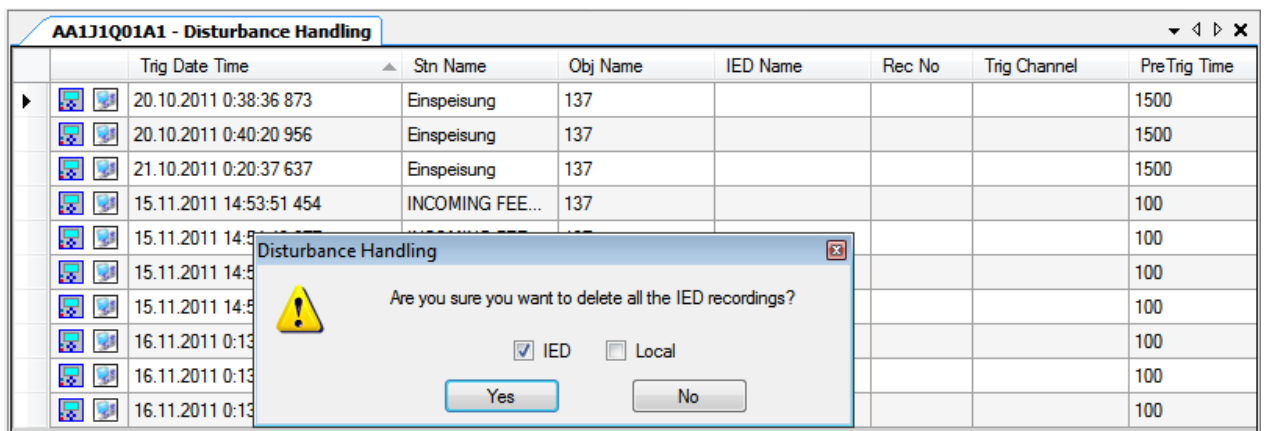



Figure 3-91_DR - Delete Recordings from IED

3.8.4.2 Delete all records from local mode

- Right-click somewhere on the view area of Disturbance Handling Tool and choose “Delete Recordings”.

Doc Kind	User Manual	Project ID	INP.9598		
	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	73
				No. of p.	127

- Select 'Local' check box, records will be cleared from the local folder and the computer icon will be in disabled state.

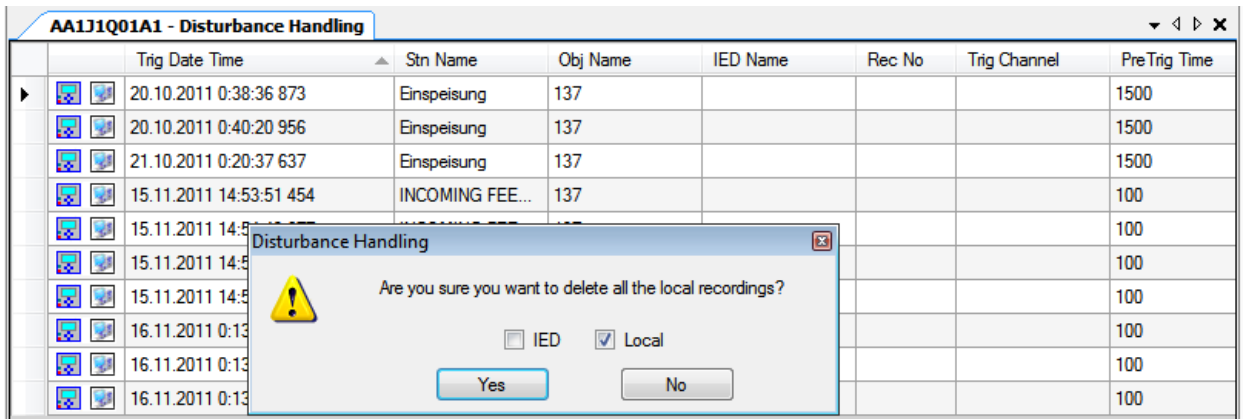


Figure 3-92 DR - Delete Recordings from local folder

3.8.5 View DR Graph

- Right click on the "Recordings" section in DR Tool
- Select any one Row.
- Click on "Create Report" in the Tool bar.

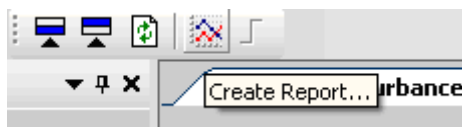


Figure 3-93 Create Report Button in Toolbar

- A dialog box is displayed.
- Select the xml file and click view report to see the DR graph.
- DR graph is displayed.

3.8.6 Close DR Tool

- Click the **Close** button in the DR tool to close the DR tool

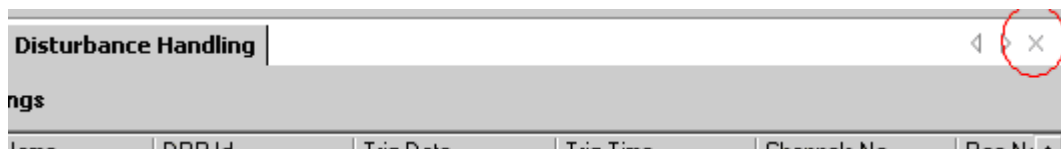



Figure 3-94 DR Tool – Close Button Highlighted

Doc Kind	User Manual	Project ID	INP.9598				
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en	Rev. ind.	Page	74
					A	No. of p.	127

- DR tool is closed.
- There is no error/warning message in the output window.

3.9 FTP Upload/Download

The FTP Upload/Download is used to upload/download the “CID” file to/from IED. The following section explains user interaction that’s needed for this functionality.

3.9.1 Open FTP Upload/Download tab in SCL Tool

- Right click on the “REF 542plus” object type
- A pop up menu is displayed.

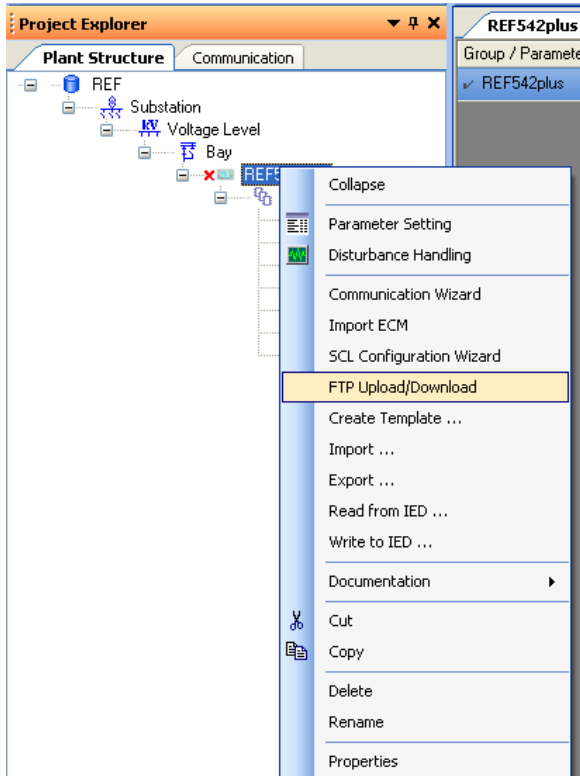


Figure 3-95 REF 542plus Context menu – FTP Upload/Download verb Highlighted

- Click on the ” FTP Upload/Download”
- REF 542plus SCL Tool is opened. The “FTP Upload/Download” tab is selected while opening/displaying the REF 542plus SCL Tool. In addition to that the Navigation to other tabs is restricted i.e. other tabs are disabled. Other tabs title’s texts are dimmed to show restriction of the navigation.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	75
				No. of p.	127

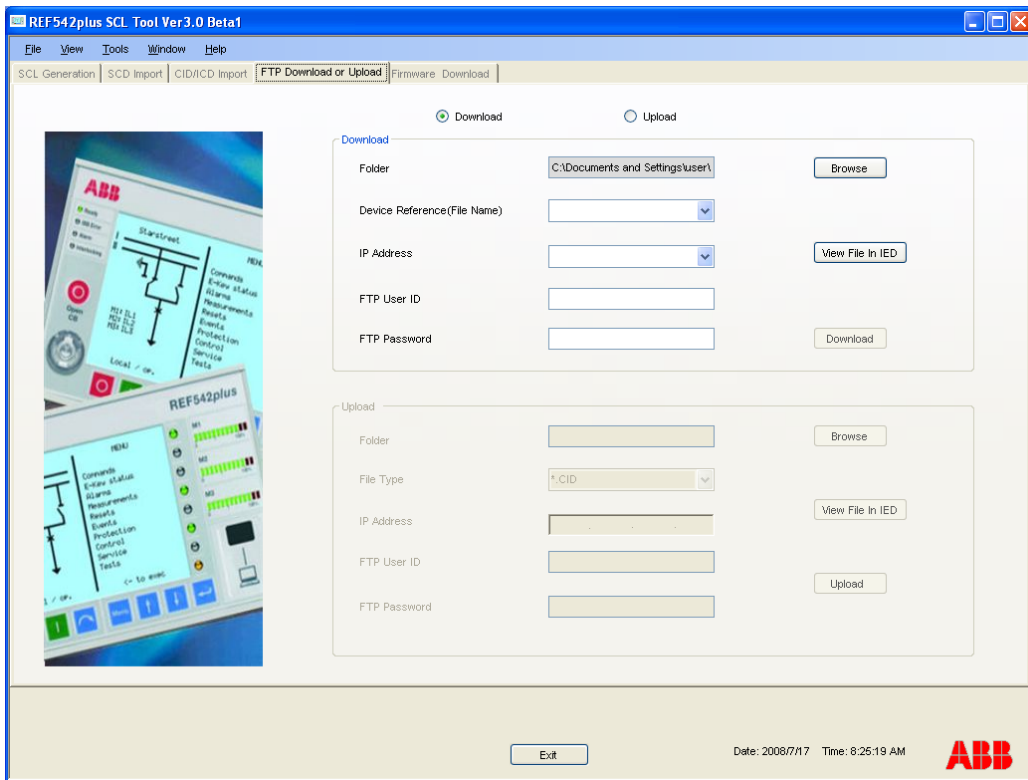



Figure 3-96 FTP Download/Upload Tab in SCL Tool

3.9.2 FTP Download

- Download radio button is checked by default.
- By default SCL folder path is same as where the REF 542plus SCL Tool generated CID files are stored.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page
		en	A	No. of p.	76 127

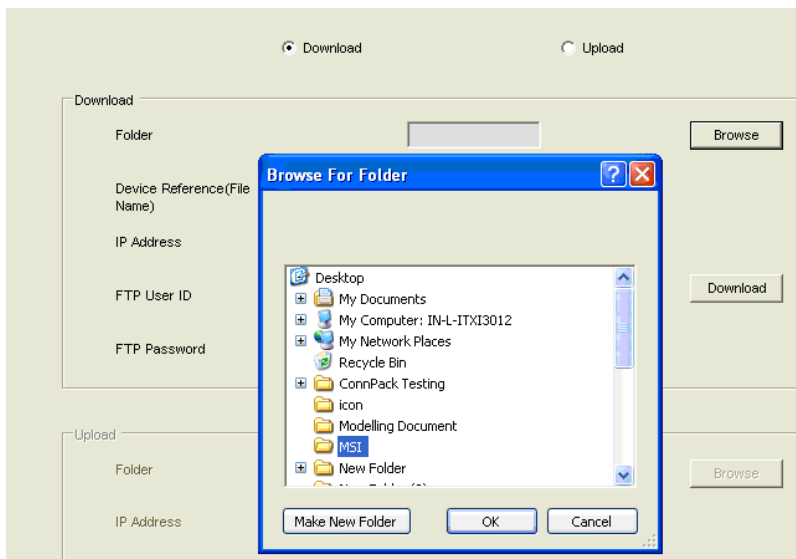


Figure 3-97 Browse For Folder Dialog in FTP Download

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

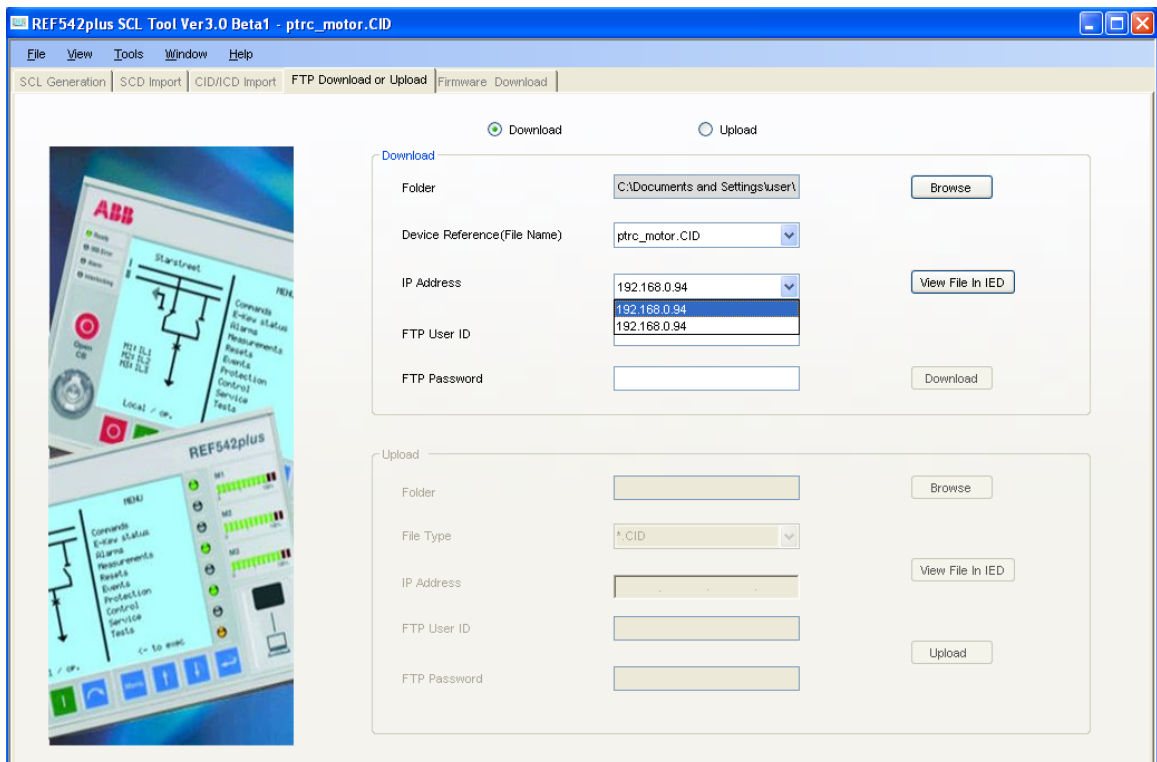


Figure 3-98 FTP Download – Displaying IP Address

- Select an IP address (primary or secondary IP address).

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	77
				No. of p.	127

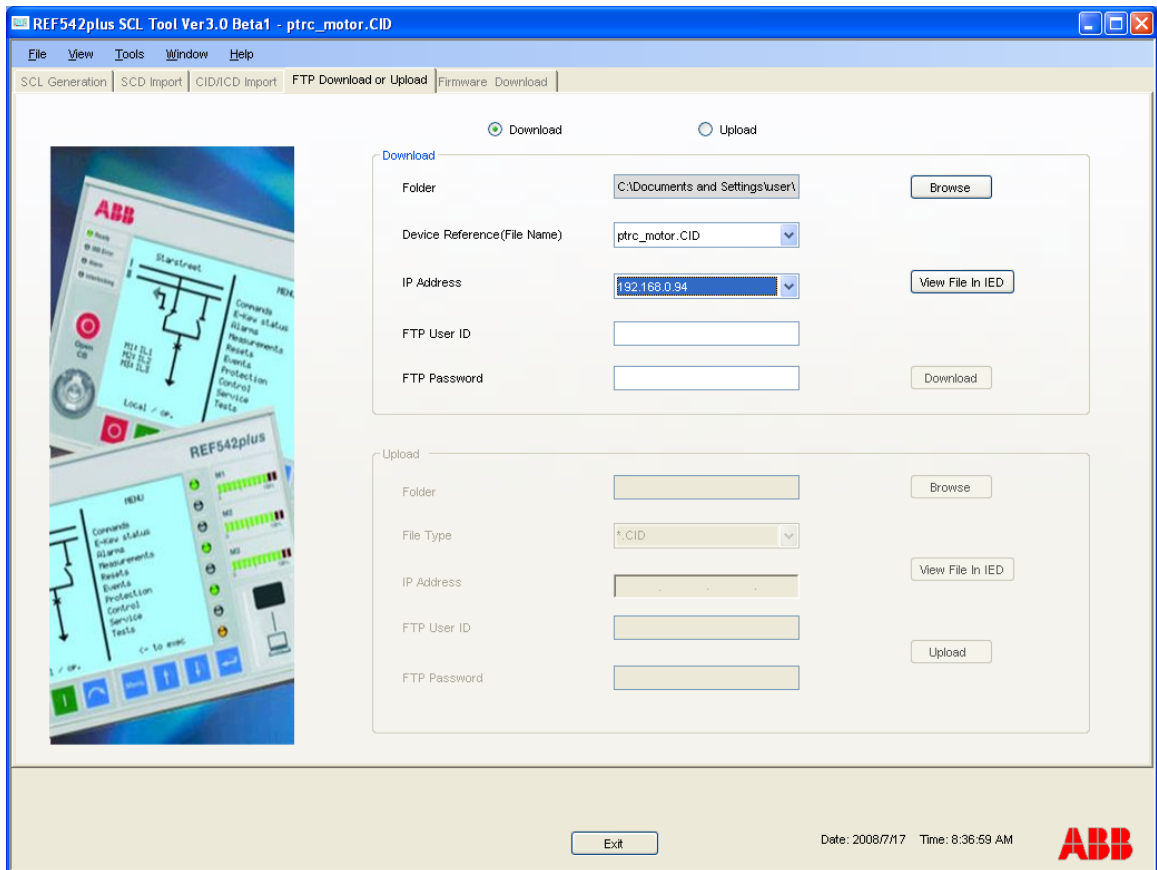


Figure 3-99 FTP Download – Displaying IP Address


- Enter user name and password (abb for REF 542plus EB).
- Click **Download** to initiate FTP connectivity and start CID file transfer from hard disk into the REF 542plus EB.
- A pop up message is displayed after successful file transfer to indicate that the SCL Tool is resetting the REF 542plus EB to recognize the newly loaded file.



Figure 3-100 Information Message to Confirm the FTP Download

3.9.3 FTP Upload

- Click on **Upload** in the “FTP Download / Upload” tab.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

- Select the destination folder for the uploaded file in the hard disk by clicking **Browse**.
- Select the type of file upload from IED. Options “CID”, “ECM” and both will be available in the “Type of File” selection list. By default, “CID” option will be selected.
- Enter the IP address of the REF 542plus EB.
- Enter user name and password (abb for REF 542plus EB).
- A pop up message appears after successful file transfer into the selected destination folder.

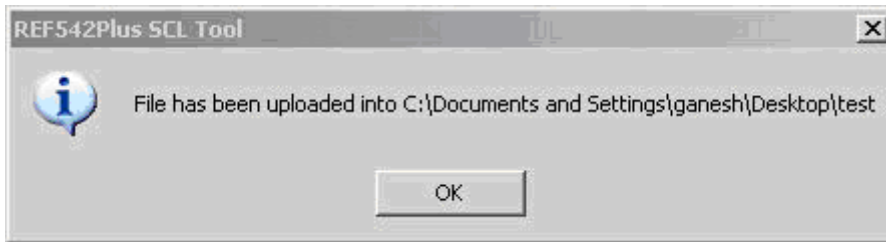


Figure 3-101 Information Message to confirm FTP Upload

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	en	Rev. ind.	Page
		9ARD170952-009			A
					No. of p.
					127

3.10 REF 542plus Connectivity Package Error and Exception Handling

3.10.1 PCM 600

PCM600 detects the configured the Communication and IED Connectivity Packages when PCM600 is starting up.

- Suppose both Communication and IED Connectivity Packages are not available, the following information message is displayed.

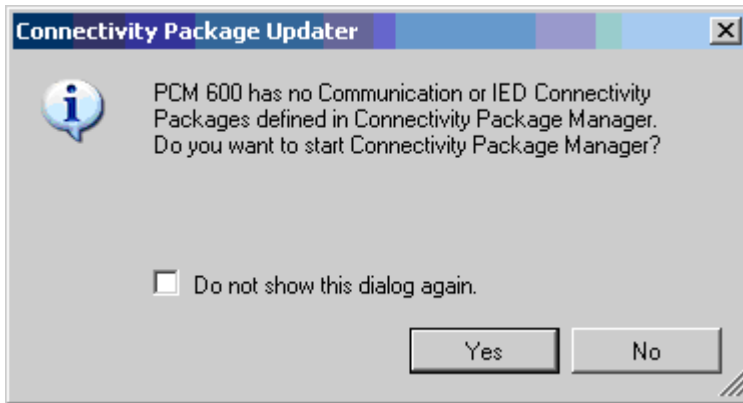


Figure 3-102 Information Dialog when no Communication and IED ConnPack

- Suppose Communication Connectivity Packages is not available/not configured in Connectivity Manager, the following information message is displayed.

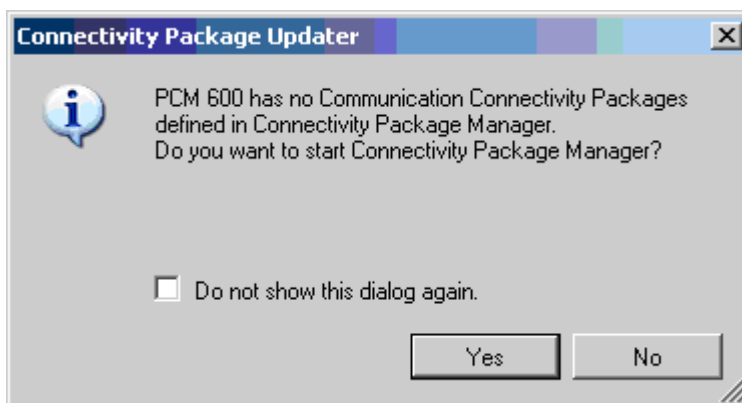


Figure 3-103 Information Dialog when no Communication ConnPack

- Suppose IED Connectivity Packages are not available/not configured in Connectivity Manager, the following information message is displayed.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.		A	Page
				No. of p.	127

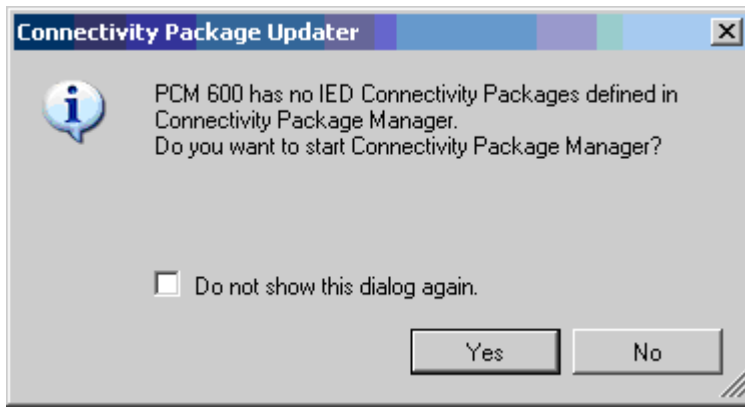


Figure 3-104 Information Dialog when no IED ConnPack

3.10.2 Parameter Setting Connectivity Package

- Parameter Setting Connectivity Package doesn't allow deletion of a protection function. Suppose user tries to delete any protection function, the following error message is displayed.

