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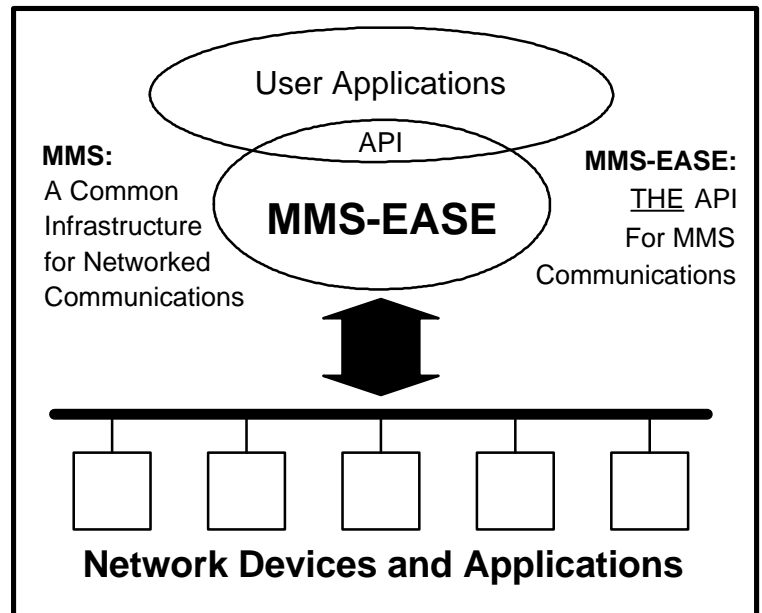
MMS-EASE

MMS-EASE: C Language API for MMS

MMS-EASE is a C language Application Program Interface (API) for the Manufacturing Message Specification (MMS) protocols as specified by MAP V3.0 for communications between programmable devices on the factory floor. SISCO's years of experience in the MMS standards activities and application integration involving real-time communications has resulted in this easy-to-use and powerful API.

MMS-EASE consists of a library of C language function calls and data structures that provide application programs access to all the services needed for communications utilizing the MMS protocols in a manner that is independent of any particular peer MMS application, device or operating system. MMS-EASE implements all core MMS services for variable, context, VMD, domain, file, semaphore, program invocation, event, and journal services of MMS.

MMS-EASE also includes an exclusive "virtual machine" that greatly simplifies programming. The MMS-EASE virtual machine provides data management functions, data structures, and automatic responders and requesters for a variety of MMS objects and services such as variables, files, domains, and program invocations. The MMS-EASE virtual machine allows your programs to interact with the network in a useful way without having to write all of the software functions yourself and yet gives your programs tremendous flexibility and control over the communications environment.



- Easy-to-use C language API simplifies user application programming for both Client and Server applications.
- Supports Ethernet™ (802.3) networks in a variety of popular computing environments.
- Implements all MMS core services for ISO 9506 and DIS 9506 per N.I.S.T. agreements.
- Includes high-level "virtual machine" functions for processing MMS objects automatically without complex programming.
- Includes full documentation with source code for a complete sample application.
- Largest installed base of any MMS API.
- Interoperable with many other MMS devices and implementations.
- Comprehensive training, support, and maintenance programs available.

ABOUT MMS

What is MMS?

MMS stands for **M**anufacturing **M**essage **S**pecification. MMS is an internationally recognized standard developed by the International Organization for Standardization (ISO) as an application protocol for communicating between intelligent programmable devices (computers, PLCs, Robots, CNCs, Remote Terminal Units (RTUs), etc.) over networks based upon the Open Systems Interconnection (OSI) model.

MMS Objects

MMS is much more than just a protocol standard. It also precisely defines a set of objects that are common to many devices. Some of these objects are variables, variable type definitions, programs, events, historical logs (called journals) and semaphores. Along with the definition of these objects, MMS defines a set of communications services that an application can use to manipulate these objects. For example, a variable object can be read and written. A program object can be started and stopped. The content, format, and meaning of these communications services (sometimes referred to as MMS messages) are also precisely defined. This definition of the MMS messages, specified in a format called Abstract Syntax Notation Number One (ASN.1), is called the protocol.

