MMS Server

GOOSE Publisher / IEC 61850, IEC 61400-25
Secure communication acc. to IEC 62351

The MMS Server equips the M1 controller with the capability of communicating in accordance with the standards IEC 61850 or IEC 61400-25. These standards describe manufacturer-independent communication between plants for energy generation and distribution. They enable the seamless integration of an ever-increasing number of heterogeneous plants, such as wind turbines or CHPs, in a control station or in a mixed network.

The standards IEC 61850 and IEC 61400-25 extend far beyond pure data communication. They also define the data modeling and thus offer an object-oriented view of the system. Objects such as generator, power switch, transformer, voltage controller, or rotor are standardized. For each of these objects the designation, data points, and services for access to the data are specified.
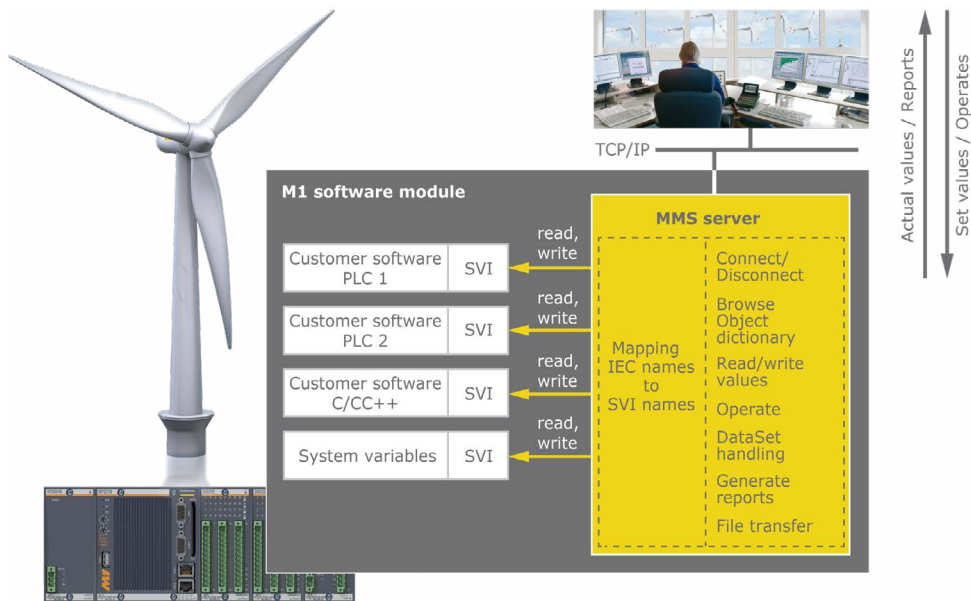
Communication between Server and Clients may be secured and encrypted by means of TLS certificates. This enables end-to-end-protection for critical infrastructure applications.

Customers could achive conformance certificates at the testing labs of TÜV SÜD and DNV.

MMS Server as a SCADA interface for the M1 controller

While TCP/IP-based MMS is mostly used as a SCADA interface, the multicast-based GOOSE is also available for automation with real-time requirements for fast transmission of spontaneous value alterations.

Both processes are configured via the same standardized XML file, which can also be used for scheduling the entire network.

The MMS Server from Bachmann electronic maps the automation process variables to the attributes of the IEC 61850 or IEC 61400-25 address space. The user of the MMS Server determines the standardized ICD file (ICD = Intelligent Electronic Device Capability Description), what information of the plant is represented by the server, and are therefore visible to the client (e.g. the control station). This enables individual adaptation to different plants or modular expansion stages.

The **GOOSE Publisher** feature enables, in addition or as an alternative, the selected process data to be distributed as prioritized multicast messages in the network. To do this, only the corresponding GOOSE control blocks need to be configured in the ICD file.

Features according to IEC 61850 / IEC 61400-25
- Support for Ed. 1 and Ed. 2 of IEC 61850
- The object definition decides between IEC 61850 or IEC 61400-25
- Transport layer MMS (Manufacturing Message Specification) according to ISO 9506
- GOOSE (Generic Object-Oriented Substation Event) Publisher in accordance with performance class 3
- Generating reports and GOOSE messages
- Browsing of objects with presentation of structures and elements in plain text (self-describing system)
- Reading and writing of values (Get / Set data values)
- Managing data sets
- Direct operate, Select before operate (single and multi-level command control, each with »normal« or »enhanced« security)
- File transfer

