



# **IntesisBox<sup>®</sup> BACnet IP Server**

BACnet MS/TP

User Manual

r1.0 eng

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Router for the integration of MS/TP devices into BACnet IP enabled monitoring and control systems.

Order code:

**IBBACRTR0320000, 32 full-load devices**

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# 1 Description

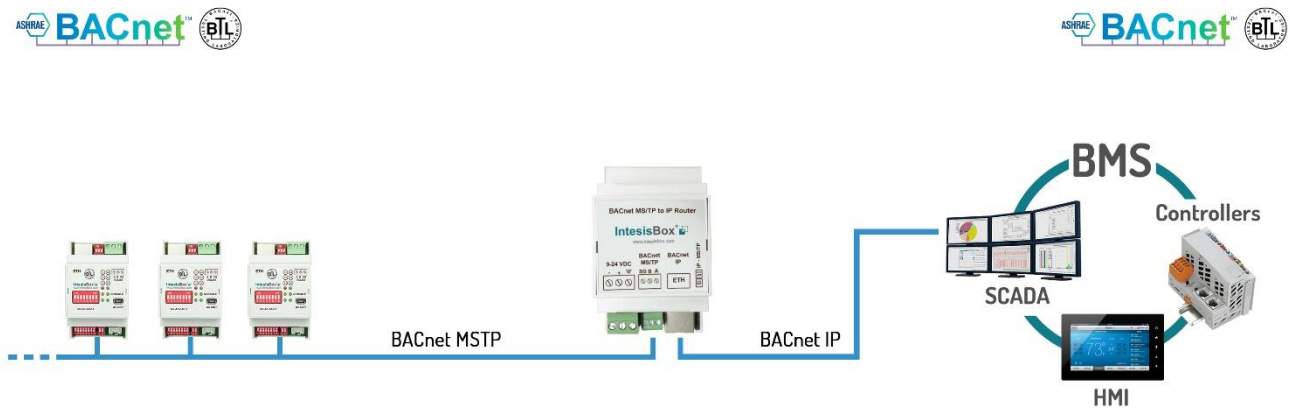
## 1.1 Introduction

This document describes how to route messages between BACnet MS/TP and BACnet IP networks using the *IntesisBox BACnet MS/TP to BACnet IP Router*.

The aim of this is to make accessible data from devices in a BACnet MS/TP network to a BACnet IP network, and viceversa, in a transparent way.

Configuration is carried out using the configuration software IntesisBox<sup>®</sup> MAPS.

This document assumes that the user is familiar with BACnet technologies and their technical terms.



**Routing between BACnet MS/TP and BACnet IP networks**

## 1.2 *Functionality*

After the start up process, IntesisBox helps route BACnet communications from a BACnet IP to BACnet MS/TP network, allowing BACnet IP devices to communicate with BACnet MS/TP devices present in another network.

It is not necessary to perform any mapping as the data from one side is shown on the other side in a transparent way.

The router also has diagnostic signals available to check that all the communication from each side is working properly.

## 1.3 *Router capacity*

IntesisBox capacity is listed below:

| Element                              | 32 devices                       | Notes                                    |
|--------------------------------------|----------------------------------|--|
| Type of BACnet devices               | IP / MSTP                        | Communication with BACnet IP and MS/TP   |
| Number of BACnet MS/TP Slave devices | Up to 32 full-load MS/TP devices | Number of BACnet MS/TP devices supported |

## 2 Protocol Implementation Conformance Statement

### BACnet Protocol Implementation Conformance Statement (PICS)

**Date:** 2019-01-02

**Vendor Name:** Intesis Software SLU

**Product Name:** IBOX-BAC-RTR

**Product Model Number:** IBOX-BAC-RTR

**Application Software Version:** 1.0

**Firmware Revision:** 1.0.0.0

**BACnet Protocol Revision:** 14

#### Product Description:

*BACnet Router*

Abstraction BACnet Router Objects.

### 2.1 BACnet Standardized Device Profile (Annex L):

- BACnet Operator Workstation (B-OWS)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Sensor (B-SS)
- BACnet Smart Actuator (B-SA)

Additional BACnet Interoperability Building Blocks Supported (Annex K):  
*Reference of BIBBs List*

### 2.2 Segmentation Capability:

Segmented request supported  No  Yes Window Size 16

Segmented responses supported  No  Yes Window Size 16

### 2.3 Data Link Layer Options:

- BACnet IP, (Annex J)
- BACnet IP, (Annex J), Foreign Device
- ISO 8802-3, Ethernet (Clause 7)
- ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) \_\_\_\_\_
- MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200
- MS/TP slave (Clause 9), baud rate(s): \_\_\_\_\_
- Point-To-Point, EIA 232 (Clause 10), baud rate(s): \_\_\_\_\_
- Point-To-Point, modem, (Clause 10), baud rate(s): \_\_\_\_\_
- LonTalk, (Clause 11), medium: \_\_\_\_\_
- Other: \_\_\_\_\_

## 2.4 Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.)  Yes  No

## 2.5 Networking Options:

- Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
- Annex H, BACnet Tunneling Router over IP
- BACnet/IP Broadcast Management Device (BBMD)  
Does the BBMD support registrations by Foreign Devices?  Yes  No

## 2.6 Character Sets Supported

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ISO 10646 (UTF-8)
- IBM™/Microsoft™ DBCS
- ISO 8859-1
- ISO 10646 (UCS-2)
- ISO 10646 (UCS-4)
- JIS X 0208

## 2.7 Gateway

If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:

