

FasBAC for Energy User Manual

Version 4.06



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1. Introduction

FasBAC for Energy (FasBAC) reads MMServer to get the meter readings from Carma Industries EMP and Data Logger/Profiler and writes the values to BACnet objects. FasBAC runs as a Win32 service.

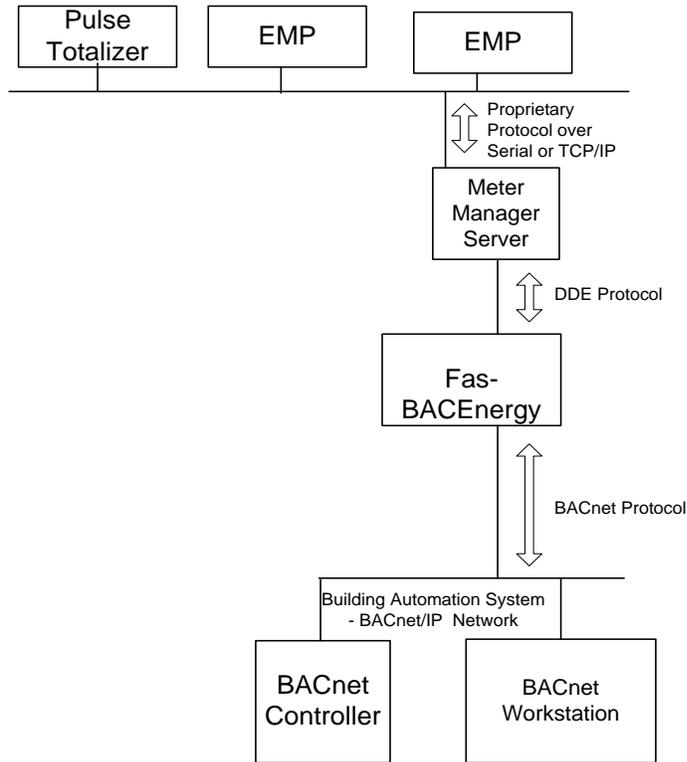


Figure 1. System Architecture

1.1. Getting data from MMServer

1.1.1. Normal

FasBAC will get data from MMServer either through polling or through advise mechanism. It will then update the present value and reliability attributes of the BACnet objects.

MMServer is a DDE server and FasBAC acts a DDE client. MMServer allows clients to either read or signup for certain DDE items.

Note: Refer to Appendix A for complete list of meter DDE items supported by MMServer and also which ones support advise.

To get the meter data FasBAC will poll the DDE items or sign up for advise if the DDE items support advise mechanism. FasBAC will also allow to poll the DDE items supporting advise by setting the configuration parameter *CarmaDoAdvise* to 0. The timeout of the synchronous reads (polling) can be set through the configuration parameter *CarmaDataPollTimeout*. If signing up for advise MMServer will update FasBAC at the data logging rate defined in MMServer.

In case of communication loss between MMServer and EMP, if the internal logging is enabled in EMP/profiler, MMServer will fetch the data from EMP/Profiler buffer and write multiple records to the log file. When the buffer for a meter has been completely written to the data log file, MMServer will send an advice to FasBAC with the latest data and timestamp.

1.1.2. Handling communication breakdown between MMServer and EMP/Profiler.

FasBAC creates BACnet status objects of type BV for monitoring the status of all meters. The online (normal) value for these meter status objects is 1. FasBAC will periodically poll the communication status DDE item of the EMP's/Profiler's for the meters specified in the configuration file. If the read fails the meter status object value is set to 0 (offline). The BACnet unit's text for 1 and 0 are "Online" and "Offline" respectively.

In addition to the meter status objects the reliability attribute of BACnet objects corresponding to polling type DDE items will be marked 'Unreliable' if the meter goes offline.

Note: The reliability attribute for BACnet objects corresponding to hot link DDE items (example: Cons, DemW) will not be updated, however the meter status objects will be reflective of actual meter communication state.

1.1.3. Handling communication breakdown between FasBAC and MMServer

If FasBAC loses connection to MMServer it periodically starts sending out Ping DDE item at the rate defined in configuration parameter *CarmaServerPollRate* to detect the MMServer. {The timeout for synchronous read of DDE item ‘Ping’ (for checking MMServer status) will be separately configurable through configuration parameter *CarmaServerPollTimeout* to allow extra time.