Features
- It is started as a stand-alone software module
- No special hardware required; purely software solution for all M1 CPUs except for ME 203
- Simultaneous operation of client, server, GOOSE Publisher, and GOOSE Subscriber on one controller
- Configuration of the variable set via standardized ICD file (XML format)
- Mapping of process variables to IEC variables in a CSV file
- Cyclic scan of report and GOOSE data to automatically detect and send value alterations
- In addition, triggering is also available from the application software
- Automatic deadband calculation (db, zeroDb) for analog measured values (MV, CMV) for reducing network load
- Integrated into the mechanisms in the controller for rights validation and logging write accesses and connections
- Customer application has been certified successfully as per IEC 61850 Ed. 2 by TÜV SÜD
- Can be operated together with other protocols (OPC, QSOAP, Telnet etc.) on the same Ethernet interface of the M1 controller
- CPU load can be limited

IT Security for MMS
- Secure communication according to IEC 62351
- TLS Certificates are stored in file-based PKI (Public Key Infrastructure) on the controller
- Authentication of clients by certificate (TLS or MACE) or by connection parameters
- Key length of 1024 and 2048 Bit supported
- Encryption of communication with session key
- Exchange of session key (re-keying) is possible after connection, this must be supported by the client
- XML Configuration of expected clients with their individual connection parameters and certificates, enables easy roll-out in substations and wind parks
- Sample configuration and certificates for testing reasons are included. For productive systems, own certificates must be used

Application
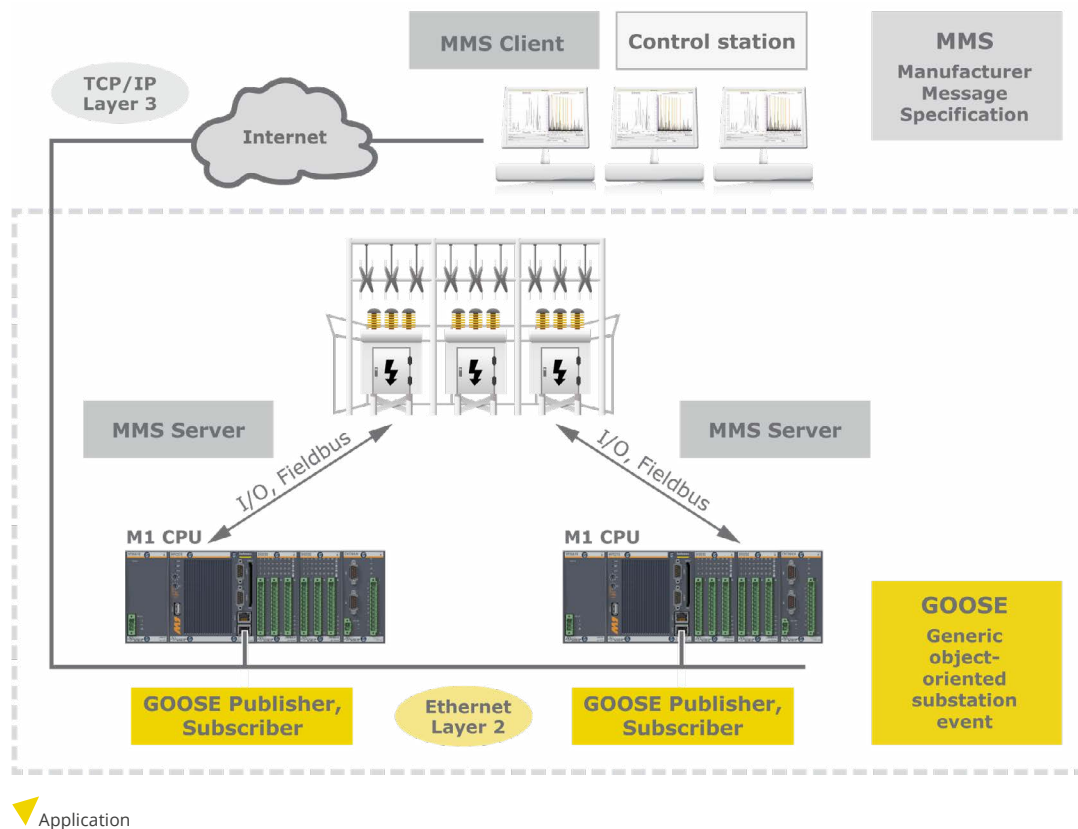
Differences between MMS and GOOSE	
MMS	**GOOSE**
SCADA protocol	Automation protocol
Connection to control station or central controller (hierarchical)	Connection between switch and protection devices (on an equal basis)
Enables the reading of individual values, writing of commands and set values, monitoring lists (reports)	Only the exchange of actual values, mostly binary status information (events), no writing via GOOSE
TCP/IP, layer 3, connection oriented	Ethernet, layer 2, connectionless, multi-cast, configurable V-LAN ID and priority
Client/Server principle: 1:1	Publisher/Subscriber principle: 1:n (producer/consumer)
Deferred transmission, partly from buffered information	Real time – immediately send value alterations
Defined for IEC 61850 and IEC 61400-25	Only defined for IEC 61850