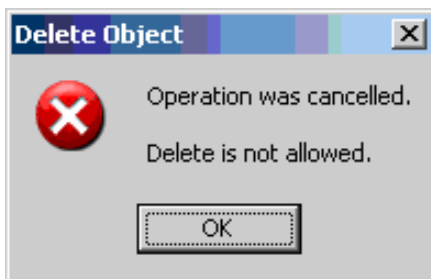


Figure 3-105 Delete Not Allowed - Error Message

- When PST is not able connect to the REF 542plus, the following error message is displayed.

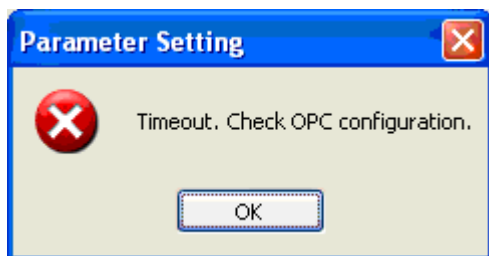


Figure 3-106 Time out Error Message

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

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	81
				No. of p.	127

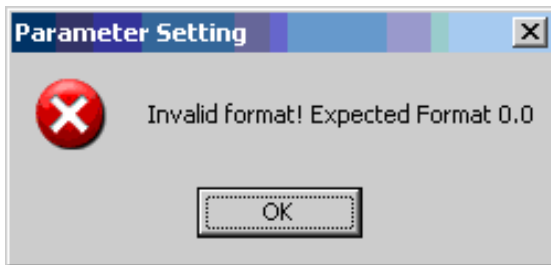


Figure 3-107 Invalid Format Error Message

- If the entered value does not fall within the range that's been specified, the following error message is displayed.



Figure 3-108 Value Not in Range Error Message

3.10.3 Disturbance Handling Connectivity Package

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

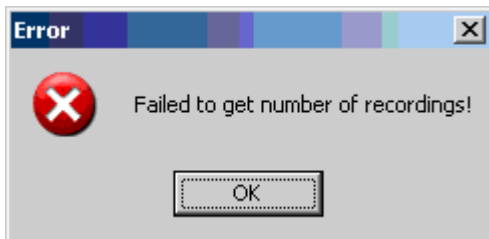


Figure 3-109 Communication Error Message in DR


4. SAB600 Support

4.1 RF542plus object Type Creation

After the installation of REF 542plus Connectivity Packages, the following configuration steps needs to be done to enable the creation of REF 542plus object type in SAB 600. This REF 542plus object type is required to invoke the standard tools of SAB600.

4.1.1 Configuring REF 542plus ConnPack in Connectivity Package Manager

User has to configure/ enable the REF 542plus Connectivity package in update manager to work with REF 542plus object type in SAB 600.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	82
		en	A	No. of p.	127

- Close the SAB 600, suppose it is opened.
- Open the update Manager by double clicking on the update Manager shortcut on the desktop (or) clicking on the Start -> Programs-> ABB->Update Manager -> Update Manager.



Figure 4-1 Update Manager Desktop Icon

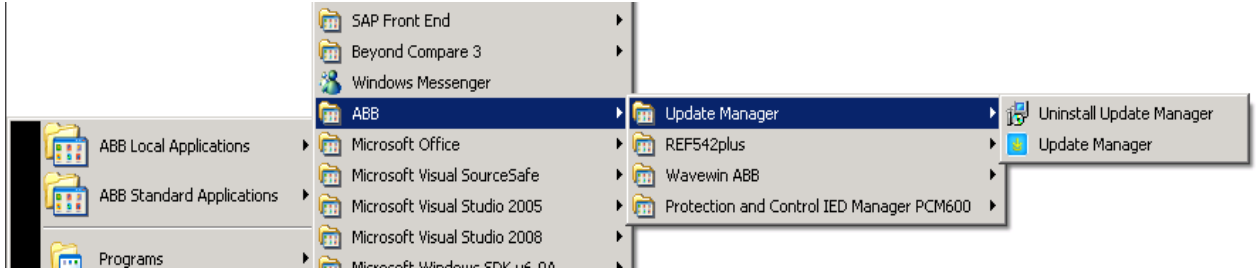


Figure 4-2 Connectivity Package Manager on Programs menu

- Update Manager Screen appears.

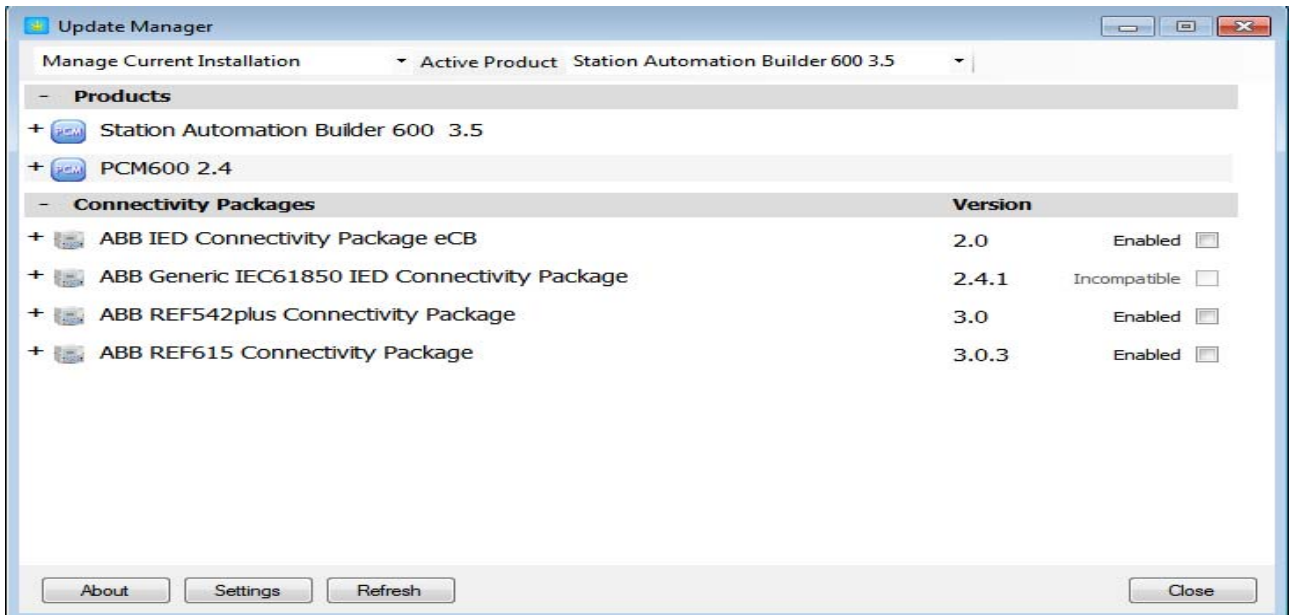


Figure 4-3 Connectivity Package Manager

- Expand the “REF 542plus Connectivity Package” node by clicking on the node.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	83
				No. of p.	127

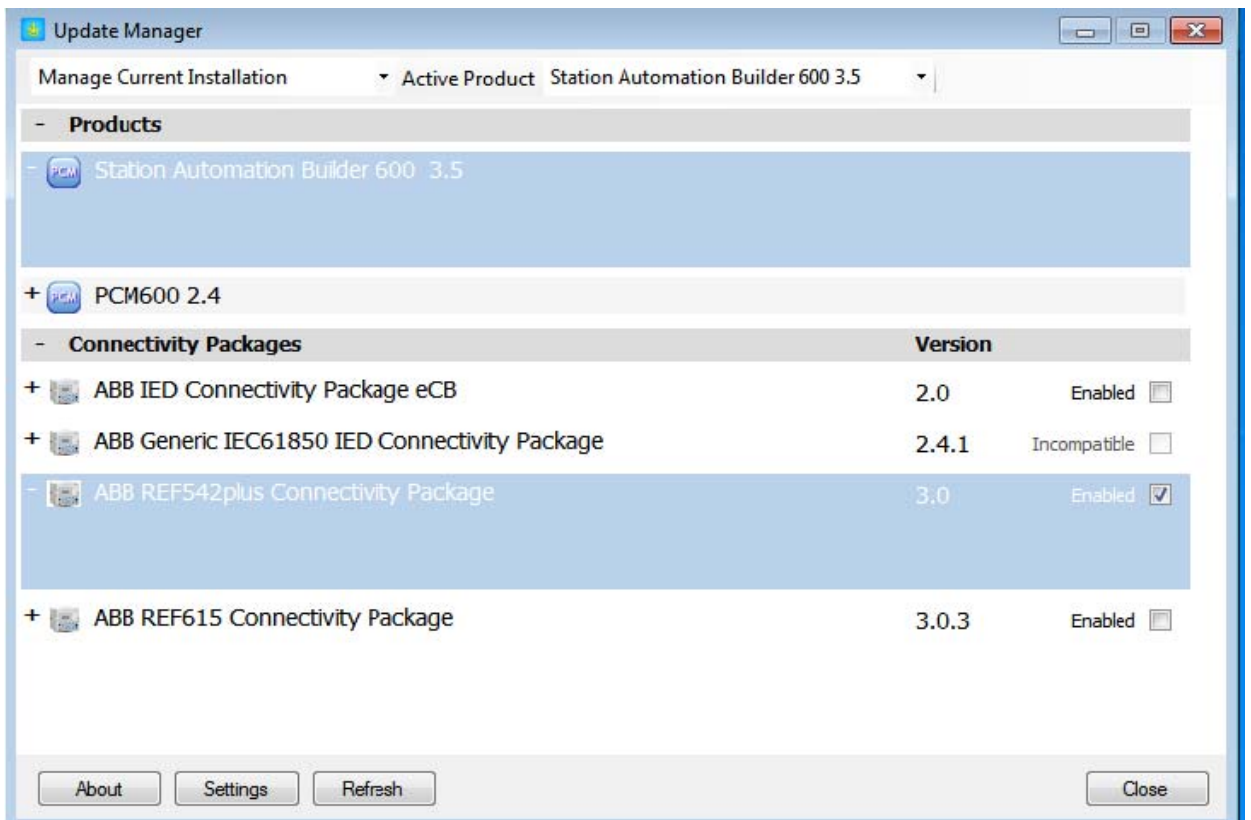


Figure 4-4 REF 542plusConnectivity Package Manager

- Check the 3.0 version check box to enable REF 542plus connectivity package in SAB600. (Suppose it is not enabled / checked; the REF 542plus Object type cannot be created in SAB 600.)
- Close the Connectivity Package manager by clicking on File → Close menu.

4.1.2 Creating/Managing Projects in SAB 600

One can use existing/new project of SAB600 to create the REF 542plus object type in SAB600. The following steps are used to manage a project in SAB600.

- Open the SAB600 by double clicking the SAB600 shortcut on the desktop



Figure 4-5 SAB600Desktop Icon

- SAB600 can be opened from Start → Programs → ABB → Station Automation Builder 600 → SAB600.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	84
				No. of p.	127

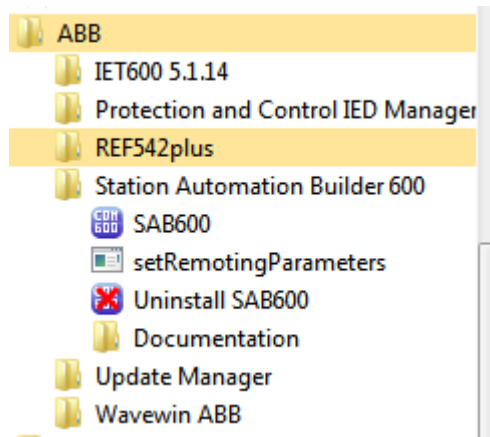


Figure 4-6 SAB600on Programs Menu

- SAB600CET screen is displayed.

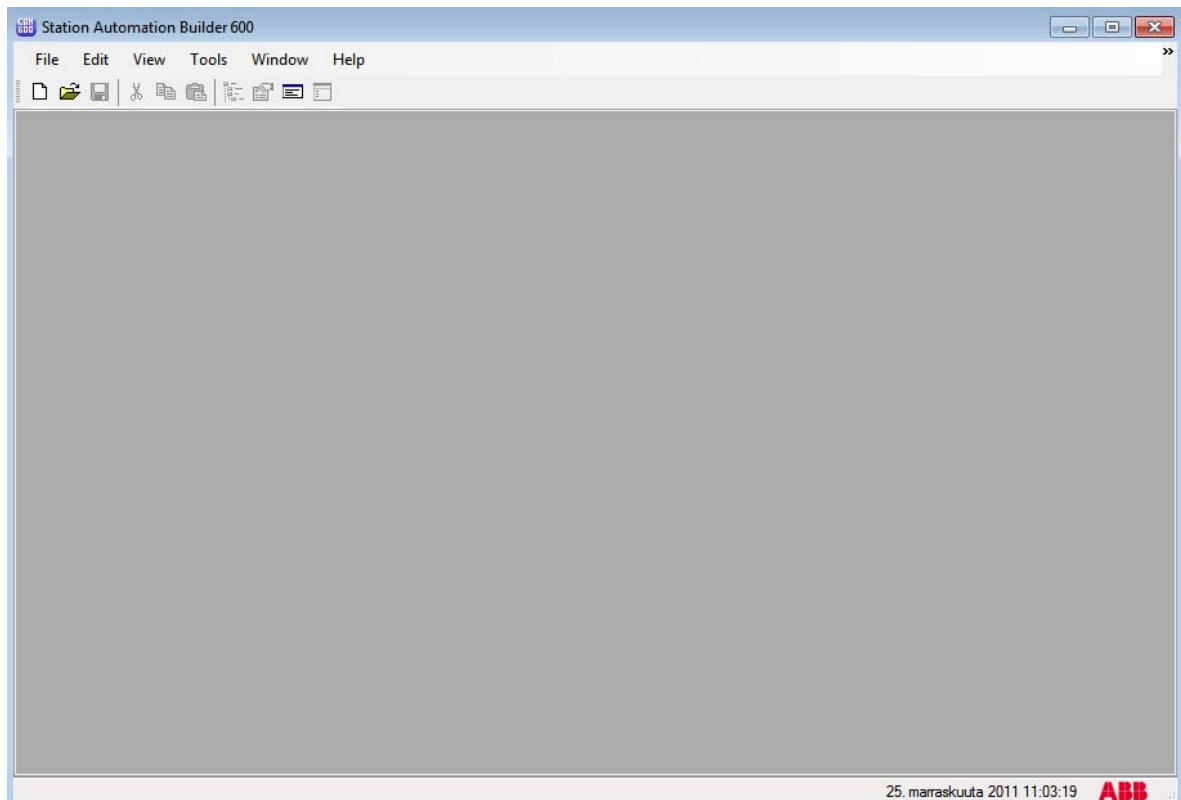



Figure 4-7 SAB 600

- Open File→Open/Manage project to create a new or managing an existing project.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

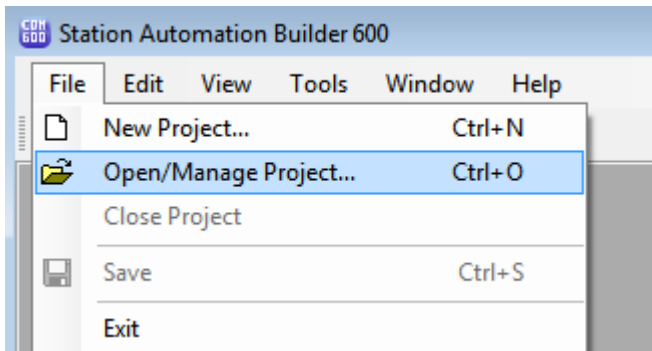


Figure 4-8 Open/Manage Project menu

- “Open/Manage Project” dialog appears. This dialog is used to do the following operations
 - Creating New project
 - Deleting a project
 - Importing a project
 - Exporting a project
 - Opening a project

In the following section, we will see how to create/open an existing project.

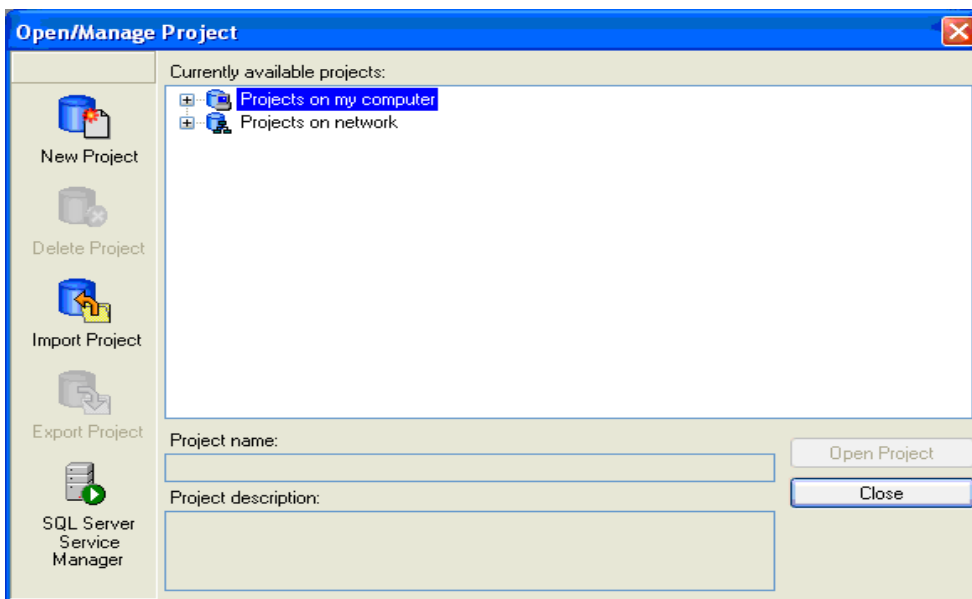


Figure 4-9 Open/Manage Project Dialog

4.1.2.1 Create New Project

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

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	86
				No. of p.	127

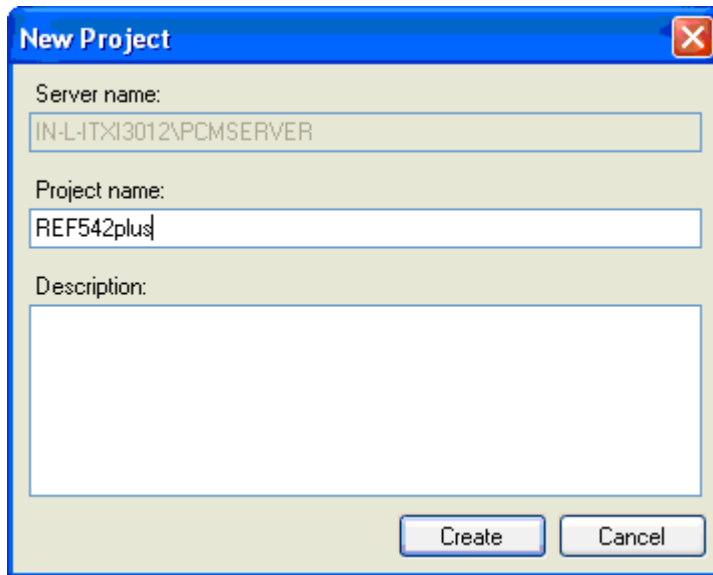


Figure 4-10 New project Dialog

- Click **Create** to create a new project.
- Once the project is created, it is displayed in the “Projects on my computer” tree structure.

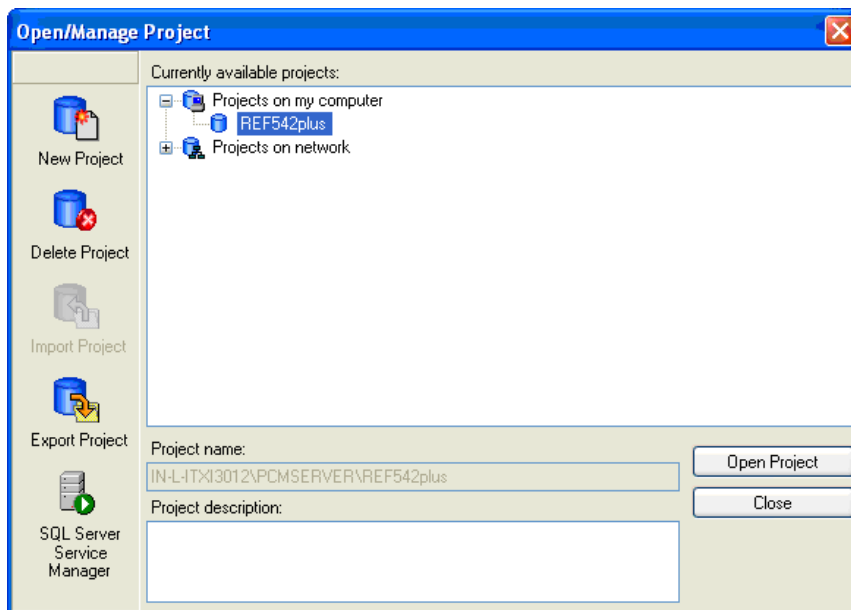


Figure 4-11 Open/Manage Project Dialog with created project

4.1.2.2 Open Existing Project

- Open the existing project from My Computer or Network through Open/Manage Project Dialog.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	87
				No. of p.	127

- To open a created project, Click on the project name to select the project, then click **Open Project** to open the project.
- Delete/open/Export of a selected project is also possible.
- After clicking **Open project**, SAB600 opens the communication structure of the project. (Communication structure is empty for newly created projects).

