



BACNet Protocol support for eHouse – 24.07.2018

eHouse PRO/BMS server software may act as BACNet IP:

- server eHouse PRO
- router/gateway to eHouse LAN, RS-485, CAN, RF, WiFi, Thermo and the future controllers

for reference marked as: **eHouse2BACNet**

Currently eHouse2BACNet has unidirectional support from external systems to eHouse.

BACNet Protocol is configured in file: `/usr/local/ehouse/bacnet.cfg` and each line contains one parameter. It is supplied with its description which must be separated from configuration value with "tab" ("t") character and "//" .

```
1 //Enable BACNet Server - Enables eHouse to BACNet server/gateway/router
1086 //Vendor ID: "iSys - Intelligent Systems" - vendor unique id assigned by ASHRAE (do not
change this value unless you have more than one eHouse2BACNet in your system
ehouse //User (future use) - Additional authentication to access eHouse2BACNet
eHouseeHouse //Password (future use) - Additional authentication to access eHouse2BACNet
0 //IP Port (future use) - currently use default BACNet port
1086000 //First Device Nr - eHouse Devices are sequentially addressed from this value when
configured and properly discovered (started from eHouse.PRO, LAN, RS-485, WiFi, CAN, RF,
Thermo
1086 //Virtual Net - Keep this value the same as Vendor ID
0 //Enable UCOV - Unsubscribed Change of Value - eHouse2BACNet will automatically report
each changes of values (no status query is necessary)
0 //Enable Authorization – (future use) Enable additional authentication and security to
eHouse2BACNet
0 //Timeout (future use)
0 //Debug BACNet Shows More info on console screen when eHouse.PRO/BMS application
executed in the shell.
0 //Delay - for controllers recognition before configure and start BACNet service (future use)
0 //Keep Alive (future use)
//Hash Table (future use) Additional hashing for authentication and security
```

Before running BACNet support, eHouse.PRO/BMS server software must be properly configured including controller names, signals (i/o/adc/dimm) names with proper charset encoding, etc. If only BACNet is used, use charset encoding supported in the BACNet Client application. If it is colliding with eHouse system you can set additional eHouse.PRO/BMS server just for

eHouse2BACNet functionality.

Functionality of BACNet is limited to functions available in individual variant of eHouse controller and signal (I/O/ADC/DIMM).

After delay time on startup eHouse2BACNet will automatically:

- send "I'm Router" command
- send "I'm Device" for each configured and connected eHouse controller + eHouse PRO/BMS server
- Automatically send UCOV message when enabled

Upon BACNet client request (hosting application) eHouse2BACNet it will send:

- "I'm Router" message
- "I'm Device" messages for each configured and connected eHouse controller + eHouse PRO/BMS server
- Auto-discovery informations (on request)
- names of each controller (on request)
- names of each available signals for each controller (if not specified means it is not available or out of range for current controller)
- states of each available signals for each controller (on request or with UCOV)
- AI - analogue measurement inputs (OBJECT_ANALOG_INPUT)
- AO - Dimmer outputs LED/PWM, DALI, DMX or other values (OBJECT_ANALOG_OUTPUT)
- AV - programs/zones/scenes etc (OBJECT_ANALOG_VALUE)
- BI - binary inputs of eHouse controllers (OBJECT_BINARY_INPUT)
- BO - (on/off) outputs (OBJECT_BINARY_OUTPUT)
- BV - (on/off) internal signals (OBJECT_BINARY_VALUE)
- MSO - multi state output as paired outputs (drives control) or all controller outputs together (OBJECT_MULTI_STATE_OUTPUT)
- MSI - multi state input for alarm signals for each alarm input (OBJECT_MULTI_STATE_INPUT)
- it converts BACNet "write property function" to eHouse events (commands)
- it receives and run eHouse direct events (commands)

AI supported properties Read (R) /Write (W) /Auto Send (AS):

- Name (R)
- Description (R)
- Unsubscribed Change Of Value (AS)
- Type (PROP_OBJECT_TYPE) (R)
- Present Value (PROP_PRESENT_VALUE) (R) / (W) - set preset for thermostats only

Proprietary Values (Read Only):

- ADC config (PROP_ADCCFG – 9900)
- ADC value (PROP_ADC – 9901)
- Temperature sensor (PROP_LM335 - 9902) – calculated (for LM335 temp sensor)
- Temperature sensor (PROP_LM35 - 9903) – calculated (for LM35 temp sensor)