**No gateway support.**



### 3 BACnet Interoperability Building Blocks Supported (BIBBs)

#### 3.1 Data Sharing BIBBs

| BIBB Type |  | Active                              | BACnet Service             | Initiate                            | Execute                             |
|-----------|--|-------------------------------------|----------------------------|-------------------------------------|-------------------------------------|
| DS-RP-A   | Data Sharing-ReadProperty-A            | <input type="checkbox"/>            | ReadProperty               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DS-RP-B   | Data Sharing-ReadProperty-B            | <input checked="" type="checkbox"/> | ReadProperty               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DS-RPM-A  | Data Sharing-ReadPropertyMultiple-A    | <input type="checkbox"/>            | ReadPropertyMultiple       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DS-RPM-B  | Data Sharing-ReadPropertyMultiple-B    | <input checked="" type="checkbox"/> | ReadPropertyMultiple       | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DS-RPC-A  | Data Sharing-ReadPropertyConditiona-A  | <input type="checkbox"/>            | ReadPropertyConditional    | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DS-RPC-B  | Data Sharing-ReadPropertyConditional-B | <input type="checkbox"/>            | ReadPropertyConditional    | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DS-WP-A   | Data Sharing-WriteProperty-A           | <input type="checkbox"/>            | WriteProperty              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DS-WP-B   | Data Sharing-WriteProperty-B           | <input checked="" type="checkbox"/> | WriteProperty              | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DS-WPM-A  | Data Sharing-WritePropertyMultiple-A   | <input type="checkbox"/>            | WritePropertyMultiple      | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DS-WPM-B  | Data Sharing-WritePropertyMultiple-B   | <input checked="" type="checkbox"/> | WritePropertyMultiple      | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DS-COV-A  | Data Sharing-COV-A                     | <input type="checkbox"/>            | SubscribeCOV               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | ConfirmedCOVNotification   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | UnconfirmedCOVNotification | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DS-COV-B  | Data Sharing-COV-B                     | <input checked="" type="checkbox"/> | SubscribeCOV               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input checked="" type="checkbox"/> | ConfirmedCOVNotification   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input checked="" type="checkbox"/> | UnconfirmedCOVNotification | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DS-COVP-A | Data Sharing-COVP-A                    | <input type="checkbox"/>            | SubscribeCOVProperty       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | ConfirmedCOVNotification   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | UnconfirmedCOVNotification | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DS-COVP-B | Data Sharing-COVP-B                    | <input type="checkbox"/>            | SubscribeCOVProperty       | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | ConfirmedCOVNotification   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | UnconfirmedCOVNotification | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DS-COVU-A | Data Sharing-COV-Unsubscribed-A        | <input type="checkbox"/>            | UnconfirmedCOVNotification | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DS-COVU-B | Data Sharing-COV-Unsubscribed-B        | <input type="checkbox"/>            | UnconfirmedCOVNotification | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

#### 3.2 Alarm and Event Management BIBBs

| BIBB Type |   | Active                   | BACnet Service               | Initiate                            | Execute                             |
|-----------|---|--------------------------|------------------------------|-------------------------------------|-------------------------------------|
| AE-N-A    | Alarm and Event-Notification-A          | <input type="checkbox"/> | ConfirmedEventNotification   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |   | <input type="checkbox"/> | UnconfirmedEventNotification | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| AE-N-I-B  | Alarm and Event-Notification Internal-B | <input type="checkbox"/> | ConfirmedEventNotification   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |   | <input type="checkbox"/> | UnconfirmedEventNotification | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| AE-N-E-B  | Alarm and Event-Notification External-B | <input type="checkbox"/> | ConfirmedEventNotification   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |   | <input type="checkbox"/> | UnconfirmedEventNotification | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| AE-ACK-A  | Alarm and Event-ACK-A                   | <input type="checkbox"/> | AcknowledgeAlarm             | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| AE-ACK-B  | Alarm and Event-ACK-B                   | <input type="checkbox"/> | AcknowledgeAlarm             | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| AE-ASUM-A | Alarm and Event-Alarm Summary-A         | <input type="checkbox"/> | GetAlarmSummary              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| AE-ASUM-B | Alarm and Event-Alarm Summary-B         | <input type="checkbox"/> | GetAlarmSummary              | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| AE-ESUM-A | Alarm and Event-Enrollment Summary-A    | <input type="checkbox"/> | GetEnrollmentSummary         | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| AE-ESUM-B | Alarm and Event-Enrollment Summary-B    | <input type="checkbox"/> | GetEnrollmentSummary         | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| AE-INFO-A | Alarm and Event-Information-A           | <input type="checkbox"/> | GetEventInformation          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| AE-INFO-B | Alarm and Event-Information-B           | <input type="checkbox"/> | GetEventInformation          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| AE-LS-A   | Alarm and Event-LifeSafety-A            | <input type="checkbox"/> | LifeSafetyOperation          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| AE-LS-B   | Alarm and Event-LifeSafety-B            | <input type="checkbox"/> | LifeSafetyOperation          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

3.3 Network Management BIBBs

| BIBB Type |  | Active                              | BACnet Service                   | Initiate                            | Execute                             |
|-----------|--|-------------------------------------|----------------------------------|-------------------------------------|-------------------------------------|
| NM-CE-A   | Network Management - Connection Establishment–A  | <input type="checkbox"/>            | Establish-Connection-To-Network  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | Disconnect-Connection-To-Network | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| NM-CE-B   | Network Management - Connection Establishment– B | <input type="checkbox"/>            | Establish-Connection-To-Network  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | Disconnect-Connection-To-Network | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| NM-RC-A   | Network Management - Router Configuration–A      | <input type="checkbox"/>            | Who-Is-Router-To-Network         | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | I-Am-Router-To-Network           | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | I-Could-Be-Router-To-Network     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | Initialize-Routing-Table         | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | Initialize-Routing-Table-Ack     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| NM-RC-B   | Network Management - Router Configuration–B      | <input checked="" type="checkbox"/> | Who-Is-Router-To-Network         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
|           |  | <input checked="" type="checkbox"/> | I-Am-Router-To-Network           | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
|           |  | <input checked="" type="checkbox"/> | Initialize-Routing-Table         | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input checked="" type="checkbox"/> | Initialize-Routing-Table-Ack     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