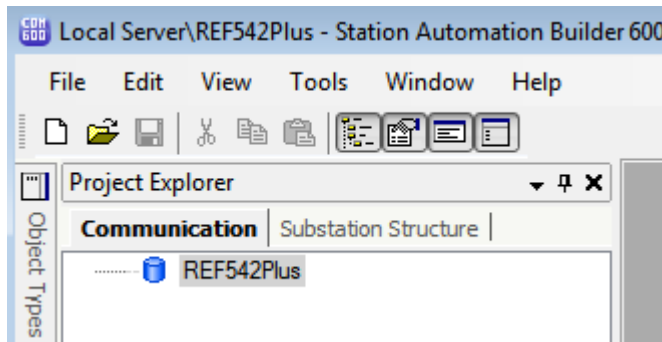


Figure 4-12 Communication structure with Project Name

- Create a Gateway 3.5x by opening the context menu of “REF 542plus” project.
- Click on the New→Communication context menu.

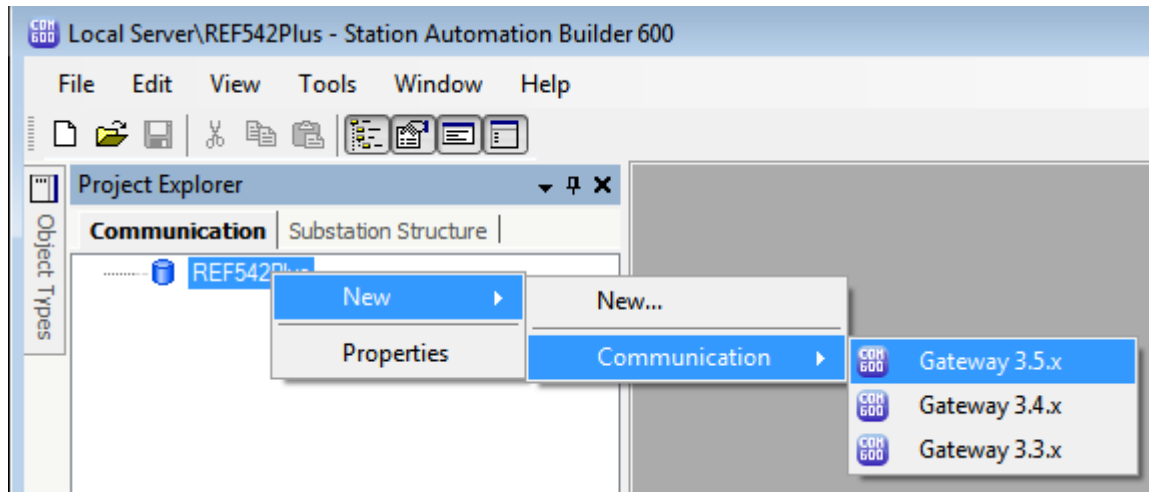


Figure 4-13 Menu Navigation for Gateway creation

- “Gateway” node is created in the REF 542plus communication structure.
- Create IEC 61850 OPC Server node in the communication structure through the context menu of “Gateway” (It is shown in the below screen).

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
		Rev. ind.	A	Page	88
				No. of p.	127

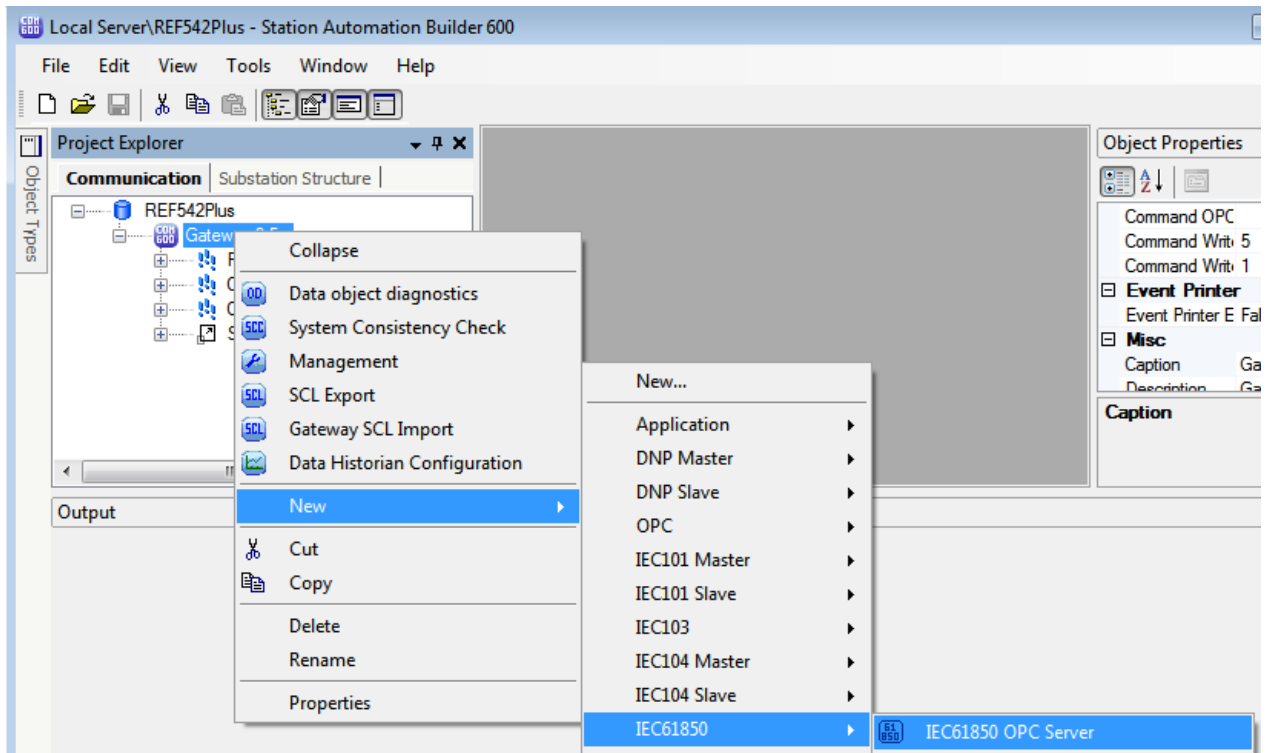
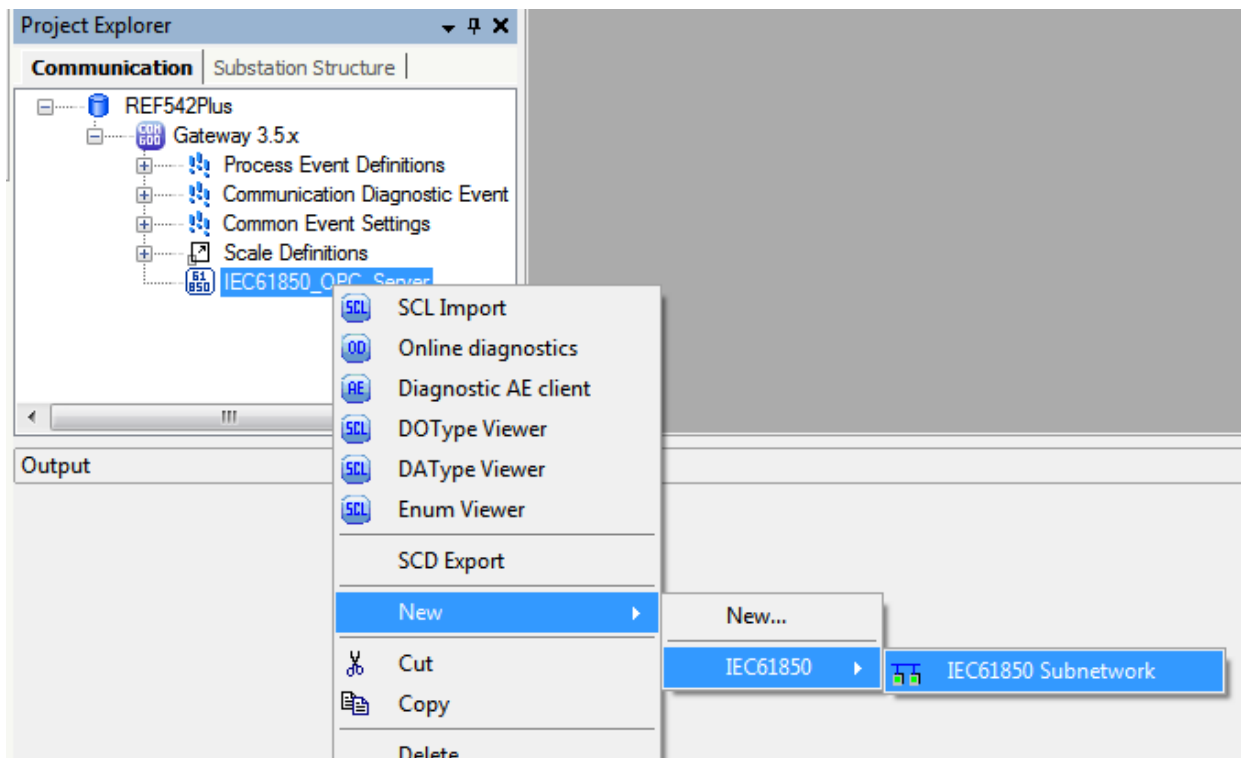


Figure 4-14 Menu navigation for IEC61850 OPC Server creation

- Create IEC 61850 Subnetwork node using the context menu of “IEC 61850 OPC Server” in the plant structure.




Doc Kind	User Manual	Project ID	INP.9598		
 ABB ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

Figure 4-15 Menu navigation for IEC 61850 Subnetwork

4.1.3 Creating REF 542plus Object in SAB600

REF 542plus object type can be created in two ways. One through the IEC 61850 Subnetwork's Context menu the other one is through the Object type's window.

- Right click on the IEC 61850 Subnetwork node in the plant structure.
- A popup menu appears.
- Click on the New→Feeder Terminals→REF 542plus to create the object type.

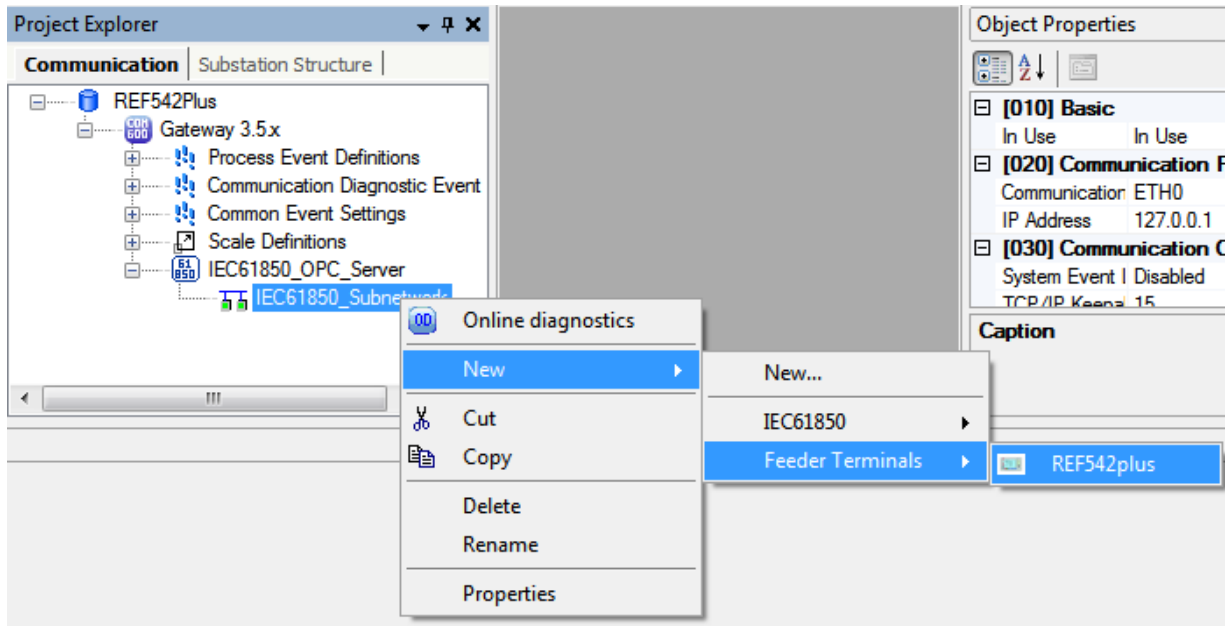



Figure 4-16 Menu navigation for REF 542plus Creation

- REF 542plus Object type is created under IEC 61850 Sub network tree node.

The following steps are used to create the REF 542plus Object Type.

- Open the Object Type window by clicking on View→Object Type.
- Object Type window is opened.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	90	
					No. of p.	127

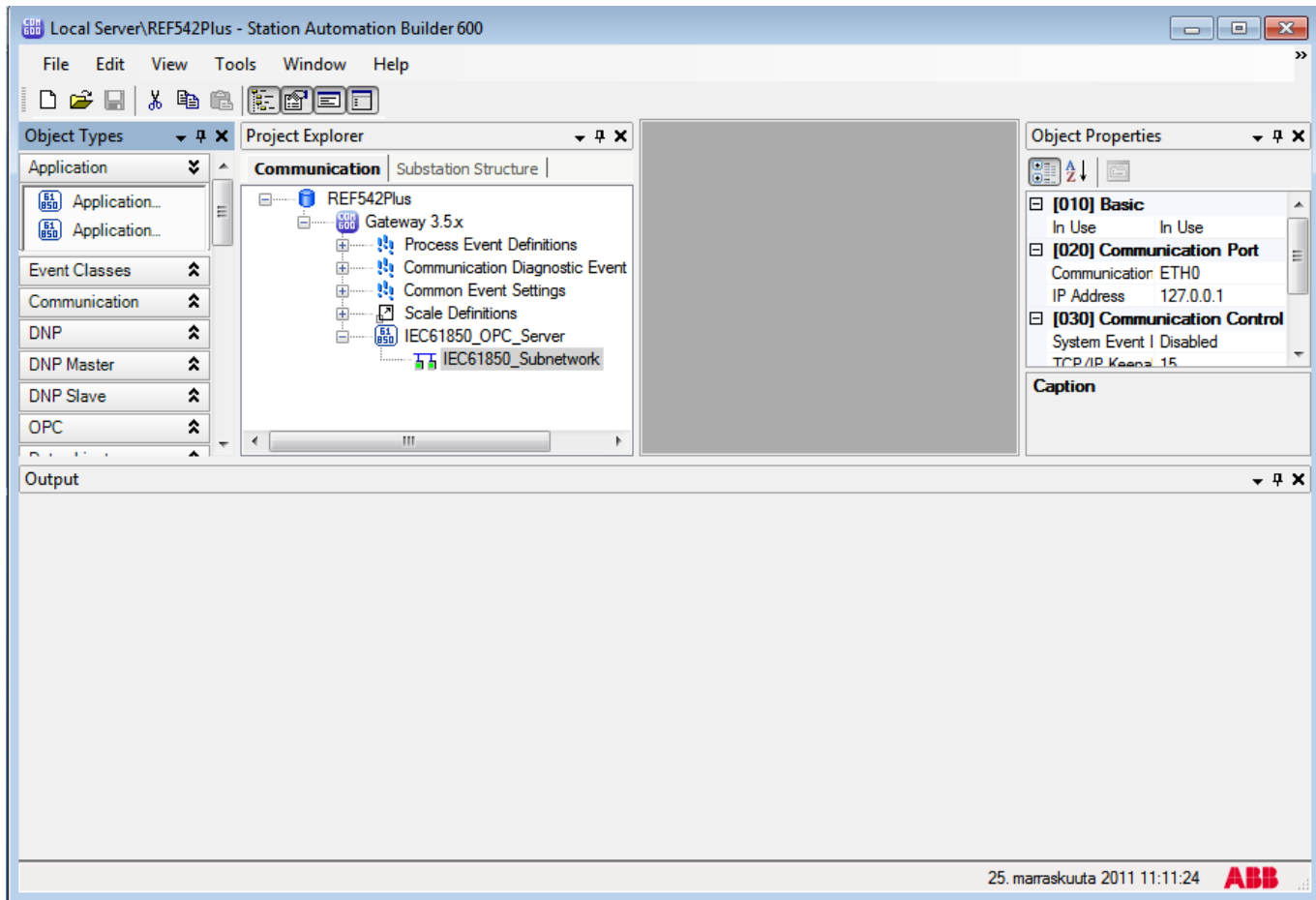



Figure 4-17 Object Type Window

- Click on the feeder Terminals, REF 542plus object type is displayed.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	91	
					No. of p.	127

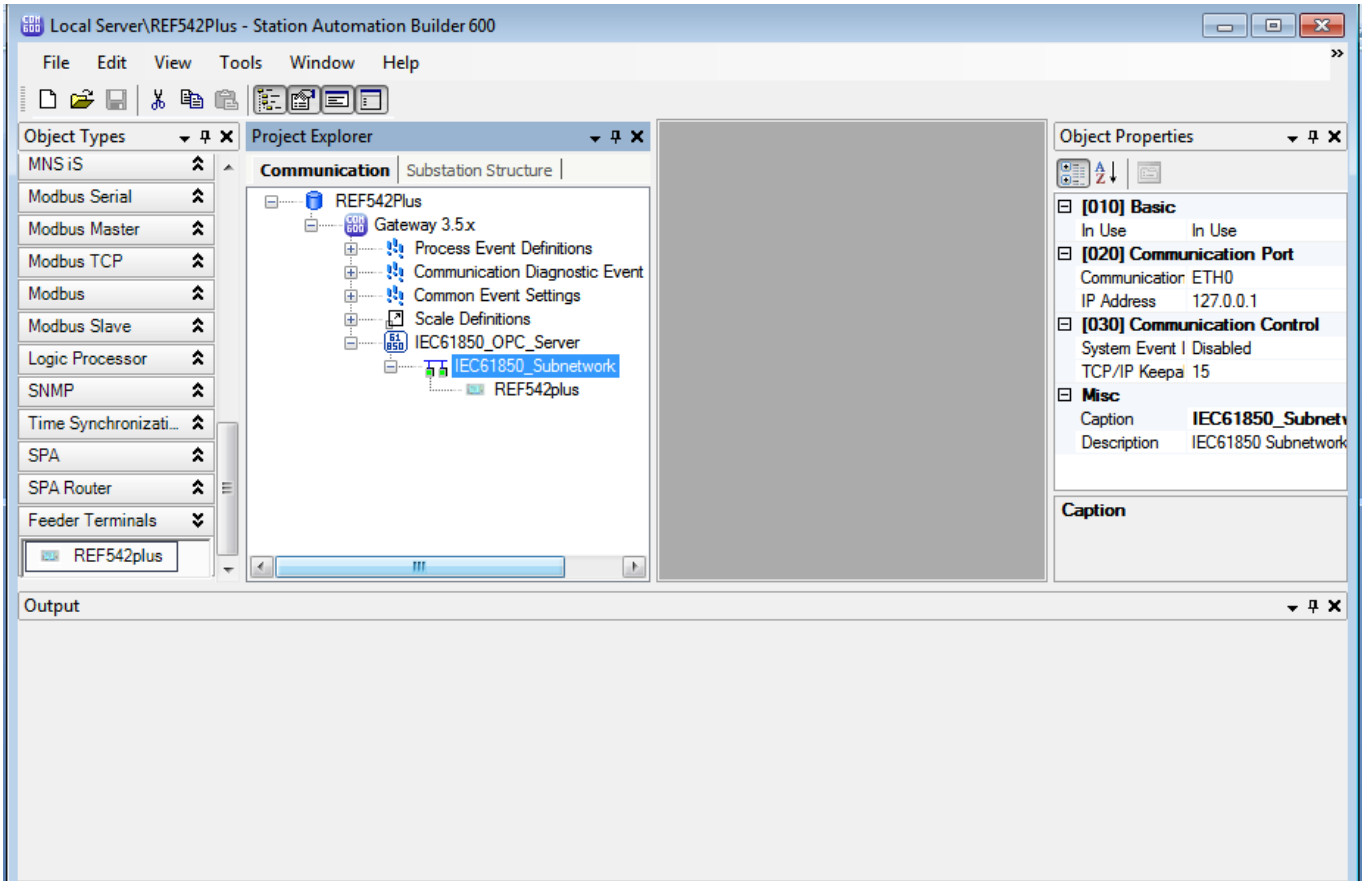



Figure 4-18 Object Type window for Feeder Terminal

- REF 542plus object can be drag and drop into Bay to create the object type in the communication structure.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

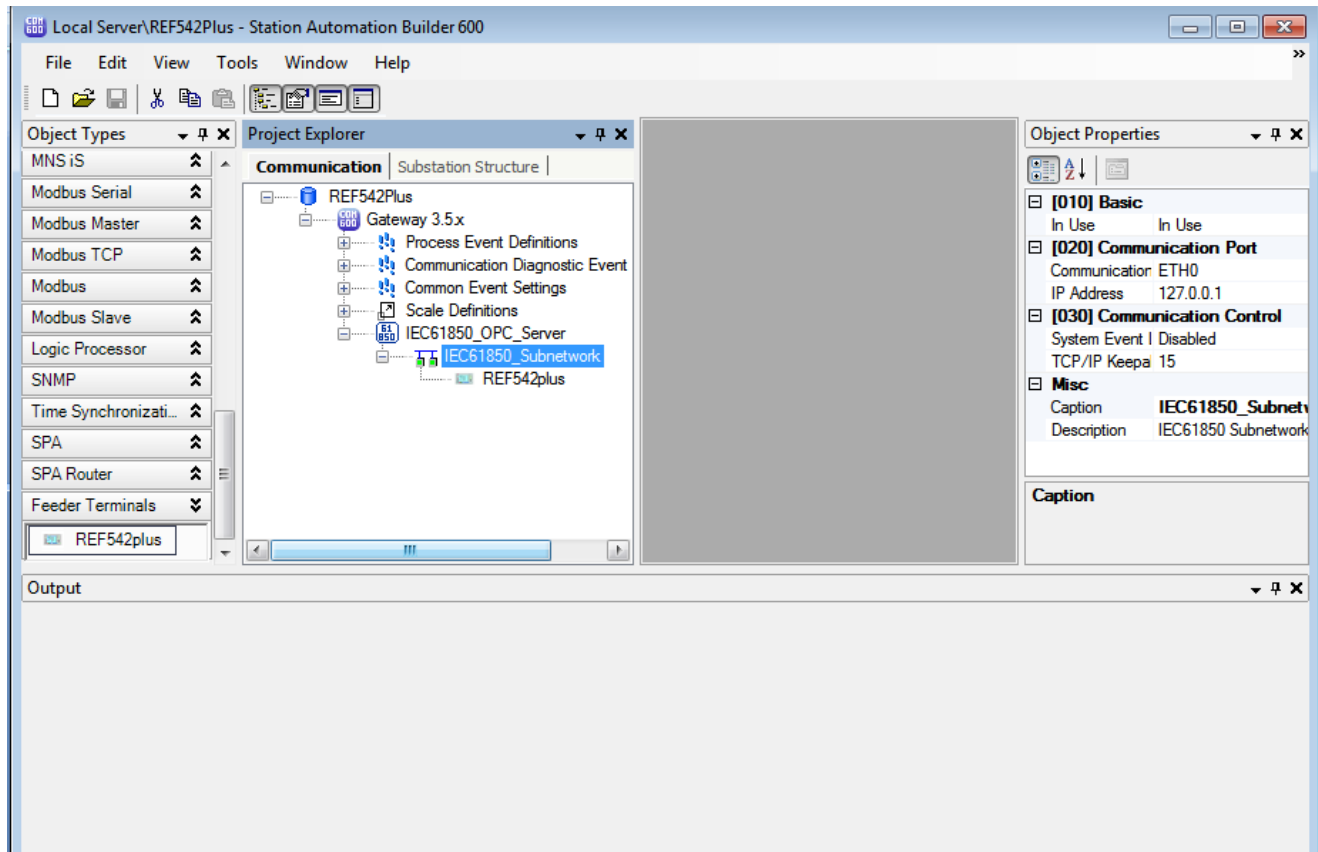


Figure 4-19 Communication Structure with REF 542plus object type


4.2 Working with SAB600 for REF 542plus

This section explains about the SCL File Import section which is used to import the SCL files to SAB 600, Parameter Setting through SAB600, DR upload and viewing Events & Alarm in SAB600.

