User manual
Web BACnet Router

Version: 1.0

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2.2 Introduction to user manual

The manual is intended for the people who are responsible for administration and using Web BACnet Router Module. The reader is expected to have basic knowledge of electrical fundamentals and Building Automation and Control networks (BACnet).

Terms and acronyms used in this manual

Term	Description
APDU	Application Layer Protocol Data Units are used in BACnet to convey the information contained in the application service primitives and associated parameters. BACnet APDUs consist of protocol control information and, possibly, user data. The variable portion of each APDU may contain service-specific information.
BACnet	Building Automation and Control networks is a registered trademark of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). For more information, see http://www.bacnet.org/.
BACnet device	Any device, real or virtual, that supports digital communication using the BACnet protocol
BACnet device object	The device object type defines a standardized object whose properties represent the externally visible characteristics of a BACnet device. Each BACnet device must have only one device object that in practice identifies the device in the BACnet network.
BACnet/IP (B/IP)	A BACnet/IP network is a collection of one or more IP subnetworks (IP domains) that are assigned a single BACnet network number.
BBMD	BACnet/IP Broadcast Management Device Each IP subnetwork that is part of a B/IP network comprised of two or more subnets has one BBMD. Each BBMD possesses a Broadcast Distribution Table (BDT) which is the same in every BBMD in a given B/IP network.

BDT	Each BBMD possesses a Broadcast Distribution Table (BDT). BDT contains a list of external BBMDs to which the broadcast messages are transported.
MAC address	The MAC address of any BACnet device in any BACnet network. Different datalink types may have different lengths and formats for MAC addresses.
MS/TP	Master-Slave/Token-Passing protocol designed specifically for building automation and control devices as part of the BACnet standard. It uses RS485 serial communication as a physical layer.
UDP	User Datagram Protocol uses the Internet Protocol as the underlying protocol. It enables programs running on different computers on a network to communicate by sending short messages known as datagrams to each other.
WBR	Web BACnet router
Modbus	A high-level protocol for industrial networks developed in 1979 by Modicon (now Schneider Automation Inc.). Providing services at layer 7 of the OSI model, it defines a request/response message structure for a client/server environment. Modbus runs over various data links including its own Modbus+ token passing network and serial links such as RS-232 and RS-485. It is widely used with TCP/IP over Ethernet.
Modbus-to-BACnet (M2B)	Communication bridge from Modbus to BACnet. It allows user to map Modbus devices and data to BACnet devices and objects.

2 Introduction to Web BACnet Router

2.3 What is Web BACnet Router

WBR is a BACnet router with 4 RS485 ports and one Ethernet port. It is capable of having up to 32 datalinks, of which up to 4 can be MS/TP and the rest can be used for B/IP. Aside from BACnet capabilities, WBR can be used for Modbus-to-BACnet bridging. Both RTU and ASCII mode for serial Modbus are supported, as well as Modbus over IP. Since BACnet and Modbus message formats are not interchangeable, serial ports and IP port numbers cannot be shared between the two.

For serial ports, all standard baud rates are supported, as well as one BACnet-specific (76800).

WBR supports standard BACnet routing with MAC addresses' length up to 6, but doesn't support half-routers.

2.4 Technical Data

	Term	**Description**
Electrical specifications	Power supply	24VAC/VDC 5W
Communication channels	Ethernet	10/100BASE-TX
	4 x RS485	Programmable baud rate (2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, 230400)
	USB	USB device, USB B connector
Hardware resources	Microprocessor	ARM9 (32bit architecture, 400 MIPS)
	RAM memory	64MB
	Flash memory	256MB
	RTC	With auxiliary battery backup
	Storage temperature	-40.. +85^{o}C

	Operating temperature	-10…+70° C
Additional specifications	Operating humidity	max 95% r.H., no condensation
	Protection degree	IP20
	Mounting	DIN rail, for indoor use only
	Dimensions	107.6x90x62.2mm
	Weight	250g

Note:

The device is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.

It may only be installed by suitably trained personnel.

Any legal regulations or regulations issued by authorities must be observed during assembly.

The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.

The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

2.5 Wiring Diagram

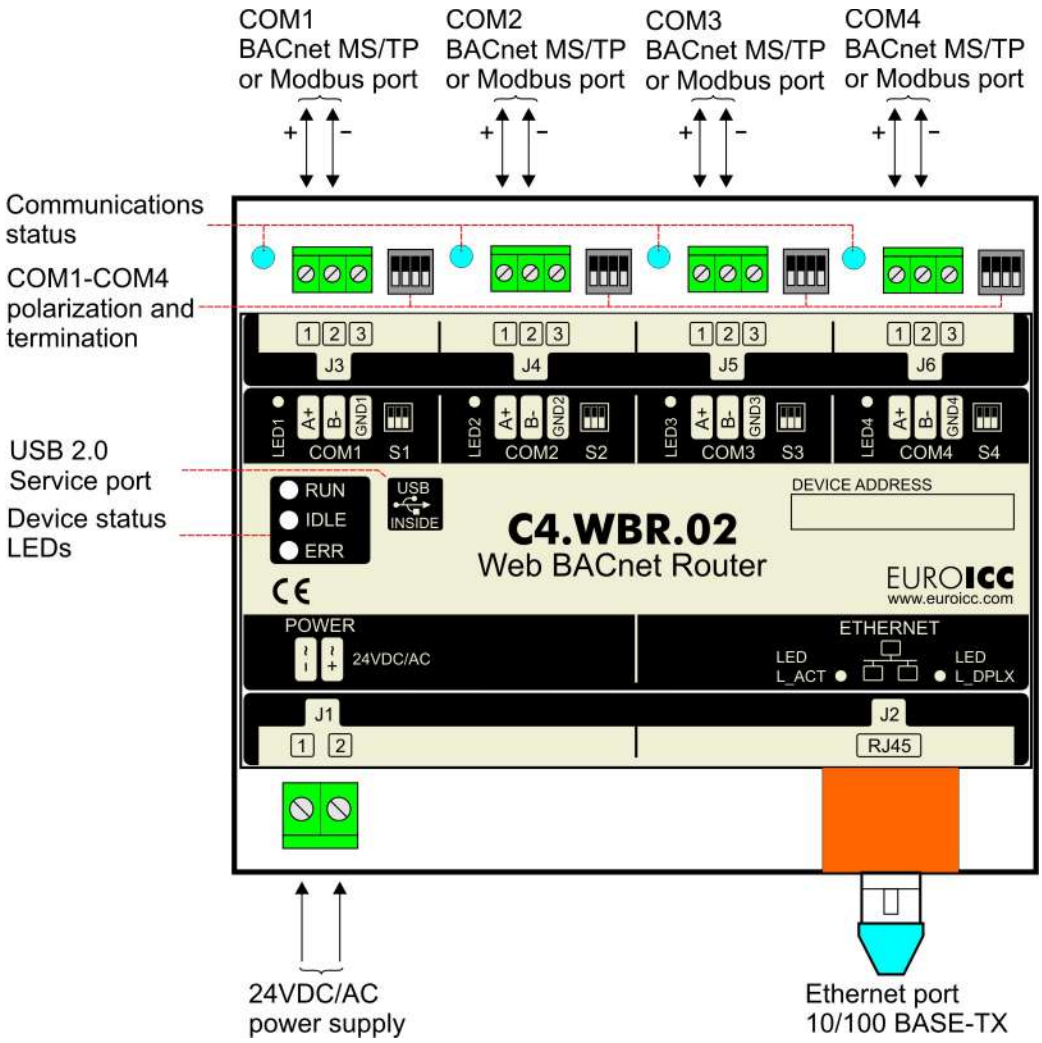

Figure 1: Wiring diagram

2.6 Mounting

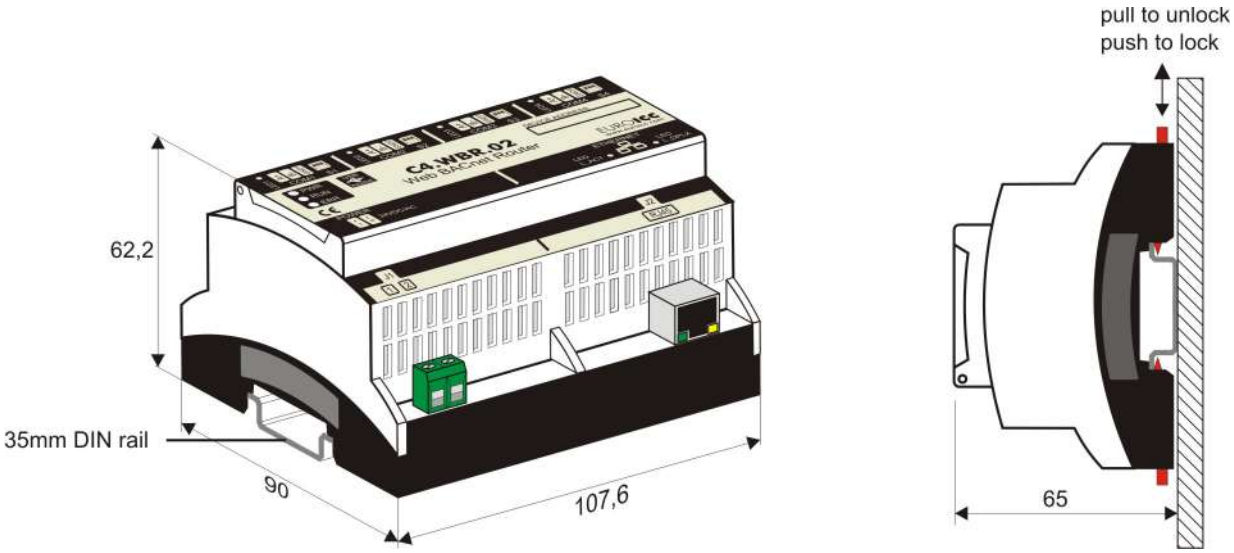

Figure 2: Mounting

2.7 Battery Replacement

To replace a battery for WBR, follow these steps:

1. Using a screwdriver, open the lid of the WBR (Figure 3)

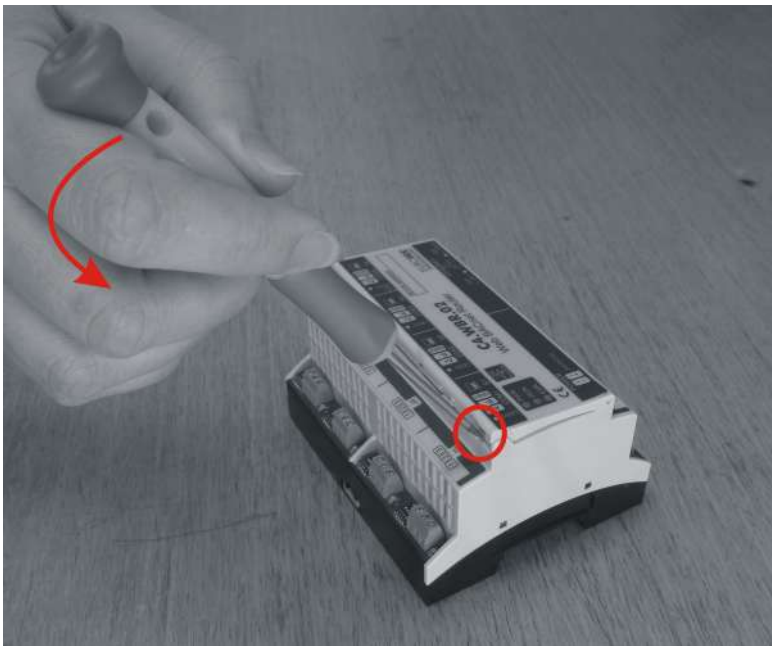

Figure 3

2. Remove the battery using tweezers (Figure 4)

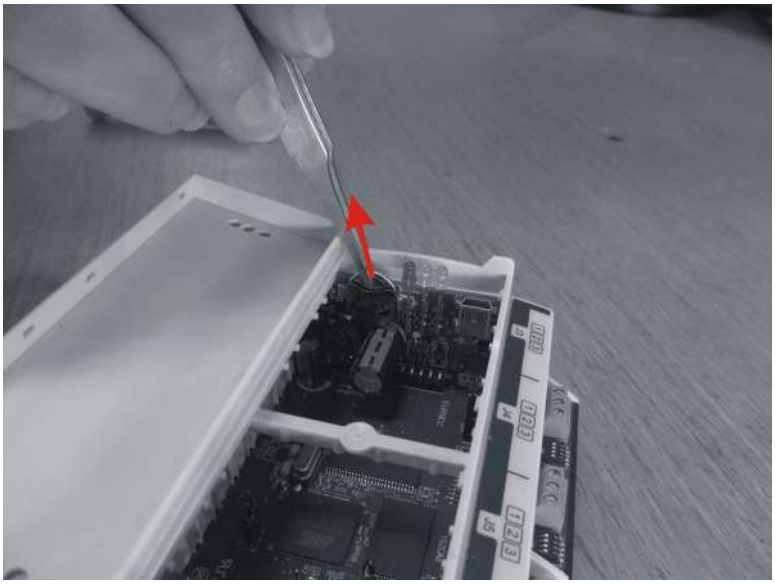

Figure 4

3. Insert standard CR 1220 battery in WBR's battery holder (Figure 5)

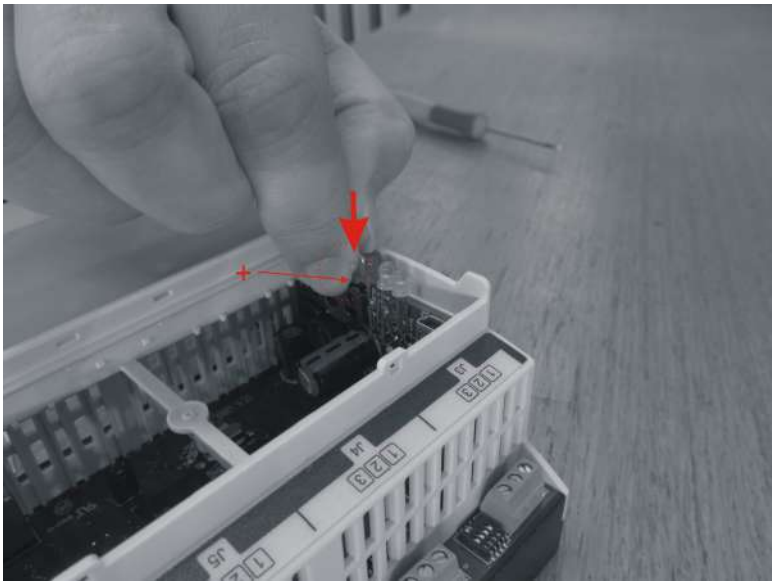

Figure 5

3 Quick Start Guide

In order to access and configure WBR, follow these steps:

- Connect WBR to power source and Ethernet cable (chapter 2.3).
- Default IP address and settings for WBR are:
    - Address: 192.168.0.100
    - Broadcast mask: 192.168.0.255
    - Netmask: 255.255.255.0

  Adjust your address and network mask accordingly.
- Turn on WBR.
- Open any internet browser (for example: Firefox, Chrome, Safari, Opera, Internet Explorer, etc.)
- Type the IP address of the WBR in the address bar (default address is 192.168.0.100).
- Continue with configuration (chapter 4).

4 Configuration

In your web browser, enter the IP address that you gave to BACnet router, for example **http://192.168.0.100**. The router module displays “Login to web server” page.

Figure 6: Administrator Login Page

Username for login is **admin** and default password is **admin**. The “Reset password” button resets user name and password to factory defaults; this button is functional only when the user accesses web interface via USB connection. Explanation on how to change user name and password may be found later in this manual (Chapter 2.8).

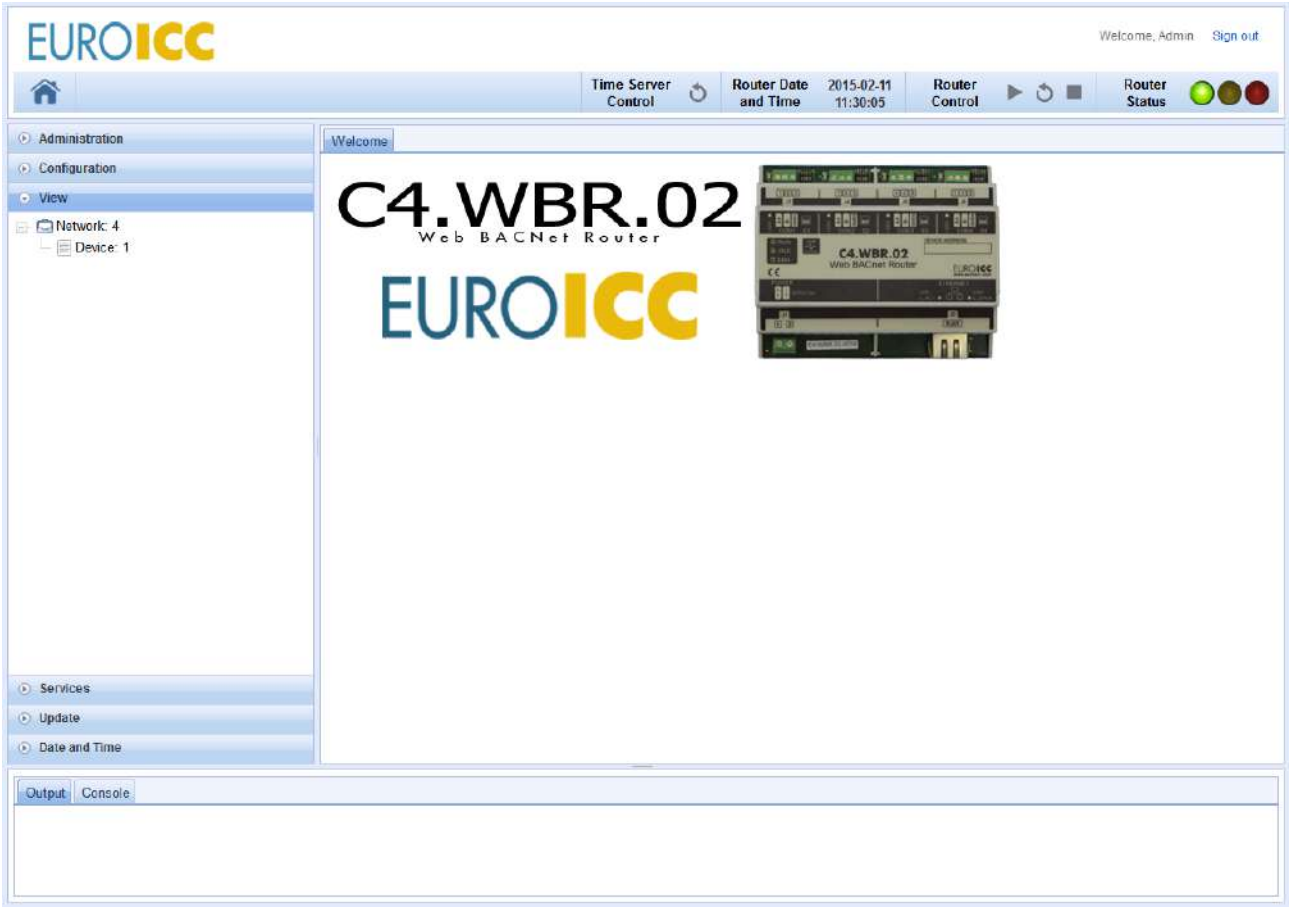

Figure 7: Main index page

If connection through Ethernet cable, for some reason, doesn't work, as a backup connection mini-USB should be used. Connection setup for USB is different for different operating systems. Configuration for most frequently used operating systems, such as Windows XP, Windows 7, MAC OS and Linux Debian is described with instructions in the following chapters.

2.8 Main Menu on Index Page

Panel for configuration on WBR are as follows:

- Home Page
- Administrator
- Configuration
- View
- Services
- Update
- Date and Time

Administrator page contains setup for Admin account which can access Web BACnet Router Application and use all privileges. Setup can change Admin name and Admin password.

Configuration tab contains setup for BACnet layers (datalink, network, and application) and IP settings for BACnet router. Setup for configuration layers is explained in the following chapters of this manual.

View tab contains view of properties of BACnet devices and objects, which are present in BACnet networks connected to WBR.

Services tab gives the user a way to manually send and receive BACnet messages. Should be used mainly for network debugging.

Update tab is used for uploading newer versions of WBR software. User should upload only software packages issued by EuroICC.

Date and Time tab contains setup for NTP servers and Time Zone.

2.9 Datalink layer configuration

Datalink setup supports three datalink layers: two standard ones, and one specific to EuroICC (MODBUS-to-BACnet bridge):

- MS/TP
- BACnet/IP (B/IP)
- Communication Bridge between MODBUS and BACnet protocols (MODBUS-to-BACnet, m2b).

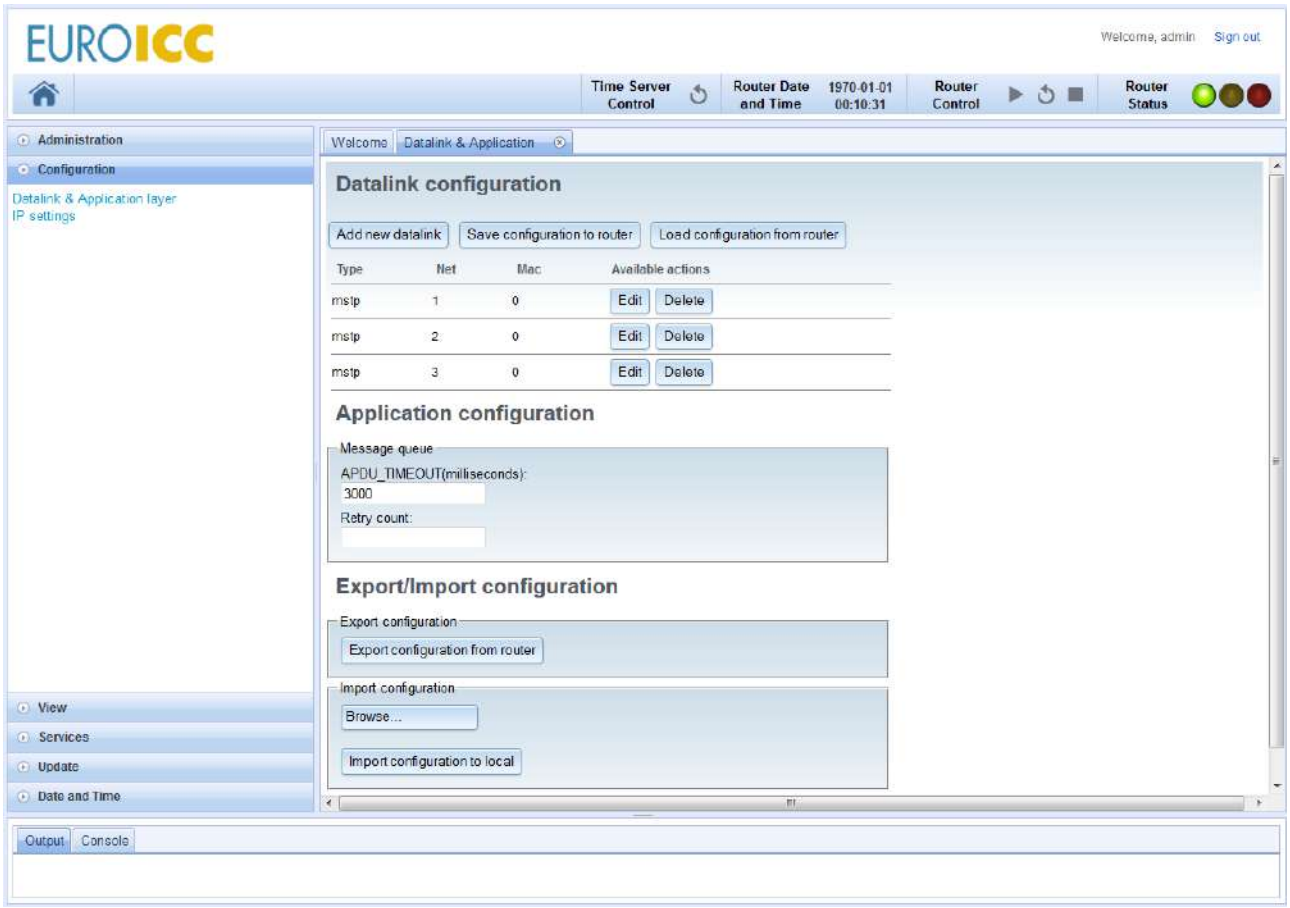

Figure 8: Main datalink and application configuration tab

4.1 MS/TP

Since MS/TP datalink uses serial communication, user must choose serial port and baud rate. Serial ports can't be shared among multiple communication layers.

MAC address for MS/TP is one byte; it must be unique within one BACnet sub-network, and should be in the range of 0 to Nmax_master (which is 127 by default).

Other parameters of MS/TP configuration are given in the following table. Note that the majority of users have no need for changing these parameters, aside from Nmax_info_frames and Tusage_timeout, which should be set according to the network topology and baud rate.

