

1 DESCRIPTION

The BACnet¹ 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

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: | 110; 300; 600; 1200; 2400; 4800; 9600; 19200; 38400; 57600; 115000 |
| Data Bits: | 7,8 |
| Stop Bits: | 1,2 |
| Parity: | Odd, Even, None |
| Multidrop Capability | No |

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

3.2 BACnet/MSTP (Master and Slave operation)

| | |
|----------------------|---------------------------------|
| Connection type: | RS-485 (Two Wire, Half Duplex) |
| Baud Rates: | 9600, 38400, 76800 ² |
| 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 |
| Ethernet Speeds Supported | 10Base-T, 100Base-T ³ |

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 |

² 76800 baud is supported on the X30, X25 and ProtoCessor

5 DATA TYPES SUPPORTED

| FieldServer Data Type | BACnet Object Type |
|-----------------------|---------------------------|
| AI | Analog Input Object |
| AO | Analog Output Object |
| AV | Analog Value Object |
| BI | Binary Input Object |
| BO | Binary Output Object |
| BV | Binary Value Object |
| MI | Multi-state Input Object |
| MO | Multi-state Output Object |
| MV | Multi-state Value Object |
| Device | Device Object |

³ Not all FieldServer models support 100BaseT. Consult the appropriate instruction manual for details of the Ethernet speed supported by specific hardware.

6 FIELDSEVER 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 | Present Value | Multiple objects can be specified providing the objects exist as consecutive objects of the same type. For instance, reading the PV property of Objects 1,2,3,4 and 5 is allowed. Reading the PV of Objects 1 4 and 5 is not allowed. |
| | 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 | None | Write Property Multiple is NOT supported. |

7 FIELDSEVER 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 | None | Write Property Multiple is NOT supported. |

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 | None | Write Property Multiple is NOT supported. |
| 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 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 | None | Write Property Multiple is NOT supported. |
| 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 | None | Write Property Multiple is NOT supported. |
| 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 | None | Write Property Multiple is NOT supported. |
| 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 | None | Write Property Multiple is NOT supported. |
| 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 | None | Write Property Multiple is NOT supported. |
| 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 | None | Write Property Multiple is NOT supported. |
| 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 |
| Trend Log Object. |
| BACnet Services not supported |
| Alarm and Event Services unsupported on Client side only |
| File Access Services |
| Virtual Terminal Services |