The Virtual Manufacturing Device Model

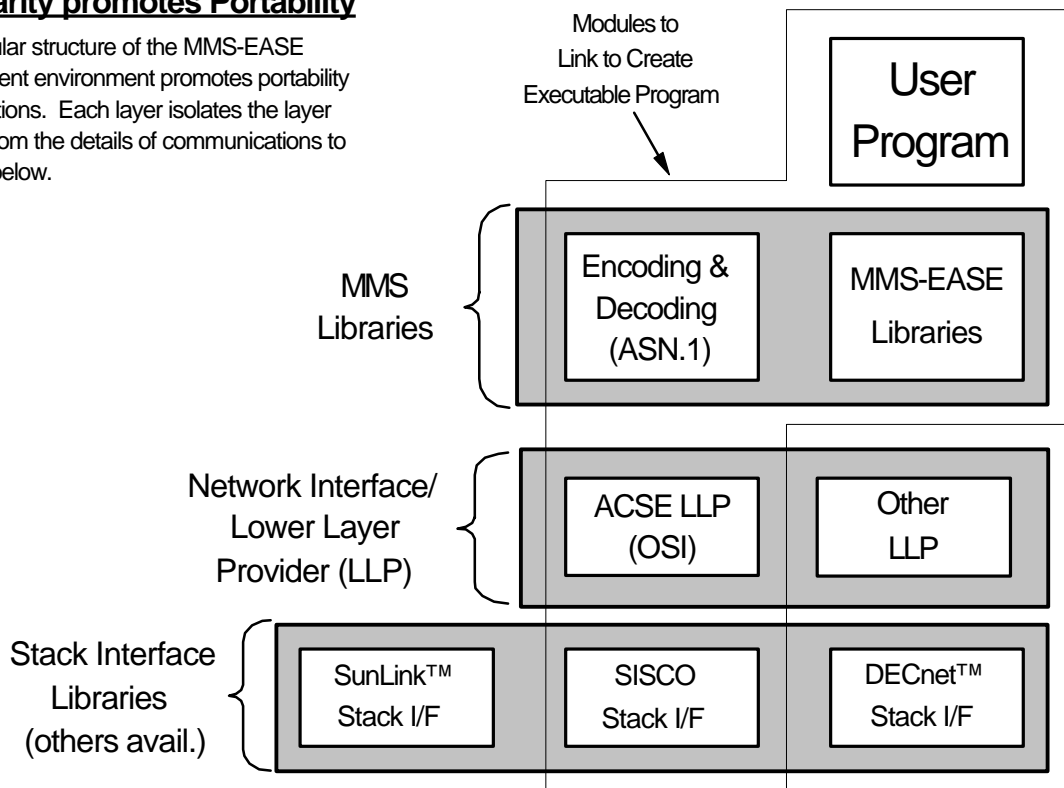
MMS goes beyond just defining objects and messages. MMS also defines how a device should behave when each message is received. This definition of objects, services (messages) to manipulate those objects, and the behavior of a device to those messages comprises what MMS refers to as the Virtual Manufacturing Device (VMD) model. All MMS communications with a device is between an application (client) and a VMD (server). Because MMS communications occur with a "virtual" device, as defined by the VMD model, most of the specifics of each individual "real" device can be hidden from the application. This allows applications to be written that are device independent. Each vendor of an MMS device or application provides an "executive function" that translates their specific "real" device into a VMD.

The Benefits of MMS

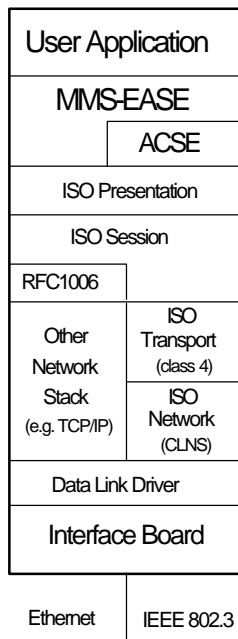
MMS can benefit users in a number of ways. First, because much of the device specific portions of application programs can be eliminated, MMS based applications can communicate with more different types of devices from different vendors without customization. Secondly, because of the extensive modeling aspects of MMS, MMS can be used as a common framework upon which to base all real-time communications, thereby simplifying system design. Thirdly, because MMS communicates with devices in the same way regardless of the device, only one communication service need be learned by engineers, operators, and service personnel resulting in savings on training, support, and maintenance. And, because many of the world's leading vendors support MMS, you have the flexibility to chose what is appropriate for a given application with the confidence that it will communicate in the same way as other MMS equipment.