3.4 Device Management BIBBs

| BIBB Type |  | Active                              | BACnet Service             | Initiate                            | Execute                             |
|-----------|--|-------------------------------------|----------------------------|-------------------------------------|-------------------------------------|
| DM-DDB-A  | Device Management - Dynamic Device Binding–A       | <input checked="" type="checkbox"/> | Who-Is                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input checked="" type="checkbox"/> | I-Am                       | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-DDB-B  | Device Management - Dynamic Device Binding–B       | <input checked="" type="checkbox"/> | Who-Is                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input checked="" type="checkbox"/> | I-Am                       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-DOB-A  | Device Management - Dynamic Object Binding–A       | <input type="checkbox"/>            | Who-Has                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | I-Have                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-DOB-B  | Device Management - Dynamic Object Binding–B       | <input checked="" type="checkbox"/> | Who-Has                    | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input checked="" type="checkbox"/> | I-Have                     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-DCC-A  | Device Management - DeviceCommunicationControl–A   | <input type="checkbox"/>            | DeviceCommunicationControl | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-DCC-B  | Device Management - DeviceCommunicationControl–B   | <input checked="" type="checkbox"/> | DeviceCommunicationControl | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-PT-A   | Device Management - PrivateTransfer–A              | <input type="checkbox"/>            | ConfirmedPrivateTransfer   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | UnconfirmedPrivateTransfer | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-PT-B   | Device Management - PrivateTransfer–B              | <input type="checkbox"/>            | ConfirmedPrivateTransfer   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | UnconfirmedPrivateTransfer | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-TM-A   | Device Management - Text Message–A                 | <input type="checkbox"/>            | ConfirmedTextMessage       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | UnconfirmedTextMessage     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-TM-B   | Device Management - Text Message–B                 | <input type="checkbox"/>            | ConfirmedTextMessage       | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | UnconfirmedTextMessage     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-TS-A   | Device Management - TimeSynchronization–A          | <input type="checkbox"/>            | TimeSynchronization        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-TS-B   | Device Management - TimeSynchronization–B          | <input checked="" type="checkbox"/> | TimeSynchronization        | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-UTC-A  | Device Management - UTCTimeSynchronization–A       | <input type="checkbox"/>            | UTCTimeSynchronization     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-UTC-B  | Device Management - UTCTimeSynchronization–B       | <input type="checkbox"/>            | UTCTimeSynchronization     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-RD-A   | Device Management - ReinitializeDevice–A           | <input type="checkbox"/>            | ReinitializeDevice         | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-RD-B   | Device Management - ReinitializeDevice–B           | <input checked="" type="checkbox"/> | ReinitializeDevice         | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-BR-A   | Device Management - Backup and Restore–A           | <input type="checkbox"/>            | AtomicReadFile             | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | AtomicWriteFile            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | CreateObject               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | ReinitializeDevice         | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-BR-B   | Device Management - Backup and Restore–B           | <input type="checkbox"/>            | AtomicReadFile             | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | AtomicWriteFile            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | ReinitializeDevice         | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-R-A    | Device Management - Restart–A                      | <input type="checkbox"/>            | UnconfirmedCOVNotification | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-R-B    | Device Management - Restart–B                      | <input type="checkbox"/>            | UnconfirmedCOVNotification | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-LM-A   | Device Management - List Manipulation–A            | <input type="checkbox"/>            | AddListElement             | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | RemoveListElement          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-LM-B   | Device Management - List Manipulation–B            | <input type="checkbox"/>            | AddListElement             | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | RemoveListElement          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-OCD-A  | Device Management - Object Creation and Deletion–A | <input type="checkbox"/>            | CreateObject               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | DeleteObject               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| DM-OCD-B  | Device Management - Object Creation and Deletion–B | <input type="checkbox"/>            | CreateObject               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | DeleteObject               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| DM-VT-A   | Device Management - Virtual Terminal–A             | <input type="checkbox"/>            | VT-Open                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
|           |  | <input type="checkbox"/>            | VT-Close                   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | VT-Data                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| DM-VT-B   | Device Management - Virtual Terminal–B             | <input type="checkbox"/>            | VT-Open                    | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | VT-Close                   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
|           |  | <input type="checkbox"/>            | VT-Data                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

## 4 Service Types

| Service type                      | Service name                 | Supported                           | Remarks |
|-----------------------------------|------------------------------|-------------------------------------|---------|
| Alarm and Event Services          | AcknowledgeAlarm             | <input type="checkbox"/>            |         |
|                                   | ConfirmedCOVNotification     | <input type="checkbox"/>            |         |
|                                   | ConfirmedEventNotification   | <input type="checkbox"/>            |         |
|                                   | GetAlarmSummary              | <input type="checkbox"/>            |         |
|                                   | GetEnrollmentSummary         | <input type="checkbox"/>            |         |
|                                   | SubscribeCOV                 | <input checked="" type="checkbox"/> |         |
| File Access Services              | AtomicReadFile               | <input type="checkbox"/>            |         |
|                                   | AtomicWriteFile              | <input type="checkbox"/>            |         |
| Object Access Services            | AddListElement               | <input type="checkbox"/>            |         |
|                                   | RemoveListElement            | <input type="checkbox"/>            |         |
|                                   | CreateObject                 | <input type="checkbox"/>            |         |
|                                   | DeleteObject                 | <input type="checkbox"/>            |         |
|                                   | ReadProperty                 | <input checked="" type="checkbox"/> |         |
|                                   | ReadPropertyConditional      | <input type="checkbox"/>            |         |
|                                   | ReadPropertyMultiple         | <input checked="" type="checkbox"/> |         |
|                                   | ReadRange                    | <input checked="" type="checkbox"/> |         |
|                                   | WriteProperty                | <input checked="" type="checkbox"/> |         |
|                                   | WritePropertyMultiple        | <input checked="" type="checkbox"/> |         |
| Remote Device Management Services | DeviceCommunicationControl   | <input checked="" type="checkbox"/> |         |
|                                   | ConfirmedPrivateTransfer     | <input type="checkbox"/>            |         |
|                                   | ConfirmedTextMessage         | <input type="checkbox"/>            |         |
|                                   | ReinitializeDevice           | <input checked="" type="checkbox"/> |         |
| Virtual Terminal Services         | VtOpen                       | <input type="checkbox"/>            |         |
|                                   | VtClose                      | <input type="checkbox"/>            |         |
|                                   | VtData                       | <input type="checkbox"/>            |         |
| Security Services                 | Authenticate                 | <input type="checkbox"/>            |         |
|                                   | RequestKey                   | <input type="checkbox"/>            |         |
| Unconfirmed Services              | I-Am                         | <input checked="" type="checkbox"/> |         |
|                                   | I-Have                       | <input type="checkbox"/>            |         |
|                                   | UnconfirmedCOVNotification   | <input type="checkbox"/>            |         |
|                                   | UnconfirmedEventNotification | <input type="checkbox"/>            |         |
|                                   | UnconfirmedPrivateTransfer   | <input type="checkbox"/>            |         |
|                                   | UnconfirmedTextMessage       | <input type="checkbox"/>            |         |
|                                   | TimeSynchronization          | <input checked="" type="checkbox"/> |         |
|                                   | UtcTimeSynchronization       | <input type="checkbox"/>            |         |
|                                   | Who-Has                      | <input checked="" type="checkbox"/> |         |
|                                   | Who-Is                       | <input checked="" type="checkbox"/> |         |
|                                   | LifeSafetyOperation          | <input type="checkbox"/>            |         |
|                                   | SubscribeCOVProperty         | <input type="checkbox"/>            |         |
|                                   | GetEventInformation          | <input type="checkbox"/>            |         |

## 5 Objects

### 5.1 Supported Object Types

The objects supported are shown in the table below.

| Object Type        | ID | Supported                           | Management Point |
|--------------------|----|-------------------------------------|------------------|
| Analog-Input       | 0  | <input checked="" type="checkbox"/> |                  |
| Analog-Output      | 1  | <input type="checkbox"/>            |                  |
| Analog-Value       | 2  | <input type="checkbox"/>            |                  |
| Averaging          | 18 | <input type="checkbox"/>            |                  |
| Binary-Input       | 3  | <input checked="" type="checkbox"/> |                  |
| Binary-Output      | 4  | <input type="checkbox"/>            |                  |
| Binary-Value       | 5  | <input type="checkbox"/>            |                  |
| Calendar           | 6  | <input type="checkbox"/>            |                  |
| Command            | 7  | <input type="checkbox"/>            |                  |
| Device             | 8  | <input checked="" type="checkbox"/> |                  |
| Event-Enrollment   | 9  | <input type="checkbox"/>            |                  |
| File               | 10 | <input type="checkbox"/>            |                  |
| Group              | 11 | <input type="checkbox"/>            |                  |
| Life-Safety-Point  | 21 | <input type="checkbox"/>            |                  |
| Life-Safety-Zone   | 22 | <input type="checkbox"/>            |                  |
| Loop               | 12 | <input type="checkbox"/>            |                  |
| Multistate-Input   | 13 | <input type="checkbox"/>            |                  |
| Multistate-Output  | 14 | <input type="checkbox"/>            |                  |
| Multistate-Value   | 19 | <input type="checkbox"/>            |                  |
| Notification-Class | 15 | <input type="checkbox"/>            |                  |
| Program            | 16 | <input type="checkbox"/>            |                  |
| Schedule           | 17 | <input type="checkbox"/>            |                  |
| Trend-Log          | 20 | <input type="checkbox"/>            |                  |
| Trend-Log-Multiple | 27 | <input type="checkbox"/>            |                  |

