

BACNet Support Branch Feeder Monitor

BFM136, BFM II

BACNet Communications Protocol

User Guide

BG0644 Rev. A2

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For further information regarding a particular installation, operation or maintenance of equipment, contact the manufacturer or your local representative or distributor.

REVISION HISTORY

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|----|----------|---------------|
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Chapter 1 Background

BACNet is a standard protocol for handling access to vendor specific devices. The BN protocol defines the behavior expected from controlling station and controlled devices. It is the responsibility of the controlling station to detect devices that support BN in its network and display all information provided by each device. It is the responsibility of vendor specific devices to implement support for the BN protocol. The standard defines a wide variety of types of support for the protocol. Each vendor decides what information it wants to share via the BN protocol. All types of data are defined by the standard. The vendor, after initial detection and identification with the controlling station, must return a list of 'objects' containing device specific data that it supports. Thereafter, the controlling station can retrieve any part of the list of supported objects. Since the types of data are defined by the standard, the controlling station is expected to display them accordingly. An essential aspect of the BN protocol is the requirement that each device, in addition to providing objects with values, it must describe, the meaning of the value provided. This includes object ID, name, type, status etc.

Chapter 2 SATEC Support of BN

The BN protocol defines various modes and 'profiles' for official support of standard.

SATEC supports the BSA profile:

- Read
- Write
- Execute (answer) Who-Is
- Initiate I-Am

And the following types of objects:

- Analog Input (AI)
- Command r/w

This the minimum to be classified as a standard BACNet device. It is need to be detected and allow access to "Analog Input" objects per a predefined, fixed list (see exact list in following chapters).

SATEC limits support to **UDP over IP** and does not support the **routing mode** (BBMD). Since the BFM supports only one IP address, shared by all sub-meters, the BN browser will detect only one BN instance per BFM device. By default, this will be the sub-meter with address ID #1. To access other SM's, the user must set the Command object value and send to the BFM device. Thereafter, all requests for retrieval of AI objects will be directed to the corresponding SM.

Chapter 3 Supported Objects

Following table shows mapping between AI objects and Modbus Point ID's:

| Al Object ID | Point ID | Description |
|--------------|----------|----------------------|
| 1 | 0x1100 | V1 Voltage |
| 2 | 0x1101 | V2 Voltage |
| 3 | 0x1102 | V3 Voltage |
| 4 | 0x1103 | I1 Current |
| 5 | 0x1104 | I2 Current |
| 6 | 0x1105 | 13 Current |
| 7 | 0x1106 | kW L1 |
| 8 | 0x1107 | kW L2 |
| 9 | 0x1108 | kW L3 |
| 10 | 0x1109 | kvar L1 |
| 11 | 0x110A | kvar L2 |
| 12 | 0x110B | kvar L3 |
| 13 | 0x110C | kVA L1 |
| 14 | 0x110D | kVA L2 |
| 15 | 0x110E | kVA L3 |
| 16 | 0x110F | Power factor L1 |
| 17 | 0x1110 | Power factor L2 |
| 18 | 0x1111 | Power factor L3 |
| 19 | 0x111E | V12 Voltage |
| 20 | 0x111F | V23 Voltage |
| 21 | 0x1120 | V31 Voltage |
| 22 | 0x1400 | Total kW |
| 23 | 0x1401 | Total kvar |
| 24 | 0x1402 | Total kVA |
| 25 | 0x1403 | Total PF |
| 26 | 0x1404 | Total PF lag |
| 27 | 0x1405 | Total PF lead |
| 28 | 0x1406 | Total kW import |
| 29 | 0x1407 | Total kW export |
| 30 | 0x1408 | Total kvar import |
| 31 | 0x1409 | Total kvar export |
| 32 | 0x1501 | In (neutral) Current |
| 33 | 0x1502 | Frequency |
| 34 | 0x1503 | Voltage unbalance |
| 35 | 0x1504 | Current unbalance |
| 36 | 0x1600 | V1 Volt demand |