FasBAC creates MMServer_Status BACnet object of type BV to reflect the state of FasBAC’s communication state with MMServer. The value of MMServer_Status BACnet object will be set to 0 (offline) in case of communication loss.

Note: The values for other BACnet objects; either the ones created to monitor individual meter status or those actually displaying DDE item values will not be changed.

1.2. FasBAC – BACnet interface

FasBAC acts like a BACnet device that can host BACnet objects, which can be read by other BACnet compliant software /device.

FasBAC can also write to BACnet objects hosted by third party devices.

Depending on the details of the mappings created in the FasBACEnergy.csv file, FasBAC will either internally create and update the BACnet objects or update the external BACnet objects.

FasBAC’s BACnet device communication settings can be altered as described in the Configuration section of the user manual.

1.2.1. Handling MMServer communication errors.

In case of communication loss between MMServer and EMP, the poll data will not be obtained from MMServer, hence values in the mapped BACnet objects will not be updated..

1.3. Error Logging

FasBAC will write appropriate error messages to the Windows Application Event log.

2. System Requirements

Operating System

Windows 7 Professional (32 bit and 64 bit), Windows 10, Windows 2008 Server R2 and Windows 2012 Server.

PC

Memory: 4 GB

Processor speed: Intel 2 GHz or better

Hard disk: 60GB

MMServer

Version 0.18 or above running on the same PC as FasBAC.

3. Install / Uninstall

Pre-requisite to Installation

- 1) Prior to installation, enable .NET 3.5 Framework on Windows 7 and Windows 2008 Server.
- 2) To allow for BACnet communications, open Firewall port 47808.

Install

The program must be installed on the machine on which the MMserver is installed. To install the program; log on to the server with Administrator level access and run the program setup.exe.

The setup program will perform the following steps:

- Installs pre-requisite programs such as Windows Installer and .NET.
- Copies all the application files to the directory: C:\Program Files\AFDtek\FasBAC for Energy.
- Registers the program as a Windows Service.

Uninstall

The application can be removed using “Add Remove Programs” (Windows XP) or “Programs and Features” (Windows 7, Windows 2008 Server) from Control Panel.

Review and change as necessary the FasBAC default configuration settings (refer section ‘Parameter Configuration’).

Upgrade

Follow the following steps when upgrading to FasBAC:

- 1) Back-up the following files located in the program files folder:
 - a. All custom FasBAC CSV files.
 - b. bacdoc.ini
 - c. FasBAC.lic
- 2) Follow the Uninstall procedure to remove the previous version of FasBAC.
- 3) Follow the Install procedure to install the new version of FasBAC.
- 4) Restore the files backed up above.

4. System Setup

MMServer

General

FasBAC will automatically start all required instances of MMServer.

Logging

The logging feature of MMServer needs to be enabled (using the MMServer user interface) for it to go and fetch values from EMP and fill the data log files.

To enable internal EMP buffering, in the config.dat file, set the parameter 'I' for the meter.

When the internal logging for a Profiler is enabled, then in the MMsys.dat file the EMPLog item should be set to kW to enable logging of the data in the kW column in data log file.

Units for Data Profilers/Loggers

To be able to map the units from the data profilers/loggers to the BACnet objects use one of the following strings (case sensitive) for units in the config.dat file. If one of the following units is not applicable, then the string used to define units will not be mapped and the corresponding BACnet object will show units as NO_UNITS.

Units string in MMServer's config.dat	Corresponding BACnet units
kJ	KILOJOULES
kg	KILOGRAMS
kWh	KILOWATT_HOURS
cuft	CUBIC_FEET
cumeter	CUBIC_METERS
L	LITERS
impGal	IMPERIAL_GALLONS
Gal	US_GALLONS
kVAR	KILOVOLT_AMPERES_REACTIVE
kVA	KILOVOLT_AMPERES

FasBAC

Perform the following steps immediately after installation is finished:

Check that the FasBACEnergy service is not running.