## 5.2 Objects and properties

### 5.2.1 IBOX-BAC-RTR (Device Object Type)

| Property Identifier             | Property Datatype                        | Value                                | ASHRAE | IBOX |
|---------------------------------|--|--------------------------------------|--------|------|
| Object_Identifier               | BACnetObjectIdentifier                   | (Device, 246000)                     | R      | R    |
| Object_Name                     | CharacterString                          | "IBOX-BAC-RTR"                       | R      | R    |
| Object_Type                     | BACnetObjectType                         | DEVICE (8) (Device Object Type)      | R      | R    |
| System_Status                   | BACnetDeviceStatus                       | OPERATIONAL (0)                      | R      | R    |
| Vendor_Name                     | CharacterString                          | "Intesis Software SLU"               | R      | R    |
| Vendor_Identifier               | Unsigned16                               | 246                                  | R      | R    |
| Model_Name                      | CharacterString                          | "IBOX-BAC-RTR "                      | R      | R    |
| Firmware_Revision               | CharacterString                          | "1.0.0.0"                            | R      | R    |
| Application_Software_Version    | CharacterString                          | "1.0.0.0"                            | R      | R    |
| Location                        | CharacterString                          | ""                                   | O      | -    |
| Description                     | CharacterString                          | "BACnet Router"                      | O      | -    |
| Protocol_Version                | Unsigned                                 | 1                                    | R      | R    |
| Protocol_Revision               | Unsigned                                 | 14                                   | R      | R    |
| Protocol_Services_Supported     | BACnetServiceSupported                   | Refer to section 4 [Service Types]   | R      | R    |
| Protocol_Object_Types_Supported | BACnetObjectTypes Supported              | Refer to section 5.1 [Object Types]  | R      | R    |
| Object_List                     | BACnetArray[N] of BACnetObjectIdentifier | BACnetARRAY[N]                       | R      | R    |
| Structured_Object_List          | BACnetArray[N] of BACnetObjectIdentifier | -                                    | O      | -    |
| Max_APDU_Length_Accepted        | Unsigned                                 | 1476 when BACnet IP - 480 when MS/TP | R      | R    |
| Segmentation_Supported          | BACnetSegmentation                       | SEGMENTED-BOTH (0)                   | R      | R    |
| Max_Segments_accepted           | Unsigned                                 | 16                                   | O      | R    |
| VT_Classes_Supported            | List of BACnetVTClass                    | -                                    | O      | -    |
| Active_VT_Sessions              | List of BACnetVTSession                  | -                                    | O      | -    |
| Local_Date                      | Date                                     | Current date                         | O      | R    |
| Local_Time                      | Time                                     | Current time                         | O      | R    |
| UTC_Offset                      | INTEGER                                  | -                                    | O      | -    |
| Daylight_Savings_Status         | BOOLEAN                                  | -                                    | O      | -    |
| APDU_Segment_Timeout            | Unsigned                                 | 3000                                 | R      | R    |
| APDU_Timeout                    | Unsigned                                 | 3000                                 | R      | R    |
| Number_of_APDU_Retries          | Unsigned                                 | 3                                    | R      | R    |
| List_Of_Session_Keys            | List of BACnetSessionKey                 | -                                    | O      | -    |

|                                     |  |                               |   |   |
|-------------------------------------|--|-------------------------------|---|---|
| Time_Synchronization_Recipients     | List of BACnetRecipient                  | -                             | O | - |
| Max_Master * **                     | Unsigned                                 | 127                           | R | W |
| Max_Info_Frames *                   | Unsigned                                 | 1                             | O | R |
| Device_Address_Binding              | List of BACnetAddressBinding             | NULL (empty)                  | R | R |
| Database_Revision                   | Unsigned                                 | 0                             | R | R |
| Configuration_Files                 | BACnetArray[N] of BACnetObjectIdentifier | -                             | O | - |
| Last_Restore_Time                   | BACnetTimeStamp                          | -                             | O | - |
| Backup_Failure_Timeout              | Unsigned16                               | -                             | O | - |
| Active_COV_Subscriptions            | List of BACnetCOVSubscription            | List of BACnetCOVSubscription | O | R |
| Slave_Proxy_Enable                  | BACnetArray[N] of BOOLEAN                | -                             | O | - |
| Manual_Slave_Address_Binding        | List of BACnetAddressBinding             | -                             | O | - |
| Auto_Slave_Discovery                | BACnetArray[N] of BOOLEAN                | -                             | O | - |
| Slave_Address_Binding               | BACnetAddressBinding                     | -                             | O | - |
| Last_Restart_Reason                 | BACnetRestartReason                      | -                             | O | - |
| Time_Of_Device_Restart              | BACnetTimeStamp                          | -                             | O | - |
| Restart_Notification_Recipients     | List of BACnetRecipient                  | -                             | O | - |
| UTC_Time_Synchronization_Recipients | List of BACnetRecipient                  | -                             | O | - |
| Time_Synchronization_Interval       | Unsigned                                 | -                             | O | - |
| Align_Intervals                     | BOOLEAN                                  | -                             | O | - |
| Interval_Offset                     | Unsigned                                 | -                             | O | - |
| Profile_Name                        | CharacterString                          | -                             | O | - |

\* Only available when MSTP is used

\*\* Configurable through the configuration tool.