Parameters	**Description**	**Minimum-Maximum**	**Default value**
Nmax_info_frames	This parameter represents the value of the Max_Info_Frames property of the node's Device object. The value of Max_Info_Frames specifies the maximum number of information frames the node may send before it must pass the token. Max_Info_Frames may have different values on different nodes. This may be used to allocate more or less of the available link bandwidth to particular nodes. If Max_Info_Frames is not writable in a node, its value shall be 1.	1-4	1
Nmax_master	This parameter represents the value of the Max_Master property of the node's Device object. The value of Max_Master specifies the highest allowable address for master nodes. The value of Max_Master shall be less than or equal to 127. If Max_Master is not writable in a node, its value shall be 127.	1-254	127
Npoll	The number of tokens received or used before a Poll For Master cycle is executed: 50.	10-500	50
Nretry_token	The number of retries on sending Token: 1.		1
Nmin_octets	The minimum number of DataAvailable or ReceiveError events that must be seen by a receiving node in order to declare the line "active": 4.	1-10	4

Tframe_abort	The minimum time without a DataAvailable or ReceiveError event within a frame before a receiving node may discard the frame: 60 bit times. (Implementations may use larger values for this timeout, not to exceed 100 milliseconds.)	10-100	60
Tno_token	The time without a DataAvailable or ReceiveError event before declaration of loss of token: 500 milliseconds.	200-800	500
Tusage_timeout	The minimum time without a DataAvailable or ReceiveError event that a node must wait for a remote node to begin using a token or replying to a Poll For Master frame: 20 milliseconds. (Implementations may use larger values for this timeout, not to exceed 100 milliseconds.)	20-100	20

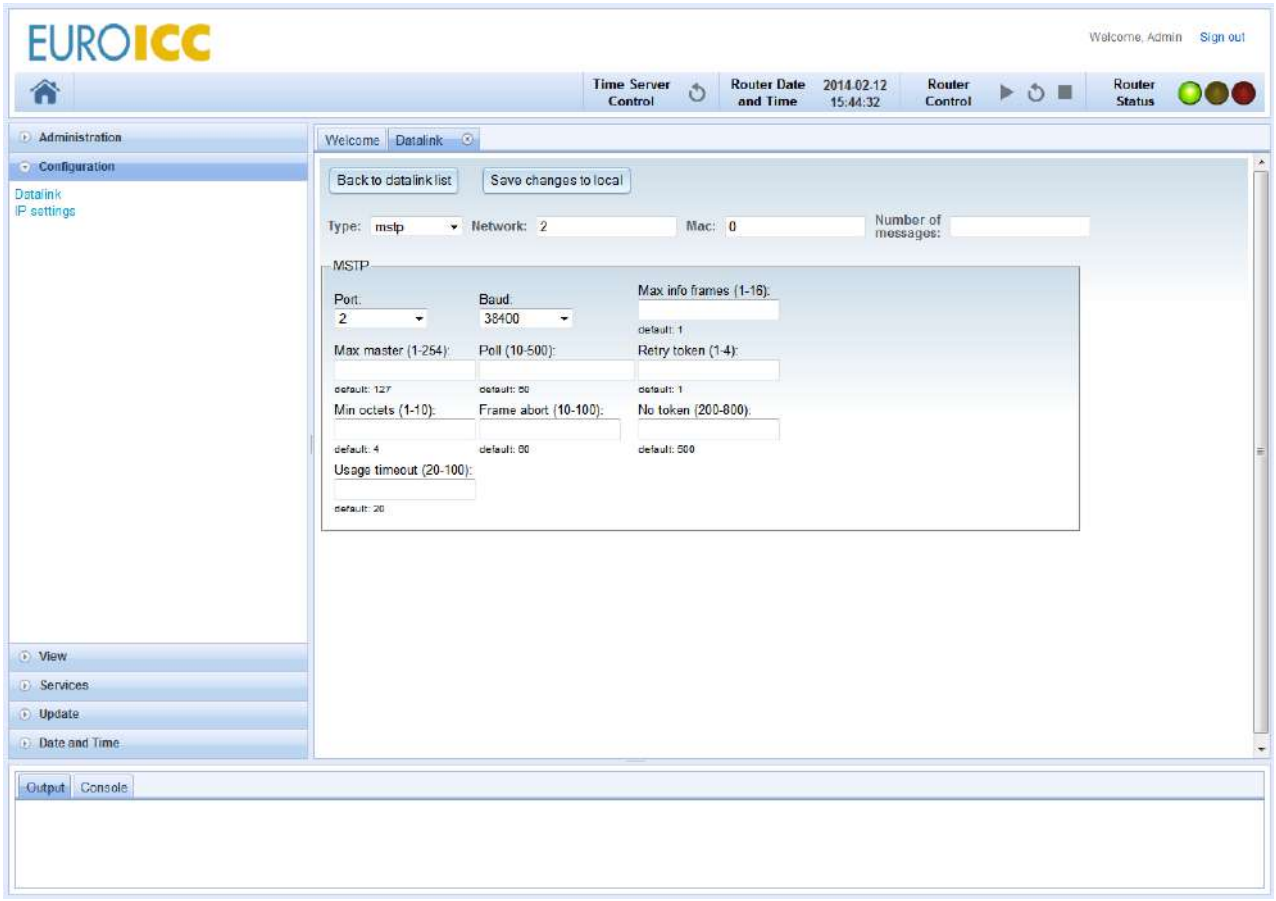

Figure 9: MS/TP configuration tab

Additionally user can enable polarization and termination resistors independently for every serial port using provided dipswitches. Figure 10 depicts one serial port with described dipswitch functionality.

When dipswitch 4 is in "ON" position, termination resistor of 120 Ω is connected between A+ and B- lines.
When dipswitches 3 and 2 are in "ON" positions, 560 Ω resistor is connected between GND and B-, and another 560 Ω resistor is connected between VCC and A+. Dipswitches 2 and 3 should always be used together.
Dipswitch 1 is unused.

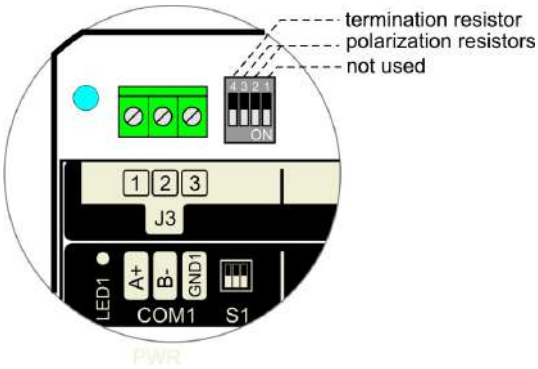

Figure 10: Termination and polarization resistors

4.2 BACnet/IP (B/IP)

B/IP datalink layer enables integration of BACnet devices on IP networks, with some limitations. MAC address is six bytes long, and consists of IP address (first four bytes) and port (last two bytes). Default IP port for BACnet is 47808 (0xBAC0), but others can be used at user's discretion. It is possible to define different B/IP networks on WBR by using different port numbers. BACnet over IP uses UDP protocol, which is packet-oriented, light-weight, but doesn't guarantee that each transaction actually reached its destination.

The main limitation of BACnet/IP is message broadcasting over different sub-networks. To amend this, the concepts of BBMD (BACnet Broadcast Management Device), BDT (Broadcast Distribution Table) and FDT (Foreign Device table) are introduced.

Each IP sub-network shall have one and only one BBMD, which will handle all broadcast requests. All BBMD's in one B/IP network must have identical BDT, and it is the duty of system integrator to make sure they do.

In the case where one BACnet device wants to join B/IP network, but there are no BBMDs in its sub-network, device can register itself as a Foreign Device to any of the existing BBMDs in that BACnet network.

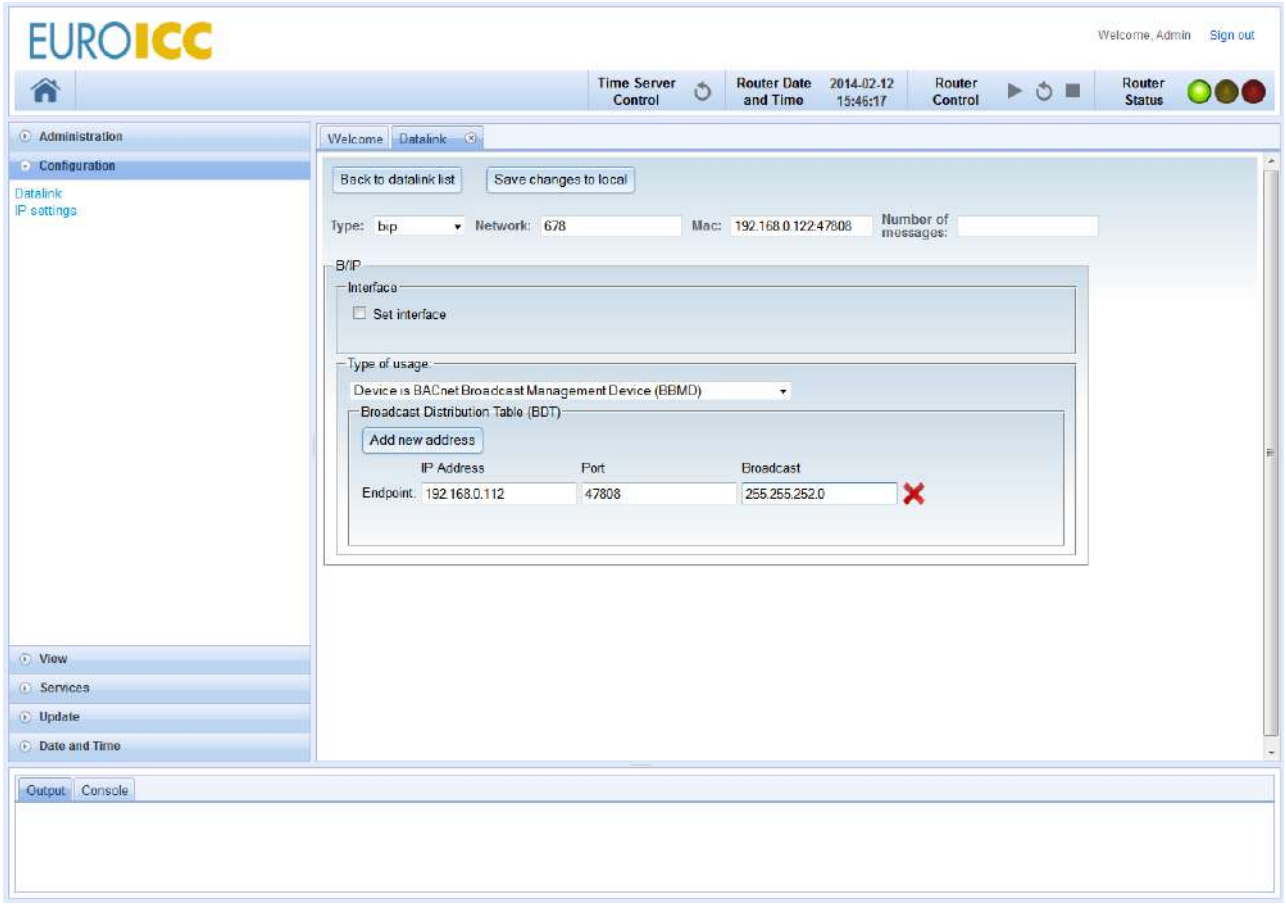

Figure 11: BACnet/IP configuration tab when device is BBMD

Default IP interface for B/IP is “eth0”, which is ethernet connection. The other option, which should be used only for debugging purposes is “usb0”, which stands for USB-to-ethernet bridge.

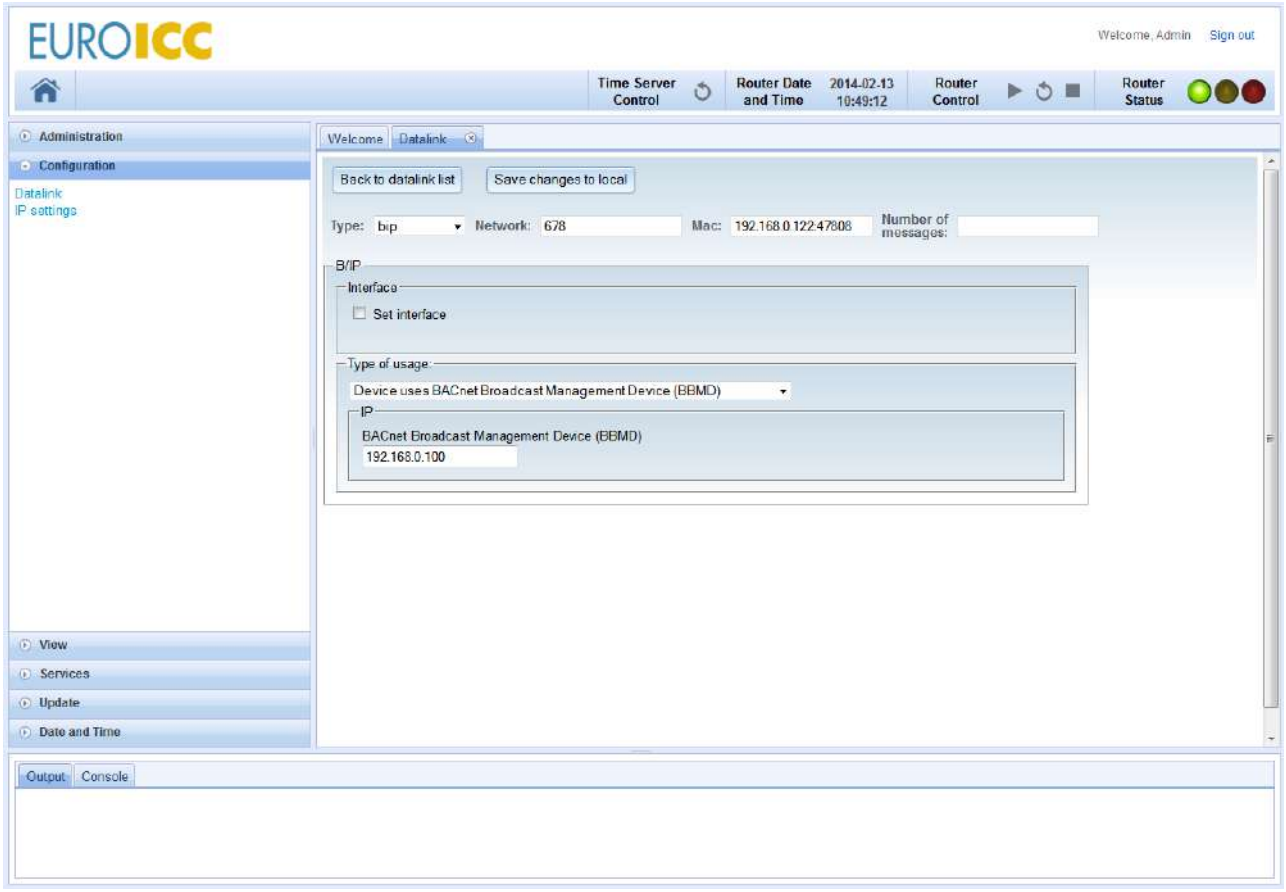

Figure 12: BACnet/IP configuration tab when device use BBMD

On B/IP configuration page, user can set the type of device usage. Options are:

- WBR is a simple B/IP device. No additional configuration options are available.
- WBR is a BACnet/IP Broadcast Management Device (as shown on image 2.1.b). Initial BDT can be set in the following format: IP address, port, BACnet broadcast mask (which is identical to IP netmask).
- WBR is a Foreign Device. The only additional parameter is IP address and port of a BBMD.