In the FASBAC for Energy directory, define the required MasterConfig.csv file which contains one entry for each MMServer that FASBAC must connect with. A sample MasterConfig.csv file is provided in the FASBAC install.

For each MMServer, define the meter data to BACnet object mappings in a CSV file as specified in MasterConfig.csv (refer section 'Mapping Meter Data to BACnet Objects').

Start FasBAC (refer section 'Operations')

Review any warnings or errors logged in the Windows Application Event log (refer section 'Log File') and take corrective action

Review and if necessary change the size of log (refer section 'Log File')

Perform the following steps (as necessary) over the duration of using FasBAC:

Review any warnings or errors logged in the Windows Application Event log (refer section 'Log File') and take corrective action.

Add or change 'meter data to BACnet object' mappings as required.

Note: Changes to CSV files become effective after restarting FasBAC.

5. Operations

FasBAC runs as a Windows service. It starts automatically with the start of the operating system. (In case of a situation where the automatic start functionality needs to be disabled, set the 'startup type' property of the FasBAC service to 'Manual' using the Services control applet in Administrative Tools.)

The FasBAC service can be started and stopped via the Services applet available under Administrative Tools in Windows. FasBAC can also be controlled manually using the command-line as described below:

Start

1. Launch Command Prompt from Start/All Programs/Accessories Menu. You must run it with Administrator privileges.
2. Do a change directory to 'c:\Program Files\AFDtek\FasBACEnergy' (or 'Program Files (x86)' on a 64-bit version of Windows).
3. Start the service using the command:

FasBACEnergy.exe /start

Stop

1. Launch Command Prompt from Start/All Programs/Accessories Menu
2. Do a change directory to 'c:\Program Files\AFDtek\FasBACEnergy' (or 'Program Files (x86)' on a 64-bit version of Windows).
3. Stop the service using the command:

FasBACEnergy.exe /stop

Note: An error message "StopService failed: Overlapped I/O operation in progress" message may be displayed in the command-line, please ignore it.

Configure

1. Launch Command Prompt from Start/All Programs/Accessories Menu
2. Do a change directory to 'c:\Program Files\AFDtek\FasBACEnergy' (or 'Program Files (x86)' on a 64-bit version of Windows).
3. Configure the parameters using the command:

*FasBACEnergy.exe /configure <parameter name *> <parameter value>*

* for parameter name and guidelines for their values, refer section 'Parameter Configuration'

Example:

FasBACEnergy.exe /configure CarmaDataPollRate 10

Starting or Stopping Individual MM Servers

When multiple MM Servers are defined (see section 6 below), it may be beneficial to stop an individual MM Server rather than stopping the entire FasBAC service. This is useful when a single MM Server configuration requires modification.

The FasBAC MM Server Manager will allow individual MM Servers to be shut down. When you launch the application, it will display all of the MM server definitions (as defined in the FasBAC master config file) in a grid-view. Three colours are used to show each individual MM Server status:

Light Green = Running

Light Yellow = Stopped (not running)

Light Salmon = FasBAC not running or not compatible with the app.

To select one or more MM Servers, click in the check-box column on the left side. The appropriate button, Start or Stop, will then be enabled. Note that if you select one MM server that is stopped and one that is running, neither button will be enabled.

When you click on Start or Stop, an hour-glass will display over the window until the operation on the selected MM Servers has completed. It will normally take longer to Start an MM Server than to shut it down. The Start operation will ensure that DDE communication is operational.

Please note that if the FasBAC service has just started, you should wait for the app to display all MM servers in green before performing any operation on any one of the MM Servers.

6. Mapping Meter Data to BACnet Objects

A set of CSV text files are used for defining the meter data that FasBAC will provide on a BACnet network. The CSV files may be edited with a text editor such as Windows Notepad or by a spreadsheet program such as Microsoft Excel. (See [Appendix F: Configuration File Samples](#)). All of the CSV files must be placed in the FasBAC program files directory.

The MasterConfig.csv file defines a list of MM Servers that FasBAC will connect with. In standard installations, FasBAC connects with a single MM Server, but it is possible for it to connect with multiple MM Servers that reside on the same machine. Each MM Server is specified using a single line in the MasterConfig.csv file.