| 37 | 0x1601 | V2 Volt demand |
|----|--------|---|
| 38 | 0x1602 | V3 Volt demand |
| 39 | 0x1603 | I1 Ampere demand |
| 40 | 0x1604 | I2 Ampere demand |
| 41 | 0x1605 | I3 Ampere demand |
| 42 | 0x1609 | kW import sliding window demand |
| 43 | 0x160A | kvar import sliding window demand |
| 44 | 0x160B | kVA sliding window demand |
| 45 | 0x160F | kW import accumulated demand |
| 46 | 0x1610 | kvar import accumulated demand |
| 47 | 0x1611 | kVA accumulated demand |
| 48 | 0x1612 | kW import predicted sliding window demand |
| 49 | 0x1613 | kvar import predicted sliding window demand |
| 50 | 0x1614 | kVA predicted sliding window demand |
| 51 | 0x1618 | kW export sliding window demand |
| 52 | 0x1619 | kvar export sliding window demand |
| 53 | 0x161A | kW export accumulated demand |
| 54 | 0x161B | kvar export accumulated demand |
| 55 | 0x161C | kW export predicted sliding window demand |
| 56 | 0x161D | kvar export predicted sliding window demand |
| 57 | 0x1700 | kWh import |
| 58 | 0x1701 | kWh export |
| 59 | 0x1704 | kvarh import |
| 60 | 0x1705 | kvarh export |
| 61 | 0x1708 | kVAh total |

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Chapter 4 User Instructions

- Connect BFM device to IP network. Make sure it has a unique IP address
- Open a BACNet browser/controller. It will discover all BFM BN devices that have a unique IP address
- By default, the browser will detect the first sub-meter for each device
- All AO objects read will belong to the first sub-meter
- For each device, the BN controller can retrieve data from each and every sub-meter by configuring the Sub-Meter Selector Command Object
- For an on-going process of retrieval of AO objects from all sub-meters, the controller should apply the following logic
 - Assume 'index' that can be assigned value between 1 and 36 (54 for BFMII)
 - Start with index assigned value 1
 - Set "Present Value" of the Sub-Meter Selector to value of 'index'
 - Retrieve all AO's from the sub-meter (and store or display them)
 - Increment index by 1 (if index > 36(54), set index to 1)
 - Go to step 'i'

4.1 Pictures of Demonstration with Freeware BN Browser, YABE

| File Functions Options Help | File Fund | General | |
|-----------------------------|---------------|-------------------------------|--------------|
| O X | | Retries 3 🜩 Timeout 1000 | ÷ |
| evices | : VA | | |
| Devices | Devices | WhoIs limit low high | ubscriptions |
| | | DAC - + 40 11-1 | Device |
| | | BAChet/IP over Udp | |
| | | Port | Mdd |
| | | Local endpoint 192.168.99.159 | ~ |
| | | BACnet/MSTP over serial | |
| | | Port ~ | |
| dress Space | Address Space | Baud 38400 | |
| | | Seume Addman 1 + | 1 |
| | | Source Address | |
| | | Max Master 127 | |
| | | Max Frames 1 | Add |
| | | BACnet/PTP over serial | |
| | | Port | |
| | | Baud 38400 | |
| | | | |
| | Log | Password | Add |
| | | BACnet/Ethemet | |
| | | Interface | Add |
| | 6 | | ~ |

Open browser and choose network.

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| File Functions Options Help | File Functions Options Help |
| © × | i 🔾 🗙 |
| Devices | Devices |
| Devices Device D | Devices Device 12345 - 192.168.99.164.47808 Device 12345 - 192.168.99.164.47808 Device 1114078 - 192.168.99.724.7808 Device 1114078 - 192.168.99.33.47808 Device 1116068 - 192.168.99.100.47808 |
| ddress Space | Address Space : 63 objects BFM 136 Multi-Channel Meter (Device:1002062) ANALOG_INPUT:0 ANALOG_INPUT:1 HS ANALOG INPUT:2 |
| | ANALOG_INPUT:3 |
| | ANALOG_INPUT:6 |
| | ANALOG_INPUT:7 |
| | ANALOG_INPUT:8 |
| | ANALOG_INPUT:9 |
| | Log |
| Sending Whole | Sending ReadPropertyRequest |
| UnconfirmedServiceRequest | ComplexAck Got excention from 'Structured Object List' |
| Inconfirmed Service Request | Sending ReadPropertyRequest |
| Inconfirmed Service Request | ComplexAck |
| Inconfirmed Service Request | Sending ReadPropertyRequest |
| Inconfirmed Service Request | |
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YABE detects all devices supporting BN on network. Choose one and YABE will bring it's list of AI objects:

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|--|---------------|---------------|---------------|-------------|---------------------------------|---|
| 🔍 Yet Another Bacnet Explorer - Yabe | | | | | | × |
| File Functions Options Help | | | | | | |
| 6 X | | | | | | |
| Devices | Coherentette | Derivate I | Dellara Corre | te (Aleren | Properties | |
| Devices | Subscription | hs, Pehodic I | 'olling, Even | its/ Alarms | | |
| Udp:47808 | Device | ObjectId | Name | Value | | |
| | | | | - I | ✓ BacnetProperty | 2000 |
| | | | | | Apdu Timeout | 3000 |
| | | | | | Application Software version | 18.5.12 |
| | | | | | Database Revision | |
| | | | | | Device Address briding | 0.9.6 |
| | | | | | Max Andy Length Accented | 400 |
| | | | | | Madel Name | 400 PEM126 |
| | | | | | Number Of Andu Retries | 2 |
| Address Space : 63 objects | | | | | Object Identifier | OBJECT DEVICE-1002082 |
| BFM136 Multi-Channel Meter (Device: 1002082) | ^ [9 | | | | Object list | Object Device. 1002002 |
| ANALOG_INPUT:0 | | | | | Object Date | PEM126 Multi-Channel Mater |
| ANALOG INPUT: | 4 | | | | Object Type | 8 · Okject Device |
| ANALOG_INPUT:2 | | | | | Protocol Object Types Supported | 100000011000000000000000000000000000000 |
| ANALOG_INPUT:3 | | | | | Protocol Revision | 16 |
| ANALOG_INPUT:4 | a | | | | Protocol Services Supported | 000000000000000000000000000000000000000 |
| ANALOG_INPUT:5 | 44 | | | | Protocol Version | 1 |
| ANALOG_INPUT:6 | | | | - 10 | Andre Denoved | |
| X2 ANALOG INPUT:7 | aa | | | | Apdu Timeout | D INT |
| NO ANALOG INPUT:0 | | ····· | | | BACINET_APPLICATION_TRA_ONSIGNE | D_INT |
| V2 ANALOG INPUT-10 | v | 1800 1200 | 1800 | 0000 | | |
| Log | | | | | | |
| ComplexAck | | | | | | 1 |
| Sending ReadPropertyRequest | | | | | | |
| ComplexAck Sending ReadPropertyRequest | | | | | | |
| ComplexAck | | | | | | |
| Sending ReadPropertyRequest | | | | | | |
| ComplexAck | | | | | | |
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Choose the command object and change from 1 to any other ID of sub-meter defined in BFM and now all the AI objects will change accordingly.

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| File Functions Options Help | | |
| i 🗿 🗙 | | |
| Devices | Subscriptions, Periodic Polling, Events/Alarms Properties | |
| Bervices Bervices Bervice 12245 - 192 168 99 164:47808 Bervice 12245 - 192 168 99 164:47808 Bervice 114078 - 192 168 99 72:47808 Device 1114078 - 192 168 99 72:47808 Device 1116058 - 192 168 99 3:47808 Device 111733 - 192 168 99 100:47808 | Device ObjectId Name Value Value Value Coject Name Object Identifier OBJECT_COMMAND:0 Object Name Object Selector Object Type 7 : Object Command Prevent Value 1 | |
| Address Space : 53 objects Address Space : 53 objects ANALOG_INPUT:51 ANALOG_INPUT:53 ANALOG_INPUT:55 ANALOG_INPUT:55 ANALOG_INPUT:55 ANALOG_INPUT:57 ANALOG_INPUT:59 ANALOG_INPUT:59 ANALOG_INPUT:59 ANALOG_INPUT:59 ANALOG_INPUT:50 A | Image: Second | |
| Log ComplexAck Sending ReadPropertyRequest ComplexAck Sending ReadPropertyRequest ComplexAck Sending ReadPropertyRequest | | ^ |