ABB I/O Systems

- S100 I/O is connected to AC 800M via CI856.
- S200 I/O is connected to AC 800M via CI851, CI854 and CI865. Please refer to the manual *S200 I/O Hardware, Hardware and Installation, User's Guide (3BSE021356*)* for more information.
- S800 I/O is connected to AC 800M via modulebus, CI851 and CI854. Please refer to the manual *S800 I/O - General Information and Installation - User´s Guide (3BSE020923*)* for more information.
- S900 I/O via CI851 and CI854.
- TRIO is connected to AC 800M via CI862. Please refer to the manual 800xA for *TRIO/Genius - Introduction and Installation (3BUR002459*)* for more information.
- Satt 19’’ Rack I/O is connected to AC 800M via CI865. Please refer to the manual *Satt I/O Interface for AC 800M (3BSE042821*)* for more information.

Protocols and Controllers Supported by Control Builder

Table 1 lists controllers and protocols supported by the current version of Control Builder.

Table 1. Protocols and Controllers supported by Control Builder.

Protocol	AC 800M	AC 800M HI
IAC	YES	NO
MMS on Ethernet	YES	YES
MMS on RS-232C (PPP)	YES	YES
MasterBus 300	YES	YES
SattBus on TCP/IP	YES	YES
COMLI(1)	YES	YES
Siemens 3964R(2)	YES	YES
MODBUS RTU(3)	YES	YES
MODBUS TCP(4)	YES	YES
FOUNDATION Fieldbus HSE	YES	NO
PROFIBUS DP	YES	YES
PROFINET IO	YES	NO
DriveBus	YES	NO
INSUM	YES	YES
IEC 61850	YES	YES
MOD5-to-MOD5	YES	YES
AF 100	YES	NO
EtherNet/IP and DeviceNet	YES	NO

(1) Both master and slave
(2) Master only
(3) Master only
(4) Both master and slave

Properties of Different Protocols

Table 2 shows access modes used, variable types handled and maximum message size permitted for various protocols, as well as which protocols that require interface units with separate CPUs, and protocols that support dial-up modems.

Table 2. Properties of the different protocols.

Protocol	Access method	Separate CPU for communication	Dial-up modem	Variable types(1)						Max. number of bits/registers or bytes per message
				Boolean	Integer	Real	String	Word	Struct(2)	
IAC MMS	Ethernet			×	×	×	×	x	×	(3)
MMS on Ethernet	Ethernet			×	×	×	×	x	×	(3)
MMS on RS-232C (PPP)	Point-to-point			×	×	×	×	x	×	(3)
MasterBus 300	Ethernet	×		×	×	×				
SattBus on TCP/IP	Ethernet			×	×	×	×		×	31 bytes
COMLI	Multidrop		×	×	×					512/32
Siemens 3964R	Point-to-point			×	×					512/32
MODBUS RTU	Multidrop			×	×					1968/123
MODBUS TCP	Ethernet	x		×	×	x				1968/123
Self-defined in Serial Communication Library	Point-to-point			×	×	×	×	x	×	140 bytes
IEC 61850	Ethernet	x		×	×	x				

Protocol	**Access method**	**Separate CPU for communication**	**Dial-up modem**	**Variable types[1]**						**Max. number of bits/registers or bytes per message**
				Boolean	**Integer**	**Real**	**String**	**Word**	**Struct[2]**	
MOD5-to-MOD5	Fiber Optic	x		x	x					417 bytes
AF 100	Twisted Pair	x		x	x	x		x		32 bytes
PROFIBUS DP	RS-485	x		x	x	x		x		244 bytes
PROFINET IO	Ethernet	x		x	x	x		x		1440 bytes
EtherNet/IP	Ethernet	x		x	x	x		x		508 bytes

(1) When transferring variables it is important to use data types having the same range on both client and server. However, a dInt variable on the server can be connected to an Int variable on the client if the values are within the Int variable's range

(2) MMS and SattBus can transfer structured variables of the data types given in the table. No protocol can transfer variables of types ArrayObject or QueueObject.

(3) See Table 5 on page 44.

Peer-to-Peer Communication Between AC 800M Controllers

Table 3 provides details on the protocols supported by AC 800M which can be used for peer-to-peer communication between controllers.:

Table 3. Summary of characteristics

Protocol	Determinism	Redundancy	Throughput (4-byte values per second)
IAC MMS on the Control Network	Delay at Transmission and reception depends on CPU load	Network (RNRP)	
MMS on the Control Network	Delay at Transmission and reception depends on CPU load	Network (RNRP)	Server: 4000..13200 Client: 5700..19800
MB 300	Delay at Transmission and reception depends on CPU load. Supervision of transmission rate	Network	2400 (per CI855)
FF HSE	Transmission and reception independent of CPU load	CI Module	660 (per CI860)
MODBUS TCP	Transmission and reception independent of CPU load	CI Module	80 (per CI867)
MOD5-to-MOD5	Transmission and reception independent of CPU load.	CI Module + Network	One remote MOD5 controller transmits 100 variables and receives 100 variables every second.
PROFIBUS DP(1)	Transmission and reception independent of CPU load	CI Module + Network	75000 with 12Mbits/sec
PROFINET IO(1)	Transmission and reception independent of CPU load	CI Module of Application Logic	Maximum of 360.000 signals in. Maximum of 360.000 signals out.

