1 DESCRIPTION

The BACnet®[1] suite of drivers is designed to work with the FieldServer products. One or more drivers using different Data Link Layer options could be configured to act as a gateway between BACnet systems and RTU, SCADA's and PLC's using a wide variety of protocols. This document provides information relevant to the following FieldServer Drivers:

- FS-8700-16 BACnet/PTP
- FS-8700-73 BACnet/MSTP
- FS-8700-07 BACnet/ARCnet
- FS-8704-06 BACnet/IP
- FS-8704-02 BACnet/Ethernet

BACnet Vendor Name: Sierra Monitor Corporation
BACnet Vendor ID: 37

2 FORMAL DRIVER TYPE

The following Data Link layer options are supported:

- BACnet IP, (Annex J)
- ANSI/ATA 878.1, 2.5 Mbps, ARCNET (Clause 8)
- Point-to-Point, EIA 232 (Clause 10), baud rate up to 115 Kbps
- ISO 8802-3, Ethernet (Clause 7)
- MS/TP master (Clause 9), baud rate up to 38.4 Kbps
- MS/TP slave (Clause 9), baud rate up to 38.4 Kbps

Client or Server

3 CONNECTION INFORMATION

3.1 BACnet/PTP

Connection type:	RS-232
Baud Rates:	9600, 19200, 38400, and 76800[2]
Data Bits:	7,8
Stop Bits:	1,2
Parity:	Odd, Even, None
Multidrop Capability:	No

3.2 BACnet/MSTP (Master and Slave operation)

Connection type:	RS-485 (Two Wire, Half Duplex)
Baud Rates:	9600, 19200, 38400, and 76800[3]
Data Bits:	7,8
Stop Bits:	1,2
Parity:	Odd, Even, None
Multidrop Capability:	Yes

3.3 BACnet/ARCnet

Connection type:	ATA/ANSI 878.1

3.4 BACnet/IP

Connection type:	Internet Protocol (IP)
Ethernet Speeds Supported:	10Base-T, 100Base-T[2]
BBMD supported:	Yes (Not supported on client connections)
Foreign Device Registration:	Not supported for client connections

3.5 BACnet/Ethernet

Connection type:	ISO 8802.3
Ethernet Speeds Supported:	10Base-T, 100Base-T[2]

4 DEVICES TESTED

Device	Tested (FACTORY, SITE)
AutomatedLogic Corporation S6104 Control Module MSTP at 38400 Baud	FACTORY
Trane Company, BCU	SITE
Trane Company Trace Summit Version 10,11,12,13	SITE
Alerton BTI	SITE
McQuay BACnet Gateway	SITE
York BACnet Gateway	SITE
Delta OWS	SITE
Reliable Controls Ethernet	SITE

[1] BACnet® is a registered trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
[2] 76800 is not supported on the X20 and X40
[3] 76800 is not supported on the X20 and X40

5 DATA TYPES AND OPTIONAL PROPERTIES SUPPORTED

FieldServer Data Type	BACnet Object Type	Optional Properties Supported
AI	Analog Input Object	Reliability
		Description
AO	Analog Output Object	Reliability
		Description
		Max_Pres_Value
		Min_Pres Value
AV	Analog Value Object	
BI	Binary Input Object	Reliability
		Description
		Active_Text
		Inactive_Text
BO	Binary Output Object	Reliability
		Description
		Active_Text
		Inactive_Text
BV	Binary Value Object	Reliability
		Description
		Active_Text
		Inactive_Text
MI	Multi-state Input Object	Reliability
		Description
		State_Text
MO	Multi-state Output Object	Reliability
		Description
		State_Text
MV	Multi-state Value Object	Reliability
		Description
		State_Text
Device	Device Object	Location
		Description
		UTC Offset
		Active COV Subscriptions
Trend Log		Description
		Log_Interval