Here is an example of a MasterConfig.csv file that specifies 2 MM Server instances:

```
// Columns are as follows:  
// DDE Server Connection Name, Description, and Path to MM Server Directory  
CompanyName_Site01, Toronto East, C:\Program Files\Carma\Company_Site01  
CompanyName_Site02, Toronto West, C:\Program Files\Carma\Company_Site02
```

The first column (e.g. "Company_Site01") is the DDE name used in communicating with the specific MM Server. The DDE name must be unique for each MM Server. The second column is a simple description (e.g. "Toronto East") and can contain any text. The third column specifies the location of

the specific MMServer on the machine. This is used by FasBAC for launching the specific instance of MMServer.

In addition to the MasterConfig.csv file, there must be a separate CSV file for each MMServer listed in the MasterConfig.csv file. Each of the CSV files (formerly named FasBACEnergy.csv) must be named the same as the corresponding DDE name in first column. For example, using the above MasterConfig.csv example, there must be 2 additional files: CompanyName_Site01.csv and CompanyName_Site02.csv. These files define the mapping of DDE items to BACnet objects using the following format:

```
<DDE Topic name>, <DDE Item name>, <param1>, <param2>, <param3>,
<multiplier>, <BACnet object name>, <BACnet object type (optional -
check details below)>, <Internal BACnet object flag (optional - check
details below)>
```

DDE Topic name

- MM_EMP or MM_METER (please refer to Appendix A)

DDE Item name

- Use the Appendix A to determine the name of the DDE Item name to be mapped to the BACnet object.

param1, param2 and param3

- Use the following table 1 to determine the values of param1, param2 and param3.

Table 1. DDE Item details for Parameters

DDE Topic	DDE Item	param1	param2	param3
MM_EMP	Refer table 7	emp-id	node-id	
MM_METER	<PwrNodeVA>	meter-id *	<return data tag from table 9>	Phase (range 1 to 'CarmaMaxPhases' setting – table 2)
MM_METER	Refer table 8	meter-id *		

* The meter-id can be max 11 characters in either of the following formats:

E<iii>M<jj> where 'iii' and 'jj' are decimal numbers to identify the EMP (or Pulse Totalizer) and Meter, respectively. Leading zeroes are not required

A<Apartment #> where *Apartment #* is a string with maximum 10 characters

M<Meter #>. where *Meter #* is a string with maximum 10 characters

Multiplier

- Multiplier – multiplier for DDE item value returned (range 1 to 1000000)

BACnet Object Name

- BACnet objects may be entered using either the object name or the object instance number combined with the device ID
- When hosting a BACnet object internally with FasBAC then the object name should be specified.
- The BACnet object property written will be the Present Value property (85)
- If the object name is used, the object name must be unique on the BACnet network
- Object names will be case sensitive and maximum length is 255 characters
- If the object instance is used, the device ID will be prefixed to the object instance using the pipe symbol (|) as a separator

BACnet Object Type

- If the object instance and device id are used to specify the BACnet object name then the object type will be required. If the object name is used, the object type is optional. If no object type is provided AV object type will be assumed
- The object type is indicated with either AI (Analog Input) or AV (Analog Value). Mappings to BACnet object types AI should only be done if the objects are hosted externally and if the BACnet device supports writing values to AI object types.
- If the object name is used and an object type is specified, the type of the actual object type will be validated

BACnet Internal Object Flag

- To host BACnet objects inside FasBAC, after specifying the type of object (AV or BV), specify value of 1. If not specified the BACnet object will be considered as hosted by external BACnet device.

Comments

- Comments will be prefixed by a double slash
- If using a spreadsheet program to create the file, the double slash prefix must be entered in the first column of the spreadsheet
- Comments may be entered on any line in the file