## 5.2.2 BACnet/IP Tx Packets (Analog Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Analog Input, 0)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet/IP Tx Packets         | R      | R    |
| Object_Type         | BACnetObjectType                  | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                              | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | 1                            | O      | R    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |



## 5.2.3 BACnet/IP Rx Packets (Analog Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Analog Input, 1)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet/IP Rx Packets         | R      | R    |
| Object_Type         | BACnetObjectType                  | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                              | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | 1                            | O      | R    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |

## 5.2.4 BACnet MS/TP Tx Packets (Analog Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Analog Input, 2)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet MS/TP Tx Packets      | R      | R    |
| Object_Type         | BACnetObjectType                  | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                              | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | 1                            | O      | R    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |

## 5.2.5 BACnet MS/TP Rx Packets (Analog Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Analog Input, 3)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet MS/TP Rx Packets      | R      | R    |
| Object_Type         | BACnetObjectType                  | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                              | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | 1                            | O      | R    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |

## 5.2.6 BACnet MS/TP Tx tokens (Analog Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Analog Input, 4)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet MS/TP Tx tokens       | R      | R    |
| Object_Type         | BACnetObjectType                  | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                              | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | 1                            | O      | R    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |

## 5.2.7 BACnet MS/TP Rx tokens (Analog Input Object Type)

| Property Identifier | Property Datatype                    | Value                        | ASHRAE | IBOX |
|---------------------|--------------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier               | (Analog Input, 5)            | R      | R    |
| Object_Name         | CharacterString                      | BACnet MS/TP Rx tokens       | R      | R    |
| Object_Type         | BACnetObjectType                     | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                                 | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                      | -                            | O      | -    |
| Device_Type         | CharacterString                      | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                    | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                     | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                    | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                              | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                             | -                            | O      | -    |
| Units               | BACnetEngineeringUnits               | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                                 | -                            | O      | -    |
| Max_Pres_Value      | REAL                                 | -                            | O      | -    |
| Resolution          | REAL                                 | -                            | O      | -    |
| COV_Increment       | REAL                                 | 1                            | O      | R    |
| Time_Delay          | Unsigned                             | -                            | O      | -    |
| Notification_Class  | Unsigned                             | -                            | O      | -    |
| High_Limit          | REAL                                 | -                            | O      | -    |
| Low_Limit           | REAL                                 | -                            | O      | -    |
| Deadband            | REAL                                 | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                    | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits            | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits            | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                     | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of<br>BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                      | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of<br>BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                      | -                            | O      | -    |

## 5.2.8 BACnet MS/TP Tx PFM (Analog Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Analog Input, 6)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet MS/TP Tx PFM          | R      | R    |
| Object_Type         | BACnetObjectType                  | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                              | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | 1                            | O      | R    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |

## 5.2.9 BACnet MS/TP Rx PFM (Analog Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Analog Input, 7)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet MS/TP Rx PFM          | R      | R    |
| Object_Type         | BACnetObjectType                  | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                              | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | 1                            | O      | R    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |

## 5.2.10 BACnet MS/TP CRC Errors (Analog Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Analog Input, 8)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet MS/TP CRC Errors      | R      | R    |
| Object_Type         | BACnetObjectType                  | ANALOG_INPUT (0)             | R      | R    |
| Present_Value       | REAL                              | 0 - 4294967295               | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | no_units (95)                | R      | R    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | 1                            | O      | R    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |



## 5.2.11 BACnet/IP Connected (Binary Input Object Type)

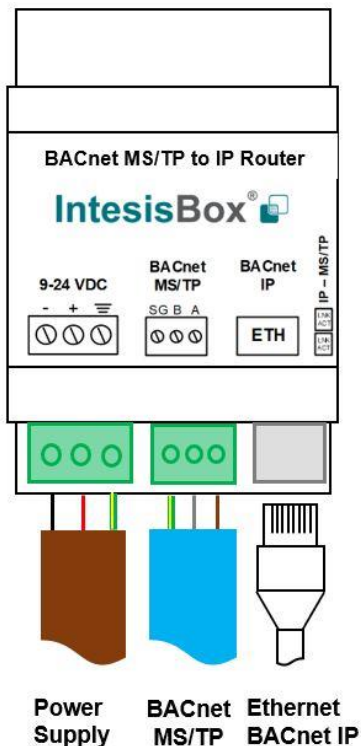
| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Binary Input, 0)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet/IP Connected          | R      | R    |
| Object_Type         | BACnetObjectType                  | BINARY_INPUT (3)             | R      | R    |
| Present_Value       | BACnetBinaryPV                    | INACTIVE (0) / ACTIVE (1)    | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | -                            | R      | -    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | -                            | O      | -    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |

## 5.2.12 BACnet/IP Connected (Binary Input Object Type)

| Property Identifier | Property Datatype                 | Value                        | ASHRAE | IBOX |
|---------------------|-----------------------------------|------------------------------|--------|------|
| Object_Identifier   | BACnetObjectIdentifier            | (Binary Input, 1)            | R      | R    |
| Object_Name         | CharacterString                   | BACnet/IP Connected          | R      | R    |
| Object_Type         | BACnetObjectType                  | BINARY_INPUT (3)             | R      | R    |
| Present_Value       | BACnetBinaryPV                    | INACTIVE (0) / ACTIVE (1)    | R      | R    |
| Description         | CharacterString                   | -                            | O      | -    |
| Device_Type         | CharacterString                   | -                            | O      | -    |
| Status_Flags        | BACnetStatusFlags                 | {FALSE, FALSE, FALSE, FALSE} | R      | R    |
| Event_State         | BACnetEventState                  | STATE_NORMAL (0)             | R      | R    |
| Reliability         | BACnetReliability                 | NO_FAULT_DETECTED (0)        | O      | R    |
| Out_Of_Service      | BOOLEAN                           | FALSE                        | R      | R    |
| Update_Interval     | Unsigned                          | -                            | O      | -    |
| Units               | BACnetEngineeringUnits            | -                            | R      | -    |
| Min_Pres_Value      | REAL                              | -                            | O      | -    |
| Max_Pres_Value      | REAL                              | -                            | O      | -    |
| Resolution          | REAL                              | -                            | O      | -    |
| COV_Increment       | REAL                              | -                            | O      | -    |
| Time_Delay          | Unsigned                          | -                            | O      | -    |
| Notification_Class  | Unsigned                          | -                            | O      | -    |
| High_Limit          | REAL                              | -                            | O      | -    |
| Low_Limit           | REAL                              | -                            | O      | -    |
| Deadband            | REAL                              | -                            | O      | -    |
| Limit_Enable        | BACnetLimitEnable                 | -                            | O      | -    |
| Event_Enable        | BACnetEventTransitionBits         | -                            | O      | -    |
| Acked_Transitions   | BACnetEventTransitionBits         | -                            | O      | -    |
| Notify_Type         | BACnetNotifyType                  | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |
| Event_Time_Stamps   | BACnetArray[N] of BACnetTimeStamp | -                            | O      | -    |
| Profile_Name        | CharacterString                   | -                            | O      | -    |

## 6 Connections

Find below information regarding the IntesisBox connections available.



### Power Supply

Must use NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply.

### If using DC power supply:

Respect polarity applied of terminals (+) and (-). Be sure the voltage applied is within the range admitted (check table below). The power supply can be connected to earth but only through the negative terminal, never through the positive terminal.

### Ethernet / BACnet IP

Connect the cable coming from the IP network to the connector ETH of the gateway. Use an Ethernet CAT5 cable. If communicating through the LAN of the building, contact the network administrator and make sure traffic on the port used is allowed through all the LAN path (check the gateway user manual for more information). Default IP is 192.168.100.246. DHCP is enabled by default.