6 FIELDSERVER AS A CLIENT

Read Operations Supported	Properties Supported	Comments and Limitations
Read Property	Present Value	Store value in Data Array location after scaling has been applied
	Out_Of_Service	When using a Complex Data Object, the OOS property is fully supported. Return FALSE when not OOS or when using standard Data Arrays.
	Units	Returns Units as specified in the Map Descriptor
	Reliability	When using a Complex Data Objects, returns "Unreliable Other" when the Node is offline, or when the data is old. Returns FALSE if the Node is online or when using Standard Data Arrays.
	Priority_Array	Returns Priority_Array of Map Descriptor
	Unsupported	This property is supported
	Protocol_Object_Type_ Supported	This property is supported
	Protocol_Services_Supported	This property is supported
	Database_Revision	This property is supported and will change if a new configuration is downloaded to the FS.
	Max_Master	This Property is supported for the BACnet/MSTP DLL option.
	Max_Info_Frames	This Property is supported for the BACnet/MSTP DLL option.
	Relinquish_Default	Returns Relinquish_Default
Read Property Multiple	As for Read Property	Transactions can be defined to read multiple objects and properties in a single ReadPropertyMultiple operation.
	ALL	Read Property Multiple of the ALL property is NOT supported
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Present Value	Send value in Data Array location after scaling has been applied
Write Property Multiple		

7 FIELDSERVER AS A SERVER

7.1 Device Object

Read Operations Supported	Properties Supported	Comments and Limitations
Read Property	Object_ Identifier	Returns Object_ID with Node_ID as Object Instance
	Object_Name	Returns Node Name
	Object_Type	Returns Device Object type
	System_Status	Returns Normal
	Vendor_Name	Returns FieldServer Technologies
	Vendor_Identifier	Returns 37
	Model_Name	Returns FieldServer model (e.g. x20)
	Firmware_revision	Returns Kernel version. (e.g. V4.10b (X))
	Application_sw_version	Returns DCC version. (e.g. V1.00b (U))
	Protocol_Version	Returns version 1
	Protocol_Revision	Returns revision 1
	Protocol_Services_Supported	This property is supported
	Protocol_Object_Type_ Supported	This property is supported
	Protocol_Object_List	Returns a list of objects defined in the FieldServer
	Max_APDU_Length_Accepted	For **FieldServers**, the MAX APDU Length for BACnet MSTP is 480 bytes and for BACnet IP/BACnet Eth 1497 bytes. For **ProtoCessors**, the MAX APDU Length for BACnet MSTP is 206 bytes and for BACnet IP/BACnet Eth 1497 bytes.
	Segmentation_Supported	Returns segmentation NOT supported
	APDU_Timeout	Returns the value as defined by the Node's "Timeout" parameter

	APDU_Retries.	Returns the value as defined by the Node's "Retries" parameter
	Device_Address_Bindings	Returns an empty list.
	Max_Master	This Property is supported for the BACnet/MSTP DLL option.
	Max_Info_Frames	This Property is supported for the BACnet/MSTP DLL option.
	Description	This property is supported
	Database_Revision	This property is supported and will change if a new configuration is downloaded to the FieldServer.
Read Property Multiple	Same properties as Read Property	Read Property Multiple is fully supported. Multiple objects with multiple properties can be specified.
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Max_Master	This Property is supported for the BACnet/MSTP DLL option.
	Max_Info_Frames	This Property is supported for the BACnet/MSTP DLL option.
Write Property Multiple	Max_Master	This Property is supported for the BACnet/MSTP DLL option.
	Max_Info_Frames	This Property is supported for the BACnet/MSTP DLL option.

