Xelas Energy Software MMS Toolkit

Manufacturing Message Specification

Introduction

Manufacturing Message Specification (MMS) is an international standard (ISO 9506) dealing with messaging system for transferring real time process data and supervisory control information between networked devices and/or computer applications. The standard is developed and maintained by the ISO Technical Committee 184 (TC184.) MMS defines:

- A set of standard objects which must exist in every device, on which operations like read, write, event signaling etc. can be executed. Virtual Manufacturing Device (VMD) is the main object and all other objects such as variables, domains, journals, files come under VMD.
- A set of standard messages exchanged between a client and a server station for the purpose of monitoring and/or controlling these objects.
- A set of encoding rules for mapping these messages to bits and bytes when transmitted.

MMS original communication stack

MMS was standardized in 1990 under two separate standards as
1. ISO/IEC 9506-1 (2003): Industrial Automation systems - Manufacturing Message Specification - Part 1: Service Definition
2. ISO/IEC 9506-2 (2003): Industrial Automation systems - Manufacturing Message Specification - Part 2: Protocol Specification

This version of MMS used seven layers of OSI network protocols as its communication stack:

Application	**Manufacturing Message Specification (MMS) – ISO/IEC 9506** **Association Control Service Element (ACSE)- ISO 8649/8650**
Presentation	**Connection Oriented Presentation - ISO 8822/8823** **Abstract Syntax Notation (ASN)- ISO 8824/8825**
Session	**Connection Oriented Session - ISO 8326/8327**
Transport	**Connection Oriented Transport - ISO 8072/8073**
Network	**Connectionless network - ISO 8348**
Link	**MAC - ISO 8802-3 [Ethernet]** **MAC - ISO 8802-4 [Token Ring]**
Physical	**Ethernet**

MMS Stack over TCP/IP

Because the Open Systems Interconnection protocols are challenging to implement, the original MMS stack never became popular. In 1999, Boeing created a new version of MMS using Internet protocols instead of the bottom four layers of the original stack, plus RFC 1006 ("ISO Transport over TCP") in the Transport layer. The top three layers use the same OSI protocols as before.

In terms of the seven-layer OSI model, the new MMS stack looks like this:

Application	**Manufacturing Message Specification (MMS) – ISO/IEC 9506** **Association Control Service Element (ACSE)- ISO 8649/8650**
Presentation	**Connection Oriented Presentation - ISO 8822/8823** **Abstract Syntax Notation (ASN)- ISO 8824/8825**
Session	**Connection Oriented Session - ISO 8326/8327**
Transport	**ISO transport over TCP - RFC 1006** **Transmission Control Protocol (TCP) - RFC 793**
Network	**Internet Control Message Protocol (ICMP) - RFC 792** **Internet Protocol (IP)- RFC 791** **Address Resolution Protocol (ARP)- RFC 826**
Link	**IP datagrams over Ethernet - RFC 894** **MAC - ISO 8802-3 [Ethernet]**
Physical	**Ethernet**

Features of Xelas Energy Software MMS Product

- Originally developed by Retix, later by Vertel
  - Xelas Software has all development rights for Retix and Vertel products.
- Developed in portable C-code
- Integrated into Embedded Transport Service product (Xelas Software ETS Product)
  - Small footprint
  - Easily portable
- Ported to:
  - VxWorks
  - pSOS
  - Embedded Linux
  - Linux x86 or x86_64
- Verified Xelas Software OSI stack products:
  - TP4/CLNP (MMS original communication stack)
  - RFC1006   (MMS stack over TCP/IP)
- Integrated with Xelas Software energy products
  - IEC-61850 (Energy management standard for substations)
  - IEC-61400 (Energy management standard for Windmill parks)
- Optional provided in source code with message-based C-API

To order an evaluation package or get more information about the MMS protocol stack please email: info@xelasenergy.com

Xelas Energy Software Product Portfolio

The Xelas Energy Software product portfolio offers all the necessary and smart building blocks to implement an IEC 61805 standard based communication network.

Protocols for all essential layers of the stacks

➢ Protocols are delivered with toolkits to implement customer solutions
➢ Manufacturing Message Specification (MMS) Protocol Stack including OSI Protocols
➢ GOOSE/GSSE, SV and SNTP

IEC 61850 Client Development Toolkit

➢ Native MMS, GOOSE/SV Support
➢ Built on top of Java J2EE Framework
➢ Persistent storage of all data, multiple database support though ODBC/JDBC
➢ Multiple Northbound interfaces (IEC 61870-5-104, Web services, OPC)
➢ Multi-threaded scalable architecture
➢ Ported on various platforms: Linux/Windows/UNIX

IEC 61850 Server Development Toolkit

➢ Native MMS, GOOSE/SV Support
➢ Extendable Common Information Model (CIM) based on IEC 61870-7-x
➢ Supports all version 1 and 2 functions
➢ Embedded architecture for rapid integration with client hardware
➢ Ported to VxWorks/pSOS/Embedded Linux
➢ Both binary as well as source code available

IEC 61850 Dynamic Mediation Framework

➢ Integrate various Protocols and Information Models
➢ Java script rules provide for quick runtime mapping
➢ Off the shelf adaptors: IEC 61850, SCADA5-104, XML, SNMP, ASCII
➢ Off the shelf Adaptations for various Information Models:
  o IEC 61850-8-x – ACSI to MMS/OSI including RFC-1006
  o IEC 61850-7-2/3/4 – Substation Automation
  o IEC 61400 – Windpower
  o IEC61850-Part 7-410 – Hydro-electric Power Plants (HYDRO)
  o IEC61850-Part 7-420 – Distributed Energy Resources (DER)

Check www.xelasenergy.com for more Product Information

About Xelas Energy Software

Xelas Energy Software is a dedicated division within Xelas Software. The energy products and solutions are based on 20 years of experience of implementing complex network management solutions. The multiple various products, originally built for telecom network management, are applicable to IEC 61850 management as well.

Xelas Software is a privately owned company, which acquired the software licenses and intellectual property of Vertel Corporation and Retix in 2004. It has offices in Los Angeles and the Netherlands.

For over twenty years, the Vertel and Retix software has proven to deliver cornerstone functionalities to manage standards based networks, by offering mediation and integration solutions for network management. Xelas Software products are made to fit energy, telecom, messaging and aviation network management markets.

Since 1990, new technology introductions, internationalization and liberation of the telecom market created a strong momentum to develop open, multivendor network management standards. Xelas Software established its market role through intense participation in industry collaboration, and developed standard software components now widely used by market leaders such as Alcatel-Lucent, Nokia Siemens Networks (NSN), Motorola, Ericsson, IBM, NTT, NEC, Samsung and Huawai.

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