4.2.1 SCL File Import and Parameter Setting in SAB600

Available SCL file is directly imported into SAB 600CET.

- Right click REF 542plus object type in 'Communication structure' in the 'Project Explorer'.
- Context menu is displayed.
- Click on the "SCL Import" verb.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	93	
					No. of p.	127

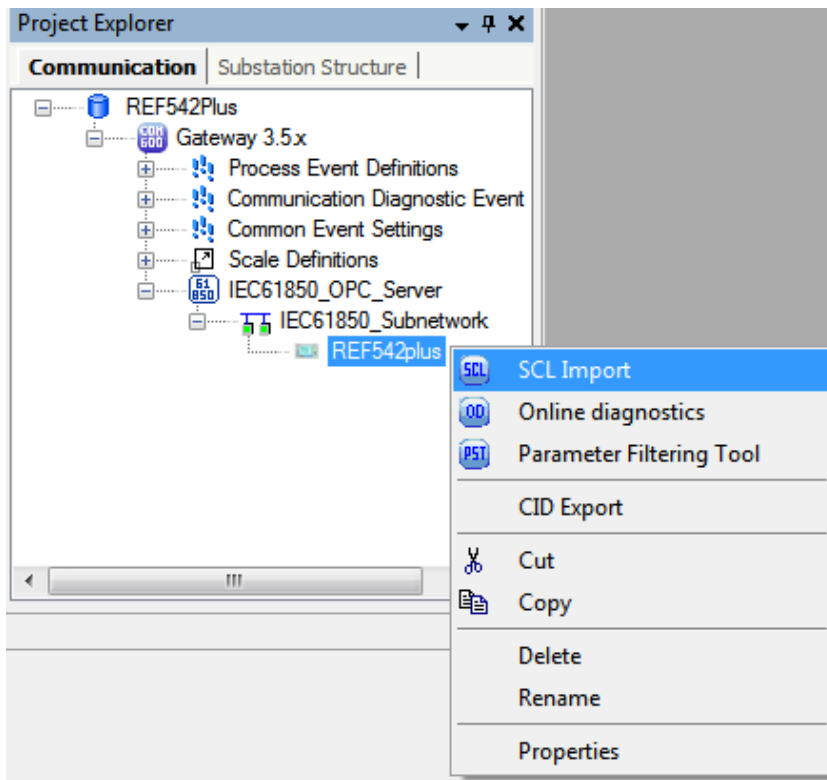



Figure 4-20 REF 542plus Context menu – SCL Import... verb Highlighted

- SCL Import dialog is displayed.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

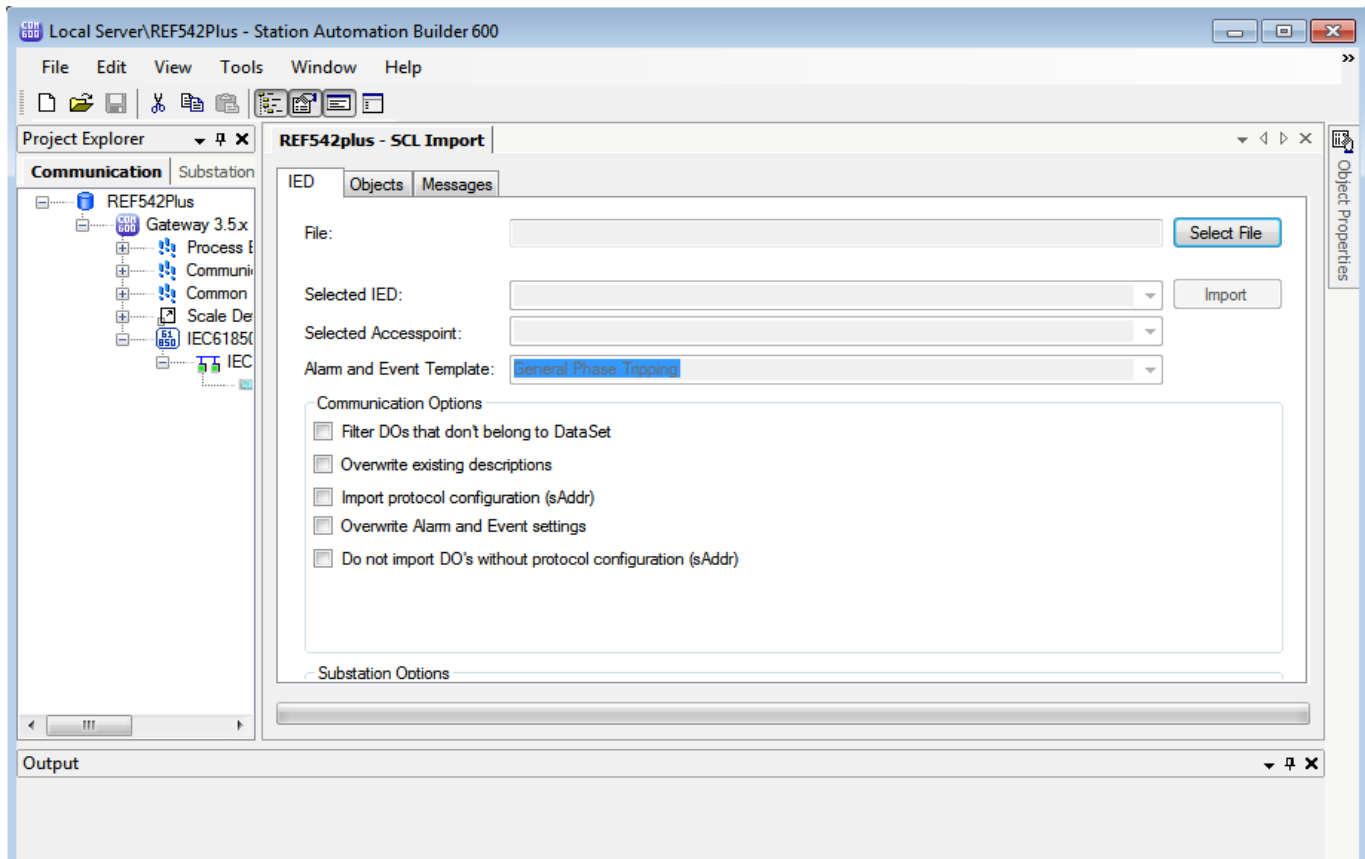



Figure 4-21 SCL Import Dialog

- Choose the SCL File to import.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	95
		en	A	No. of p.	127

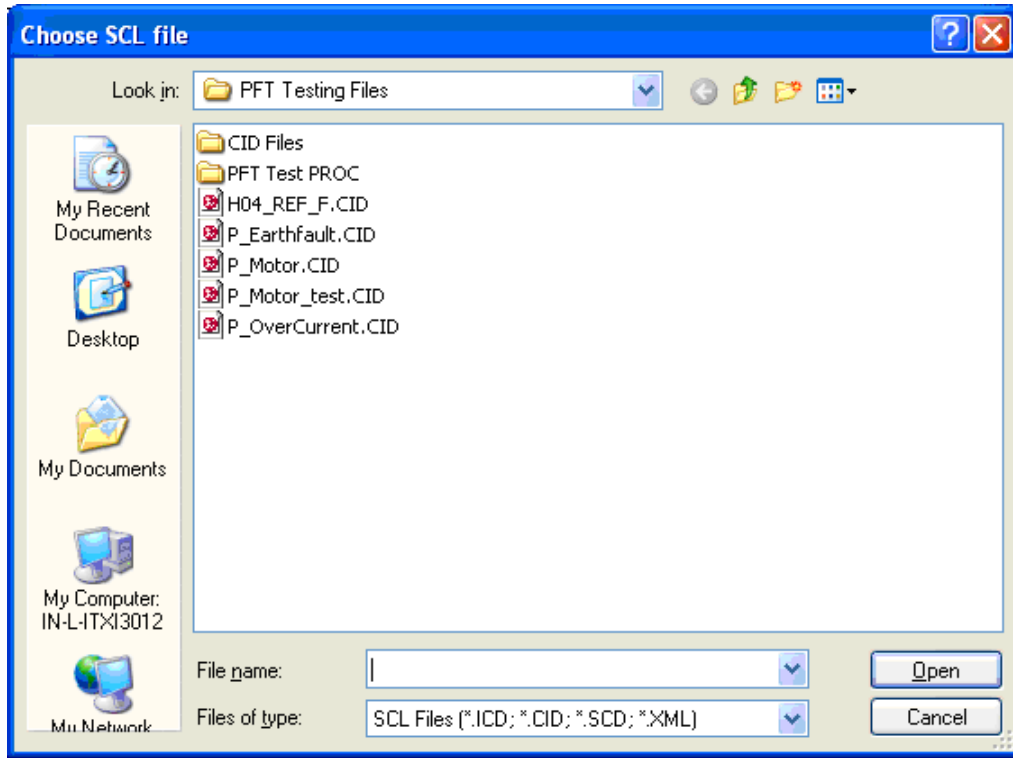



Figure 4-22 SCL File selection to Import

- Click **Import**, while importing the SCL File progress bar is displayed.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page
			en	A	No. of p.
					96
					127

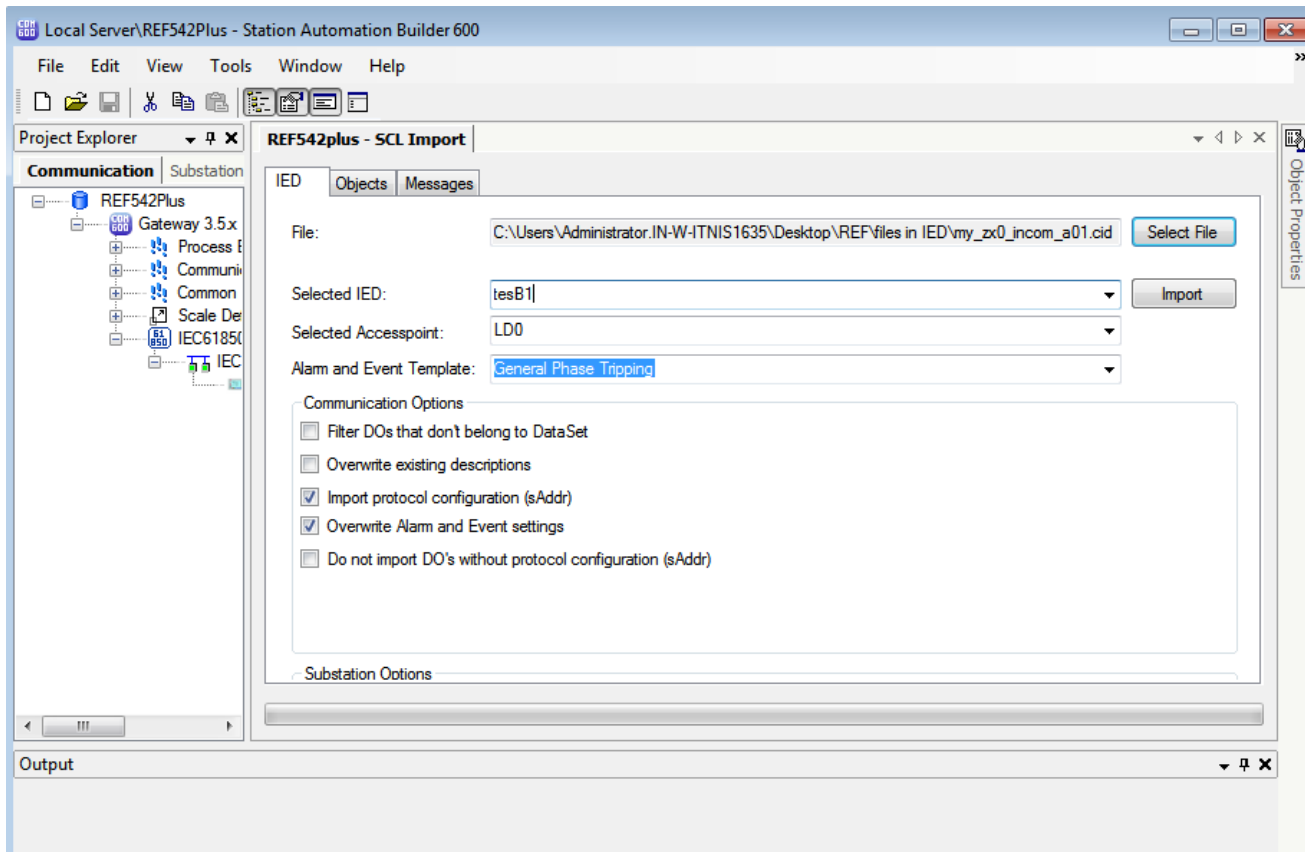


Figure 4-23 Import File Information in SCL File Import

- While importing SCL file three pop up dialogs.
- In the first pop up, enter the 'Substation' name and then click **OK**.

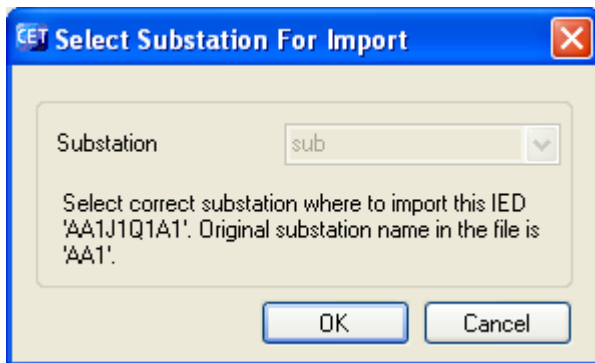



Figure 4-24 Select Substation Information Dialog for Substation Name

- In the second pop up, enter the 'Voltage Level' and then click **OK**.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang. en	Rev. ind. A	Page	97
				No. of p.	127

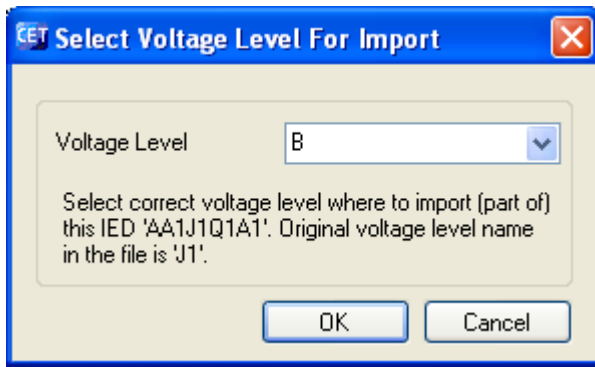



Figure 4-25 Select Substation Information Dialog for Voltage Level

- In the third pop up, enter the 'Bay' and then click **OK**.



Figure 4-26 Select Substation Information Dialog for Bay

- Right Click on the "ref" context menu, it shows the following popup menus

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

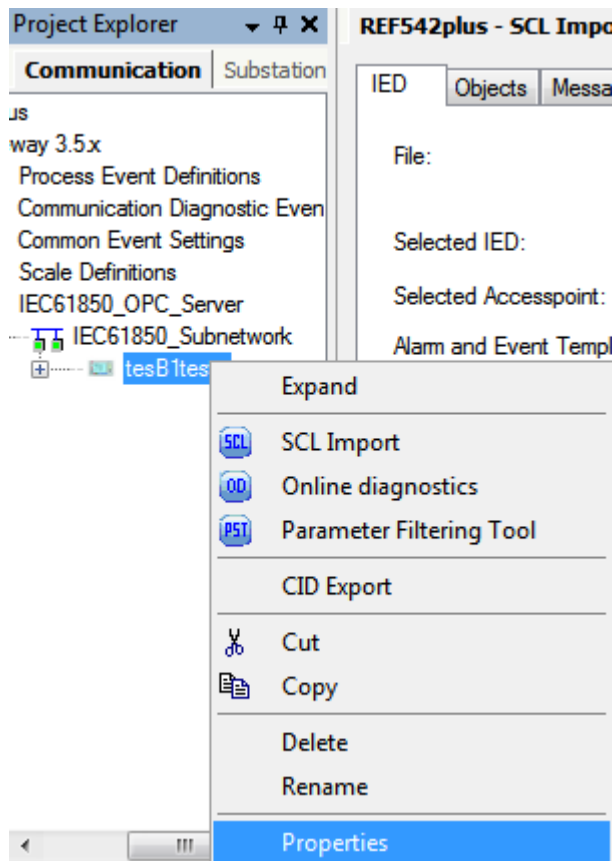



Figure 4-27 REF 542 Plus Properties

- Click on the Properties menu, to view the REF 542plus properties. Set the IP Address of REF 542plus and SPA Access properties as
 - SPA Parameter for Close Password -> V151
 - SPA Parameter for Open Password -> S198
 - SPA Store Parameter name ->S198
 - SPA Store Parameter value ->1
 - SPA value for close Password ->1
 - SPA value for open Password ->0

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	99
		en	A	No. of p.	127

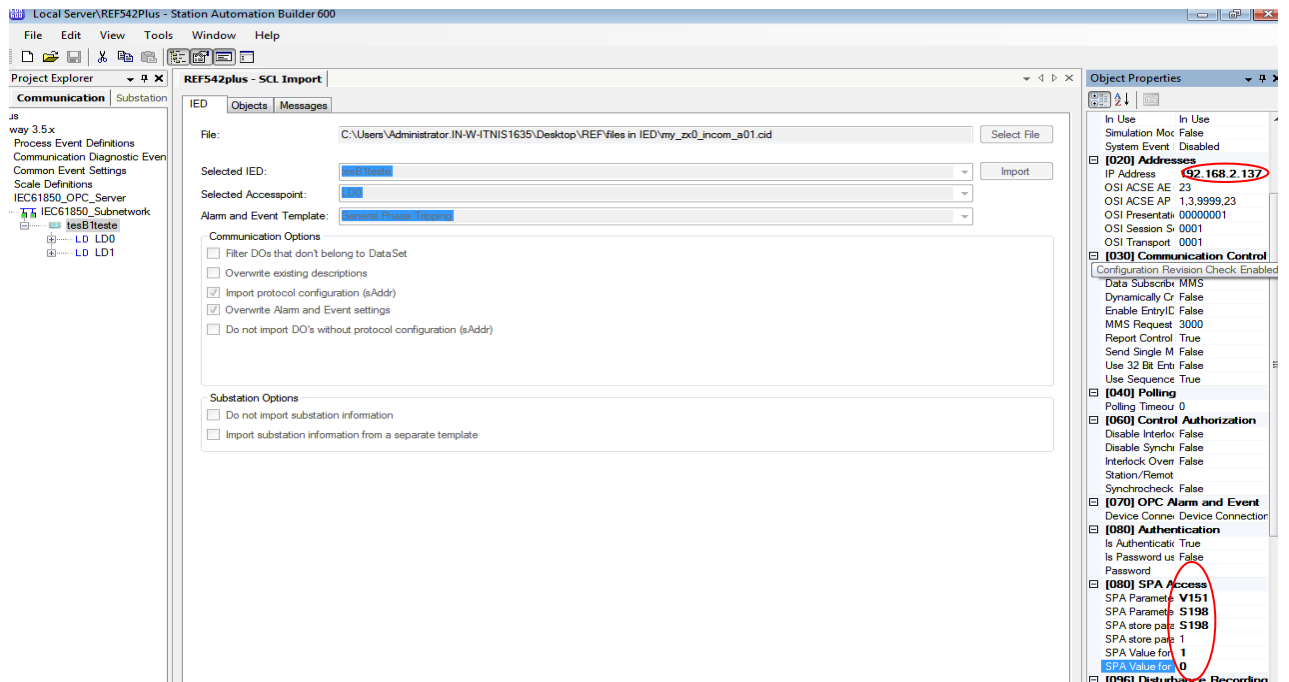



Figure 4-28 REF 542plus Properties

- Click on the Parameter filtering Tool menu, select the parameters and click on **Apply**.

