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Substation Controller - D20MX Technical Note

The D20MX and its Predecessors – Features and Functionality

Overview

The D20MX Substation Controller is a specialized computing platform designed to execute communications and energy management applications for monitoring and control of electrical substations. The D20MX is capable of consolidating data from multiple slave devices connected via communication channels (DCA: Data Collection Applications) and D20 Input / Output Modules in a single database. The D20MX can execute local logic, aggregate data, process data through one of multiple applications (DTA: Data Translation Applications) and report data upstream to master stations through different server protocols (DPA: Data Processing Applications). The D20MX serves as a single replacement for D20ME, D20MEII, D20EME, D20M++, D20M+, and D20M. It is backward compatible with the existing D20 accessories such as horizontal [VME and non-VME] chassis, remote I/O peripherals and modems.

This document lists the high-level differences between the key features of the D20MX and the key features of its predecessors [D20MEII, D20ME]. For more detail, refer to other available D20MX documents such as the D20MX Hardware User manual [994-0140] and the B014-1NCG WESMAINT II plus configuration guide. For further assistance, consult the technical and customer support section of this document for support contact information.

Hardware Features – Differences between D20MX and D20ME II / D20ME

Parameter	D20MX	D20ME II, D20ME
Processor type	MPC8360 PQII Pro	MC68EC030
CPU frequency	667Mhz	40MHz
Memory size	1GB	1.5 MB
NVRAM size	16 MB	512 KB - Requires an EME for 8MB and a memory expansion card for 16MB
Backup power	Super capacitor	Lithium Battery
Firmware flash	256 MB but 128MB is currently utilized	2 MB
RTC Clock (Hardware controlled)	Yes - 14 day stand-by with Super capacitor	No. Power down time saved in NVRAM
Ethernet	2 Ports on board (100BaseFX Full duplex) Or, (10/100/1000BaseTX) Or, 2 Port ST/LC MIC (100BaseFX Full duplex)	D20 EME required + NIC (10BaseFL Half duplex)
D.20 link ports	2 ports	2 ports
Serial communication ports	7 ports	7 ports
IRIG-B support	Yes	Yes
Wesmaint Maintenance Access	Front port - Null Modem; Rear port - Wesmaint cable	Front port - Wesmaint cable; Rear - Wesmaint cable
Multi-node/More serial port	Equivalent functionality planned for future.	Yes
Size	2U	1U

Software Features – Differences between D20MX and D20ME II / D20ME

LAN Redundancy & Standby IP

Redundancy	D20MX	D20ME II, D20ME
Redundant LAN	D20MX supports the redundant LAN scheme - which is the same mechanism as the classic UR LAN redundancy scheme. Review the D20MX Hardware User Manual for details.	Not supported natively. Requires a licensed application called LAN Redundancy Manager [B119] which also provides advanced routing mechanisms. The B119 application is compatible with IEDs that use Redundant LAN but not with masters that use Redundant LAN.
	The D20MX assumes redundant LAN operation if only LAN A is configured or if both LANs are configured and LAN B is assigned to Port 1 in B152-1N (IP Redundancy Monitor). The D20MX supports both IEDs [slave devices] and Master devices that use redundant LAN	
	The D20MX assumes dual LAN redundancy (i.e. the same scheme used by the D20ME II and D20ME) if both LAN A and B are configured and LAN B is assigned to Port 2 in B152-1N (IP Redundancy Monitor)	
Standby IP	D20MX Standby CCU now has an IP address Uses the configured IP address + 1 for CCU A and +2 for CCU B Can also be configured with hostname RADIUS authentication is supported on the Standby CCU	Not supported

Security Features – Electric Reliability Compliance

Security Features	D20MX	D20ME II, D20ME
SSH/SFTP	Uses SSH/SFTP - Secure replacements for Telnet and TFTP	Unavailable - Uses Insecure Telnet and TFTP
	Telnet and TFTP are unavailable	
	SGConfig supports the Wesmaint terminal session using SSH	
	SGConfig supports LAN Configuration synchronization to the D20MX using SFTP	
Locally Encrypted Passwords	Cleartext password no longer provisioned remotely in SGConfig	Unavailable - Passwords are not complex and not encrypted
	New users are created with default password of "changeme"	
	Passwords must be changed from the D20MX command line	
	Passwords stored are one-way encrypted (SHA-256)	
	Compatible with automated tools such as Cyber-Ark to allow password changes via an SSH session	
Remote Syslog	D20MX sends logs to one or two syslog servers where logs can be archived and analyzed in real-time	Unavailable
	Log format follows Syslog standard for maximum interoperability with third party tools	
RADIUS with PEAP, EAP-TTLS, or CHAP	Supports PEAP, EAP-TTLS and CHAP authentication methods	Unavailable
	No need to create individual users in SGConfig, only a set of roles	
	User roles are assigned to users using the RADIUS server	
	If RADIUS server is down, then authentication falls back to local password file	
	While communications between the D20MX and RADIUS server is up, the D20MX does not check user credentials against the local password file.	
Role Based Access Control	Default configuration contains a role based access control model defined in the new B014 RADIUS Roles Table.	Unavailable
	Roles: Administrator(2), Engineer(1), Operator(3), Observer(0)	

D20MX Currently Supported Applications

Note: * An Application ID containing an "N" (e.g., A009N) signifies a unique application definition for the D20MX.

† The D20MX version of the application is based on this D20 classic application version. However, the D20MX version is not identical to the D20 classic version due to minor changes to improve the robustness and security of the original application.

D20MX Application IDs*	Base D20 Classic Application Version†	Application Name	Description
D20MX v1.0			
A026-1	321	Communication Watchdog DTA	Reports on the state of communications between the RTU and a remote device.
A027N	832	SOE Logger DTA	Sequence of Events Logger DTA.
A030	300	Accumulator Freeze DTA	Detects system status point changes and system accumulator point freezes.
A033-5N	211	TEJAS V DPA	Valmet TEJAS V DPA.