Example of a FasBAC BACnet Mapping CSV file:

```
//Create each DDE item to BACnet object mapping by providing
//following information in the given order:

//DDE Topic, DDE Item name, param1, param2, param3, multiplier,
//BACnet object name, BACnet object type (optional), Internal BACnet
//identifier(optional)

//please refer to user manual for description of elements listed
//above

//examples of internally hosted BACnet objects:

MM_Meter,Cons,MMeter12,,,1,Meter12Cons,AV,1
MM_Meter,ConsNow,MMeter12,,,1,Meter12ConsNow,AV,1
MM_Meter,DemW,MMeter1,,,10,SITE01_GAS_M1,AV,1
MM_Meter,DemW,MMeter2,,,10,SITE01_GAS_M2,AV,1
MM_Meter,DemW,MMeter3,,,10,SITE01_GAS_M3,AV,1

//examples of externally hosted BACnet objects:

MM_Meter,DemW,MMeter12,,,1,101|163,AV
MM_Meter,DemVA,MMeter12,,,1,101|178,AV
MM_Meter,DemWInst,MMeter12,,,1,101|164,AV
MM_Meter,DemVAInst,MMeter12,,,1,101|165,AV
MM_Meter,DemWPres,MMeter12,,,1,101|183,AV
MM_Meter,DemVAPres,MMeter12,,,1,101|177,AV
MM_Meter,DemWPk,MMeter12,,,1,101|166,AV
MM_Meter,DemVAPk,MMeter12,,,1,101|167,AV
MM_Meter,PwrNodeVA,MMeter12,iPTNode,1,1,101|168,AV
MM_Meter,PwrNodeVA,MMeter12,iCTNode,1,1,101|169,AV
MM_Meter,PwrNodeVA,MMeter12,dRMSVoltage,1,1,101|180,AV
MM_Meter,PwrNodeVA,MMeter12,dRMSCurrent,1,1,101|207,AV
MM_Meter,PwrNodeVA,MMeter12,dPhaseAngle,1,1,101|222,AV
MM_Meter,PwrNodeVA,MMeter12,dDemkWInst,1,1,101|237,AV
MM_Meter,PwrNodeVA,MMeter12,dDemkVAInst,1,1,101|179,AV
MM_Meter,PwrNodeVA,MMeter12,dPowerFactor,1,1,101|206,AV

MM_EMP,ScanRMS,1,40,,1,101|221,AV
MM_EMP,ScanVA,1,40,,1,101|236,AV
MM_EMP,ScanWSign,1,40,,1,101|185,AV
```

Figure 2. A FasBAC BACnet Mapping CSV File

Additional Notes Regarding CSV files and MMServer:

- 1) Each MMserver directory must contain the required MMServer executable files and corresponding configuration files. The name of the DDE connection is defined using the DDENAME parameter in the mmsys.dat file.
- 2) The MasterConfig.csv file and the individual MMServer csv files will be read by FasBAC when it starts. When a CSV file is modified, the FasBAC service must be restarted for any changes to take effect.
- 3) Changes to any CSV file will take effect after restarting FasBAC.

7. Parameter Configuration

Stop the service, change the values of the configuration parameters and then start the service using the instructions described in the section ‘Operations’

Note: All changes to FasBAC configuration become effective after restarting FasBAC.

General Settings

To change parameters listed in Table 2 do the following:

Table 2. Configurable Parameters

Name	Description	Range	Default Value
CarmaServerPollRate	Defines the rate at which FasBAC will poll the MMserver when the MMserver is off-line to FasBAC.	1 - 10 minutes	1
CarmaServerPollTimeout	Defines the maximum number of seconds FasBAC will wait for MMServer response during the sync read call to MMServer for “Ping” DDE item.	1-10 seconds	10
CarmaDataPollRate	Defines the rate at which FasBAC will poll MMServer for (non advise) DDE items specified in the csv file	1 - 60 minutes	15
CarmaDataPollTimeout	Defines the maximum number of seconds FasBAC will wait for MMServer response during the sync read call to MMServer for DDE items.	1-10 seconds	10
CarmaMaxPhases	Defines the maximum number of phases	1-10	3
CarmaDoAdvise	Defines the option to enable or disable using the XTYP_ADVREQ feature for certain DDE items in MMServer.	0,1	1
BACnetMedia	Defines the BACnet media.	Ethernet, BACnetIP	BACnetIP
BACnetCommunicationRate	Defines the rate at which FasBAC will send BACnet Who-Has and Write messages.	100 - 1000 milliseconds	100
BACnetObjectNameResolveTimeout	Defines the time delay between initialization of BACnet and MMServer communication. This gives time for the BACnet object name resolution to complete before MMServer starts writing to BACnet objects.	1-300 seconds	5