### Port BACnet MS/TP

Connect the EIA485 bus to connectors A (-), B (+) and SG (SNGD) of gateway's Port. Respect the polarity.

**Note for MS/TP port;** Remember the characteristics of the standard EIA485 bus: maximum distance of 1200 meters, maximum 32 devices connected to the bus, and in each end of the bus it must be a termination resistor of 120 Ω.

Ensure proper space for all connectors when mounted (see section 9).

## 6.1 Powering the device

A power supply working with any of the voltage range allowed is needed (check section 8). Once connected the RUN led (Figure above) will turn on.

**WARNING!** In order to avoid earth loops that can damage the gateway and/or any other equipment connected to it, we strongly recommend:

- The use of DC power supplies, floating or with the negative terminal connected to earth. **Never use a DC power supply with the positive terminal connected to earth.**
- The use of AC power supplies only if they are floating and not powering any other device.

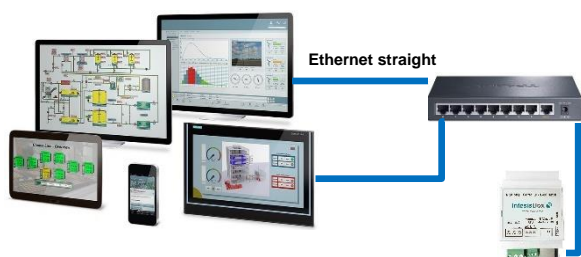
## 6.2 Connection to BACnet

### 6.2.1 BACnet IP

Connect the communication cable coming from the network hub or switch to the ETH port (Figure above) of IntesisBox. The cable to be used shall be a straight Ethernet UTP/FTP CAT5 cable

In case there is no response from the BACnet devices to the frames sent by IntesisBox, check that they are operative and reachable from the network connection used by IntesisBox. Check the IntesisBox Ethernet interface sending *Pings* to its IP address using a PC connected to the same Ethernet network.

Check as well with the network admin that there are no limitations regarding UDP communication or ports blocked.



BACnet IP connection using switch/hub and straight cable



BACnet IP connection without switch/hub and crossed cable

### 6.2.2 BACnet MSTP

Connect the EIA485 bus to connectors A (-), B (+) and SG (SNGD) of gateway's Port. Respect the polarity.

Remember the characteristics of the standard EIA485 bus: maximum distance of 1200 meters, maximum 32 devices connected to the bus, and in each end of the bus it must be a termination resistor of 120 Ω.

## 6.3 Connection to the configuration tool

This action allows the user to have access to configuration and monitoring of the device (more information can be found in the configuration tool User Manual). One method to connect to the PC can be used:

- **Ethernet:** Using the Ethernet port of IntesisBox.

## 7 Set-up process and troubleshooting

### 7.1 Pre-requisites

It is necessary to have a BACnet IP client or MSTP device operative and well connected to the corresponding BACnet port of IntesisBox.

Connectors, connection cables, PC to use the configuration tool and other auxiliary material, if needed, are not supplied by Intesis Software SLU for this standard integration.

Items supplied by Intesis Software for this integration are:

- IntesisBox gateway.
- Link to download the configuration tool.
- Product documentation.

### 7.2 IntesisBox MAPS. Configuration & monitoring tool for IntesisBox BACnet series

#### 7.2.1 Introduction

IntesisBox MAPS is a Windows® compatible software developed specifically to monitor and configure IntesisBox BACnet series.

The installation procedure and main functions are explained in the *IntesisBox MAPS User Manual*. This document can be downloaded from the link indicated in the installation sheet supplied with the IntesisBox device or in the product website at [www.intesisbox.com](http://www.intesisbox.com)

In this section, only the specific case of to BACnet router will be covered.

Please check the IntesisBox MAPS user manual for specific information about the different parameters and how to configure them.

#### 7.2.2 Connection

To configure the IntesisBox connection parameters press on the **Connection** button in the *menu bar*.

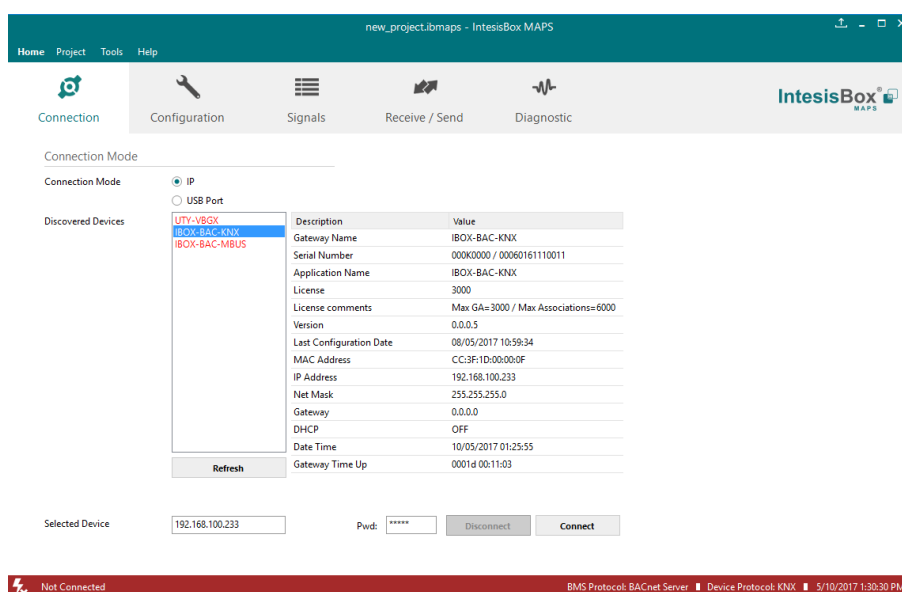


Figure 7.1 MAPS connection

### 7.2.3 Configuration tab

Select the **Configuration** tab to configure the connection parameters. Two subsets of information are shown in this window: General (Gateway general parameters) and BACnet Router (BACnet interface configuration).