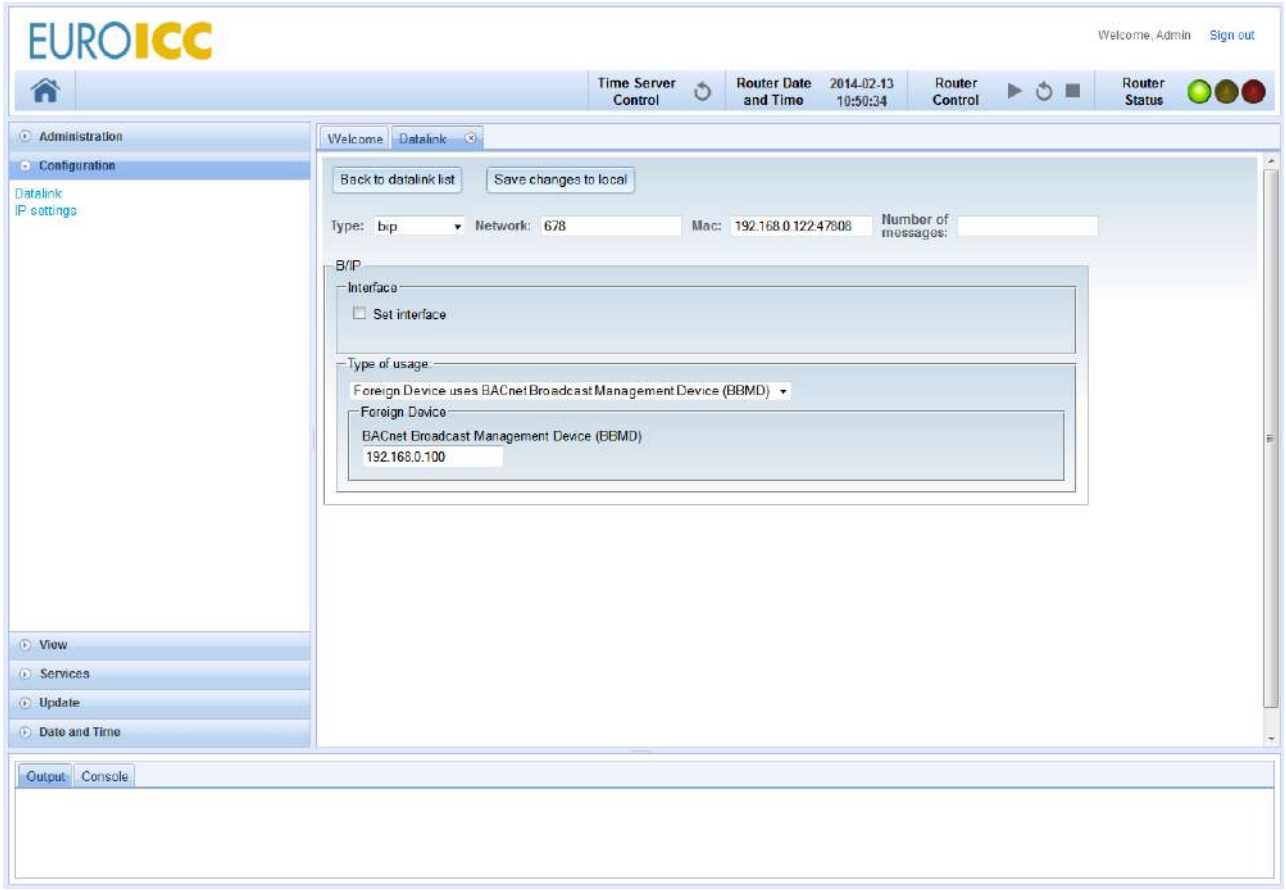

Figure 13: Foreign Device configuration tab when use BBMD

4.3 Modbus-to-BACnet (M2B)

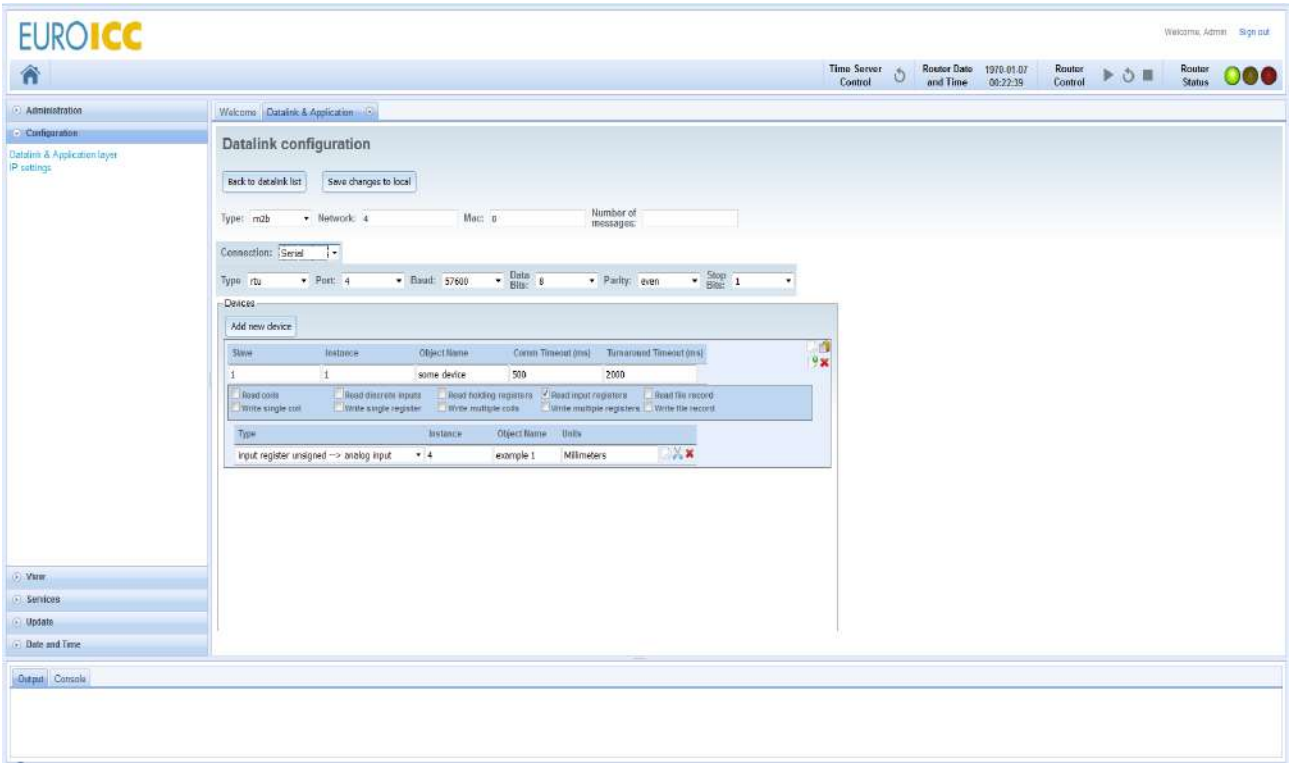

Figure 14: M2B configuration tab with RTU mode

Modbus communication can operate in two serial modes (rtu and ascii) and one IP mode. There are several things that should be kept in mind:

- rtu mode requires 8 data bits
- ascii mode requires 7 data bits and 2 stop bits
- default parity is even, but odd and no parity are supported
- no parity implies 2 stop bits in any serial mode
- IP mode implies an additional address field for each slave device
- MAC should be 0 for all Modbus types, since it is reserved value and can't be used in Modbus network.

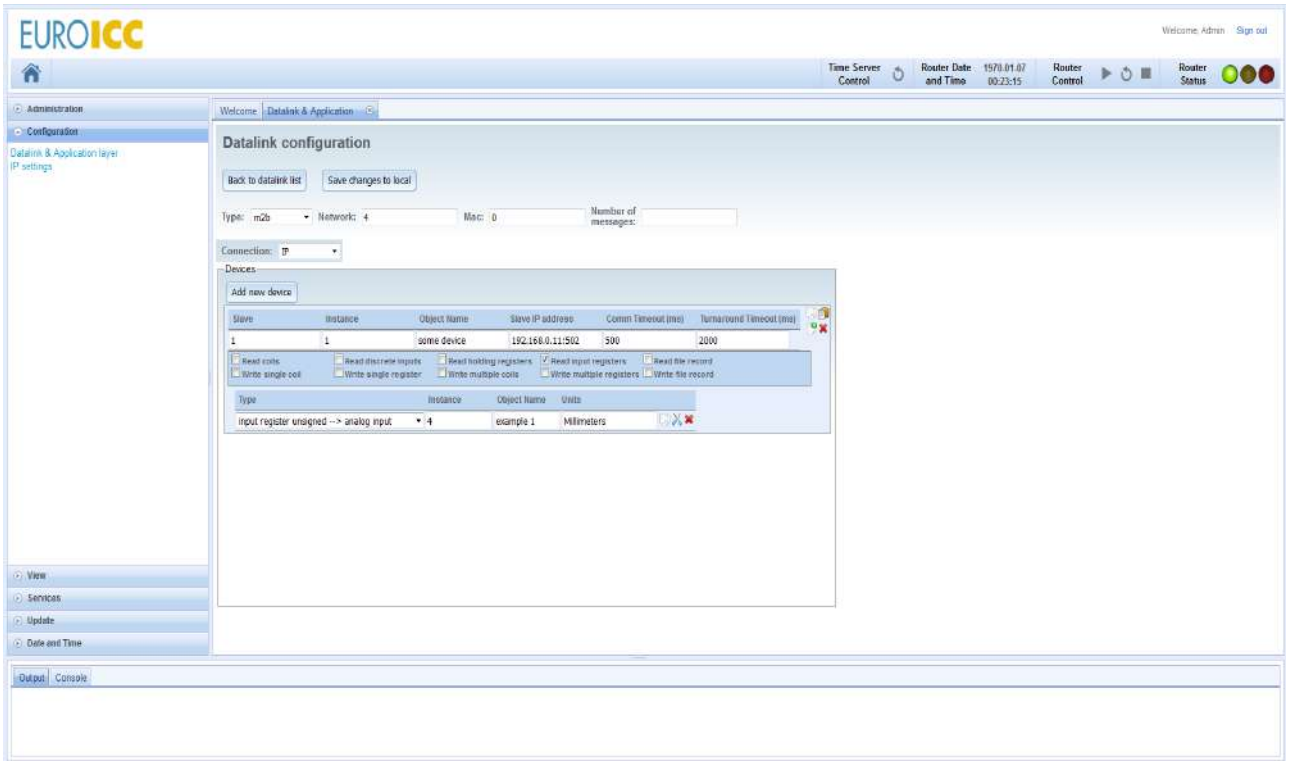

Figure 15: M2B configuration tab with IP communication

M2B provides mapping for Modbus slave devices into BACnet devices by setting the following values:

- slave id of the Modbus device (1-247)
- name and instance id for the device (both should be unique across BACnet internetwork)
- communication timeout – the value in milliseconds after which the driver will consider the error in communication, if no valid message was received
- turnaround timeout – the value in milliseconds of the minimum time the driver will take between two consecutive reads of the same device
- for Modbus/IP only: address and port (default port for Modbus is 502, but others can be used)
- each Modbus device can support one or more Modbus functions: read coils, read discrete inputs, read holding registers, read input registers, write single coil, write single register, write multiple coils, write multiple registers, read file record, and write file record. WBR will not allow definition of an object without support for read function for that data type. Write functions are optional, and at least one version (single or multi-write) is necessary for Write-Property service support.