BACnetNotifyOfflineMeter	Defines the option to enable or disable the feature of writing a value of -1 to BACnet objects when the corresponding meter value cannot be read.	0,1	0
--------------------------	---	-----	---

BACnet Communication Settings

FasBAC acts as a BACnet device and requires that several BACnet parameters be setup correctly in order to successfully communicate with other BACnet devices / software. Some of these settings must be unique for each BACnet device that resides on the same BACnet network. FasBAC's BACnet communication is based on the parameters located in the BACDOC.INI file. The BACDOC.INI resides in the same Program Files directory as FasBAC.

Note: In addition to the BACnet communication parameters that must be user configurable for BACnet communication, there are other parameters in the BACDOC.ini file that should not be changed by the user.

To change parameters listed in Table 3 do the following:

1. Open BACDOC.ini file (present in the Windows directory) from Windows Explorer.
2. Change the value of the key in the BACDOC.ini file as described in table 3.
3. Save the BACDOC.ini file and close it.

Table 3. Configurable BACnet Communication Parameters

Name	Description	Range	Default Value
OurInstance	The BACnet device ID. Must be unique for each BACnet device on the same BACnet network. If more than one FasBAC device is on the BACnet network, this value will have to be changed for each device.	1 - MaxBACnetID	64003
OurPeerName	The BACnet device name. Must be unique for each FasBAC device on the same BACnet network. If more than one FasBAC device is on the BACnet network, this value will have to be changed for each device.	up to 32 characters (case sensitive)	FASBAC-FOR-ENERGY
BACnetIPport	The UDP port number to use for BACnet/IP (hex BAC0) This number must be the same for all BACnet devices that must communicate with one another.	1024 - 49151	47808

8. Log File / Troubleshooting

FasBAC uses the Windows Application Event log for reporting errors and status messages. The message format follows Windows conventions for Windows event logging.

To view the Log File, do the following steps:

1. From the Start Menu, open Control Panel.
2. From Control Panel, open Administrative Tools.
3. From Administrative Tools, open Component Services.
4. In Component Services, expand the Event Viewer and select Application.
5. In the right hand pane view messages with source column having value "FasBACEnergy".

To ensure latest log messages are available, do the following:

1. Right click on the Application (step 4 above) and select Properties.
2. In General tab in the Log size section, select the option 'Override events as needed'.

Event log messages will be generated for the following conditions:

Table 4. Carma METER MANAGER events

Error Description	Action to be taken
Starting FasBACEnergy - Carma METER MANAGER to BACnet service.	None
FasBACEnergy - Carma METER MANAGER to BACnet service has shutdown.	None
Connected to Microsoft Windows DDEML Library.	None
Disconnected from Microsoft Windows DDEML Library.	None
FasBACEnergy was unable to initialize the DDEML library.	FasBACEnergy will not work as a key Windows library (DDEML.dll) is missing.
Established connection to the Carma METER MANAGER Server.	None
Closed connection to the Carma METER MANAGER Server.	None
Carma METER MANAGER Server is on-line.	None. (Carma METER MANAGER Server was previously off-line, now it has become on-line)
Carma METER MANAGER Server is off-line.	Check if Carma Meter Manager Server is running.
Lost connection to Carma METER MANAGER	Check if Carma Meter

Server.	Manager Server is running.
Trying to connect to Carma METER MANAGER Server.	Check if Carma Meter Manager Server is running.
Carma METER MANAGER Server could not read item <DDE Item name>.	Carma Meter Manager Server could not read values from EMP for data logging. Check EMP online status.
Read succeeded on Carma METER MANAGER Server item < DDE Item name >.	None. (Previously read to this item had failed, now it has succeeded.)
Following error occurred on reading Carma METER MANAGER Server item < DDE Item name e><DDEML error #><Carma Meter Manager Error # >.	To get description of DDEML error # refer Appendix C and for Carma Meter Manager Error # refer Appendix D.
Carma METER MANAGER Server item < DDE Item name > cannot be read as it has not been configured correctly.	Carma Meter Manager returned an invalid configuration error. Make necessary changes in the FasBACEnergy.csv file or METER MANAGER Server's config.dat file.

