

Guidelines when using Line Data Communication Module (LDCM) in the 670 series

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1 Application

LDCM is used for different data communication purposed. One application is to transfer analog values in the differential schemes with Line Differential protection IED RED 670. Another application is to transfer only binary signals between 670 series IEDs.

2 Introduction

When the communication module LDCM is used for transfer of analog values in a differential protection scheme in any product in the 670 series, - it is essential for the best possible performance to use the following setting combination recommendations.

The first issue concerns the source of time synchronization. It is imperative to distinguish between the time synchronization of the sampling of analog values in a line differential protection scheme with 670 series products and the time synchronization of events in these.

The second issue concerns the configuration of the LDCM itself.

Unfavourable combinations of the 670 series parameter Settings for **\Time\Synchronisation\TimeSynch** and **\General settings\Communication\LDCM configuration\LDCM31x\CRMx** will affect the performance.

3 Affected parameters

3.1 Settings for \Time\Synchronisation\TimeSynch

For \Time\Synchronisation\TimeSynch the related parameters are:

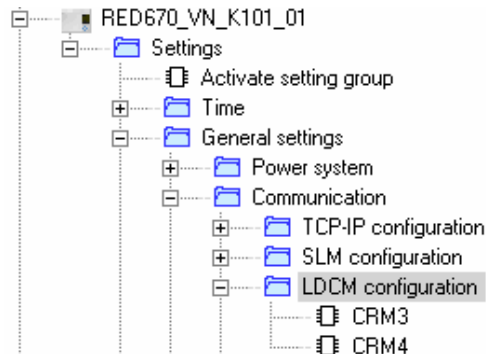
CoarseSyncSrc; FineSyncSource; TimeAdjustRate

RED670_VN_K101_01 - P...			
Group / Parameter Name	IED Value	PC Value	
Settings			
Activate setting group			
ActiveSetGrp		SettingGroup1	
Time			
Synchronisation			
TimeSynch			
CoarseSyncSrc		Off	
FineSyncSource		Off	
SyncMaster		Off	
TimeAdjustRate		Slow	
TimeSynchBIN			

3.2 Settings for \General settings\Communication\LDCM configuration\LDCM31x\CRMx

For \General settings\Communication\LDCM configuration\LDCM31x\CRMx the related parameters are:

DiffSync; GPSSyncErr



RED670_VN_K101_01 - P...			
Group / Parameter Name	IED Value	PC Value	
▶ LDCM configuration			
CRM3			
ChannelMode		On	
TerminalNo		1	
RemoteTermNo		2	
DiffSync		ECHO	
GPSSyncErr		Block	
CommSync		Master	

To achieve the best possible performance the following tables for combinations of setting of the outlined parameters are recommended to provide the best possible and optimum availability of the line differential protection scheme in any product in the 670 series.

4 Affected products

Type designations: All 670 series Ver.1.0B; Ver.1.0Br01, Ver.1.1 and Ver.1.1r01

5 Recommended settings

The below setting combinations provide the optimum availability and security:

Settings\Time\Synchronization\ TimeSynch	Comb. 5.1	Comb. 5.2	Comb. 5.3	Comb. 5.4	Comb. 5.5
CoarseSyncSrc	Off	DNP	Off	Off	Off
FineSyncSource	Off	Off	GPS	GPS	GPS
TimeAdjustRate	Slow	Slow	Fast	Slow	Slow
Settings\General settings\ Communication\LDCM configuration\LDCM312\CRM3					
DiffSync	Echo	Echo	Echo	GPS	GPS
GPSSyncErr	Block	Block	Block	Block	Echo
<i>Table 5</i>					

6 Alternative settings

The following setting combination can be used, however it is not recommended.

6.1 Settings affected by GPS failure

When the GPS signal returns after a failure in the reception, the COMFAIL signal generated will prevail until the GPS time synchronization has been re-established between the line ends. During COMFAIL (lasts until complete synchronization) the line differential protection is blocked, and all back-up protection will work. The line protection capability will still be in service, since a graceful degradation to back-up protection will take place.

Settings\Time\Synchronization\ TimeSynch	Comb. 6.1
CoarseSyncSrc	Off
FineSyncSource	GPS
TimeAdjustRate	Fast
Settings\General settings\ Communication\LDCM configuration\LDCM312\CRM3	
DiffSync	GPS
GPSSyncErr	Echo
<i>Table 6.1</i>	

6.2 Settings that will generate infrequent COMFAIL signals

The following setting combinations can be used, however they will generate an infrequent additional COMFAIL signals. The expected rate for COMFAIL is from 1 per week to 1 per day. During COMFAIL (lasts 5 to 15 s) the line differential protection is blocked, and all back-up protection will work. The line protection capability will still be in service, as a graceful degradation to back-up protection will take place.

Settings\Time\Synchronization\ TimeSync	Comb. 6.2	Comb. 6.3	Comb. 6.4	Comb. 6.5	Comb. 6.6
CoarseSyncSrc	SPA	Off/LON*	Off	Off	Off
FineSyncSource	SPA	LON	SNTP	BIN	IRIG-B
TimeAdjustRate	Slow	Slow	Slow	Slow	Slow
Settings\General settings\ Communication\LDCM configuration\LDCM312\CRM3					
DiffSync	Echo	Echo	Echo	Echo	Echo
GPSSyncErr	Block	Block	Block	Block	Block
*) Off/LON: 670 series Ver. 1.0B Off, 670 series Ver. 1.1 LON					
<i>Table 6.2</i>					

If the user cannot accept an infrequent additional COMFAIL rate from 1/week to 1/day, the setting combinations as shown in table 5 Comb. 5.1 shall be used. The result is that the 670 series products provide time-tagging for events with a relative accuracy of 1 ms for events within the IED only, since no external clock reference is used.