MMS Server/GOOSE	
Performance data	
Number of server instances per controller	1
Number of logical devices per server	200
GOOSE performance class	P3

Order codes		
Item	**Item no.**	**Description**
MMS-Server - Internet Download	00014547-90	Software and documentation for the MMS Server. Provides communication over the ethernet interface according to the standards IEC61850 or IEC61400-25. Without a valid Runtime License the MMS Server runs only temporarily for 2h in demo mode.
MMS-Server RT	00014547-63	License to operate the MMS Server on one controller CPU. Allows communication over the ethernet interface with standards-compliant client software using the IEC61850 or IEC61400-25 protocol in accordance with the compatibility documentation.
MMS-GSV-Server RT	00023856-63	License to operate the MMS Server on one controller CPU. Provides communication over the ethernet interface with standards-compliant client software via the IEC61850 incl. GOOSE and IEC61400-25 in accordance with the compatibility documentation.
MMS-TLS-Server RT	00036194-63	License to operate the MMS Server on one controller CPU. Allows encrypted and/or plain communication over the ethernet interface with standards-compliant client software using the IEC61850 or IEC61400-25 protocol in accordance with the compatibility documentation.
MMS-GSV-TLS-Server RT	00036535-63	License for the operation of the MMS Server incl. GOOSE Publisher on one controller CPU. Provides encrypted and/or plain MMS communication over the ethernet interface with standards-compliant client software using the IEC61850 or IEC61400-25 protocol in accordance with the compatibility documentation.
MMS-Client/Server RT	00020316-63	License for the combined operation of the MMS Server and Client on one controller CPU. Provides communication over the ethernet interface with standards-compliant remote stations using the IEC61850 or IEC61400-25 protocol in accordance with the compatibility documentation.
MMS-GSV-Client/GSV-Server RT	00026409-63	License for the combined operation of the MMS Server and MMS Client incl. GOOSE Publisher and Subscriber on one controller CPU. Provides communication over the ethernet interface with standards-compliant remote stations using the IEC61850 or IEC61400-25 protocol in accordance with the compatibility documentation.
MMS-Client/TLS-Server RT	00036550-63	License for the combined operation of the MMS Server and Client on one controller CPU. Provides communication over the ethernet interface with standards-compliant remote stations using the IEC 61850 or IEC 61400-25 protocol in accordance with the compatibility documentation. The server allows encrypted and/or plain MMS communication.
MMS-GSV-Client/GSV-TLS-Server RT	00036551-63	License for the combined operation of the MMS Server and Client incl. GOOSE Publisher and Subscriber on one controller CPU. Provides communication over the ethernet interface with standards-compliant remote stations using the IEC 61850 or IEC 61400-25 protocol in accordance with the compatibility documentation. The server allows encrypted and/or plain MMS communication.

MMS Server – Available services				
Functional group	**Description**	**Services**	**IEC 61850**	**IEC 61400-25**
Server	Represents the visible outwards appearance of a device. All other functional groups are part of the server.	GetServerDirectory	M	O
Association	Services for establishing and closing a connection via the client.	Associate	M	M
		Abort	M	O
		Release	M	O
Logical device	Provides the list of all logical devices within the server.	GetLogicalDeviceDirectory	M	O
Logical node	Represents a certain function, e.g. the overvoltage protection.	LogicalNodeDirectory	M	O
		GetAllDataValues	M	X
Data	Allows specification of typified information, such as the position of a switch with quality information and time-stamp.	GetDataValues	M	M
		SetDataValues	O	M
		GetDataDefinition	M	O
		GetDataDirectory	M	O
Data set	Allows grouping of different data.	GetDataSetValues	M	M
		CreateDataSet	O	O
		DeleteDataSet	O	O
		GetDataSetDirectory	O	O
Report Control Block	Automatic transmission of process values to the client after modifying value or quality. The behavior is controlled by a Report Control Block (RCB). The data is managed in data sets.	Report	C	O
		GetBRCBValues		
		SetBRCBValues		
		GetURCBValues		
		SetURCBValues		
GOOSE	Event-oriented, real-time communication on Ethernet Layer 2. The data is managed in data sets.	SendGOOSEMessage	C	X
Control	Describes the service for the control of devices or groups for parameter specification, for instance.	Select	O	O
		SelectWithValue		
		Cancel		
		Operate	M	M
		CommandTermination	O	O
File transfer	Defines the exchange of files.	GetFile	M	X
		SetFile	O	
		DeleteFile	O	
		GetFileAttributeValues	M	

M = mandatory

O = optional

C = conditional, at least one of them should be supported (BRCB or URCB)

X = not part of the standard