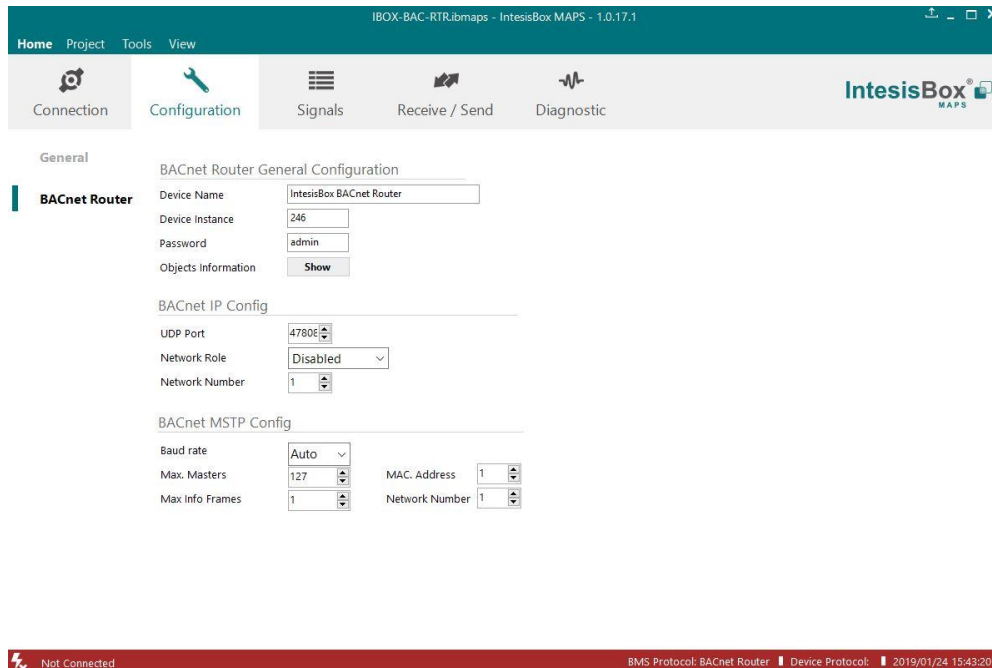


Figure 7.2 IntesisBox MAPS configuration tab

### 7.2.4 Signals

All available objects, Object Instances, are listed in the signals tab. More information on each parameter and how to configure it can be found in the IntesisBox MAPS user manual.

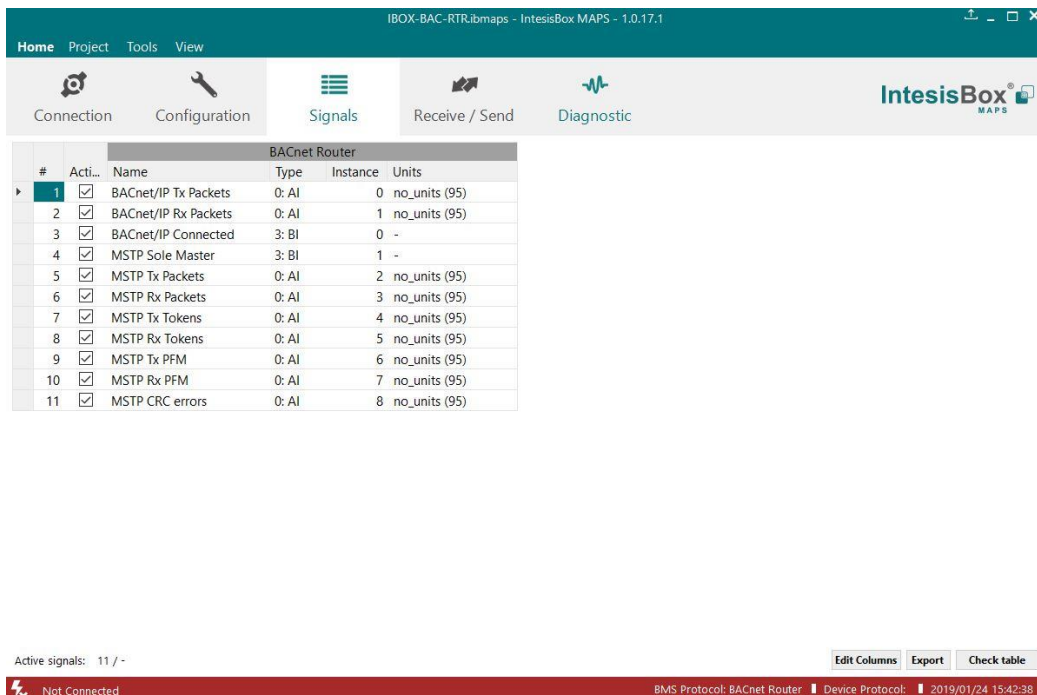


Figure 7.3 IntesisBox MAPS Signals tab

## 7.2.5 Sending the configuration to IntesisBox

When the configuration is finished, follow the next steps.

- 1.- Click on **Save** button to save the project to the project folder on your hard disk (more information in IntesisBox MAPS User Manual).
- 2.- You will be prompted to generate the configuration file to be sent to the gateway.
  - a.- If **Yes** is selected, the file containing the configuration for the gateway will be generated and saved also into the project folder.
  - b.- If **NO** is selected, remember that the binary file with the project needs to be generated before the IntesisBox starts to work as expected.
- 3.- Press the **Send File** button to send the binary file to the IntesisBox device. The process of file transmission can be monitored in the IntesisBox Communication Console window. IntesisBox will reboot automatically once the new configuration is loaded.

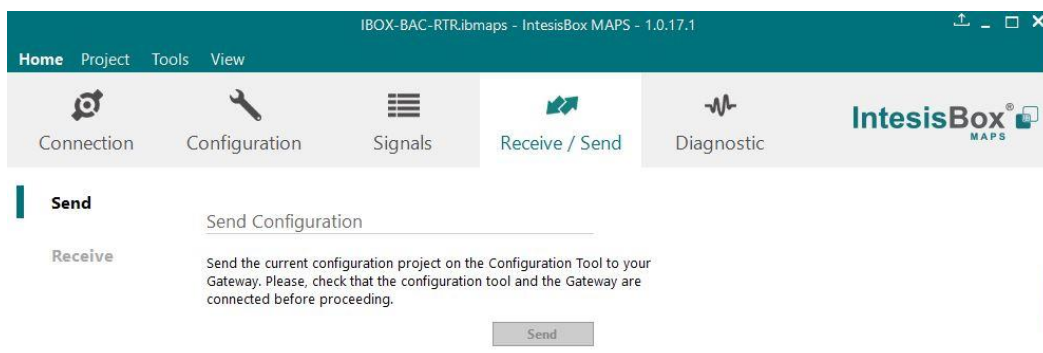


Figure 7.4 IntesisBox MAPS Receive/Send tab

**After any configuration change, do not forget to send the configuration file to the IntesisBox using button Send File.**

## 7.2.6 Diagnostic

To help integrators in the commissioning tasks and troubleshooting, the Configuration Tool offers some specific tools and viewers.

In order to start using the diagnostic tools, connection with the Gateway is required.

The Diagnostic section is composed by two main parts: Tools and Viewers.

- **Tools**

Use the tools section to check the current hardware status of the box, log communications into compressed files to be sent to the support, change the Diagnostic panels' view or send commands to the gateway.
- **Viewers**

In order to check the current status, viewer for the Internal and External protocols are available. It is also available a generic Console viewer for general information about communications and the gateway status and finally a Signals Viewer to simulate the BMS behavior or to check the current values in the system.