7 Restrictions for GPS synchronization

The following setting combinations shall not be used in combination with GPS synchronization of line differential communication protection.

Settings\Time\Synchronization\ TimeSync	Comb. 7.2	Comb. 7.3	Comb. 7.4	Comb. 7.5	Comb. 7.6
FineSyncSource	GPS+SPA	GPS+LON	GPS+BIN	GPS+SNTP	GPS+IRIG-B
<i>Table 7</i>					

8 670 series with station communication using IEC 60870-5-103

IEC 60870-5-103 is not used to synchronize the 670 product, but instead the offset between the local time in the IED and the time received from 103 is added to all times in e.g. events sent via 103. In this way the IED acts as if it is synchronized from various 103 sessions at the same time. Actually, there is a "local" time for each 103 session,

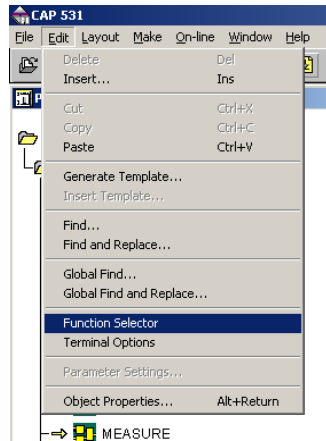
If LON, SPA, DNP 3.0 or IEC 61850 is used for station communication, see the applicable sections above.

9 Configuration of LDCM for the 670 series.

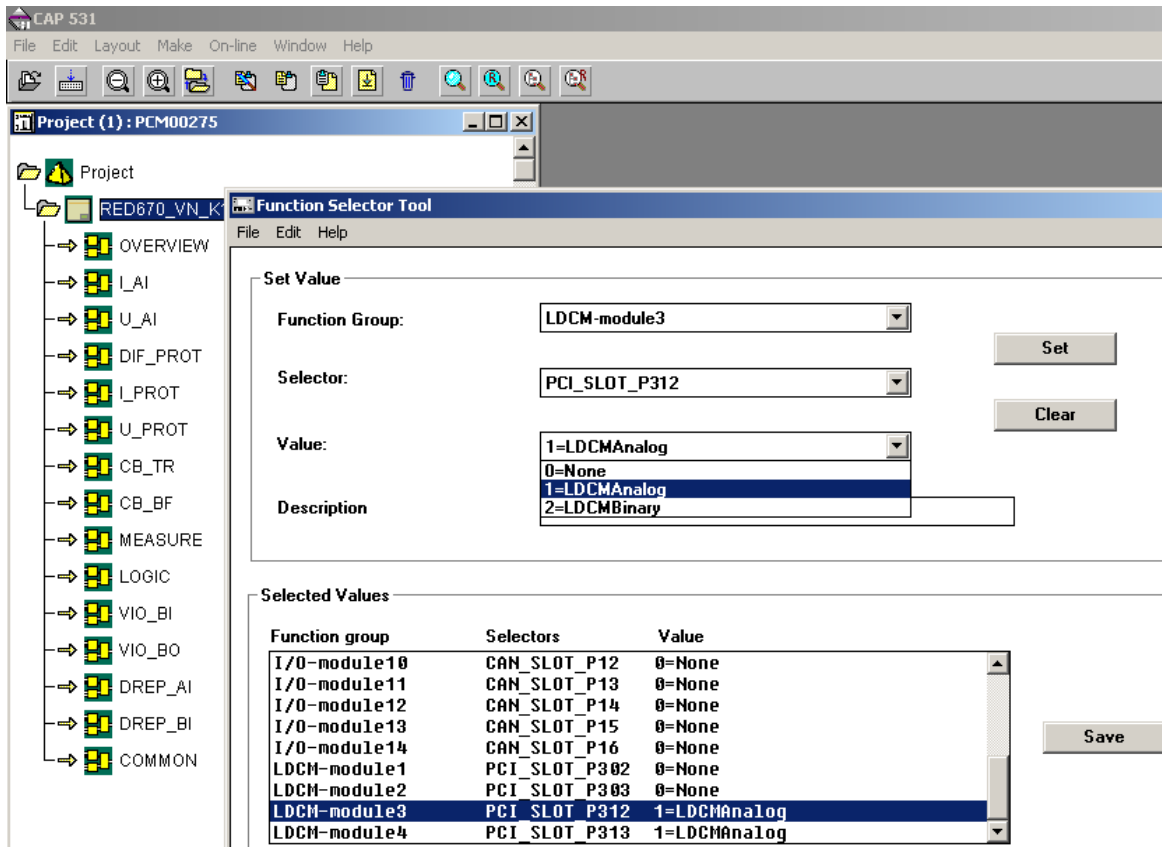
LDCM can be used in different communication setups as shown in the function selector Tool inside CAP531:

- 0 None
- 1 For transfer of analogue signals (plus up to 8 binary)
- 2 For transfer of only binary signals (up to 192 binary)

Configuration of the LDCM must always be made in the configuration tool CAP531, by selecting **Edit\Function Selector**



Then the settings in the appearing Function Selector Tool must be made according to one of the two alternatives below.



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