D20MX Application IDs*	Base D20 Classic Application Version†	Application Name	Description
A035	211	Analog Reference DTA	Monitors analog input points and provides the system database with pseudo analog values that represent either correctly functioning analog input hardware (good reference value), or failed analog input hardware (bad reference value).
A036N	421	ProLogic Executor DTA	Provides user programmable soft logic automation functionality.
A059N	911	Modbus DCA	Modbus (RTU & ASCII modes) DCA
A068N	311	Modbus DPA	Modbus (RTU & ASCII modes) DPA
A088-0	203	Substation Maintenance DTA	Allows status and analog input values to be suppressed for maintenance purposes.
A113N	301	PSR DCA	Programmable Synchrocheck Relay (PSR) DCA
A118	103	Failover DTA	Allows configurable combination of control requests to result in a failover or switchover of a redundant system.
A123-0	111	NGC General DTA	Generates control lockout indications, digital input suppression or unsupression indications, and control active indications
A184-0	120	General Alarm DTA	Takes several alarms and groups them together under one General Alarm.
B003	751	D.20 Peripheral Link DCA	D.20 peripheral link DCA.
B008-1	311	System Point Database	Maintains the database of system points in the RTU
B009	401	Mailbox DTA	Mailbox system point conversion application
B012N	201	IRIG-B DCA	IRIG-B DCA
B013	560	DNP V3.00 Data Link	Distributed network protocol (DNP) V3.00 data link.
B014-1N	520	WESMAINT II+	RTU maintenance facility.
B015	530	Bridgeman	Bridge manager
B021N	991	DNP V3.00 DPA	Distributed Network Protocol (DNP) V3.00 DPA.
B023	755	DNP V3.00 DCA	Distributed Network Protocol (DNP) V3.00 DCA.
B034N	203	Redundant Monitor	Monitors CCU states and initiates failover. Also, receives command requests to perform database synchronization, switchover and failover.
B045-0	101	D20AC WESMAINT II+ Display Screens	Provides D20AC WESMAINT II+ displays.
B052-0N	351	DNP Internet Data Link	DNP V3.00 Data Link over Internet.
B071-0	200	WESMAINT File Upload	Uploads files via the WESMAINT port as S records or using ZMODEM.
B100-0	141	Internet Protocol Stack	Internet Protocol Stack

D20MX Application IDs*	Base D20 Classic Application Version†	Application Name	Description
B152-0N	n/a	IP Redundancy Monitor DCA	Provides health and active pseudo DI points for LAN Ports.
D20MX v1.1			
A083-0	342	Calculator DTA	Convenient and flexible soft logic utility that can perform applications such as substation level interlocking, feeder interlocking, and converting digital inputs to control outputs for driving a map board
D20MX v1.2			
A009N	805	PG&E DPA	Communicates to Master Stations via PG&E protocol
A078N	610	SEL DCA	Communicates to IEDs via SEL protocol
A101-0N	906	IEC 60870-5-101/104 DPA	Communicates to Master Stations via IEC 101/104 protocol
A185-0N	110	LG 8979 DPA	Communicates to Master Stations via LG 8979 protocol
A199-0N	106	HR6000/XA-21 DPA	Communicates to Master Stations via Harris protocol
B058-0N	231	IEC 870-5 FT1.2 Primary Data Link	FT 1.2 primary data link configuration
B060-0	210	IEC 60870-5-101/104 DCA	Communicates to IEDs via IEC 101/104 protocol
B085-0	130	IEC 60870-5-101 Balanced Mode Data Link	IEC 60870-5 FT1.2 balanced data link
B086-0	131	IEC 60870-5-104 Data Link	IEC 60870-5-104 data link
D20MX v1.3			
A017N	131	DNP1 Data Link	Distributed Network Protocol (DNP) V1.0 Data Link Application. Required by the Quantum Meter Scanner DCA.
A018	120	Quantum Meter Scanner DCA	The Quantum Meter Scanner DCA obtains data from one or more Quantum Meters via the DNP interface.
A023N	423	CDC Type I DPA	The CDC Type I DPA emulates a CDC Type I RTU
A041-1	116	Proportional Integral Derivative (PID) Controller	The Proportional, Integral and Derivative (PID) DTA uses the generally-accepted industry standard for control of closed loop processes.
A131-0	131	MODBUS TCP/IP DCA	Provides an interface to Sub-Remote Units (SRUs) using the MODBUS protocol over the TCP/IP communication layer.
A135-0	110	MODBUS TCP/IP DPA	Provides communications with one or more master station using the MODBUS protocol over TCP/IP communication layer.
A195-0	110	Redundant I/O DTA	Provides I/O point redundancy.

D20MX Application IDs*	Base D20 Classic Application Version†	Application Name	Description
B082-0N	311	LogicLinx Executor	The LogicLinx executor is responsible for executing PLC programs written using the LogicLinx PLC (IEC 1131-3 compliant) editor.
B099-0	113	SNTP Client	The Simple Network Time Protocol (SNTP) client application provides reasonably accurate and reliable time synchronization.
B148-0	104	Time Zone and DST Settings DTA	The Time Zone and DST (Daylight Saving Time) provides a time zone and DST information to other applications.

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Modification Record

Version	Revision	Date	Author	Change Description
1.00	0	June 13 2013	KO	Created
	1	June 14 2013	RR	Added data link applications to Currently Supported Applications table.
1.30	0	December 24, 2013	GL	Updated for version v1.30
	1	January 7, 2014	GL	Added D20 Classic Application version numbers.