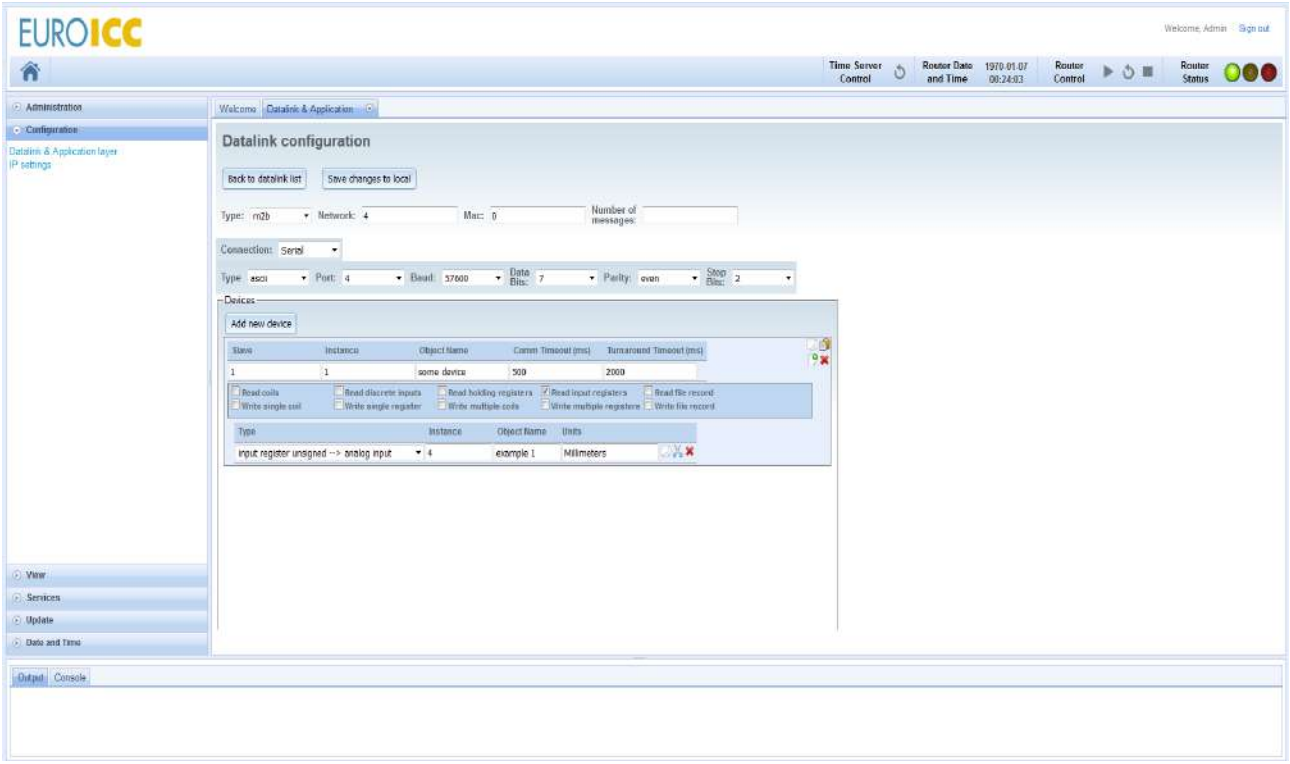

Figure 16: M2B configuration tab with ASCII mode

Aside from device mapping, M2B also maps Modbus values to BACnet objects:

- Coils are mapped to Binary Values, Discrete Inputs to Binary Inputs, Holding Registers to Analog Values, Input Registers to Analog Inputs, and Modbus Files to BACnet Files with record access.
- Holding Registers and Input Registers can be used as one register containing unsigned or signed 16-bit integer value, or as two consecutive registers treated as single wide register with 32-bit float value in normal (higher 16 bits in lower register) or swapped order (lower 16 bits in lower register).
- all objects must have names and instance ids, which must be unique within one device
- registers can have specified units of measurements
- discrete inputs can have specified polarity

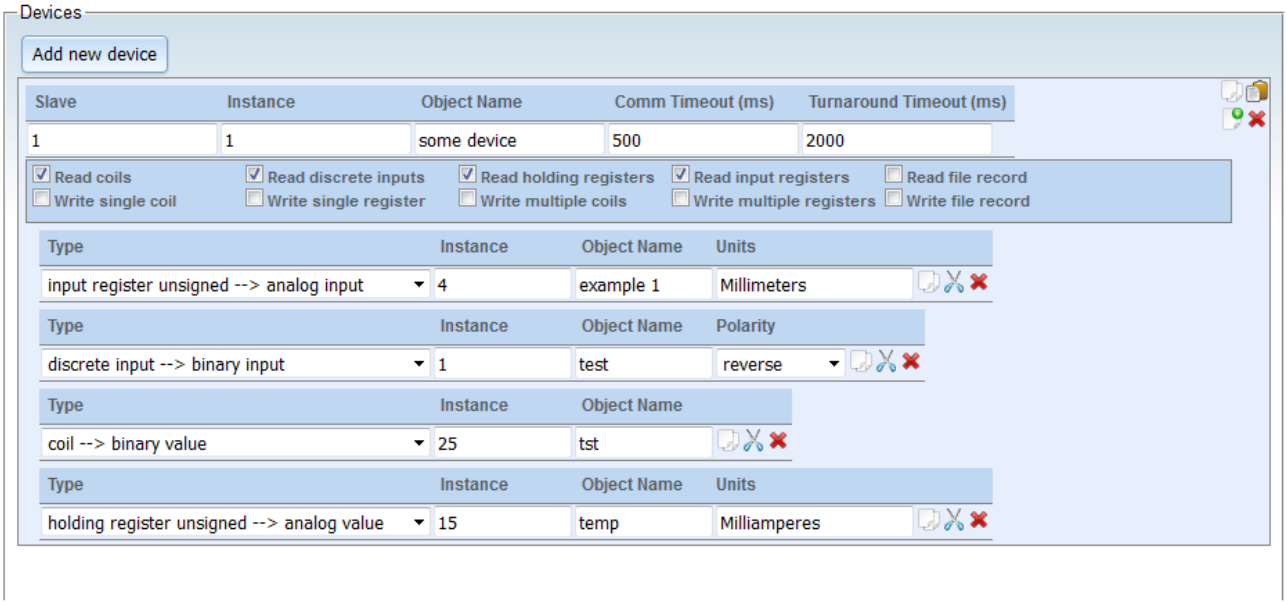

Figure 17: MODBUS devices configuration field

2.10 Application layer configuration

There are two options for Application layer:

- APDU timeout – the time WBR will wait for a reply for Confirmed services before attempting retry or declaring communication timeout.
- Retry count – the number of times WBR will try sending the same message after the first APDU timeout has passed.

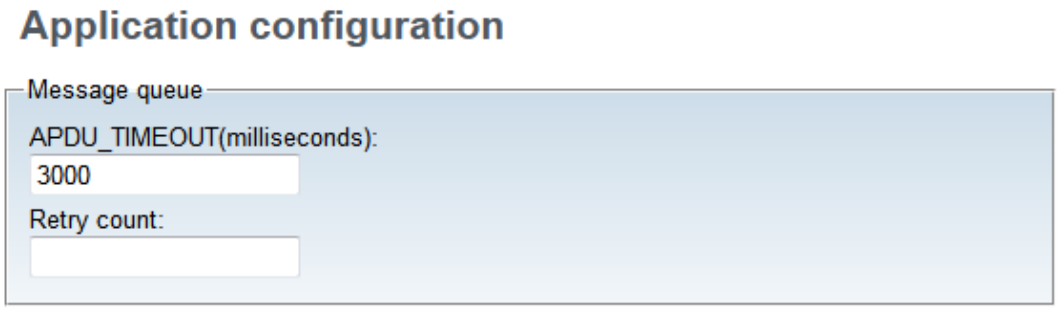

Figure 18: Application Layer configuration

2.11 IP interface settings

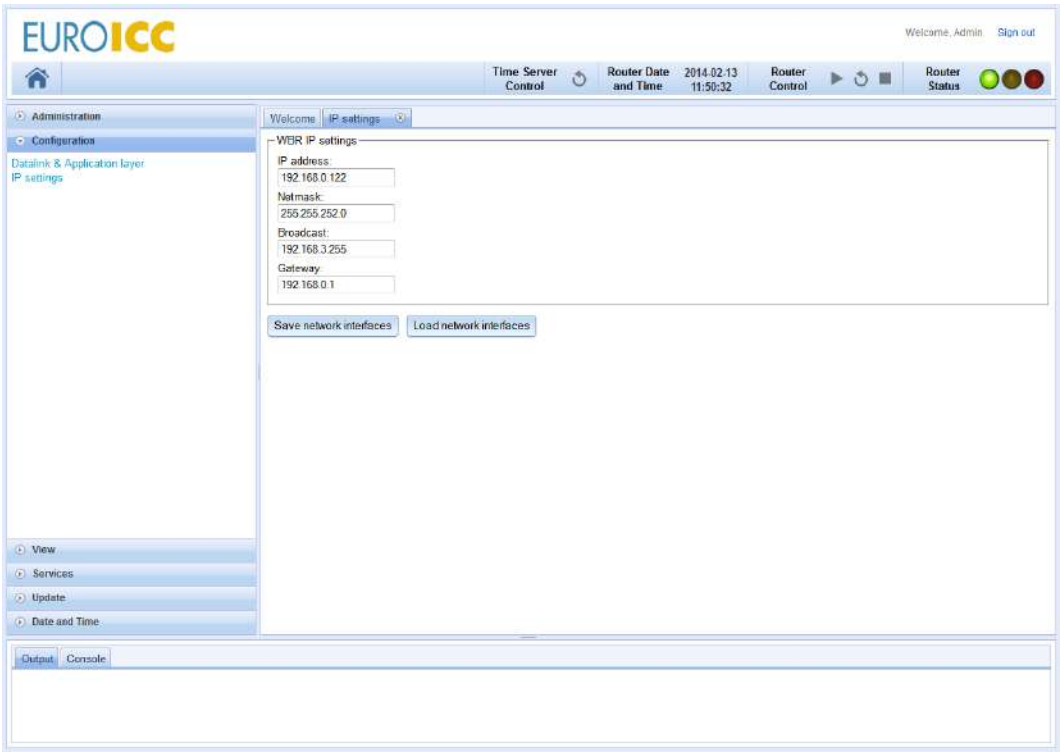

Figure 19: IP settings configuration

WBR has two network interfaces: ethernet and USB. Only settings for ethernet connection can be changed, because USB port is used mainly for debugging purposes.

IP Settings page

The following parameters for ethernet connection are available:

Parameters	**Description**
IP Address	The IP address of the router module in the designated network
Netmask	The subnet mask of the router module according to the IP address
Broadcast	Broadcast refers to transmitting a packet that will be received by every device on the network
Gateway	In networks where subnetworks are connected by IP routers, this address is used to define the gateway to other networks (the IP address of the router of the

	subnetwork where your router module is installed). If default gateways are used, broadcast messages are most likely blocked by the IP routers and you need to use a BBMD to transport the broadcast messages.

2.12 Save and load configuration

The ***Save changes to local*** button temporarily saves the changes made on this page. If you want to save configuration on router, you need to go back on datalink list and click ***save configuration to router*** button. Also, if you want to load configuration from router you click ***load configuration from router*** button.

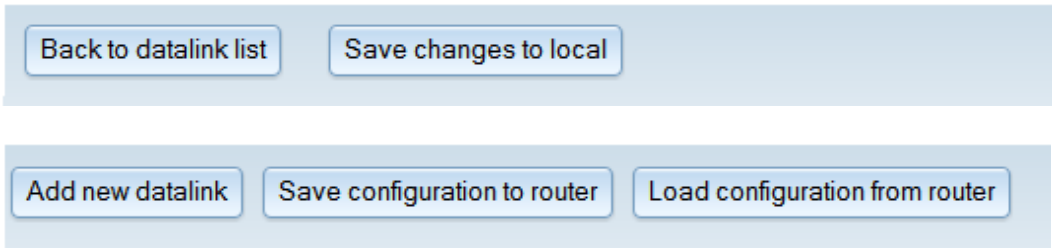

Figure 20: Save and Load XML configuration

Note: You must save your changes before switching to another configuration page. If you switch to another page without saving, the changes will be lost.

2.13 Export/Import configuration

The "*Export configuration from router"* button saves Web BACnet Router configuration to local machine. This configuration can be loaded to any WBR device by using "Import configuration" dialog.

Figure 21: Export/Import configuration

2.14 Connecting to WBR via USB

If, for any reasons, user can't connect to WBR via Ethernet (for example: bad address, bad netmask, etc.), there is a fallback network communication for WBR via USB. WBR's IP address on USB interface is 10.0.0.1 and it cannot be changed by user. The DHCP on WBR will assign IP addresses in the range of [10.0.0.10 – 10.0.0.40] to any connecting device.

In order to enable network communication over USB with WBR, user must:

- Install the appropriate driver on their computer (see below)
- Turn on WBR.
- Connect WBR and their computer via micro-USB cable.
- Open any internet browser (for example: Firefox, Chrome, Safari, Opera, Internet Explorer, etc.)
- Type 10.0.0.1 in the address bar.
- Reconfigure Ethernet IP settings on WBR.
- Do a soft restart of WBR.
- Disconnect WBR from computer.