7.2 Analog Input Object

Read Operations Supported	**Properties Supported**	**Comments and Limitations**
Read Property	Object_Identifier	No limitations
	Object_Name	Returns Map Descriptor Name
	Object_Type	Returns Analog Input Object type
	Present_Value	Returns value in Data_Array after scaling has been applied.
	Status_Flags	When using Complex Data Objects returns the FAULT and OUT_OF_SERVICE fields as indicated in section 12.2.7 of the BACnet specification. When using standard Data Arrays returns FALSE for all bits.
	Event_State	No limitations
	Reliability	When using a Complex Data Objects, returns Unreliable Other when the Node is offline, or when the data is old. Returns FALSE if the Node is online or when using Standard Data Arrays.
	Out_Of_Service	Fully supported when using a Complex Data Object. Returns FALSE when not OOS or when using standard Data Arrays.
	Description	This property is supported
	Units	Returns Units as specified in the Map Descriptor
Read Property Multiple	Same properties as Read Property	Read Property Multiple is fully supported. Multiple objects with multiple properties can be specified.
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Present_Value	Writing to the Present Value is allowed if the Object is OOS.
Write Property Multiple		
Data Sharing Operations Supported	**Properties Supported**	**Comments and Limitations**
SubscribeCOV	Present_Value	Subscription storage is non-volatile.
COVNotification	Present_Value	Confirmed and Unconfirmed.
Alarm and Event Operations Supported	**Properties Supported**	**Comments and Limitations**
EventNotification	Present_Value, Status	Confirmed and Unconfirmed
AcknowledgeAlarm		No limitations

7.3 Analog Output Object, Analog Value Object

Read Operations Supported	Properties Supported	Comments and Limitations
Read Property	Object_Identifier	No limitations
	Object_Name	Returns "Map Descriptor Name"
	Object_Type	Returns Analog Output Object type
	Present_Value	Returns value in Data Array after scaling has been applied.
	Status_Flags	When using Complex Data Objects returns the FAULT and OUT_OF_SERVICE fields as indicated in section 12.2.7 of the BACnet specification. When using standard Data Arrays returns FALSE for all bits.
	Event_State	No limitations
	Reliability	When using a Complex Data Objects, returns "Unreliable Other" when the Node is offline, or when the data is old. Returns FALSE if the Node is online or when using Standard Data Arrays.
	Out_Of_Service	Fully supported when using a Complex Data Object. Returns FALSE when not OOS or when using standard Data Arrays.
	Units	Returns Units as specified in the Map Descriptor
	Priority_Array	Returns Priority_Array of Map Descriptor
	Description	This property is supported
	Relinquish_Default	Returns Relinquish_Default
Read Property Multiple	Same properties as Read Property	Read Property Multiple is fully supported. Multiple objects with multiple properties can be specified.
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Present_Value	When using Complex Data Objects and OOS is TRUE, then the write will not cause a write-through operation to the Server side. If the OOS is FALSE or when using standard Data Arrays then writes will always cause a write-through operation to the Server side.
Write Property Multiple		
Data Sharing Operations Supported	**Properties Supported**	**Comments and Limitations**
SubscribeCOV	Present_Value	Subscription storage is non-volatile.
COVNotification	Present_Value	Confirmed and Unconfirmed.
Alarm and Event Operations Supported	**Properties Supported**	**Comments and Limitations**
EventNotification	Present_Value, Status	Confirmed and Unconfirmed
AcknowledgeAlarm		No limitations

7.4 Binary Input Object

Read Operations Supported	Properties Supported	Comments and Limitations
Read Property	Object_Identifier	No limitations
	Object_Name	Returns "Map Descriptor Name"
	Object_Type	Returns Analog Input Object type
	Present_Value	Returns the binary value in the Data Array
	Status_Flags	When using Complex Data Objects returns the FAULT and OUT_OF_SERVICE fields as indicated in section 12.2.7 of the BACnet specification. When using standard Data Arrays returns FALSE for all bits.
	Event_State	No limitations
	Reliability	When using a Complex Data Objects, returns "Unreliable Other" when the Node is offline, or when the data is old. Returns FALSE if the Node is online or when using Standard Data Arrays.
	Out_Of_Service	Fully supported when using a Complex Data Object. Returns FALSE when not OOS or when using standard Data Arrays.