Table 5. BACnet events

Error Description	Action to be taken
The BACDOC library is not in "windowless" mode. Check the bacdoc.ini file. The service will be shutdown.	Change the settings in the bacdoc.ini file to run the PolarSoft BACDoor library in windowless mode.
BACDOC library initialized.	None.
BACDOC library deinitialized.	None.
Will not be able to write to the BACnet object <objectname> as the name is not yet resolved.	Check if the BACnet device is online.
Following error occurred while writing to BACnet object <objectname>. BACDoor Library Error # <error #>.	Check if the BACnet device is online. To get description of BACDoor error # refer Appendix B.
The BACnet object <objectname> is on-line.	None. (Previously the object was off-line, now it has become on-line.)
The Device ID returned by WhoHas for the BACnet object <objectname> does not match the Device ID provided in the FasBACEnergy.csv file hence it is being removed. Any updates received for this object will not be passed on to the BACnet network.	Make the necessary changes in the FasBACEnergy.csv file.
The Object Type returned by WhoHas for	Make the necessary

BACnet object <objectname> does not match the Object Type provided in the FasBACEnergy.csv file hence it is being removed. Any updates received for this object will not be passed on to the BACnet network.	changes in the FasBACEnergy.csv file.
BACDOC Library reported the following Error: Number <error #>	Check if the BACnet device is online

Table 6. Configuration File events

Error Description	Action to be taken
FasBACEnergy could not open the configuration file: <filename>	Make sure the FasBACEnergy.csv file is present in the same directory as the program FasBACEnergy.exe.
Error encountered on line number <linenumber> in the FasBACEnergy.csv file.	Make the necessary changes in the FasBACEnergy.csv file
<metername> meter name in the FasBACEnergy.csv file is invalid.	Make the necessary changes in the FasBACEnergy.csv file

Appendix A: Supported MMServer DDE Items

The following MMserver DDE items are supported for mapping to BACnet objects.

MM_EMP Topic

For the MM_EMP topic the following values (DDE items) of a particular node of the EMP can be mapped to BACnet objects.

Table 7. MM_EMP Topic Items

Topic Item	Description
ScanRMS	Read instantaneous RMS values at EMP inputs
ScanVA	Read instantaneous VA values at CT/PT inputs of an EMP
ScanWSign	Read instantaneous signed Watt values at CT/PT inputs of an EMP

MM_Meter Topic

For the MM_Meter topic the following values (DDE items) of a particular meter can be mapped to BACnet objects.

Table 8. MM_Meter Topic Items

Topic Item	Description
Cons *	Consumption register value saved in the server at last logging interval
ConsNow *	Consumption register value from unit
DemW *	Watt demand register values saved in the server at last logging interval
DemVA	VA demand register values saved in the server last logging interval
DemWInst	Instantaneous Watt register value for last sensor scan from EMP
DemVAInst	Instantaneous VA register value for last sensor scan from EMP
DemWPres	Present Watt register value from EMP
DemVAPres	Present VA register value from EMP
DemWPk	Peak Watt demand register values from EMP
DemVAPk	Peak VA demand register values from EMP
PwrNodeVA	Power Node Data Group

* denotes the MMServer DDE items which are also supported by the Data Logger / Profiler.

PwrNodeVA is a special case where its return data tags (see Table 9) are mapped to BACnet objects. The 'N' after the data tag represents the phase number (range 1 to 'CarmaMaxPhases' setting – see table 2).

Table 9. PwrNodeVA DDE item return data tags

iPTNode N
iCTNode N
dRMSVoltage N
dRMSCurrent N
dPhaseAngle N
dDemkWInst N
dDemkVAInst N
dPowerFactor N