4.4 For Windows XP

When USB cable is plugged into the Windows XP, it should detect the new hardware and display a dialog. If so, proceed to Step 4, if not, then start setup from Step 1.

Step 1: Right click on My Computer → Properties

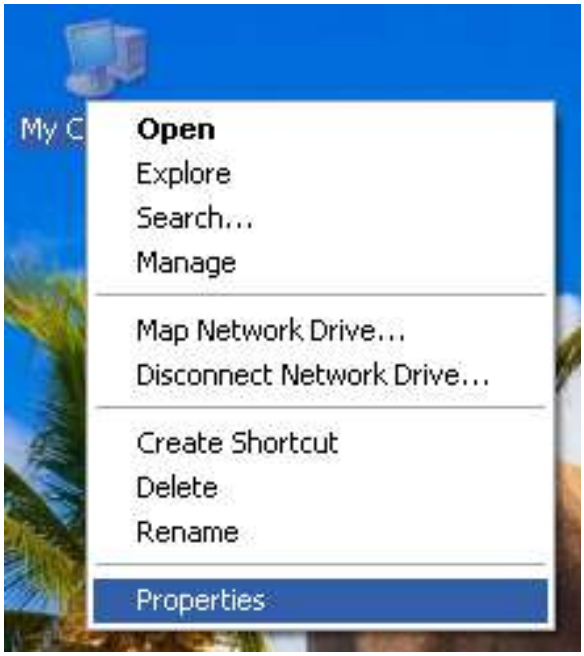

Figure 22: First Step for USB Setup

Step 2: Select Device Manager

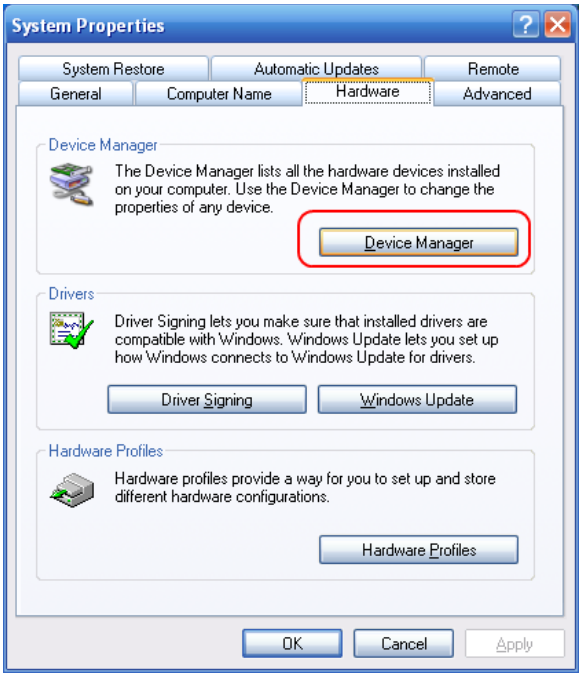

Figure 23: Step 2 for USB Setup

Step 3: Right click on device found by Windows XP name RNDIS/Ethernet Gadget→ Update Driver.

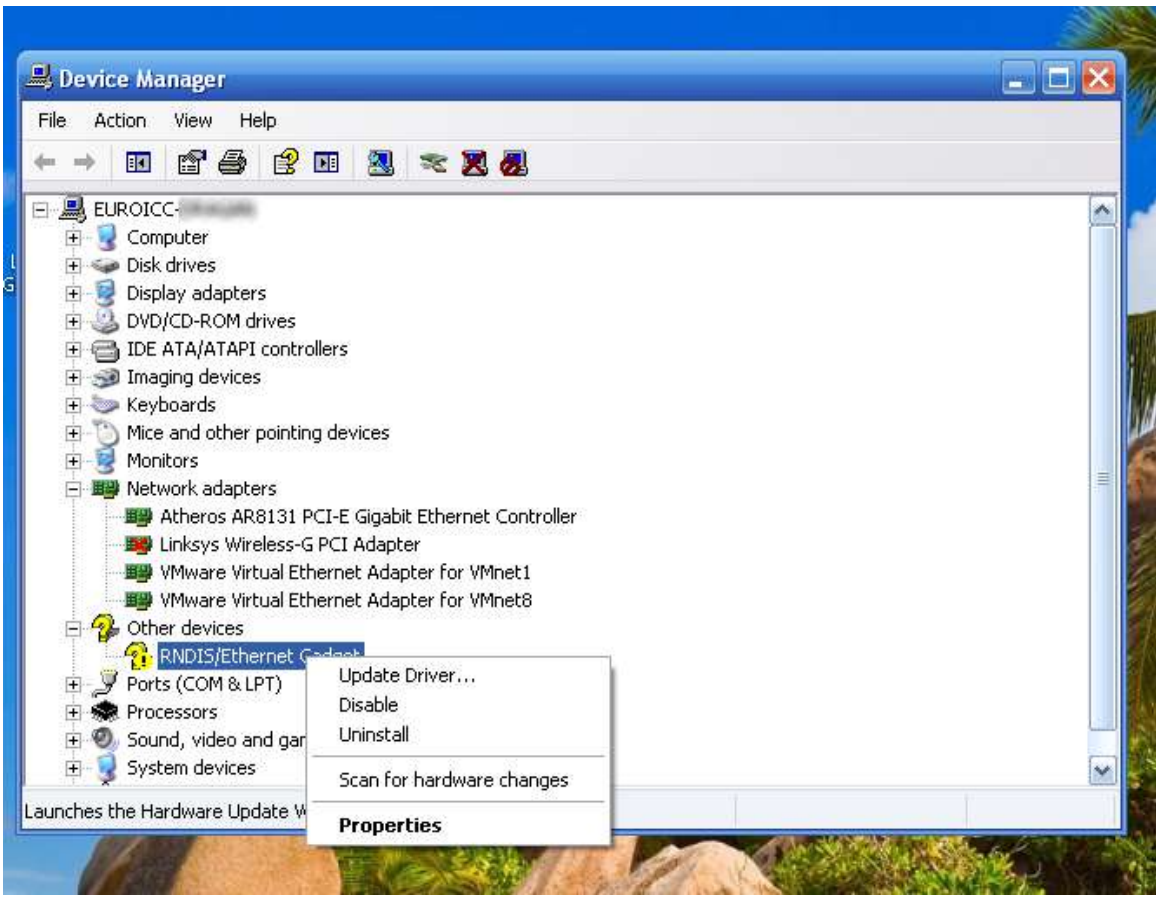

Figure 24: Step 3 for USB Setup

Step 4: Choose "No, not this time"

Figure 25: Found New Hardware Wizard - Step 1

Step 5: Choose "Install from a list or specific location" and click Next

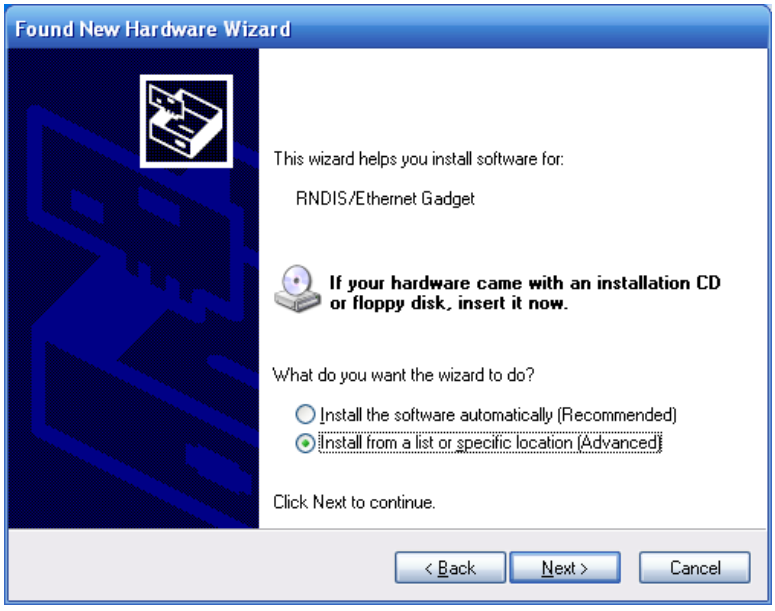

Figure 26: Found New Hardware Wizard - Step 2

Step 6: Choose "Don't search. I will choose the driver to install."

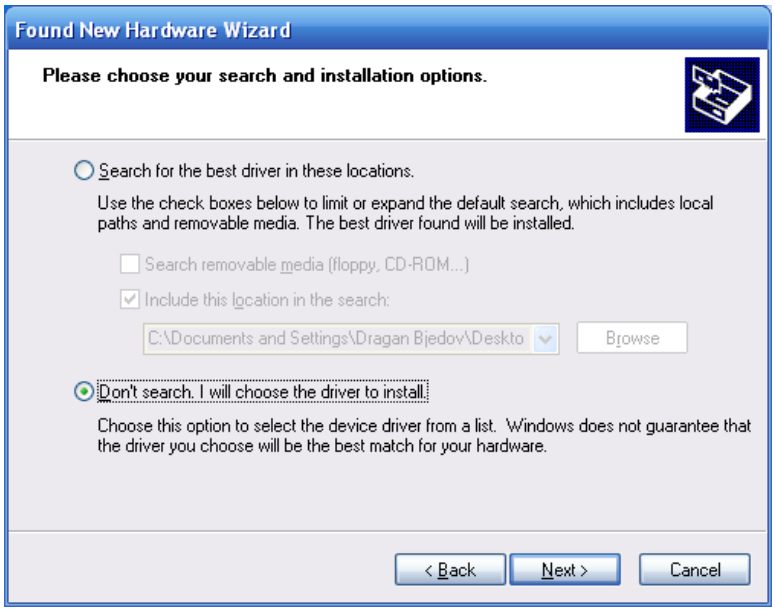

Figure 27: Found New Hardware Wizard - Step 3

Step 7: Select Network Adapters and click Next.

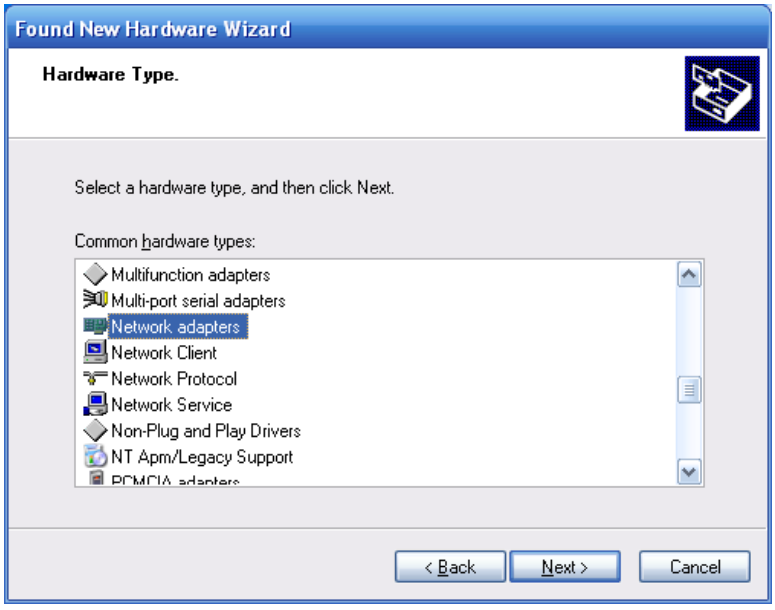

Figure 28: Found New Hardware Wizard - Step 4

Step 8: Click on Have Disk...