Doc Kind	User Manual	Project ID	INP.9598					
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en	Rev. ind.	A	Page	100
							No. of p.	127

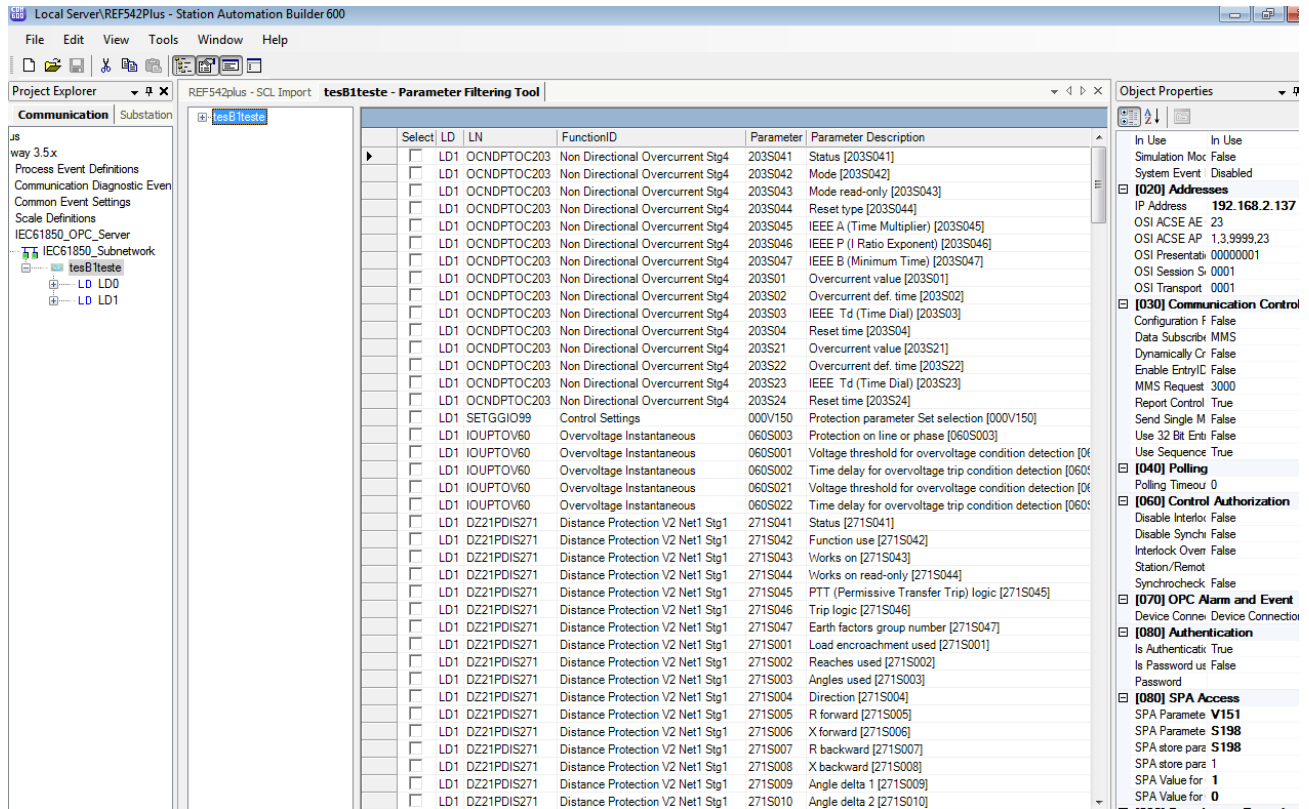



Figure 4-29 Select Parameters

- Set SPA Address as 99 for LD0 and LD1 using property bag as shown in figure.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en	Rev. ind.	A
					Page	101
					No. of p.	127

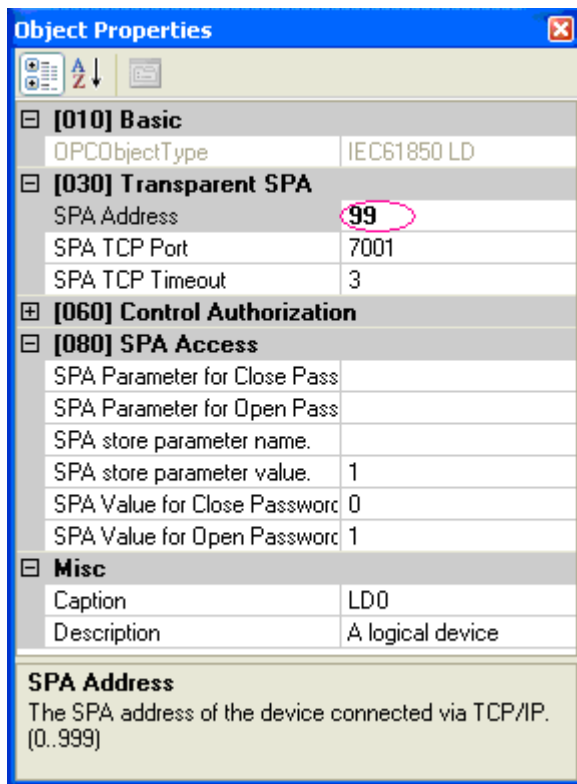


Figure 4-30 Set SPA Address

- Right Click on the “Gateway” context menu, it shows the following popup menus and select the Properties.

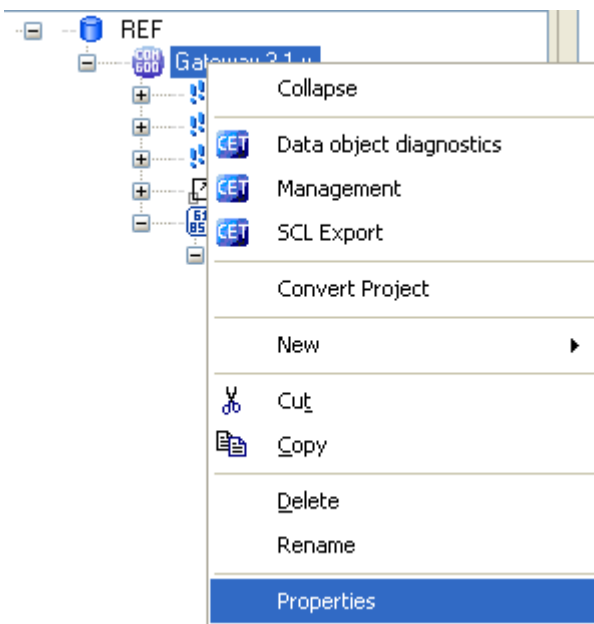


Figure 4-31 SAB600Properties menu

- Set IP Address for Gateway (SAB600) as shown in figure.

Doc Kind	User Manual	Project ID	INP.9598		
ABB	ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en
				Rev. ind.	A
				Page	102
				No. of p.	127

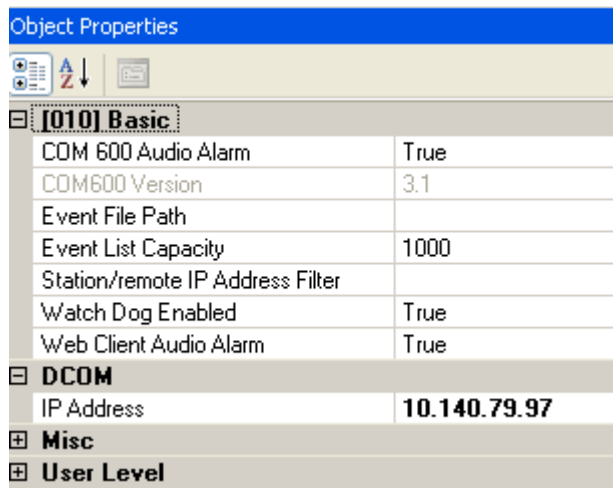


Figure 4-32 Set IP Address of Gateway (SAB 600)

- Right click on Gateway and select management.

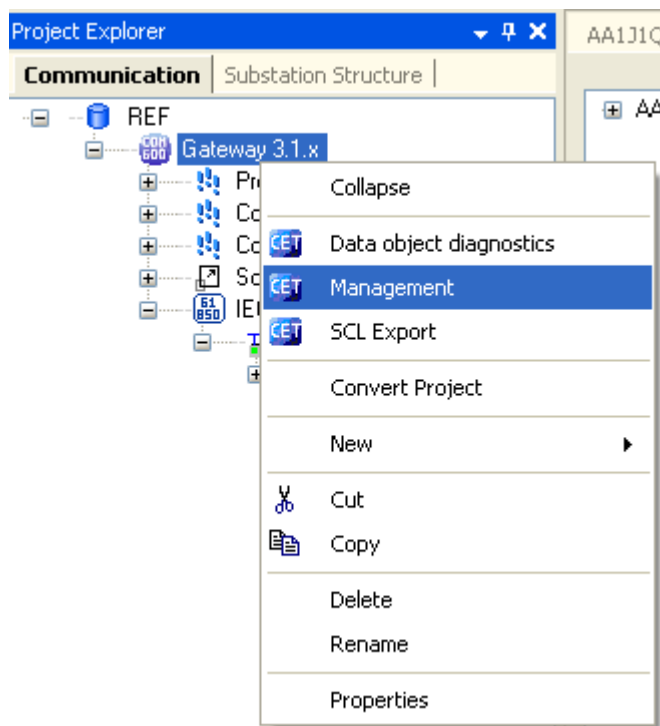



Figure 4-33 Select Management Information Dialogue

- 'Gateway-Management' tool opens.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	103
		en	A	No. of p.	127

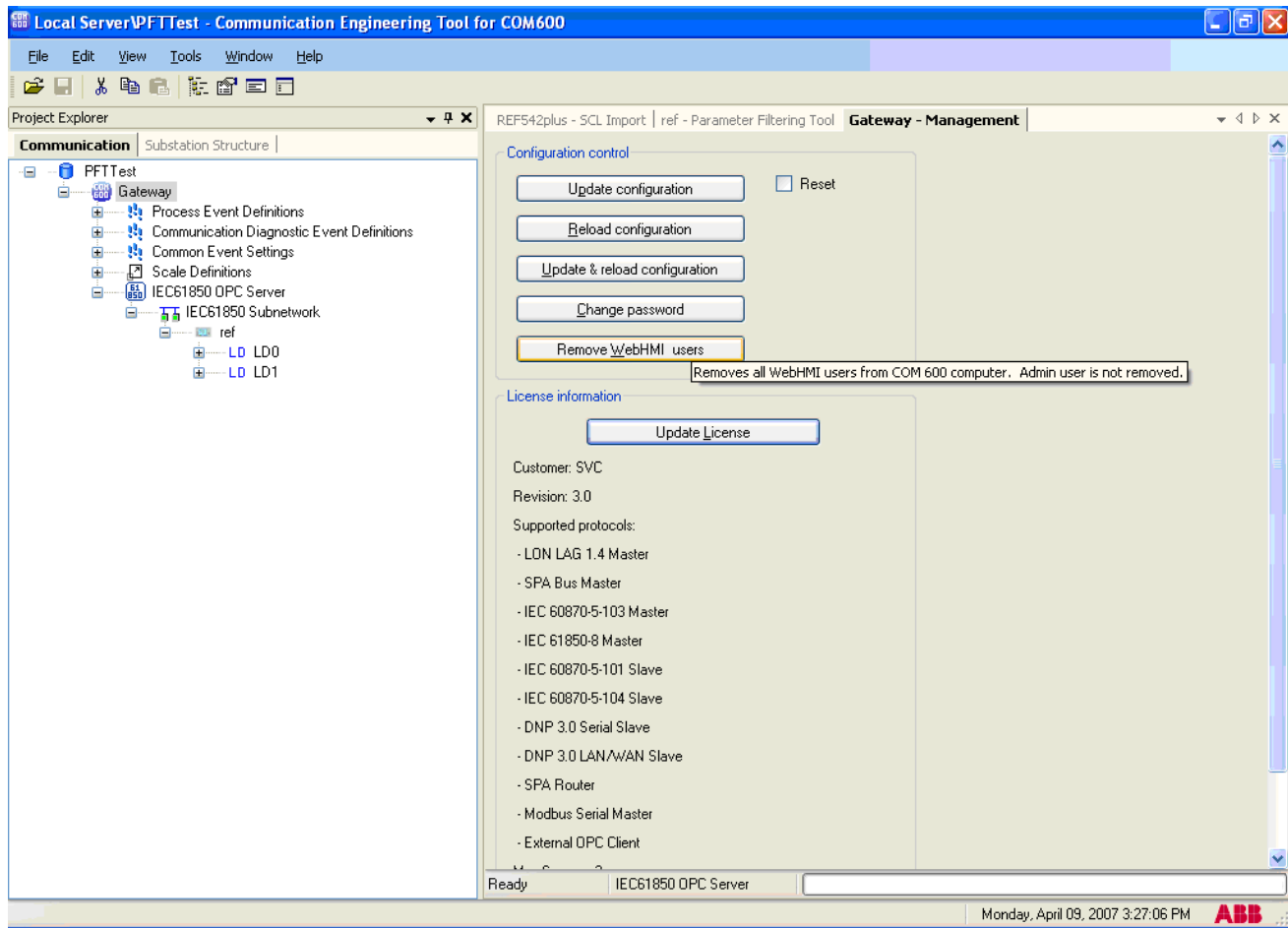



Figure 4-34 Management Information Dialog

- Click on **Update configuration** and a progress bar is displayed.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang. en	Rev. ind. A	Page	104
				No. of p.	127

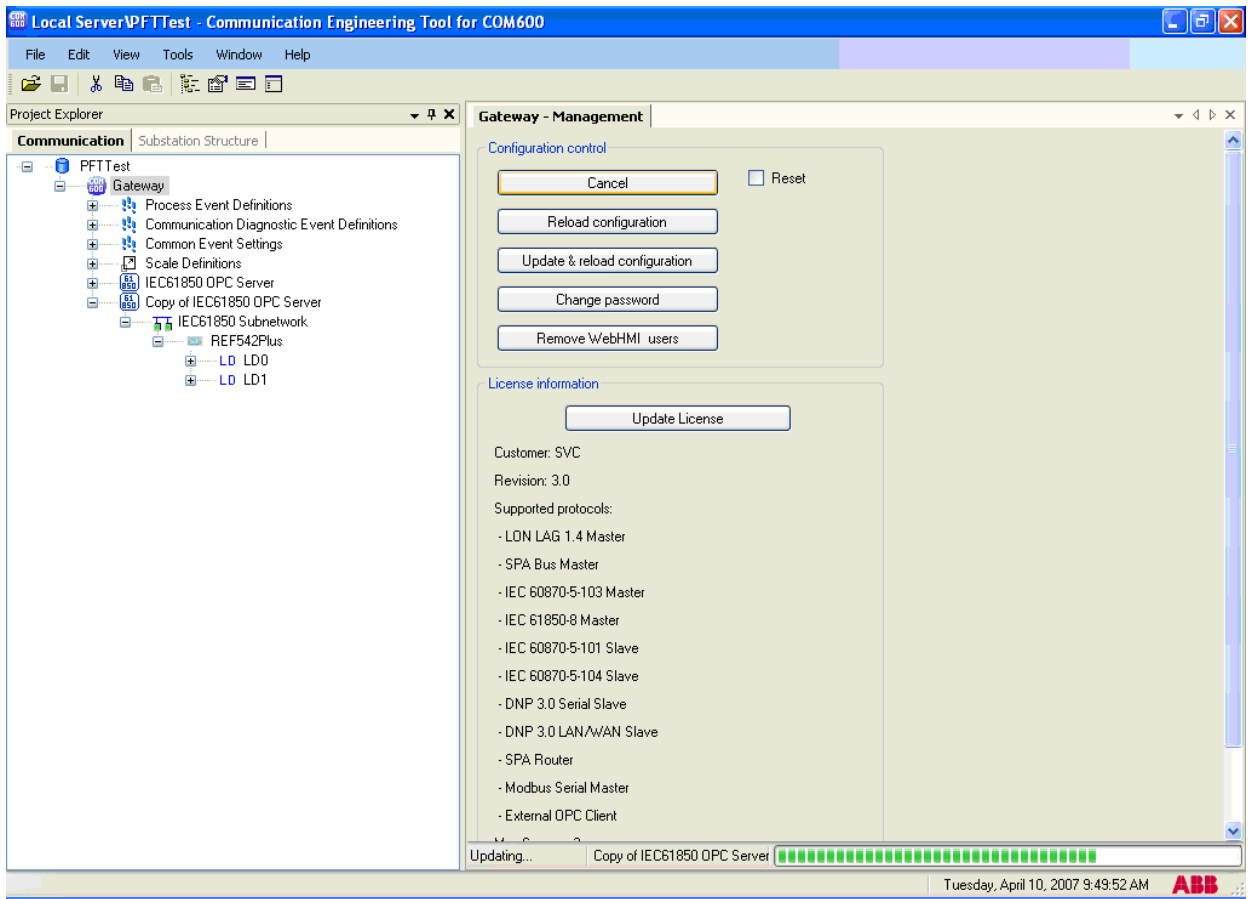



Figure 4-35 Update Configuration using Management Information Dialog

- Click on **Reload configuration** and a progress bar is displayed.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	105
		en	A	No. of p.	127

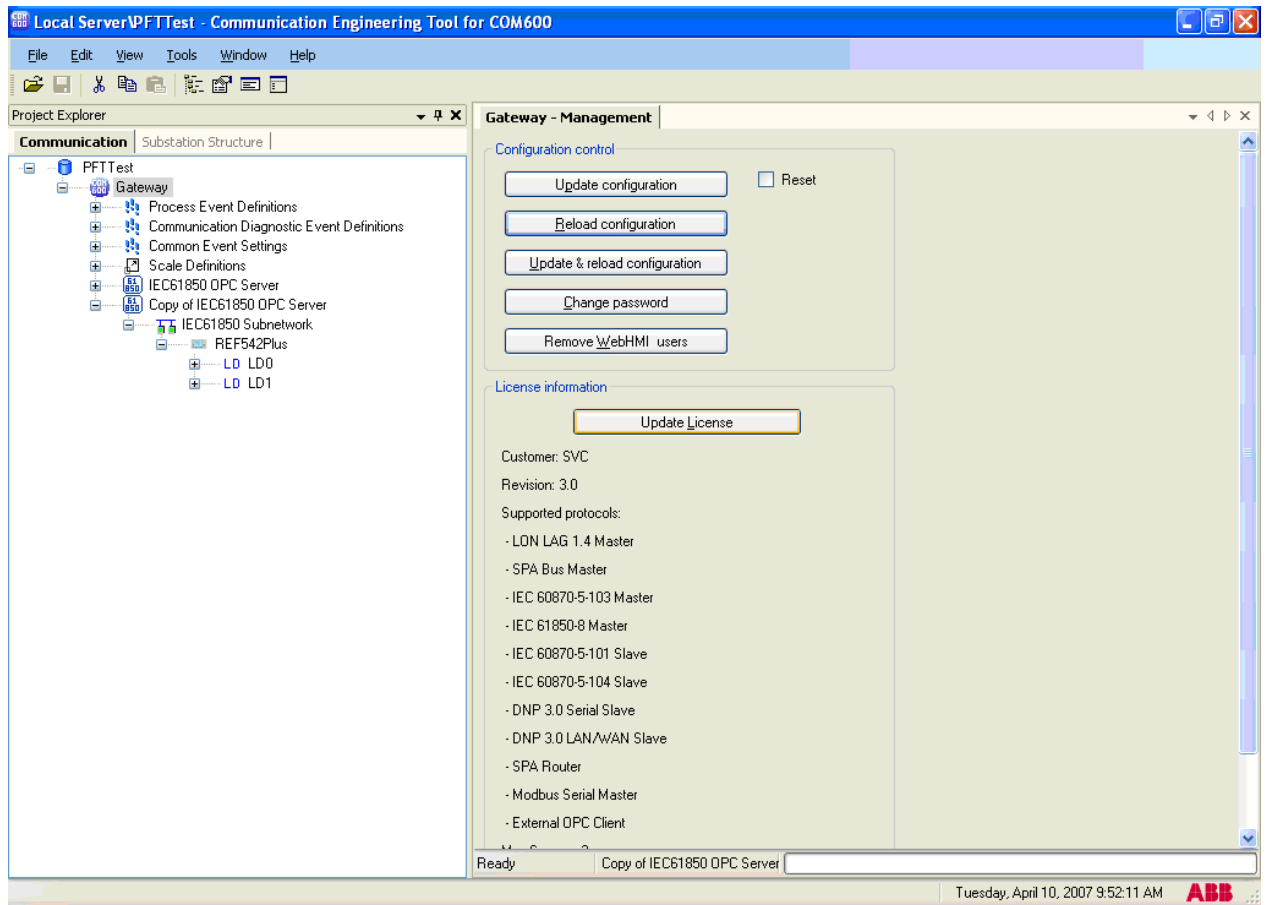



Figure 4-36 Reload Configuration using Management Information Dialog

- Click on **Update & reload configuration** and a progress bar is displayed.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	106
				No. of p.	127
		en	A		

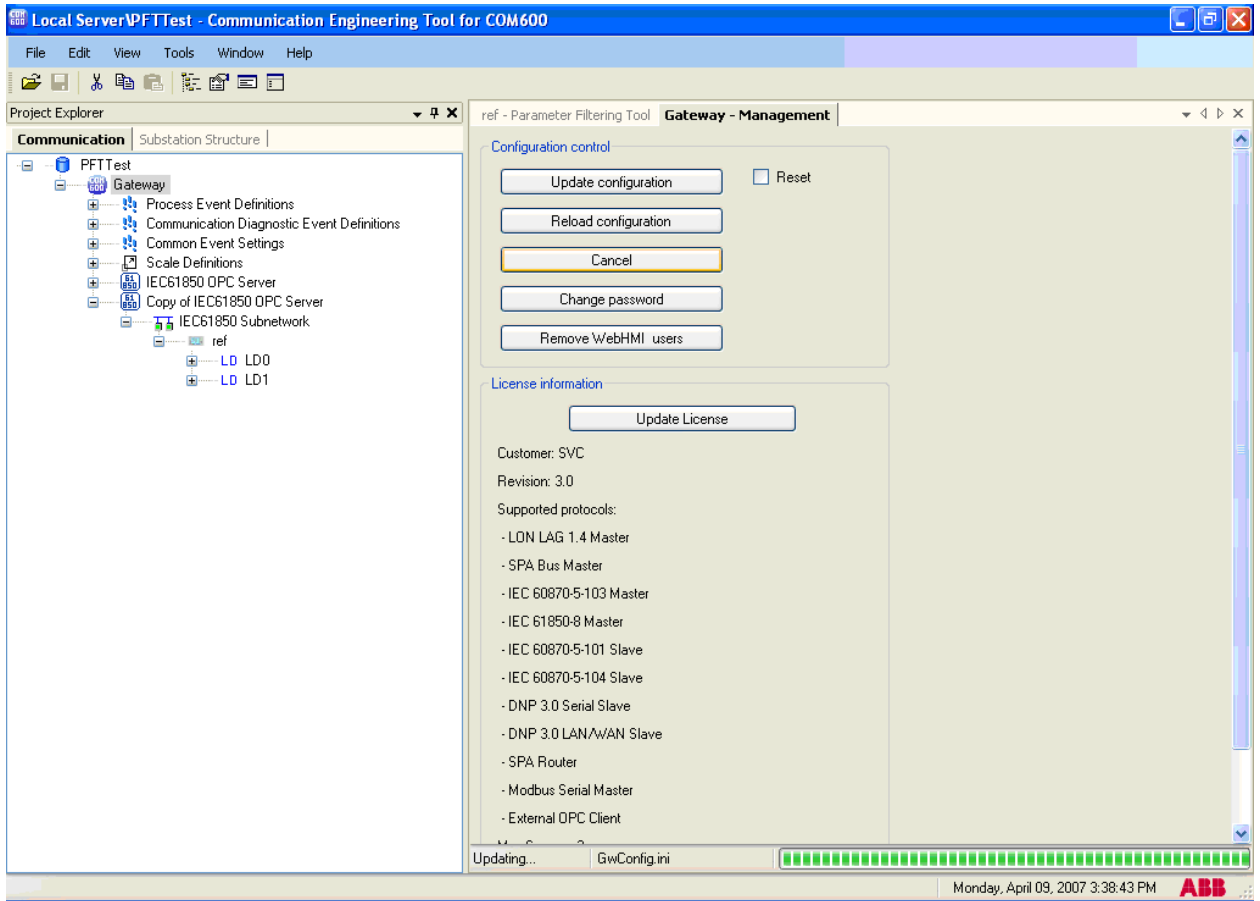



Figure 4-37 Update and Reload Configuration using Management Information Dialog

- Open the web page (<http://10.140.79.97/> , assume the IP Address SAB600 as 10.140.79.97) using 'Internet Explorer'.
- Login page is displayed for SAB600 authentication as shown below.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	107
		en	A	No. of p.	127