Appendix B: BACDoor OEM Client Error Descriptions

Error #	OEM Client Error Description
0	Success
-1	NoFreeBuffers
-2	InvalidPort
-3	OpenAdapterFailed
-4	LSLNotFound
-5	InvalidService
-6	CantGetSelector
-7	InvalidPointer
-8	LSAPinUse
-9	NotYetInitialized
-10	CreateThreadFailed
-11	MACDriverNotFound
-100	NoFreeTimers
-101	CantCreateWindow
-102	FailedClassRegistration
-105	MACPNotInstalled
-106	UnknownPDUType
-107	InvalidPDUType
-108	InvalidRequestThisState
-109	NoFreeSpaceAvailable
-110	NoFreeInvokeIDs
-111	Timeout
-112	ReceivedPacketTooLarge
-113	TransmitError
-114	InvalidDestinationAddr
-115	InvalidResponse
-116	AbortReceived
-117	RejectReceived
-118	ErrorReceived
-119	NoMoreSegments
-120	CannotSendSegmentedCACK
-121	TransmitPacketTooLarge
-122	NoPacketsAvailable
-123	InvalidRequestHandle
-124	NoFreeCacheSlots
-125	InvalidTag

Error #	OEM Client Error Description
-126	InvalidPassword
-127	BIPInitFailed
-128	BIPCantLocateSubnetMask
-130	MSTPInitFailed
-131	TooManyPeers
-132	PeerAlreadyKnown
-133	MACorRouterAddressTooLong
-134	NotImplemented
-135	PTPInitFailed
-136	InvalidRequest
-137	NoListProvided
-139	BDE_BIPIPorMaskNotInitialized
-204	NoNALSpacketinResult
-205	NoAPDUinResult
-206	BufferSizeExceeded
-998	InhibitTX
-1000	UnknownOS

Appendix C: Windows DDEML Error Descriptions

Error #	DDEML Error Description
16384	ADVACKTIMEOUT
16385	BUSY
16386	DATAACKTIMEOUT
16387	DLL_NOT_INITIALIZED
16388	DLL_USAGE
16389	EXECACKTIMEOUT
16390	INVALIDPARAMETER
16391	LOW_MEMORY
16392	MEMORY_ERROR
16393	NOTPROCESSED
16394	NO_CONV_ESTABLISHED
16395	POKEACKTIMEOUT
16396	POSTMSG_FAILED
16397	REENTRANCY
16398	SERVER_DIED
16399	SYS_ERROR
16400	UNADVACKTIMEOUT
16401	UNFOUND_QUEUE_ID

Appendix D: Carma Meter Manager Server Error Descriptions

Error #	Carma Meter Manager Server Error Description
0	No Error
-1	Com Error: Could not transmit to local port
-2	Com Error: Could not receive from local port
-3	Com Error: No echo received from EMP/Profiler
-4	Com Error: Timeout for EMP/Profiler response
-5	Com Error: No command echo
-6	Com Error: Could not clear EMP output buffer
-7	Com Error: Local network status error
-8	Com Error: No network query command echo
-9	Com Error: No network timeout command echo
-10	Com Error: Invalid message checksum
-11	Com Error: Invalid data checksum
-12	Com Error: Error checking EMP/Profiler status
-13	Com Error: Receive buffer timeout
-14	Com Error: Local port not available
-15	Com Error: EMP/Profiler response is too long
-16	Com Error: No communication yet with EMP/Profiler
-17	Com Error: Command refused by EMP/Profiler
-18	Com Error: Reply timeout (response too short)
-19	EMP is not configured for TOU
-20	No data for Virtual Meter request
-21	Com Error: Error encoding command
-22	No Virtual Meter element defined
-23	No TOU schedule specified
-24	Com Error: EMP/Profiler communications disabled
-25	No active TOU schedule on EMP
-200	Unknown Item
-201	Item Not Yet Available
-202	Item is XTYP_EXECUTE Only
-203	No XTYP_EXECUTE allowed for Item
-204	No XTYP_ADVISE allowed for Item
-205	Item only valid for Pulse Totalizer
-206	EMP is not configured for sensors
-207	EMP is not configured for TOU
-208	EMP is not configured for demand

Error #	Carma Meter Manager Server Error Description
-209	Item not valid for a Pulse Totalizer
-210	Item not valid for a virtual meter
-211	Invalid EMPId
-212	Item not support multiple EMPId
-213	Missing EMPId
-214	Invalid NodeId
-215	Invalid MeterId
-216	Invalid TOU Schedule
-217	Item not configured for local logging
-218	Hot link signup does not support multiple meters
-219	Logging not enabled for meter or data type of hot link request