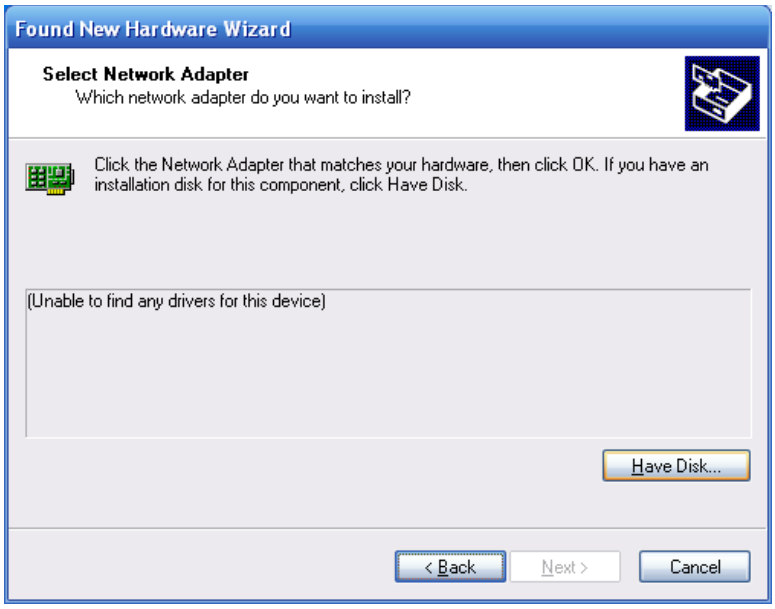

Figure 29: Found New Hardware Wizard - Step 5

Step 9: Find the directory containing the linux.inf file. USB driver can be found on the accompanying USB drive, in folder "drivers", or on the address: ***http://www.davehylands.com/linux/gumstix/usbnet/linux.inf*** *,*

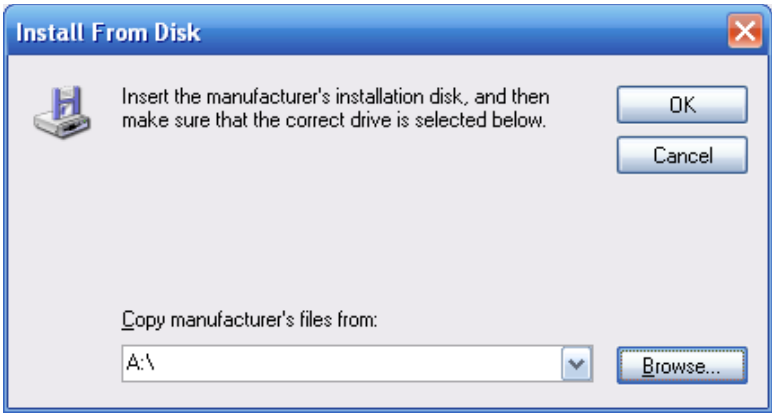

Figure 30: Found New Hardware Wizard - Step 6

Step 10: Select the linux.inf file

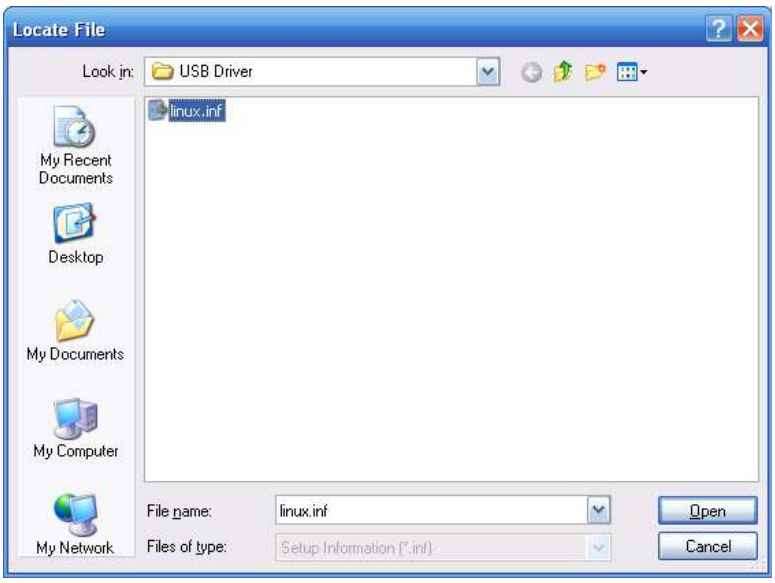

Figure 31: Found New Hardware Wizard - Step 7

Step 11: The directory containing the linux.inf file should be selected. Click OK.

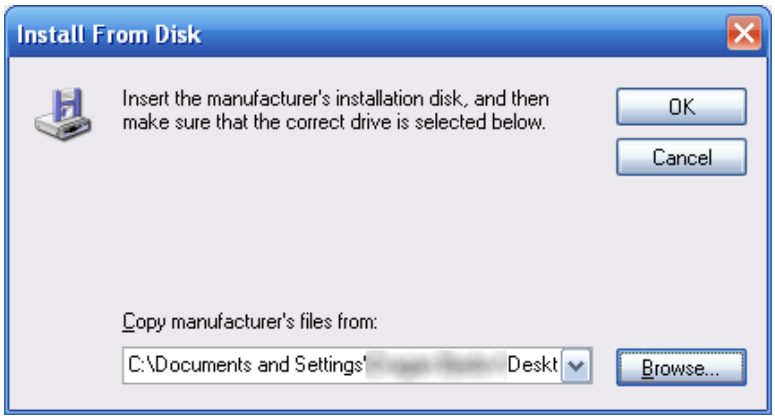

Figure 32: Found New Hardware Wizard - Step 8

Step 11: Select the Linux USB Ethernet/RNDIS Gadget and click Next.

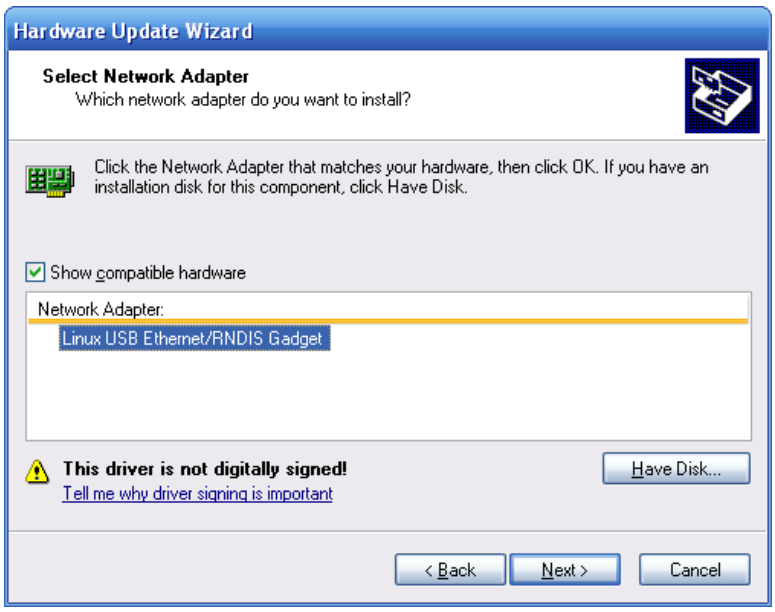

Figure 33: Found New Hardware Wizard - Step 9

Step 11: You'll probably get this warning from XP. Click Continue Anyway.

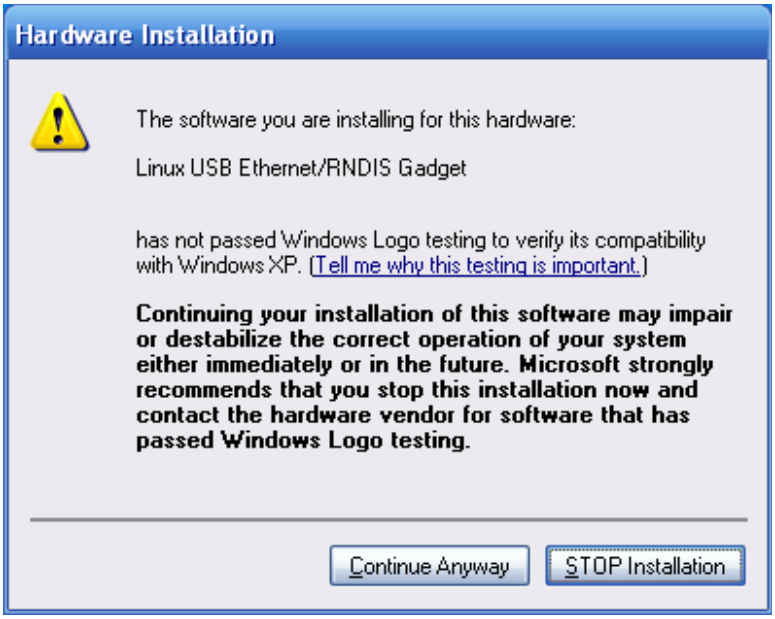

Figure 34: Found New Hardware Wizard - Step 10

Step 12: Click Finish

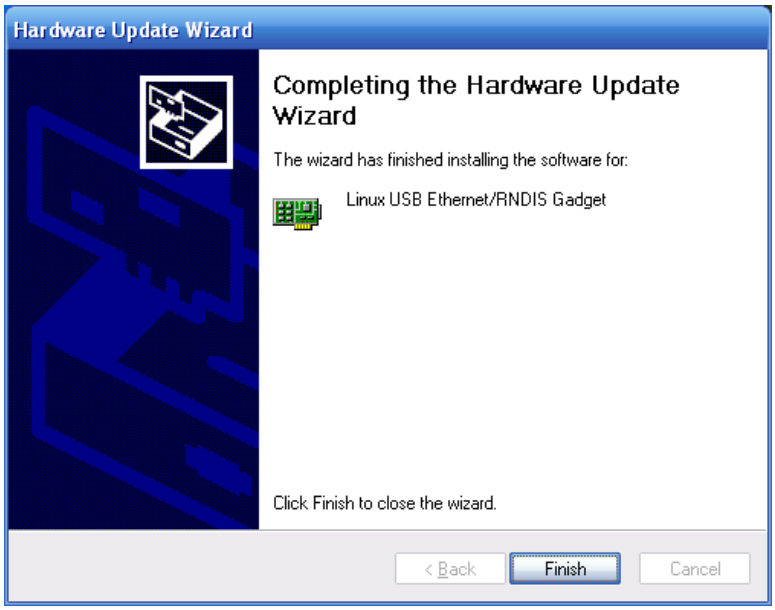

Figure 35: Found New Hardware Wizard - Step 11

Step 13: Result of installation is shown on Figure 36

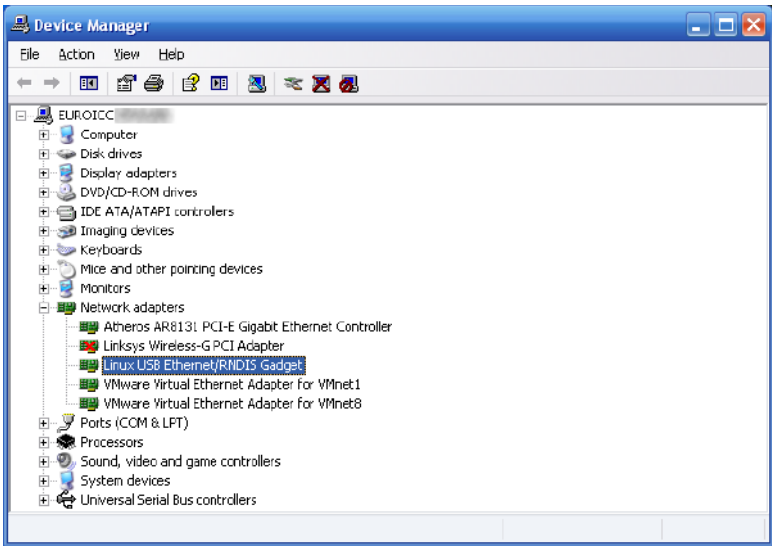

Figure 36

Step 14: In your web browser, enter the immutable IP address of the BACnet router, http://10.0.0.1. The router module will then display "Login to web server" page, and you can proceed with configuration by going to chapter 4.

