

ANNEXURE I

Software requirement specifications for Implementation of IEC61850 Client on Remote Terminal Unit (RTU) for SCADA

1.0 Introduction

This document describes the software requirement specifications for the development of Remote Terminal Unit (RTU) to implement the IEC 61850 Client for SCADA. The application shall be based on the latest MMS stack for IEC61850 client module. The application runtime environment will be QNX 6.5 Operating System over x86 hardware platform.

2.0 Scope:

The scope of the work includes:

- 2.1 Submitting the detailed design document in line with the requirement specifications.
- 2.2 Developing the software as per the approved design document.
- 2.3 Demonstration of the software features at vendor premises
- 2.4 A. Supply of MMS stack Source Code Libraries along with user's manual and documentation.
B. Design, development and testing of IEC61850 Client Runtime driver along with the software documentation including data diagrams, flow charts, user's manuals etc.
C. Design, development and testing of IEC61850 Client Configuration interface along with the data diagrams, flow charts, user's manuals etc.
- 2.5 Installing the software at BHEL R&D in their hardware and testing.
- 2.6 Training at BHEL R&D, Hyderabad on the development and configuration of the software.
- 2.7 Support during / for the successful third party test certification at a reputed test lab.
- 2.8 Maintenance and Warranty for a period minimum of one year after successful installation / third party test certification (whichever is later).

3.0 Deliverables

The deliverables will include:

- 3.1 Source Code Library of MMS Stack for IEC61850 protocol, IEC61850 Client Run time Driver and IEC61850 Client configuration interface.
- 3.2 Integration of IEC 61850 Client run time driver, MMS protocols and Configuration interface with BHEL RTU application software over QNX Platform.
- 3.3 Design documentation and user manual of both Source code Libraries and Implementation softwares.
- 3.4 Training on Source code Libraries and implementation of softwares.

4.0 Detailed functional requirements of the software (Scope as defined in IEC61850 standard)

The vendor shall integrate IEC 61850 Client with BHEL RTU application on QNX platform.

4.1 MMS Stack: The MMS stack should support the following ACSI services for IEC61850-8-1 Client system:

Sl No.	Conformance Block	Mandatory	Optional
1	Basic Exchange	Associate, Abort and/or release, GetDataValues, GetServerDirectory	GetAllDataValues SetDataValues GetLogicalDeviceDirectory GetLogicalNodeDirectory

			(DATA) GetDataDirectory
2	Data Set	GetLogicalNodeDirectory (DATA-SET) GetDataSetDirectory	GetDataSetValues SetDataSetValues
3	Data Set Definition	CreateDataSet , DeleteDataSet	
4	Substitution	SetDataValues	
5	Un-buffered Reporting	Receive Report GetURCBValues SetURCBValues	
6	Buffered Reporting	Receive Report GetBRCBValues SetBRCBValues	
7	Logging	GetLCBValues GetLogicalNodeDirectory (LOG) QueryLogByTime or QueryLogAfter GetLogStatusValues	SetLCBValues
8	Direct control	Operate	TimeActivatedOperate
9	SBO control	Select, Operate	Cancel, TimeActivatedOperate
10	Enhanced Direct Control	Operate Receive CommandTermination	TimeActivatedOperate
11	Enhanced SBO Control	SelectWithValue, Operate Receive CommandTermination	Cancel, TimeActivatedOperate
12	Time sync	TimeSynchronization	
13	Get File transfer	GetServerDirectory(FILE) GetFileAttributeValues GetFile	DeleteFile
14	Set File transfer	GetFile	DeleteFile

4.2 IEC61850 Client Run time Driver and Client Configuration Interface:

1. The software developed should be able to communicate with multiple IEDs on IEC 61850 over the TCP/IP network.
2. Browse the data model (Logical Devices, Logical Nodes, Data Objects and Data Attributes)

3. Read and write of Data values
4. Read and write of Data Set values
5. Control Model (all models as mentioned in the above table)
6. Reporting (Buffered and Un-buffered)
7. File transfer
8. Time Synchronization

Support for GOOSE Subscription and Sampled values shall not be required at this stage, however the Source Code should have ability to expand and include GOOSE Subscription and Sampled value subscription. The developed driver should provide inter-operability support for the Ed.2 and Ed.1 devices.

The scope includes building IEC61850 client for transmit of user data as per configuration file. It can be assumed that the data of the input signals is transferred via IPC (Inter process communication) from the BHEL's software.

5.0 General

- 5.1 The application shall be developed based on the latest MMS Stack Source Code Libraries.
- 5.2 The vendor should have the development environment and all the software and hardware components to carry out the development. The vendor should substantiate the same in the offer.
- 5.3 A. The offer should contain the technical documentation of Source code Libraries for technical evaluation.
B. The offer should specify the development environment and the same has to be included in the Technical Proposal.
- 5.4 The successful bidder shall submit a design document within 2 weeks' time from the date of Purchase Order.
 1. After the design is approved by BHEL R&D, vendor shall take up the implementation.
 2. BHEL R&D shall review the work at suitable stages of then development.
 3. The functioning of the software shall be inspected periodically.
 4. Vendor shall install the software at BHEL R&D, on the target hardware platform provided by BHEL.
 5. Testing shall be conducted as per mutually agreed Acceptance criteria. This shall include modifications on the source code, compiling in the development environment and porting on to the runtime platform at BHEL R&D
- 5.5 The source code is deliverable to BHEL; the source code should be compiled and executed in the presence of BHEL in their in-house development environment for demonstration.
- 5.6 The application and configuration software modules for server are the sole property of BHEL R&D and should not be used for any other purpose by the vendor.
- 5.7 The vendor should be able to demonstrate the functionality of client driver by interfacing with multiple IEDs within BHEL RTU.