	Polarity	Always returns “Normal”
	Active_Text	Returns Active Text as specified on the Map Descriptor.
	Description	This property is supported
	Inactive_Text	Returns Inactive Text as specified on the Map Descriptor.
Read Property Multiple	Same properties as Read Property	Read Property Multiple is fully supported. Multiple objects with multiple properties can be specified.
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Present_Value	Writing to the Present Value is allowed if the Object is OOS.
Write Property Multiple		
Data Sharing Operations Supported	**Properties Supported**	**Comments and Limitations**
SubscribeCOV	Present_Value	Subscription storage is non-volatile.
COVNotification	Present_Value	Confirmed and Unconfirmed.
Alarm and Event Operations Supported	**Properties Supported**	**Comments and Limitations**
EventNotification	Present_Value, Status	Confirmed and Unconfirmed
AcknowledgeAlarm		No limitations

7.5 Binary Output Object, Binary Value Object

Read Operations Supported	**Properties Supported**	**Comments and Limitations**
Read Property	Object_Identifier	No limitations
	Object_Name	Returns "Map Descriptor Name"
	Object_Type	Returns Analog Input Object type
	Present_Value	Returns binary value in Data_Array
	Status_Flags	When using Complex Data Objects returns the FAULT and OUT_OF_SERVICE fields as indicated in section 12.2.7 of the BACnet specification. When using standard Data Arrays returns FALSE for all bits.
	Event_State	No limitations
	Reliability	When using a Complex Data Objects, returns “Unreliable Other” when the Node is offline, or when the data is old. Returns FALSE if the Node is online or when using Standard Data Arrays.
	Out_Of_Service	Fully supported when using a Complex Data Object. Returns FALSE when not OOS or when using standard Data Arrays.
	Priority_Array	Returns Priority_Array of Map Descriptor.
	Relinquish_Default	Returns current Relinquish_Default.
	Description	This property is supported
	Active_Text	Returns Active Text as specified on the Map Descriptor.
	Inactive_Text	Returns Inactive Text as specified on the Map Descriptor.
Read Property Multiple	Same properties as Read Property	Read Property Multiple is fully supported. Multiple objects with multiple properties can be specified.
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Present_Value	When using Complex Data Objects and OOS is TRUE, then the write will not cause a write-through operation to the downstream side. If the OOS is FALSE or when using standard Data Arrays then writes will always cause a write-through operation to the downstream side
Write Property Multiple		

Data Sharing Operations Supported	Properties Supported	Comments and Limitations
SubscribeCOV	Present_Value	Subscription storage is non-volatile.
COVNotification	Present_Value	Confirmed and Unconfirmed.
Alarm and Event Operations Supported	**Properties Supported**	**Comments and Limitations**
EventNotification	Present_Value, Status	Confirmed and Unconfirmed
AcknowledgeAlarm		No limitations

7.6 Multiple State Input Object

Read Operations Supported	Properties Supported	Comments and Limitations
Read Property	Object_Identifier	No limitations
	Object_Name	Returns "Map Descriptor Name"
	Object_Type	Returns Analog Input Object type
	Present_Value	Returns unsigned integer value in the Data Array.
	Status_Flags	When using Complex Data Objects returns the FAULT and OUT_OF_SERVICE fields as indicated in section 12.2.7 of the BACnet specification. When using standard Data Arrays returns FALSE for all bits.
	Event_State	No limitations
	Reliability	When using a Complex Data Objects, returns "Unreliable Other" when the Node is offline, or when the data is old. Returns FALSE if the Node is online or when using Standard Data Arrays.
	Description	This property is supported
	Out_Of_Service	When using a Complex Data Object, the OOS property is fully supported. Return FALSE when not OOS or when using standard Data Arrays.
	Number_Of_State	When using a Complex Data Object, returns the number of states defined. When using Standard Data Arrays returns the value of 5.
	State_Text	When using Complex Data Objects returns the State Text strings defined. When using Standard Data Arrays, return "State_x" where "x" is the value stored in the Data_Array and could be 0 to 4.
Read Property Multiple	Same properties as Read Property	Read Property Multiple is fully supported. Multiple objects with multiple properties can be specified.
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Present_Value	Writing to the Present Value is allowed if the Object is OOS.
Write Property Multiple		
Data Sharing Operations Supported	**Properties Supported**	**Comments and Limitations**
SubscribeCOV	Present_Value	Subscription storage is non-volatile.
COVNotification	Present_Value	Confirmed and Unconfirmed.
Alarm and Event Operations Supported	**Properties Supported**	**Comments and Limitations**
EventNotification	Present_Value, Status	Confirmed and Unconfirmed
AcknowledgeAlarm		No limitations