Table 3. Summary of characteristics

Protocol	Determinism	Redundancy	Throughput (4-byte values per second)
IEC 61850	Transmission and reception independent of CPU load	CI Module of Application Logic	Receive: 22500, with 150 analog data attributes within each of the 150 datasets (maximum possible). Send: 9000, with 150 analog data attributes within each of the 60 datasets (maximum possible).
AF 100	Transmission and reception independent of CPU load	CI Module + Network	24000, if 32 byte CDPs are used. 8000, if 4 byte CDPs are used. A mix of 4, 8, 16 and 32 byte CDPs gives a throughput between 8000 and 24000 4-byte data per second.

(1) When used with external coupler.

Methods of Access to Other Controller Systems

The Table 4 indicates protocols that can be used for communication between AC 800M and other legacy controllers by ABB.

Table 4. Methods of access to legacy controllers.

Protocol	MB 300	SattBus on TCP/IP	COMLI(1)	Siemens 3964R	MOD -BUS	Self-def. in Serial Comm. Library	MMS	AF 100
SattLine 200		×	×			×	x(2)	
AC 210			×			×		
AC 250 with ACB ver. 1		×	×			×		
AC 250 with CB 2 or later		×	×			×	×	
AC 800C		×	×			×	×	
MP 200/1	×			×(3)	×(4)			
AC 55						×		
AC 70					×	×		x
AC 110, 160				×	×	×		x
AC 410, 450	×			×	×	×		x
SattCon05			×(5)			×		
SattCon15, 31, 35, 60, 115, 125			×			×		
SattCon200		×	×			×		

(1) Supported message types differ between the controllers; refer to the relevant programmer's manuals.
(2) Support in SattLine CPU50 v2.3 or later, and SattLine Workstation v2.3 or later.
(3) From version MP 200/1, version 4.0.
(4) From version MP 200/1, version 2.1.
(5) With control board CU05-25, CU05-45 or CU05-65.

Clock Synchronization

AC 800M supports clock synchronization by four different protocols: *CNCP, SNTP, MB 300 Clock Sync*, and *MMS Time Service*. In addition to these, AC 800M also supports the protocol type *SNTP on CI* for clock sychronization using communication interfaces (CI) that independently function as time master or time slave.

The protocol to be used for receiving time is chosen in the Hardware Editor of the Control Builder.

AC 800M can send clock synchronization with all protocols simultaneously, but it uses one configured protocol (by the parameter *CS protocol type*) to receive clock synchronization from another source. Advantage of AC 800M is that it can receive time with a protocol and distributes to other nodes with another protocol, and acts as a router.

CNCP is the normal protocol for clock synchronization on the Control Network. An AC 800M controller selected as Clock Master (i.e. with *Clock Master Order No>0*) multicasts synchronization messages on the network (see Figure 2). All nodes that are configured to receive time with CNCP (`CS protocol type = CNCP`) is synchronized from the Clock Master.

SNTP is a standardized protocol used by AC 800M controllers that need to be synchronized from an external time server which is connected to the Control Network. Set `CS protocol type = SNTP` to configure AC 800M to be an SNTP client. As SNTP is a simplified version of NTP, both NTP and SNTP servers can be used.

To get a good clock accuracy in the AC 800M, an (S)NTP server with high precision should be used. The SNTP server is typically synchronized via a GPS receiver. An SNTP server can typically handle many SNTP clients that receive clock synchronization through GPS. Therefore, all controllers on a control network can use SNTP to be synchronized from the same SNTP server. AC 800M contains an SNTP server that always is enabled. It can be used by other units that need to be synchronized if no external NTP server is used. CNCP and SNTP can both operate at the same time on the network.

SNTP on CI is a protocol that is used by AC 800M controllers, which have communication interfaces that can handle clock synchronization independently (for example, the CI869 that communicates with AF 100).

Set `CS protocol type = SNTP on CI` to configure the CI (which is connected to AC 800M) to be an SNTP client. These communication interfaces have separate clock synchronization setting (Master/Slave).

The OPC server for the AC 800M supports the MMS Time Service for small systems where no AC 800M is used for backward compatibility with older products.

MB 300 Clock Sync is a protocol for clock synchronization of Advant/Master products on a MasterBus 300 network. AC 800M can receive its synchronization via CI855 (`CS protocol type = MB300`).

CI855 can act as Clock Sync master on MB 300 (`CI855 Parameter Time Sync = MB300 Master`)

For more details on Clock Synchronization refer to 3BSE03446*, *Automation System Network: Design and Configuration*.