Modularity promotes Portability

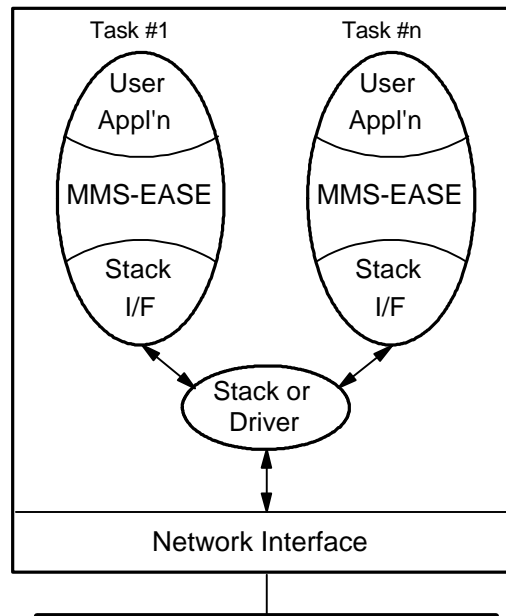
The modular structure of the MMS-EASE development environment promotes portability of applications. Each layer isolates the layer above it from the details of communications to the layer below.



Block Diagram of MMS-EASE Product Structure



MMS-EASE Network Architecture



MMS-EASE in a Multi-Tasking Environment

Sample MMS-EASE Function Calls

The following function is used to send an InitiateDownload Sequence request message to a remote device:

mp_initdown (chan, initdown_req_info)

1. When this function is called the following information is supplied by the calling program:

chan = This is the channel number over which the request is to be sent. A channel represents a connection to a remote networked device.

initdown_req_info = A pointer to an operation specific data structure that contains data regarding this InitiateDownloadSequence request.

2. The function returns a pointer to a queue data structure that the user application can use to track the status of the request. A user defined function is called once the remote application or device responds.

All Functions And Data Structures Are Completely Documented

The following "virtual machine" function not only sends the message (as the mp_initdown function does described to the left) but it will also automatically download the specified domain:

mv_download(chan,dom,type,num_cap,capab,len,file)

1. When this function is called the following information is supplied by the calling program:

chan = The channel number over which the download is to occur.

dom = The name of the domain in the remote device to be downloaded.

type = The type of download. The choices are from local memory, from a user defined function, or from a file.

num_cap = The number of capabilities in the pointer list described below.

capab = A pointer to a list of character strings that describe the capabilities of the domain to be downloaded.

len = the length of the file name field.

file = The name of the file containing the domain data.

2. The function returns a pointer to a queue data structure that the user application can use to track the status of the request. A user defined function is called after the download is complete.

Assurance of Interoperability

SISCO has a proven history of demonstrated leadership in the field of MMS interoperability. MMS-EASE, and SISCO's other MMS products, have been tested for interoperability with a variety of MMS products from many leading vendors. SISCO will continue to test and maintain its products in conformance with industry and international standards and the U.S. Government's N.I.S.T. MMS implementor's agreements.

NOTES:1.) Specifications presented herein are thought to be accurate at time of publication but are subject to change without notice. NO WARRANTIES OF ANY KIND ARE IMPLIED ON THE INFORMATION CONTAINED IN THIS DOCUMENT. 2.) Function call descriptions are technically accurate but have been simplified for clarity. 3.) All company names, tradenames and trademarks are trademarks or registered trademarks of their respective companies. 4.) MMS-EASE is available through SISCO directly or OEMs and/or distributors world-wide. Contact SISCO for the location of your representative.

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