

# SYNC 500 Series DLMS/COSEM Server Library

## OVERVIEW

Kalkitech provides an easy upgrade path for Meter OEMs to implement DLMS protocol in their existing/new meters by providing DLMS Server Source Code Library\*. The stack has been written in ANSI C, keeping in mind the hardware resource constraints typically found in metering hardware platforms. It provides the flexibility to tradeoff between ROM and RAM storage for several large footprint items (like configuration information, object lists etc). The ROM size for the stack with a typical set of features is found to be about 40KB (without meter configuration information) and runs on around 3KB RAM. Configuration info for a typical meter with about 150 objects, a few associations and profile capture-object lists was seen to occupy an additional 15KB ROM and 1.5KB RAM.

## KEY FEATURES

- DLMS UA attested stack
- Suitable for simple micro-controller without OS or light-wight Embedded OS/RTOS to full fledged Desktop/Server OS
- Platform independent design allows easy porting or migration of hardware or OS
- Platform specific functionality separated out as a file, with default implementations available for Windows and Linux
- Supports HDLC and COSEM wrapper for IP
- Supports event notification and Data notification
- Supports IEC 62056-21 Mode-E implementation
- Memory constraints for embedded system are taken care of
- Security support as per AES GCM
- Supports various companion specifications including Indian IS15959 part1 and part2

Kalkitech's DLMS Source Code Library has been tested & implemented on numerous metering processors including:

- ATMEL
- Renesas
- Wavecom / Sierra Wireless
- Texas Instruments
- Freescale /NXP
- Teridian / Maxim
- ST Micro Electronics
- Microchip

## COSEM APPLICATION LAYER

### Interface Classes

The stack supports the following Interface Classes and their instantiation

- Data (IC: 1)
- Register (IC: 3)
- Extended Register (IC: 4)
- Demand Register (IC: 5)

- Register Activation (IC: 6)
- Profile Generic (IC: 7)
- Clock (IC: 8)
- Script Table (IC: 9)
- Schedule (IC: 10)
- Special Days Table (IC: 11)
- Association SN (IC: 12)
- Association LN (IC: 15)
- SAP Assignment (IC: 17)
- Image Transfer (IC: 18)
- IEC Local Port Setup (IC: 19)
- Activity Calendar (IC: 20)
- Register Monitor (IC: 21)
- Single Action Schedule (IC: 22)
- IEC HDLC Setup (IC: 23)
- M-Bus Slave Port Setup (IC: 25)
- Utility Table (IC: 26)
- PSTN Modem Configuration (IC: 27)
- PSTN Auto Answer (IC: 28)
- Auto Connect(IC: 29)
- Push Setup (IC : 40)
- TCP-UDP Setup (IC: 41)
- IPv4 Setup (IC: 42)
- Ethernet Setup (IC: 43)
- PPP Setup (IC: 44)
- GPRS Modem Setup (IC: 45)
- SMTP Setup (IC: 46)
- GSM Diagnostic(IC: 47)
- Ipv6 Setup(IC: 48)
- S-FSK IEC 61334-4-32 LLC Setup (IC: 55)
- ISO/IEC 8802-2 LLC Type 1 Setup (IC: 57)
- ISO/IEC 8802-2 LLC Type 2 Setup (IC: 58)
- ISO/IEC 8802-2 LLC Type 3 Setup (IC: 59)
- Register Table (IC: 61)
- Compact Data(IC: 62)
- Security Setup (IC: 64)
- Parameter monitor(IC: 65)
- Sensor Manager (IC: 67)
- Disconnect Control (IC: 70)
- Limiter (IC: 71)
- M-Bus Client (IC: 72)
- Wireless Mode Q Channel (IC: 73)
- M-Bus Master Port Setup (IC: 74)
- LLC SCS setup(IC: 80)
- PRIME NB OFDM PLC Physical layer counters(IC: 81)
- PRIME NB OFDM PLC MAC setup(IC: 82)
- PRIME NB OFDM PLC MAC functional parameters(IC: 93)
- PRIME NB OFDM PLC MAC counters(IC: 84)
- PRIME NB OFDM PLC MAC network administration data(IC: 85)
- PRIME NB OFDM PLC Applications identification(IC: 86)
- G3-PLC MAC layer counters(IC: 90)
- G3-PLC MAC setup(IC: 91)
- G3-PLC 6LoWPAN adaptation layer setup(IC: 92)

## Application Contexts

The protocol stack supports both Short Name (SN) and Logical Name (LN) referencing with ciphering and with no ciphering.