Clock Synchronization

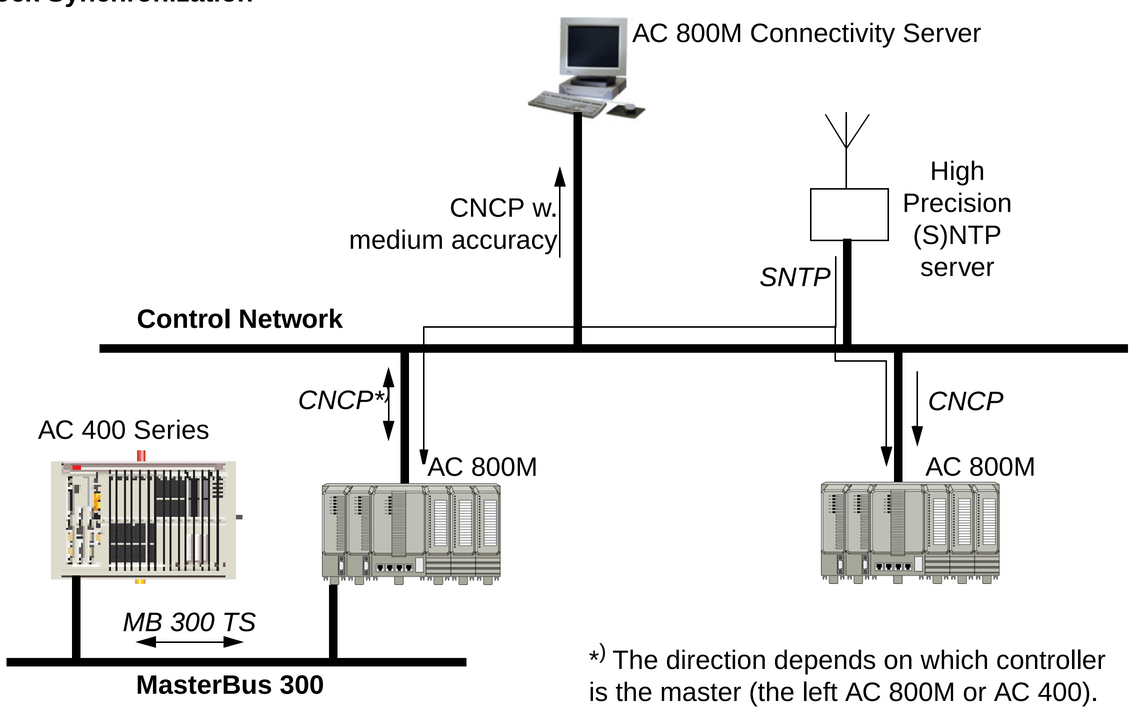

Figure 2. Clock Synchronization

Intermediate Clock Master

AC 800M can act as intermediate clock master. This means that it relays time synchronization between two Network Areas with CNCP. To do this, it shall have a Clock Master order number that is at least two numbers higher than any ordinary Clock Master on the network area with the time source.

The standard and recommended synchronization interval is 20 seconds.

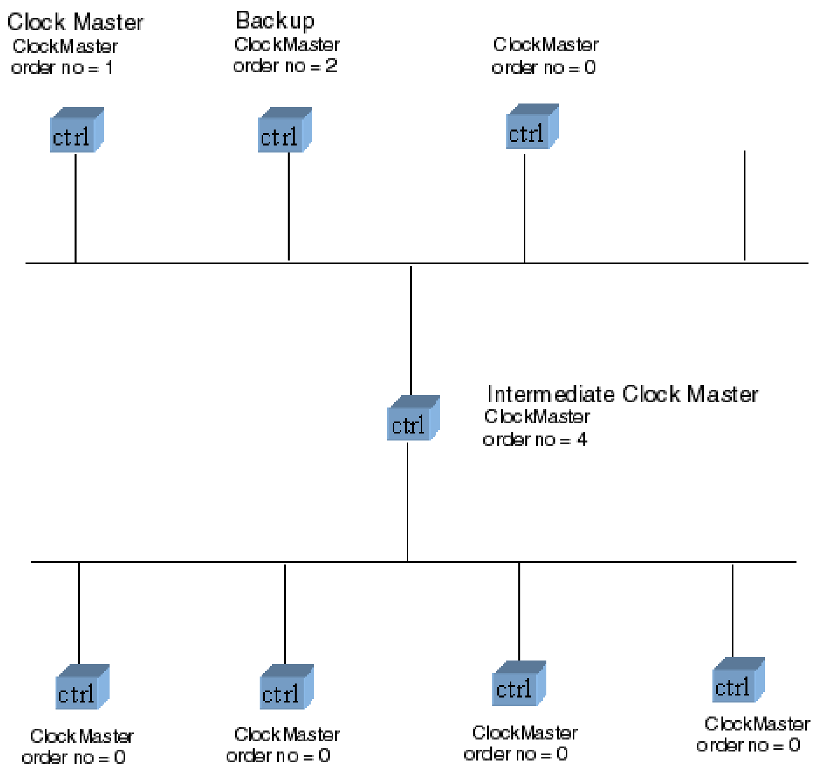

Figure 3. Intermediate Clock Master - Configuration