- Voltage (PROP_VOLT - 9904) – calculated (for low voltage measurement)
- Percent (PROP_PERCENT - 9905) – calculated (for percentage in reference to max value)
- Inverted Percent 100-x (PROP_INV_PERCENT - 9906) – calculated (100-percentage)
- Temperature sensor (PROP_MCP9700 - 9907) – calculated (for MCP9700 temp sensor)
- Temperature sensor (PROP_MCP9701 - 9908) – calculated (for MCP9701 temp sensor)
- Humidity (PROP_HUMIDITY - 9909) – calculated (for Humidity sensor)
- Light Sensor (PROP_LIGHT - 9910) – calculated (for Light Level sensor)
- Calibration Value (PROP_CALIBRATION - 9911) – for calculations
- Offset Value (PROP_OFFSET - 9912) – for calculations
- Calibration V Value (PROP_CALIBRATION_V - 9913) – for calculations
- Offset V Value (PROP_OFFSET_V - 9914) – for calculations
- Offset Auxiliary Value (PROP_A_OFFSET - 9915) – for calculations
- Auxiliary Factor (PROP_A_FACTOR - 9916) – for calculations
- Auxiliary Value (PROP_A_VALUE - 9917) – for calculations
- Minimum Level (PROP_MIN_VALUE - 9918) - for regulation (R/W)
- Maximum Level (PROP_MAX_VALUE - 9919) - for regulation (R/W)

AO supported properties (Read/Write/Auto Send)

- Name (R)
- Description (R)
- Unsubscribed Change Of Value (AS)
- Type (PROP_OBJECT_TYPE) (R)
- Present Value (PROP_PRESENT_VALUE) (R)
- Present Value (W) - set value for dimmers/DAC (Numeric: BACNET_APPLICATION_TAG_UNSIGNED_INT, BACNET_APPLICATION_TAG_SIGNED_INT, BACNET_APPLICATION_TAG_REAL, BACNET_APPLICATION_TAG_DOUBLE) 0..100%: set value immediately
 - less than 0: (-128,0) decrement to minimum (0%)
 - more than 100: (101,128) increment to max (100%)
- Present Value (W) - set value for dimmers/DAC (String: BACNET_APPLICATION_TAG_CHARACTER_STRING)
 - "0": decrement to 0%
 - (0..100): set value immediately [%]
 - "-": decrement one step (current programmed step value)
 - "-X": decrement one step (where X is step value 1..100)
 - "+": increment one step (current programmed step value)
 - "+X": increment one step (where X is step value 1..100)
 - "--": decrement to 0% (current programmed step value)
 - "--X": decrement to 0% (where X is step value 1..100)
 - "++": increment 100% (current programmed step value)
 - "++X": increment 100% (where X is step value 1..100)

AV - programs/settings/scenes/zones numbers preset (AVx where x index of AV)

(Numeric: BACNET_APPLICATION_TAG_UNSIGNED_INT,

BACNET_APPLICATION_TAG_SIGNED_INT, BACNET_APPLICATION_TAG_REAL, BACNET_APPLICATION_TAG_DOUBLE)

- AV0 – Profile
- AV1 – Program (on/off + dimmers)
- AV2 - ADC Program/Regulation Program
- AV3 - Security Zone Change
- AV4 - Security Program + Zone Change

BI supported properties (Read/Write/Auto Send)

- Name (R)
- Description (R)
- Unsubscribed Change Of Value (AS)
- Type (PROP_OBJECT_TYPE) (R)
- Present Value (PROP_PRESENT_VALUE) (R)

BO supported properties (Read/Write/Auto Send)

- Name (R)
- Description (R)
- Unsubscribed Change Of Value (AS)
- Type (PROP_OBJECT_TYPE) (R)
- Present Value (PROP_PRESENT_VALUE) (R) / (W) - set output state

MSO - Multiple output settings (Drives Mode/All Outputs)

- Name (R)
- Description (R)
- Unsubscribed Change Of Value (AS - via single outputs BO)
- Type (PROP_OBJECT_TYPE) (R)
- Present Value (PROP_PRESENT_VALUE) (R) only by outputs state (BO)
- Present Value (PROP_PRESENT_VALUE) (W) - set all output state for the controller (All Outputs Mode) BACNET_APPLICATION_TAG_CHARACTER_STRING:
1011111110101001010101 (sequential outputs (0..max) states 1-on/0-off)
- Present Value (PROP_PRESENT_VALUE) (W) - set all output state for the controller (2 line control - Drives/servos 3-ways cut-off Mode)
BACNET_APPLICATION_TAG_CHARACTER_STRING:
 - "open", "up", "+" (might be follow by movement time [s]) - first direction
 - "close", "down", "-" (might be follow by movement time [s]) - second direction
 - "stop", "off" (might be follow by movement time [s]) - all outputs off
 - "somyfstop", "both" (might be follow by movement time [s]) - all outputs on

UCOV - Enable "Unsubscribed Change of Value" will send status change automatically. It could be received, if supported by BACNet Client Application. This is best solution for minimize amount data/communication and server utilization especially for very big and unlimited installations.