## 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 MS/TP
- 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)
- 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 Ethernet

| | |
|---|---|
| **Connection Type:** | ISO 8802.3 |
| **Ethernet Speeds Supported:** | 10Base-T, 100Base-T |

### 3.2  BACnet PTP

| | |
|---|---|
| **Connection Type:** | RS-232 |
| **Baud Rates:** | 9600, 19200, 38400, 76800 |
| **Data Bits:** | 7,8 |
| **Stop Bits:** | 1,2 |
| **Parity:** | Odd, Even, None |
| **Multidrop Capability:** | No |

### 3.3  BACnet MS/TP (Master and Slave Operation)

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

**NOTE: When configured as a BACnet master, there is no physical limit to the number of remote BACnet slave devices is supported. When configured as BACnet slave, there is no physical limit to the number of virtual slave nodes supported. In both cases, the limitation is the point count capacity of the FieldServer**.

### 3.4  BACnet/IP

| | |
|---|---|
| **Connection Type:** | Internet Protocol (IP) |
| **Ethernet Speeds Supported:** | 10Base-T, 100Base-T |
| **BBMD Supported:** | Yes (not supported on connections where FieldServer is a client) |
| **Foreign Device Registration:** | Not supported for client connections |

**NOTE: When configured as a BACnet master, there is no physical limit to the number of remote BACnet slave devices is supported. When configured as BACnet slave, there is no physical limit to the number of virtual slave nodes supported. In both cases, the limitation is the point count capacity of the FieldServer.**

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[1] BACnet® is a registered trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

## 4   DEVICES TESTED

| Device | Tested (FACTORY, SITE) |
|---|---|
| AutomatedLogic Corporation - S6104 Control Module MS/TP 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 |

## 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 MS/TP DLL option. |
| | Max_Info_Frames | This Property is supported for the BACNet MS/TP 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. |
| | Firmware_revision | Returns Kernel version. |
| | Application_sw_version | Returns DCC version. |
| | 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 MS/TP is 480 bytes and for BACnet/IP or BACnet Ethernet 1497 bytes. For **ProtoCessors**, the MAX APDU Length for BACnet MS/TP is 206 bytes and for BACnet/IP BACnet Ethernet 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. |

| Read Property | Device_Address_Bindings | Returns an empty list. |
|---|---|---|
| | Max_Master | This Property is supported for the BACnet MS/TP DLL option. |
| | Max_Info_Frames | This Property is supported for the BACnet MS/TP 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 MS/TP DLL option. |
| | Max_Info_Frames | This Property is supported for the BACnet MS/TP DLL option. |
| Write Property Multiple | Max_Master | This Property is supported for the BACnet MS/TP DLL option. |
| | Max_Info_Frames | This Property is supported for the BACnet MS/TP 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 the Reference Section 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 and 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 the Reference Section 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 the Reference Section 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. |

| Read Property | 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 and 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 the Reference Section 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 the Reference Section 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 and 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. |

| | | |
|---|---|---|
| Read Property | Status_Flags | When using Complex Data Objects returns the FAULT and OUT_OF_SERVICE fields as indicated in the Reference Section 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. |
| 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 MS/TP on the ProtoCessor |
| For BACnet MS/TP and PTP, 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. |

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3/17