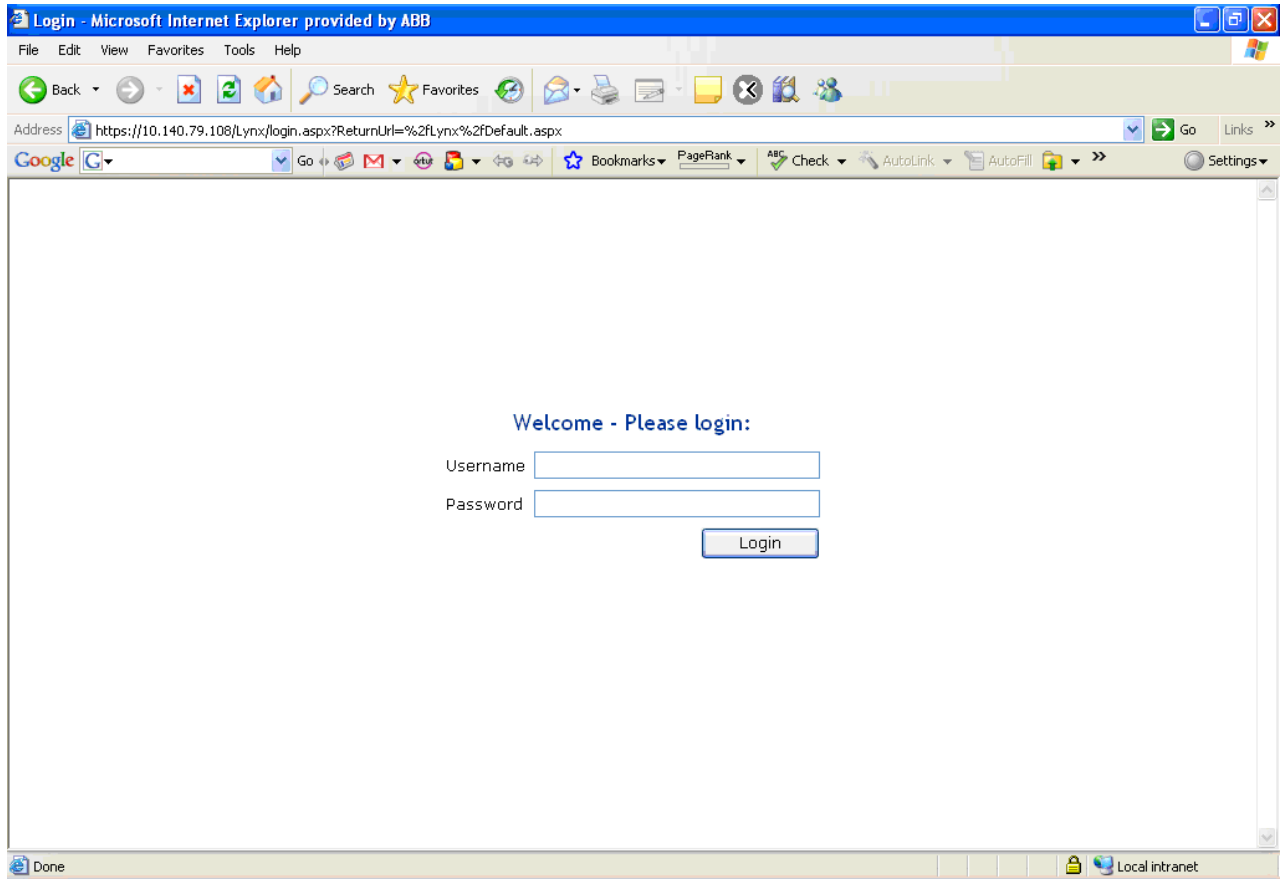



Figure 4-38 Open SAB600web HMI

- Enter Username and Password and click on **Login** button to log on to SAB600.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

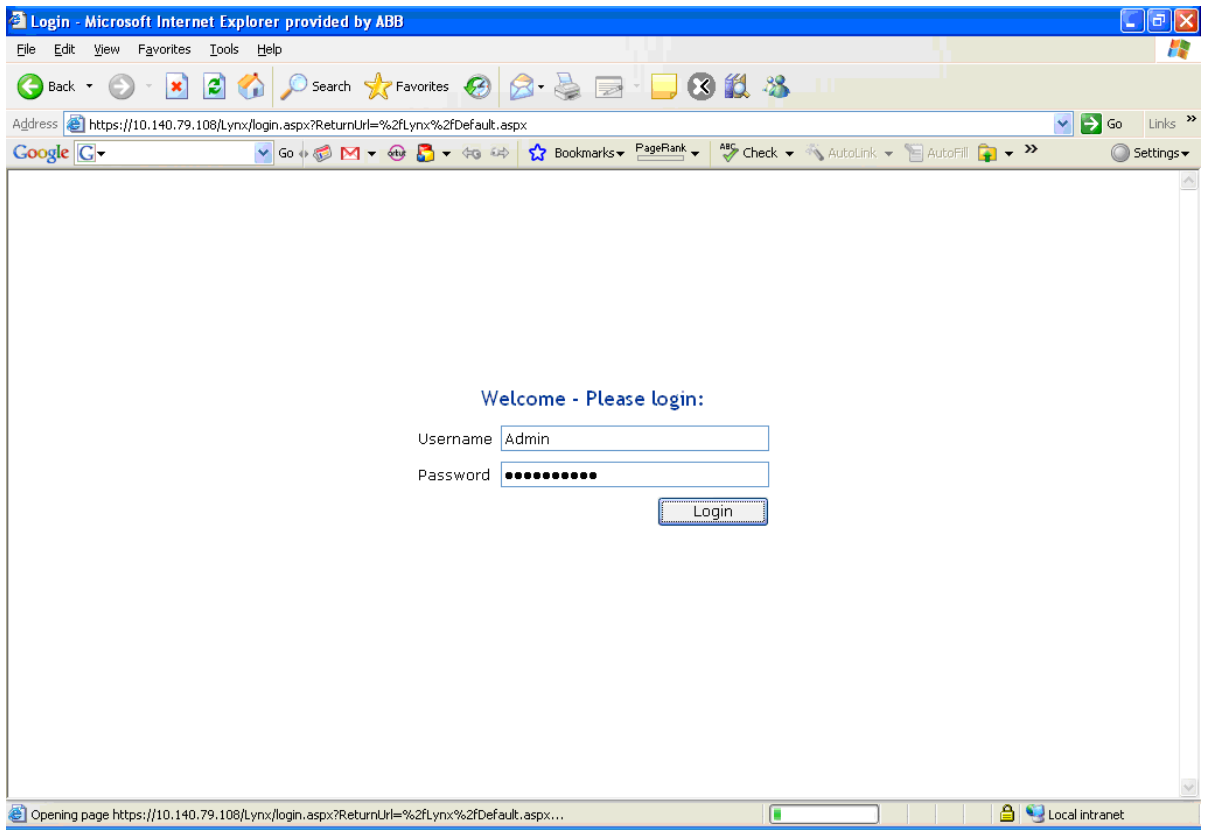



Figure 4-39 Username and Password Information

- SAB600 Web HMI displays the selected parameters from SAB600 CET.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page
			en	A	109
					No. of p.
					127

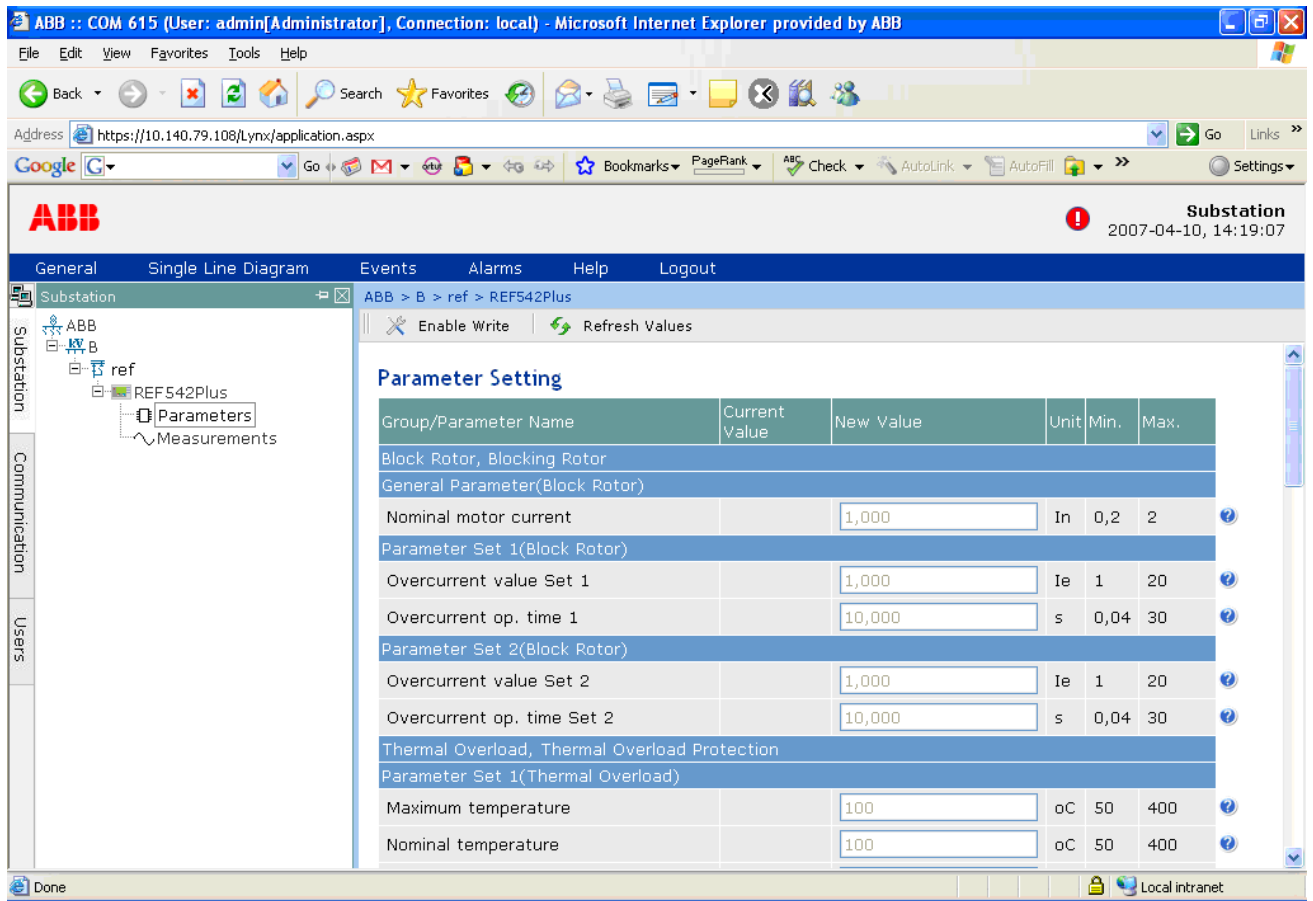



Figure 4-40 SAB600HMI

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

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.

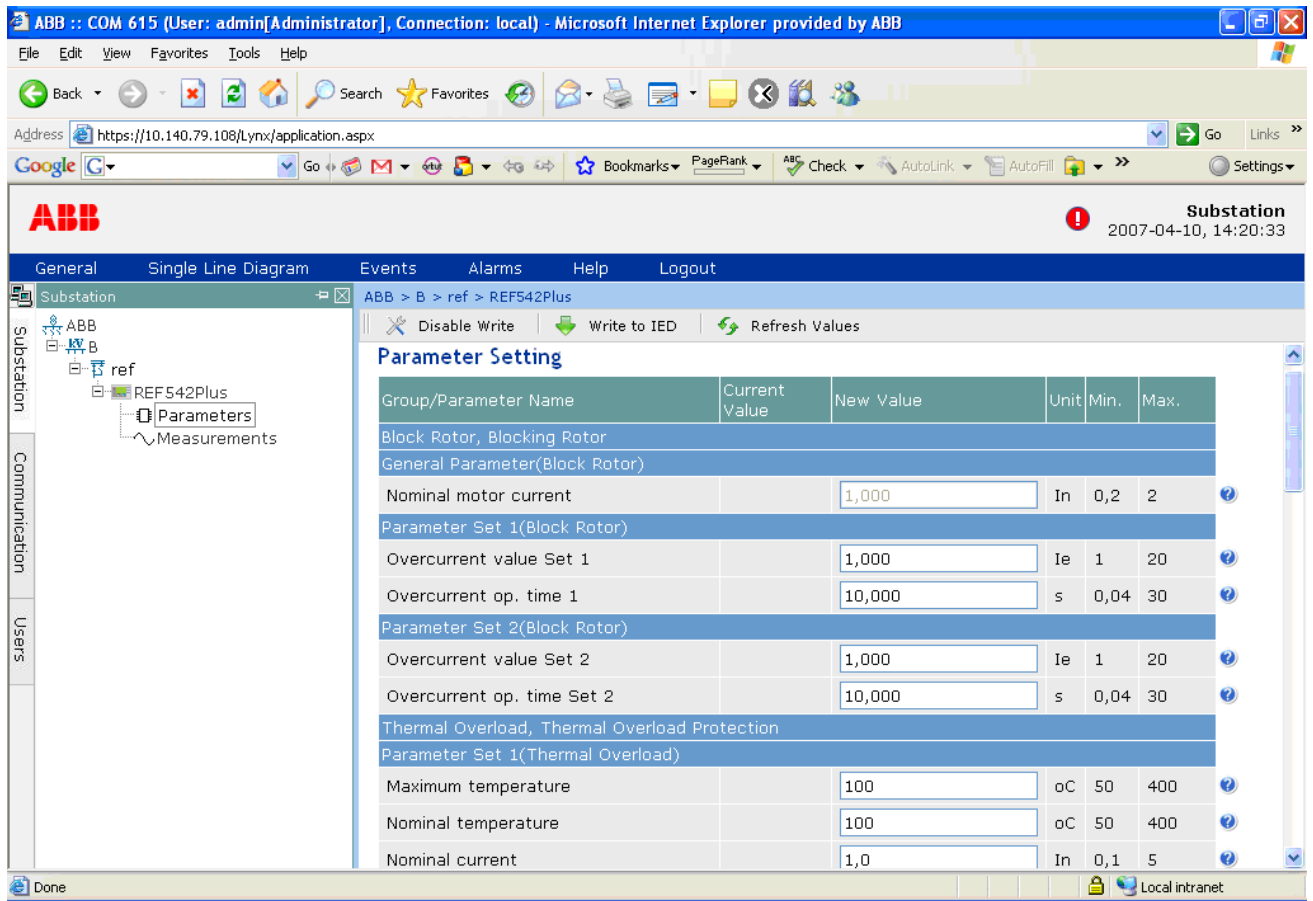


Figure 4-41 Enable Write Information

- Enter the value of parameter to be written in REF 542plus in 'New value' column and green color is for valid values and red for invalid values.

Doc Kind	User Manual	Project ID	INP.9598		
ABB ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	en	Rev. ind.	A
		Page	111	No. of p.	127

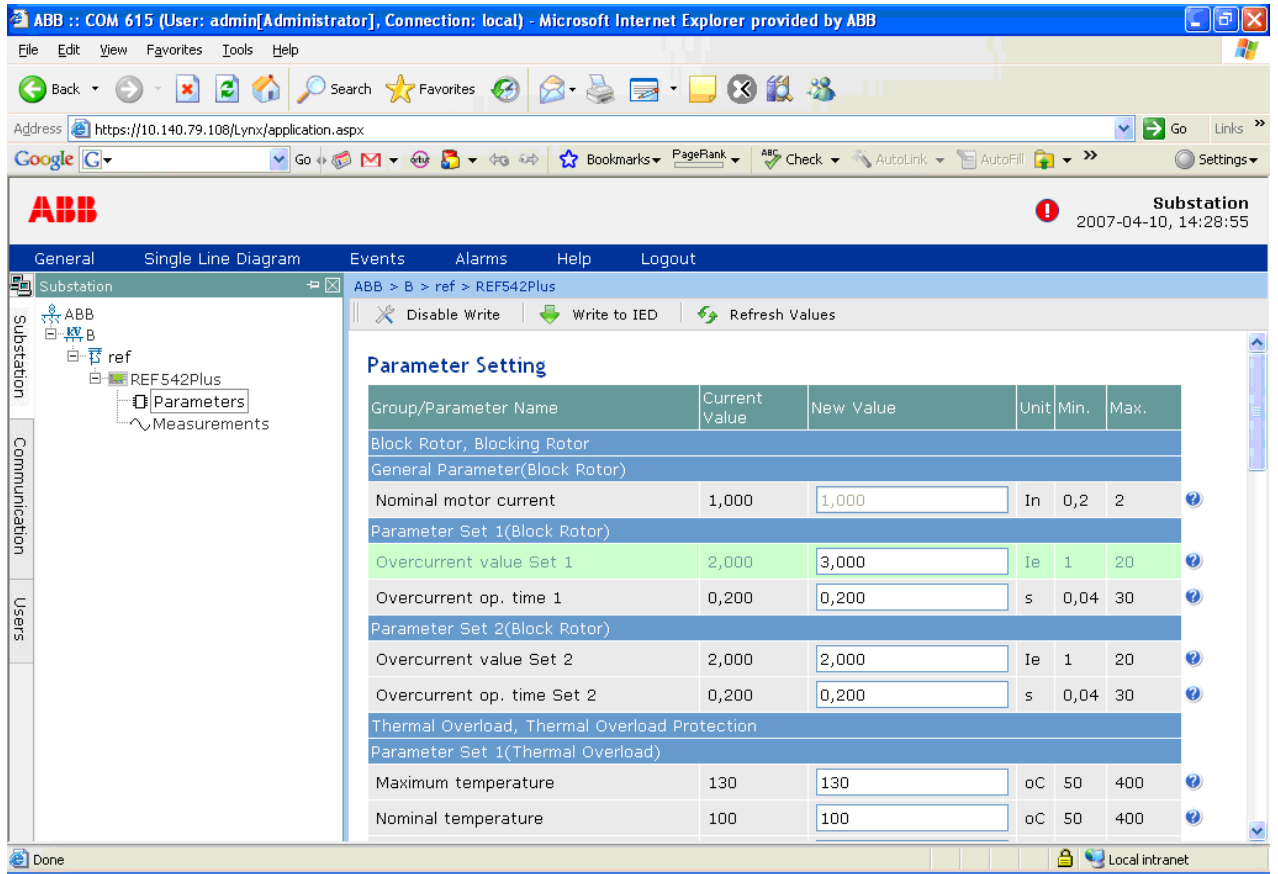



Figure 4-42 Set Parameter's value

- Now click on **Write to IED** to write the parameter in IED (REF 542plus).

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	112
		en	A	No. of p.	127

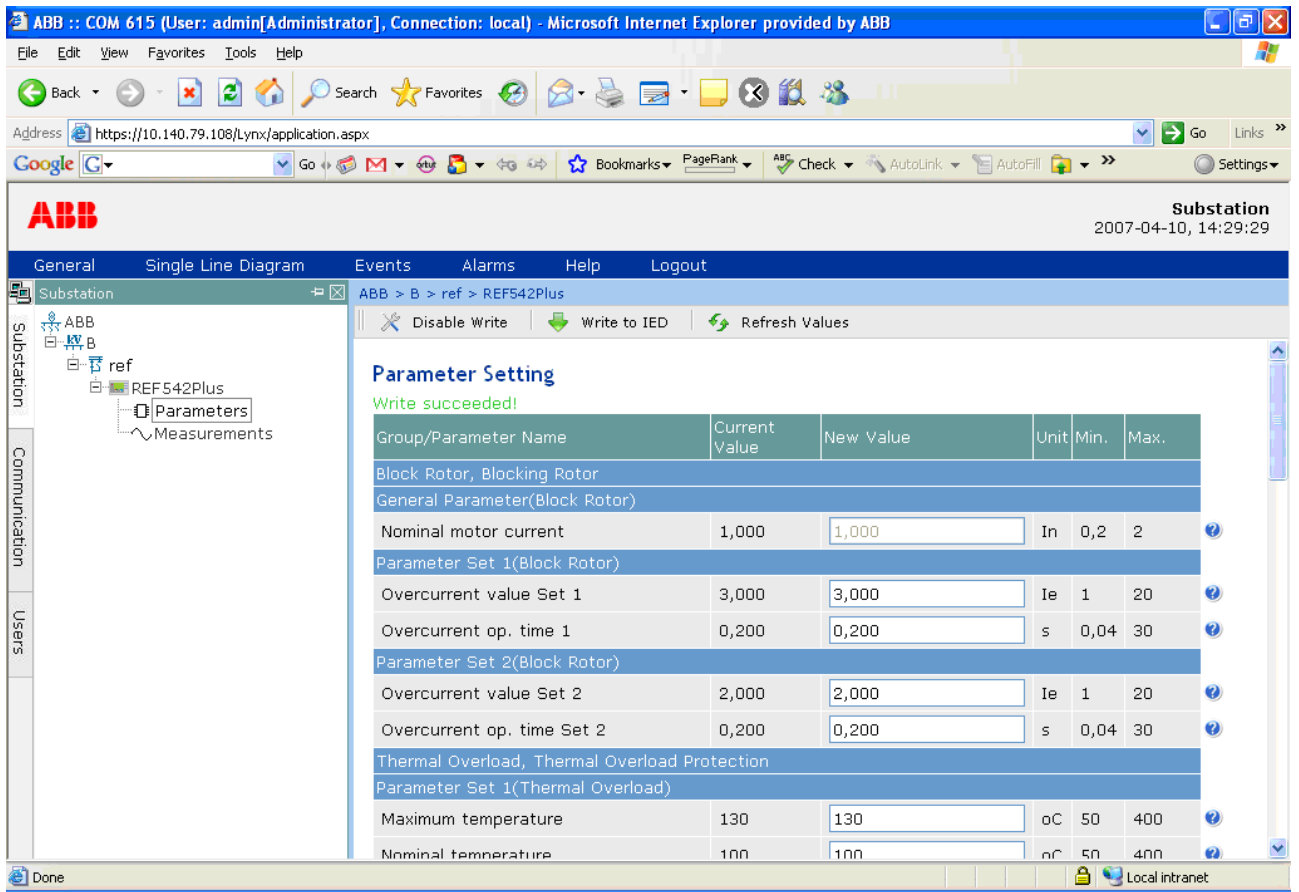


Figure 4-43 Write to IED

- Click on **Refresh** to read all the parameters current value in IED which appears in column 'Current Value' as shown.