## Access Control (authentication)

Supports NO\_SECURITY, LOW\_LEVEL\_SECURITY, HIGH\_LEVEL\_SECURITY mechanisms (mechanism ID: 1,2,3,4,5).

## Data security (Encryption)

AES GCM 128 encryption and GMAC Authentication support

## Conformance block

The stack supports the following featured services in the DLMS Conformance-block.

## LN Services

- GET
- BLOCK TRANSFER WITH GET
- SET
- BLOCK TRANSFER WITH SET
- ACTION
- SELECTIVE ACCESS

- DATA NOTIFICATION
- GENERIC BLOCK TRANSFER (along with Data Notification)
- EVENT NOTIFICATION
- MULTIPLE REFERENCING

## SN Services

- READ
- WRITE

## HDLC DATALINK LAYER

### Addressing

Supports 1-byte, 2-byte and 4-byte addressing.

### Timeouts

Supports Inactivity and Inter-frame timeouts

## COSEM Transport Layer for IPv4 Networks

SCL supports COSEM wrapper layer for IPv4 networks, to enable communication via Ethernet/GPRS/PPP/PLC/RF.

Transducers		User Layer Application Control Function	
Metering Function	Configuration Interface	COSEM / Application Layer (62056-53)	
	Data Interface (Abstraction Layer)	HDLC Datalink Layer (62056-46)	DLMS Wrapper Layer (62056-47)
Meter Data Registers		MODE-E Switch to HDLC (62056-21 Mode-E only)	UDP / TCP
		Physical Layer (62056-42)	IP
		Platform Interface Ethernet / GPRS	
	RS232 / RS485 / PSTN / GSM Modem	Ethernet / GPRS	Optical Port

Legend



## CONFIGURATION INTERFACE

The DLMS SCL provides a rich configuration interface. Implementers of the SCL can configure:

- Logical Device
- Associations
- Multiple associations may be configured with different Application Contexts, Authentication Mechanisms and Conformance Block services.
- Complete OBIS list of supported objects
- Static information for each object
- Capture-object lists for Profile Generic objects
- Configurable buffer sizes
- LN/SN support
- Interface class support
- Support for communication profiles - HDLC, TCP/UDP
- Application and data-link layer parameters

## DATA INTERFACE

The data interface to the meter consists of a set of functions that are called on receipt of DLMS GET, SET or ACTION request from a client (or their SN equivalents). The SCL will process the request, take care of access privilege checking and call appropriate methods in the data interface.

## OBIS CODES

The complete range of standard OBIS codes related to the above mentioned Interface Classes can be configured into the system. The OBIS codes can be given in such a way that they are meeting standard, country-specific or manufacturer specifications. They can also be implemented in gas meters.

## INTEGRATION TO METER DATA

The SCL as it ships, assumes a typical subset of object attributes to be static. Implementers can modify this subdivision and choose which all attributes of an object need to be dynamic (where values change dynamically and need to be updated from meter) by minor editing in certain source files.

The values for the static attributes of all supported objects are normally filled in the Configuration Interface. If the implementer chooses to modify the static/dynamic subdivision of objects, the implementer will have to modify the static initialization of the objects in the Configuration interface to suit the new arrangement.

The SCL will have a sample implementation to clarify the structure and semantics of each object and its supporting structures. The implementer's role is to edit the initialization of structure variables to suit his requirement. The static information of requested objects will be retrieved by the SCL itself, and the implementer only needs to fill in the dynamic values from meter registers (using Data Interface functions).