7.7 Multi-State Output Object, Multi-State Value Object

Read Operations Supported	Properties Supported	Comments and Limitations
Read Property	Object_Identifier	No limitations
	Object_Name	Returns "Map Descriptor Name"
	Object_Type	Returns Analog Input Object type

	Present_Value	Returns unsigned integer value in Data_Array.
	Status_Flags	When using Complex Data Objects returns the FAULT and OUT_OF_SERVICE fields as indicated in section 12.2.7 of the BACnet specification. When using standard Data Arrays returns FALSE for all bits.
	Event_State	No limitations
	Reliability	When using a Complex Data Objects, returns "Unreliable Other" when the Node is offline, or when the data is old. Returns FALSE if the Node is online or when using Standard Data Arrays.
	Out_Of_Service	Fully supported when using a Complex Data Object. Returns FALSE when not OOS or when using standard Data Arrays.
	Number_Of_State	When using a Complex Data Object, returns the number of states defined. When using Standard Data Arrays returns the value of 5.
	State_Text	When using Complex Data Objects returns the defined State Text string. When using Standard Data Arrays, returns "State_x" where "x" is the value stored in the Data_Array and could be 0 to 4.
	Description	This property is supported
	Priority_Array	Returns Priority_Array of Map Descriptor
	Relinquish_Default	Returns Relinquish_Default
Read Property Multiple	Same properties as Read Property	Read Property Multiple is fully supported. Multiple objects with multiple properties can be specified.
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Present_Value	When using Complex Data Objects and OOS is FALSE or when using standard Data Arrays, writes will trigger a write-through operation to the Client side.
Write Property Multiple		
Data Sharing Operations Supported	**Properties Supported**	**Comments and Limitations**
SubscribeCOV	Present_Value	Subscription storage is non-volatile. P
COVNotification	Present_Value	Confirmed and Unconfirmed.
Alarm and Event Operations Supported	**Properties Supported**	**Comments and Limitations**
EventNotification	Present_Value, Status	Confirmed and Unconfirmed
AcknowledgeAlarm		No limitations

7.8 Notification Class Object

Read Operations Supported	**Properties Supported**	**Comments and Limitations**
Read Property	Object_Identifier	No limitations
	Object_Name	Returns "Map Descriptor Name"
	Object_Type	Returns Notification Class Object type
	Description	No limitations
	Notification_Class	No limitations
	Priority	No limitations
	Ack_Required	No limitations
	Description	This property is supported
	RecipientList	No limitations
Read Property Multiple	Same properties as Read Property	Read Property Multiple is fully supported. Multiple objects with multiple properties can be specified.
Write Operations Supported	**Properties Supported**	**Comments and Limitations**
Write Property	Recipient_List	RecipientList Storage is non-volatile
Write Property Multiple		
AddList	RecipientList	Used to subscribe to Alarm and Event Notifications

8 UNSUPPORTED FUNCTIONS AND DATA TYPES

BACnet Object Type not supported
Averaging Object
Calendar Object
Command Object
Event Enrollment Object
File Object
Group Object
Life Safety Point Object
Life Safety Zone Object
Loop Object
Notification Class Object unsupported on Client side only
Program Object
Schedule Object
BACnet Services not supported
Alarm and Event Services unsupported on Client side only
File Access Services
Virtual Terminal Services
COV and EventNotification services are not supported for BACnet MSTP on the ProtoCessor
For BACnet MSTP, PTP and Arcnet, COV services are disabled by default and may be enabled by setting the Node_Option property to COV_Enable in the Nodes section configuration file.