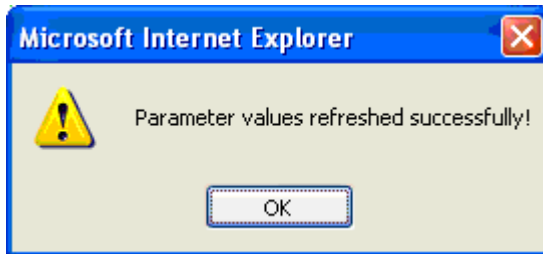



Figure 4-44 Refresh the values

Doc Kind	User Manual	Project ID	INP.9598					
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	en	Rev. ind.	A	Page	113
							No. of p.	127

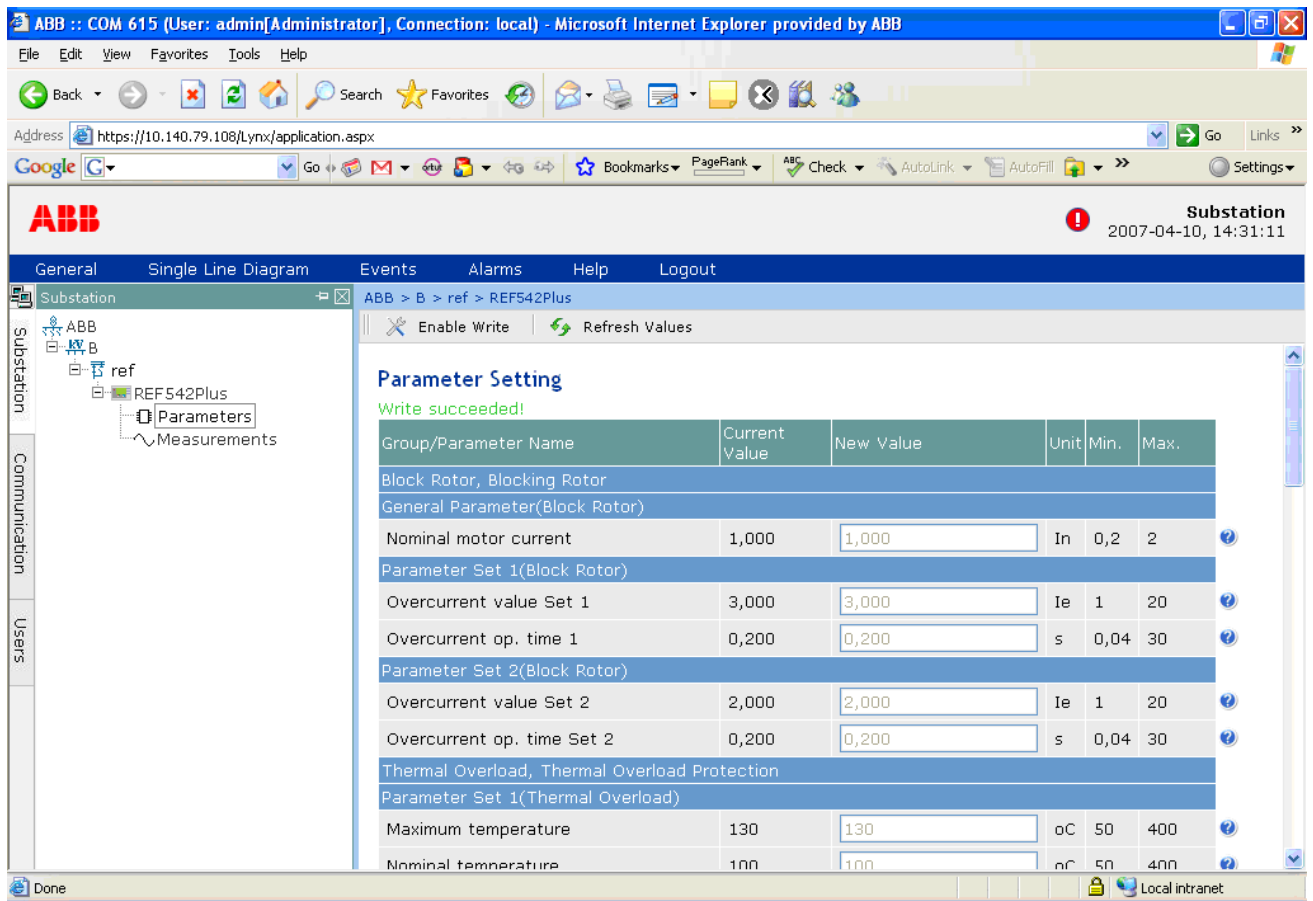



Figure 4-45 Read the parameters

4.2.2 DR Upload

DR files can be uploaded through SAB600. The following section explains the steps which are required to work with DR upload in SAB600.

- Right click REF 542plus object type in 'Communication structure' in the 'Project Explorer' of the SAB600 CET.
- A popup menu is displayed as shown below.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	114	
					No. of p.	127

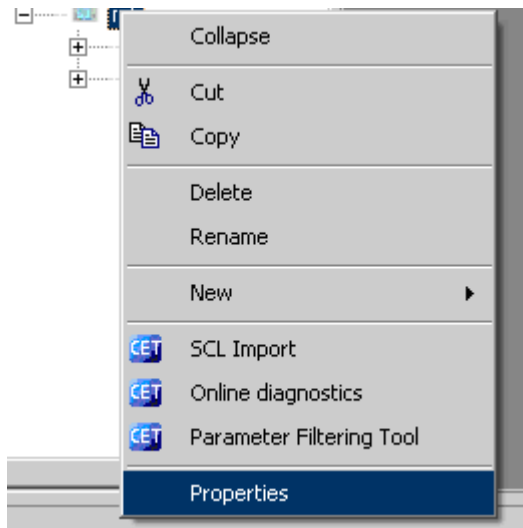



Figure 4-46 REF 542plus Object Type Properties

- Click on the properties
- It displays the property grid.
- Enter the following DR related properties in the property grid as shown below.

[096] Disturbance Recording	
Disturbance Recorder Delete Recordings	False
Disturbance Recorder Enabled	True
Disturbance Recorder Local Directory	c:\COMTRADE\IED
Disturbance Recorder Maximum Total File Size	0
Disturbance Recorder Polling Period	120
Disturbance Recorder Remote Directory	COMTRADE
[096] Disturbance Recording via FTP	
Disturbance Recorder FTP Password	
Disturbance Recorder FTP User Name	
Disturbance Recordings Read Via FTP	True

Figure 4-47 DR Related Properties

- Enter the user name and the password for FTP in “Disturbance Recording via FTP” section in the property grid.
- Right Click on the “Gateway” context menu, it shows the following popup menus and select the Properties.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	115	
					No. of p.	127

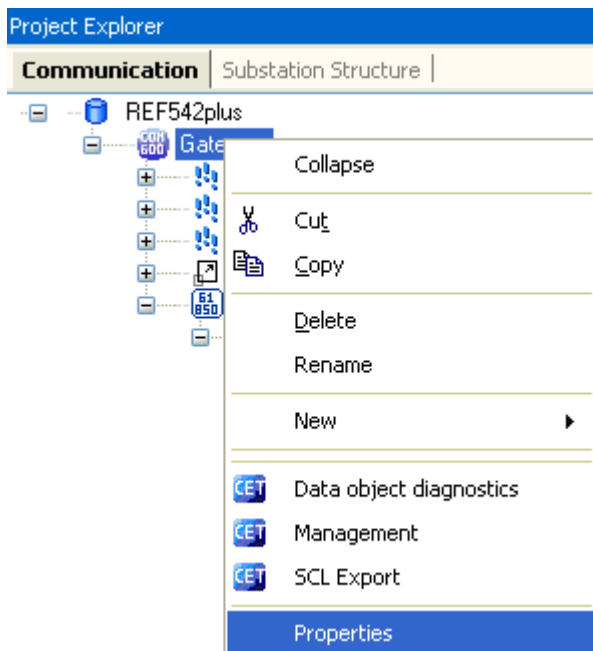


Figure 4-48 SAB600Properties menu

- Set IP Address for Gateway (SAB600) as shown in figure.

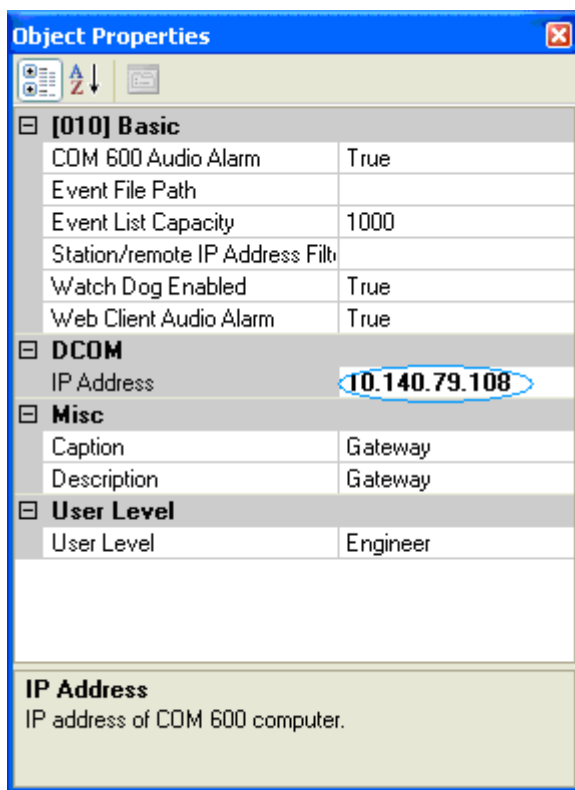



Figure 4-49 Set IP Address of Gateway (SAB 600)

- Right click on Gateway and select management.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	116	
					No. of p.	127

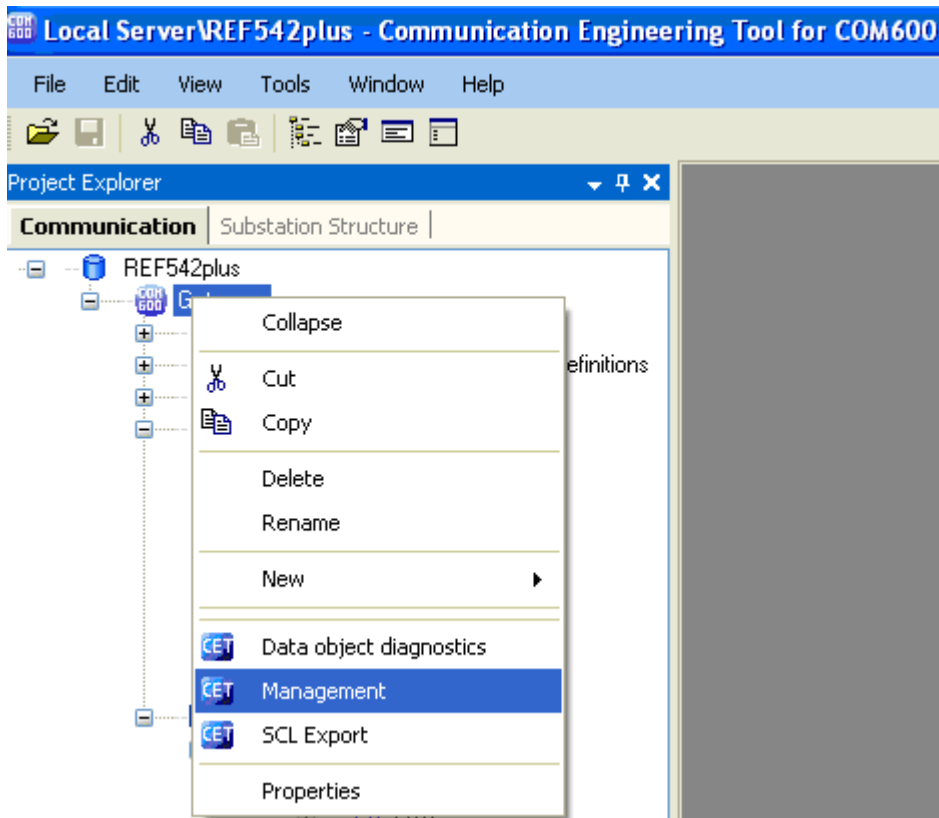



Figure 4-50 Select Management Information Dialog

- 'Gateway-Management' window is opened as shown below.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page
			en	A	No. of p.
					117
					127

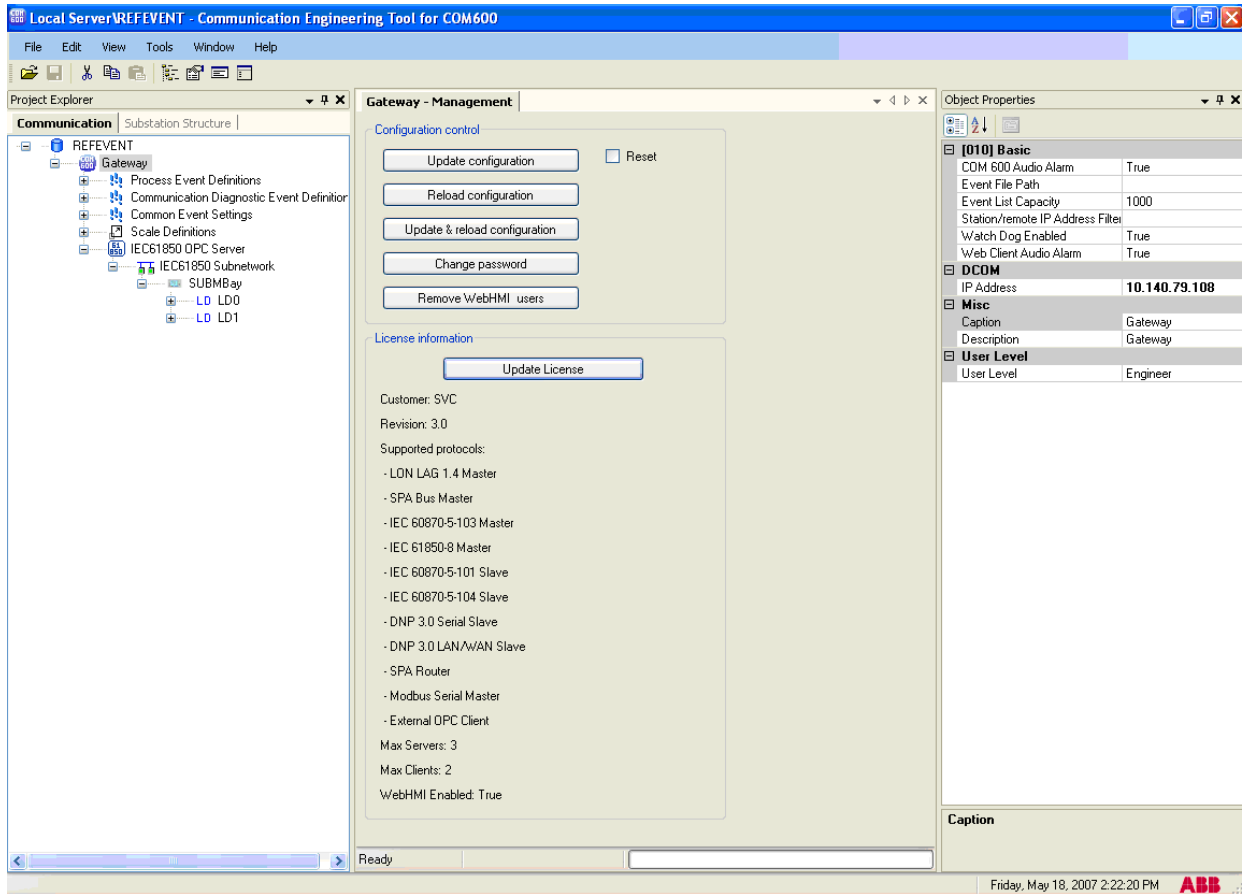



Figure 4-51 Management Information Dialog

- Click on **Update configuration** and observe that a progress bar is displayed.
- Click on **Reload configuration** and observe that a progress bar is displayed.
- Click on **Update & reload configuration** and a progress bar is displayed.
- Open the web page (<http://10.140.79.97/> , assume the IP Address SAB600as 10.140.79.97) using 'Internet Explorer'.
- Login page is displayed for SAB600authentication as shown below.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	118
		en	A	No. of p.	127

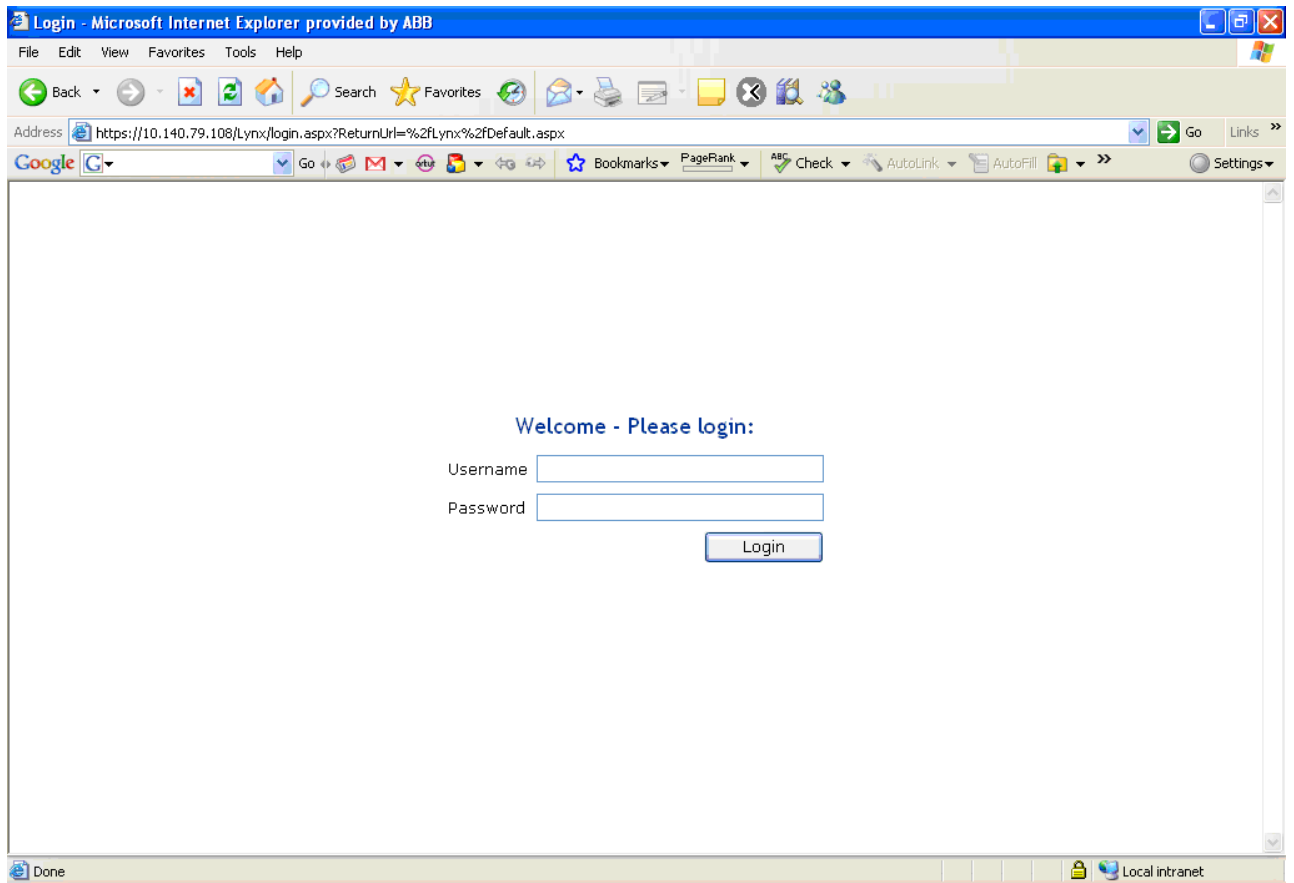



Figure 4-52 Open SAB600web HMI

- Enter Username and Password and click on Login button to log on SAB600.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page
			en	A	No. of p.
					119
					127

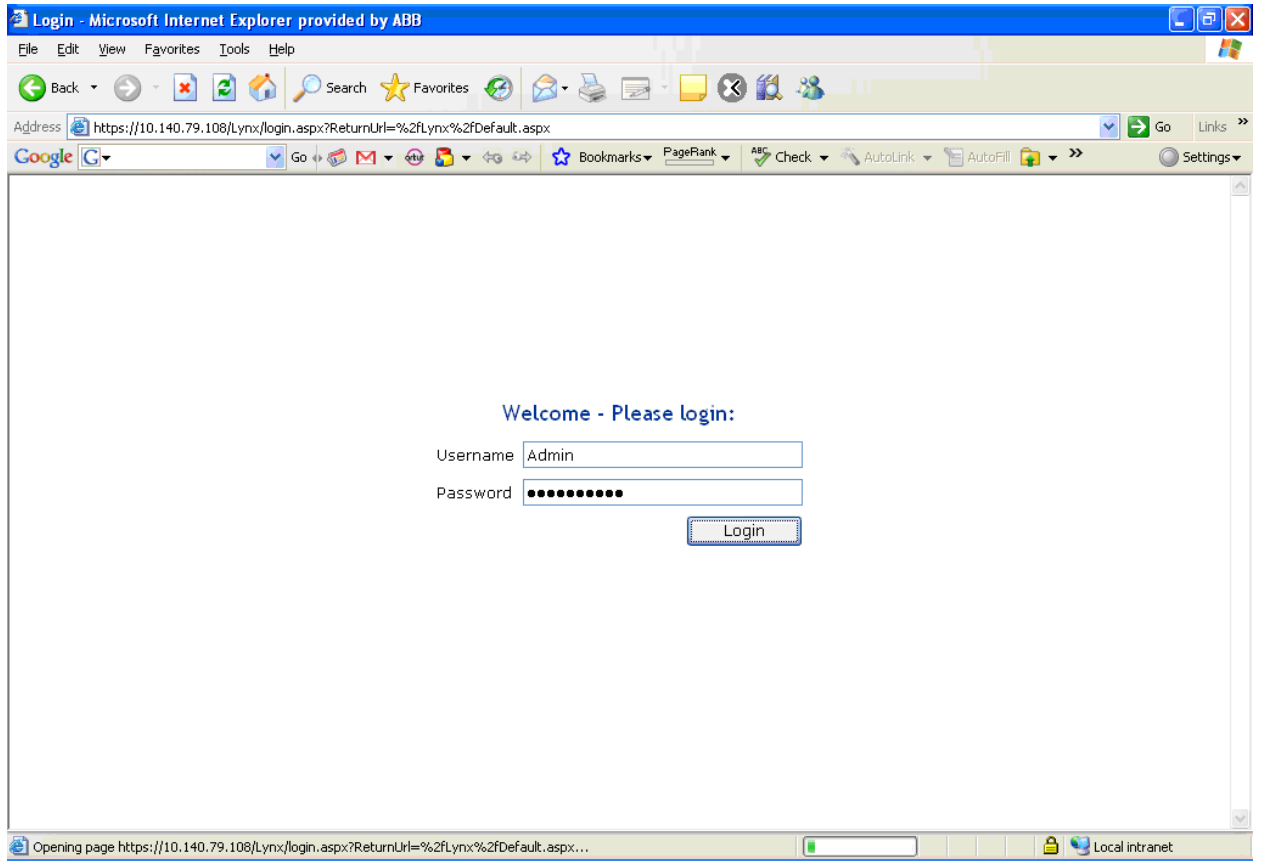



Figure 4-53 Username and Password Information

- After the successful login; SAB600Web HMI opens.
- Click on the Disturbances node as shown below.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	120	
					No. of p.	127