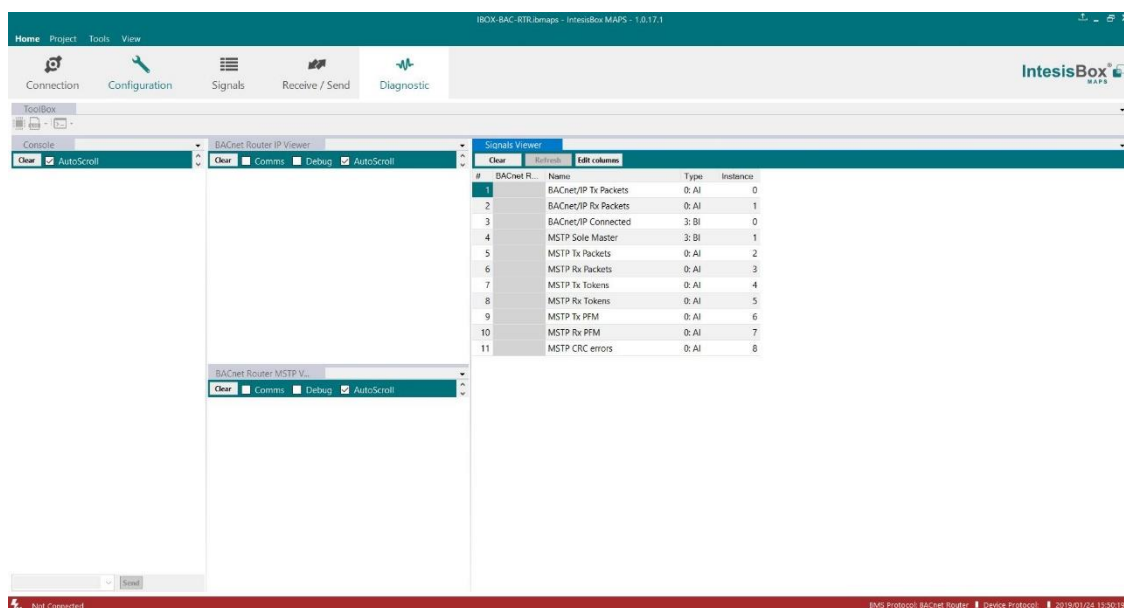


Figure 7.5 Diagnostic

More information about the Diagnostic section can be found in the Configuration Tool manual.



### 7.3 Set-up procedure

1. Install IntesisBox MAPS on your laptop, use the setup program supplied for this and follow the instructions given by the Installation wizard.
2. Install IntesisBox in the desired installation site. Installation can be on DIN rail or on a stable not vibrating surface (DIN rail mounted inside a metallic industrial cabinet connected to ground is recommended).
3. If using BACnet IP, connect the communication cable coming from the BACnet IP network to the port marked as Ethernet on IntesisBox (More details in section 6).

If using BACnet MSTP, connect the communication cables coming from the BACnet MSTP network to the port marked as BACnet MSTP on IntesisBox (More details in section 6).

4. Power up IntesisBox. The supply voltage can be 9 to 30 Vdc. Take care of the polarity of the supply voltage applied.

**WARNING!** In order to avoid earth loops that can damage IntesisBox and/or any other equipment connected to it, we strongly recommend:

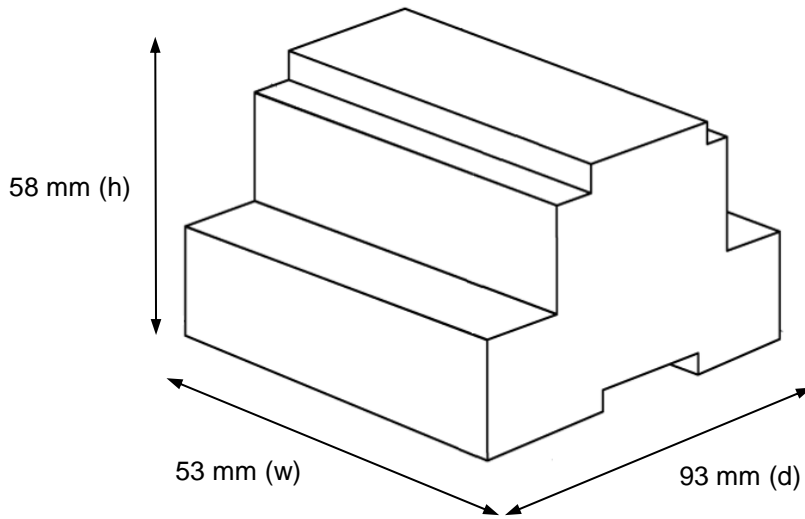
- The use of DC power supplies, floating or with the negative terminal connected to earth. **Never use a DC power supply with the positive terminal connected to earth.**
5. If you want to connect using IP, connect the Ethernet cable from the laptop PC to the port marked as ETH of IntesisBox (More details in section 6).
  6. Open IntesisBox MAPS, create a new project selecting a copy of the one named **IBOX-BAC-ROUTER**.
  7. Modify the configuration as desired, save it and download the configuration file to IntesisBox as explained in the IntesisBox MAPS user manual.
  8. Visit the Diagnostic section and check that there is communication activity, some TX frames and some other RX frames. This means that the communication with the two BACnet networks is OK. In case there is no communication activity between IntesisBox and the BACnet devices, check that those are operative.

## 8 Electrical & Mechanical Features



|  |   |        |
|--|---|--------|
| <b>Enclosure</b>   | Plastic, type PC (UL 94 V-0)<br>Net dimensions (d <sub>x</sub> w <sub>x</sub> h): 93x53x58 mm<br>Recommended space for installation (d <sub>x</sub> w <sub>x</sub> h): 100x60x70mm<br>Color: Light Grey. RAL 7035 |        |
| <b>Mounting</b>  | Wall.<br>DIN rail EN60715 TH35.   |        |
| <b>Terminal Wiring</b><br>(for power supply and low-voltage signals) | Per terminal: solid wires or stranded wires (twisted or with ferrule)<br>1 core: 0.5mm <sup>2</sup> ... 2.5mm <sup>2</sup><br>2 cores: 0.5mm <sup>2</sup> ... 1.5mm <sup>2</sup><br>3 cores: not permitted        |        |
| <b>Power</b>   | 1 x Plug-in screw terminal block (3 poles)<br>Positive, Negative, Earth<br>9-24VDC +/-10% Max.: 205mA   |        |
| <b>Ethernet</b>  | 1 x Ethernet 10/100 Mbps RJ45<br>2 x Ethernet LED: port link and activity   |        |
| <b>Port</b>  | 1 x Serial EIA485 (Plug-in screw terminal block 3 poles)<br>A, B, SGND (Reference ground or shield)<br>1500VDC isolation from other ports   |        |
| <b>Operation Temperature</b>   | 0°C to +60°C  |        |
| <b>Operational Humidity</b>  | 5 to 95%, no condensation   | 100 mm |
| <b>Protection</b>  | IP20 (IEC60529)   |        |

## 9 Dimensions



Recommended available space for its installation into a cabinet (wall or DIN rail mounting), with space enough for external connections