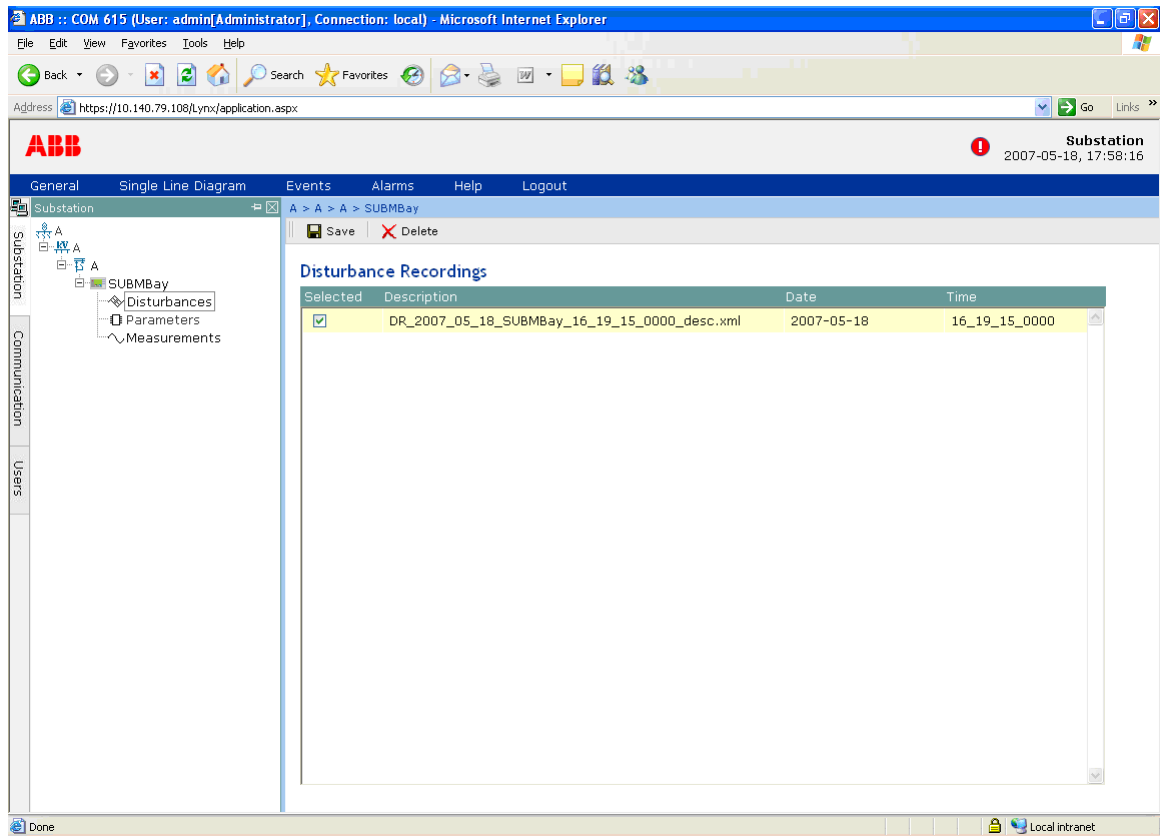


Figure 4-54 SAB600HMI

- DR files are displayed.
- Select the record by clicking on check box.
- Click on the **Save** and it shows the pop up.

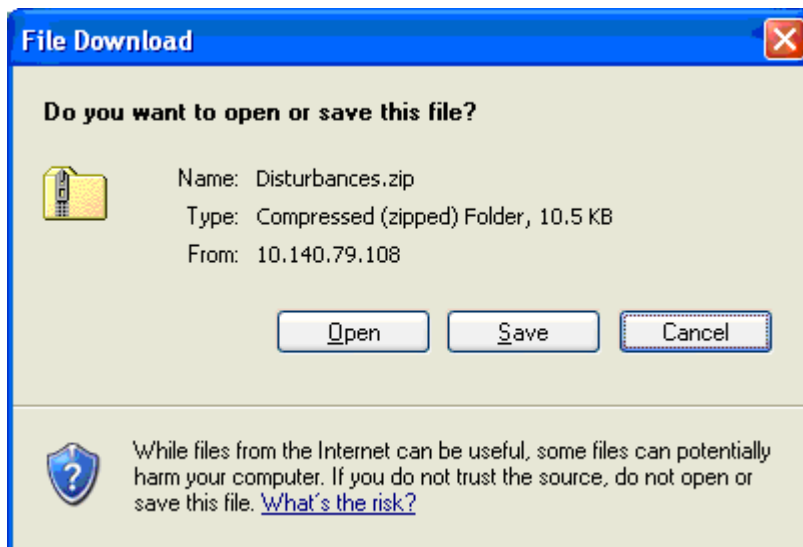



Figure 4-55 Dialog to confirm DR File save

- Click on the **Save**.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	121	
					No. of p.	127

- It shows the save dialog box as shown below

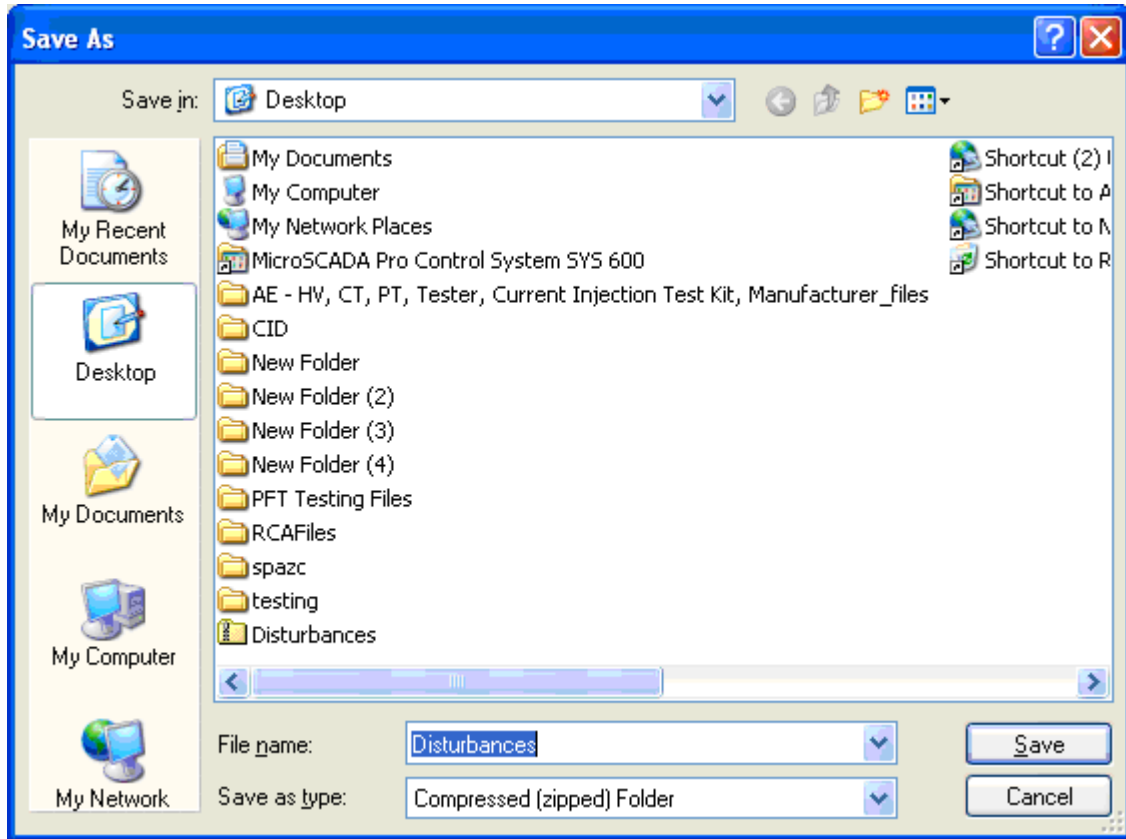



Figure 4-56 Dialog to Save the DR File

- Save the file by clicking on **Save** button.
- It saves the file as .zip file which contains the .dat and .cfg file.

4.2.3 Viewing Alarms, Events and Measurements in SAB600

- Open the SAB600 web page as explained in the previous section.
- Click on **Alarms** in the title bar.
- It shows the Alarms page as shown below.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	122
		en	A	No. of p.	127

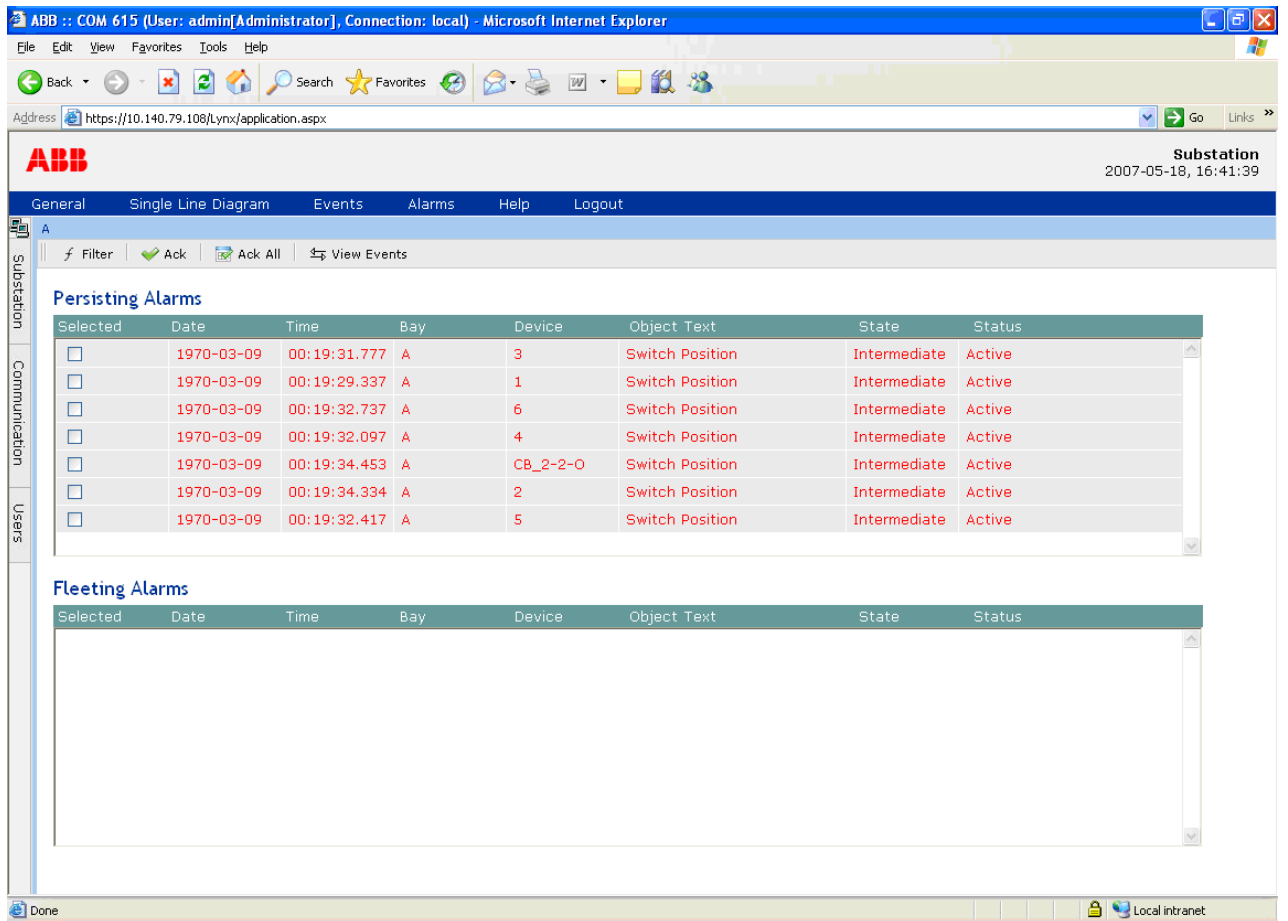



Figure 4-57 SAB600 HMI for Alarms

- Click on the **Events** on the shown title bar.
- It shows the events as shown below.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.
					127

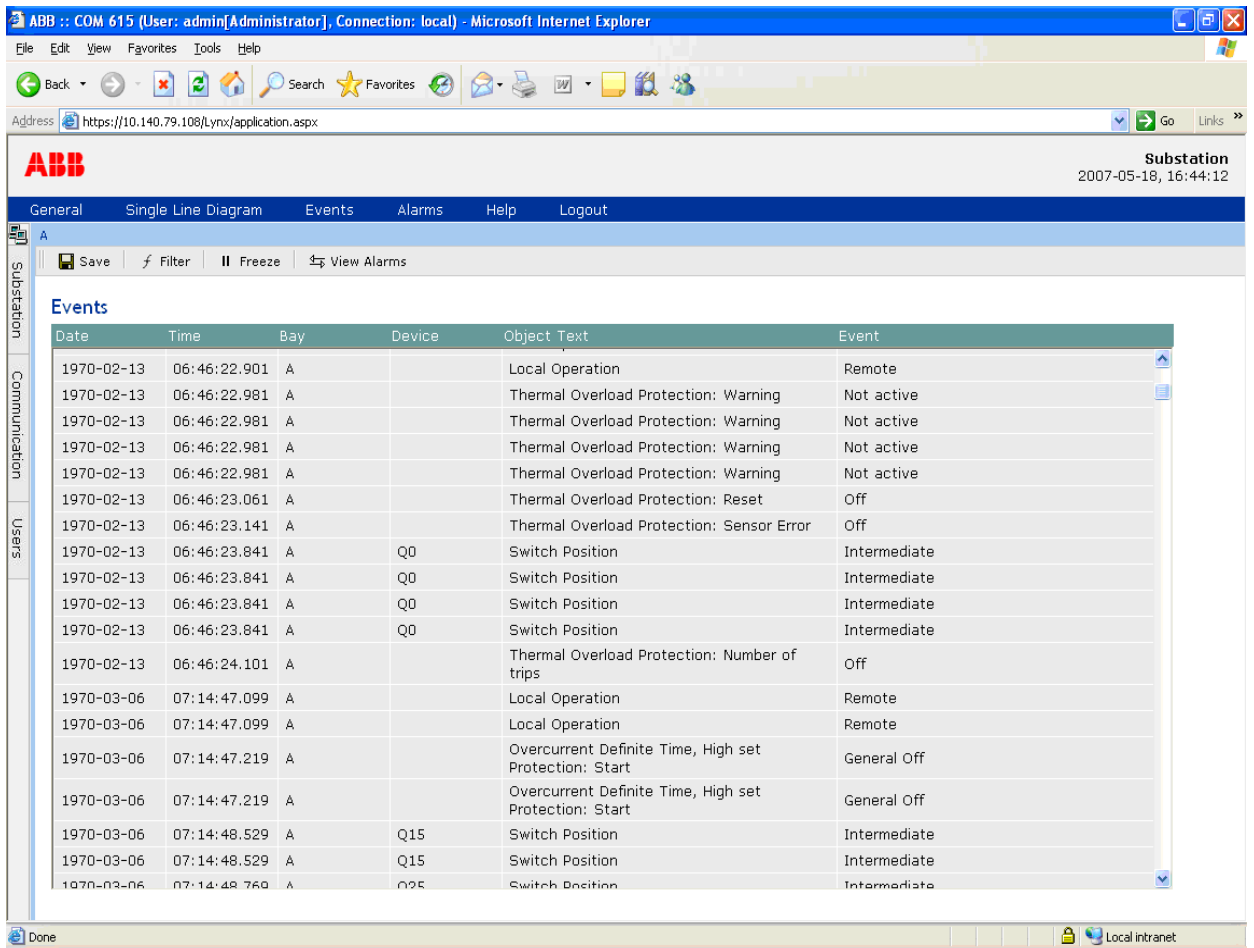



Figure 4-58 SAB600 HMI for Events

- Click on the **Measurements** which appear as sub node for IED node in the web page.
- It shows the Measurement description and its value.

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	9ARD170952-009	Doc. no.	Lang.	Rev. ind.	Page	
			en	A	124	
					No. of p.	127

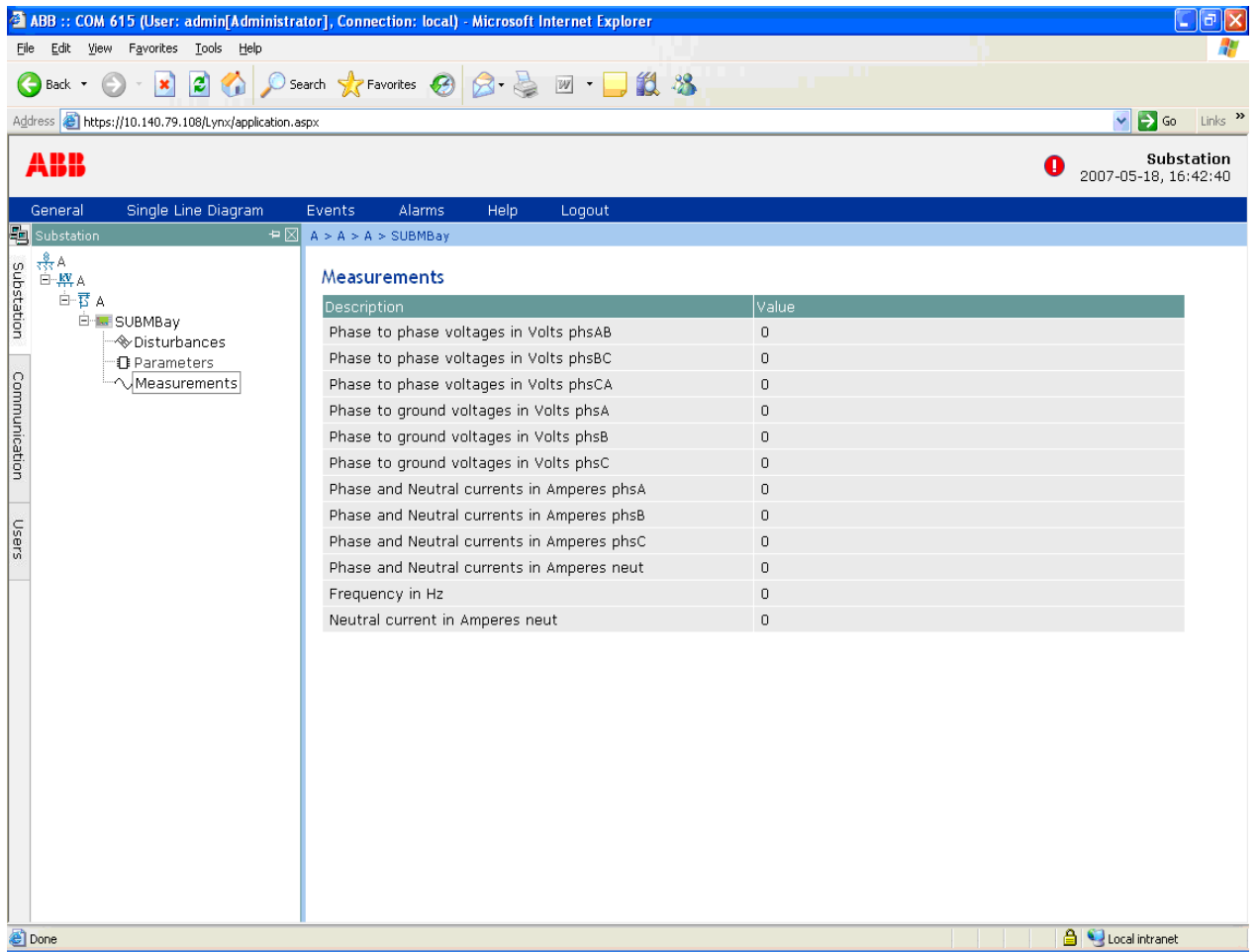


Figure 4-59 SAB600 HMI for Measurements

5. Administration & Configurations Details

5.1 Parameterization

NA


5.2 Application Framework / Product Architecture

5.3 User Interface

Please refer section 3&4.

5.4 User Role

All users are considered as Operator.

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no. 9ARD170952-009	Lang.	Rev. ind.	Page	125
		en	A	No. of p.	127

5.5 Functionality & its Descriptions


Please refer section 3&4.

5.6 Performances, Fine Tuning & Optimizations

6. Appendix

7. References


Ref. No	Document Id no.	Title
1	9ARD195983-001	Description of Function
2	9ARD195984-005	Test Specification Document
3	9ARD195983-003	Release Notes
4	9ARD195982-001	Technical Requirement Specification
5	9ARD170952-008	REF 542plus SCL Tool User Manual

Doc Kind	User Manual	Project ID	INP.9598			
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page	126
					No. of p.	127

8. Index

9. Revision

Rev. ind.	Page (P) Chapt. (C)	Description	Date Dept./Init.
-d0	All	Initial Draft	2009/04/23/INCRC/PM
-		Ready for Approval	
-Ad0	All	Update for Version 3.0 SP1	2011/10/23/INCRC/MS
A		Ready for Approval	2011/11/22/INCRC/MS

Doc Kind	User Manual	Project ID	INP.9598		
 ABB Corporate Research Center Bangalore	Doc. no.	9ARD170952-009	Lang.	Rev. ind.	Page
			en	A	No. of p.
					127
					127