4.5 For Windows 7

Step 1: Click Start

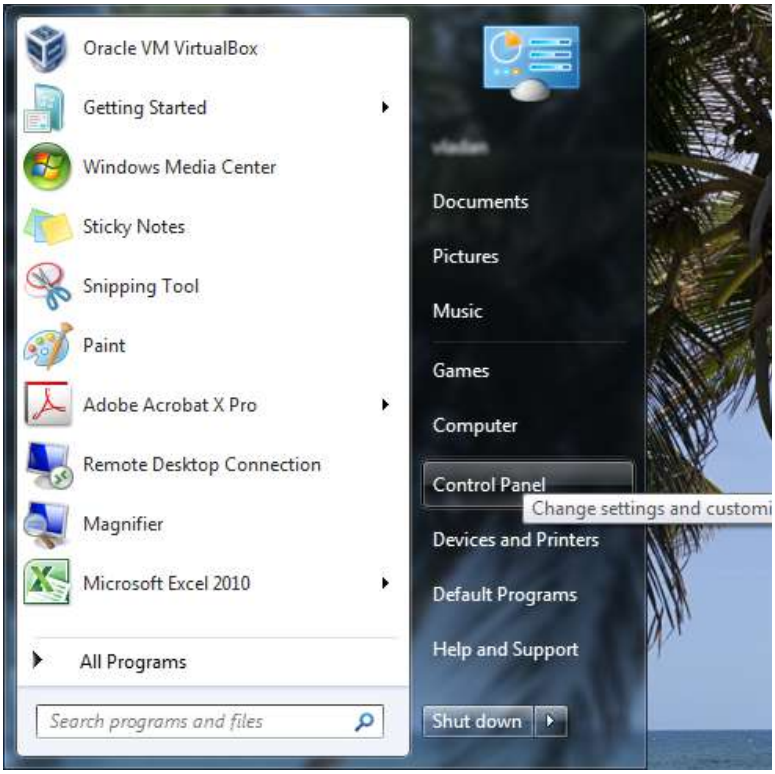

Figure 37

Step 2: Open Device Manager

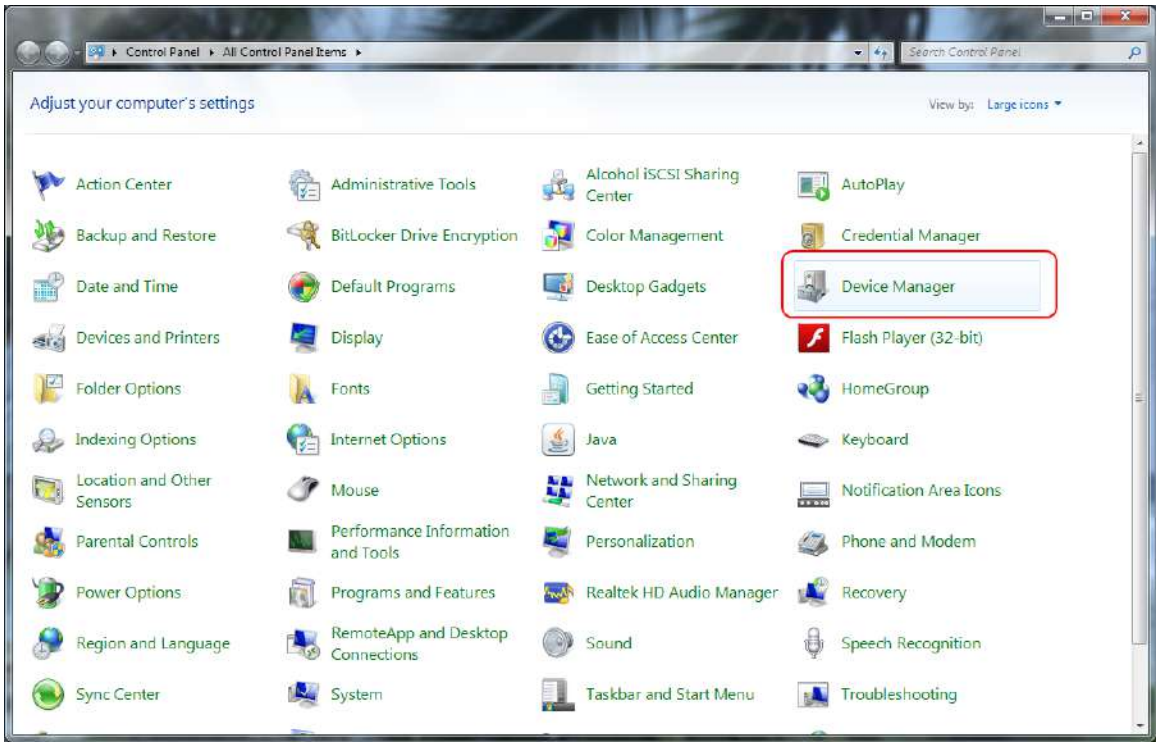

Figure 38

Step 3: Right click on USB Controller → Properties

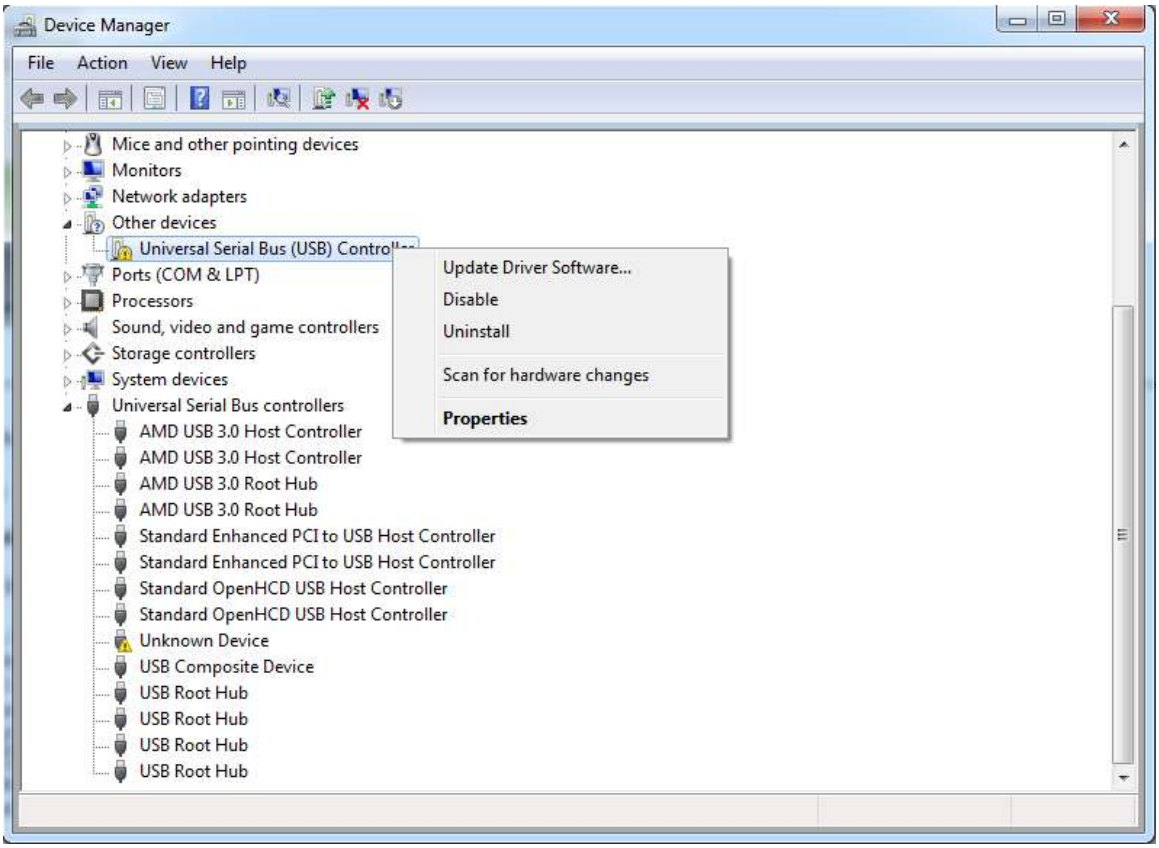

Figure 39

Step 4: Select "Browse my computer for driver software"

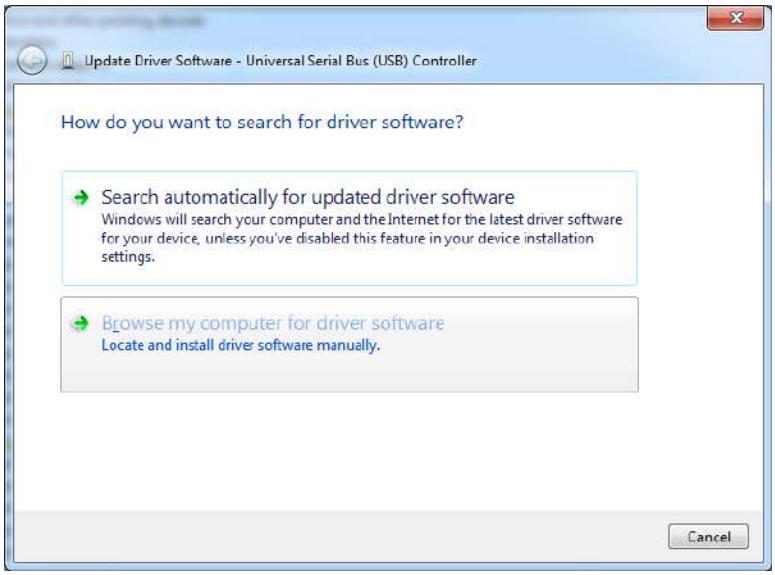

Figure 40

Step 5: Select "Let me pick from a list of device drivers on my computer"

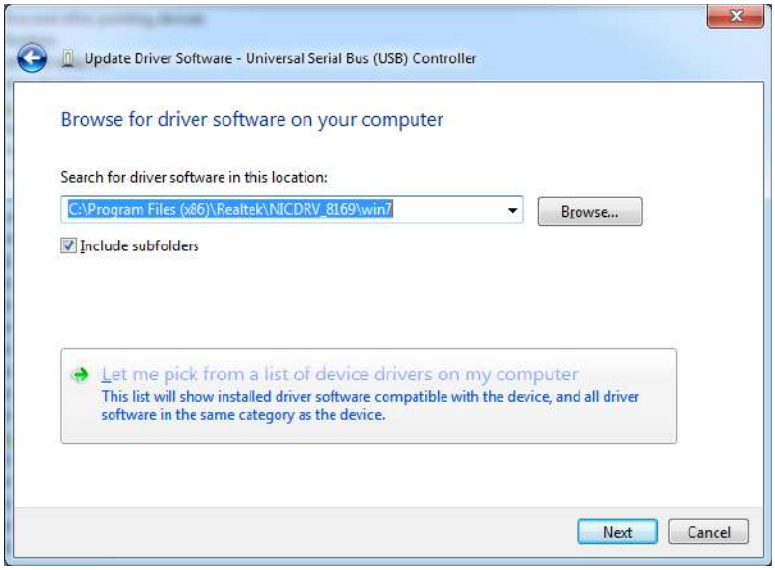

Figure 41

Step 6: Select “Network adapters” from the list of devices

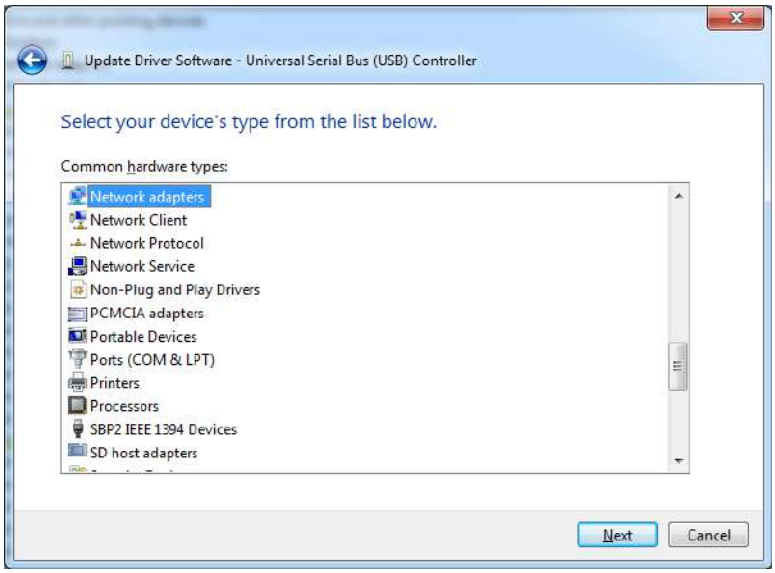

Figure 42

Step 7: In Manufacturer column, select “Microsoft Corporation”

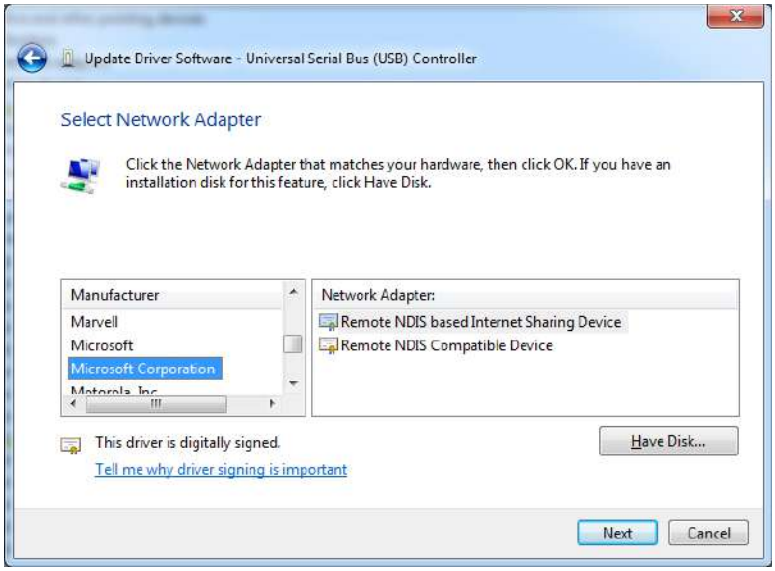

Figure 43

Step 8: In Network Adapter column, select "Remote NDIS based Internet Sharing Device"

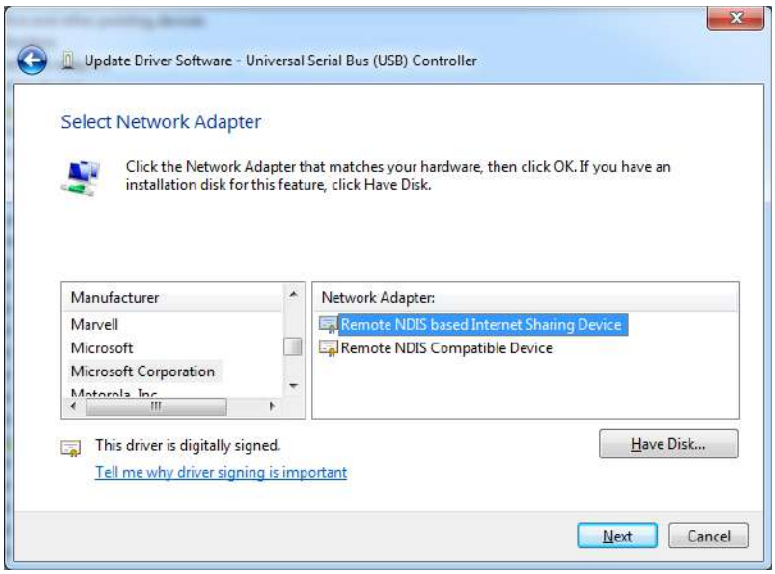

Figure 44

Step 9: When prompted security issue for Windows, click Yes

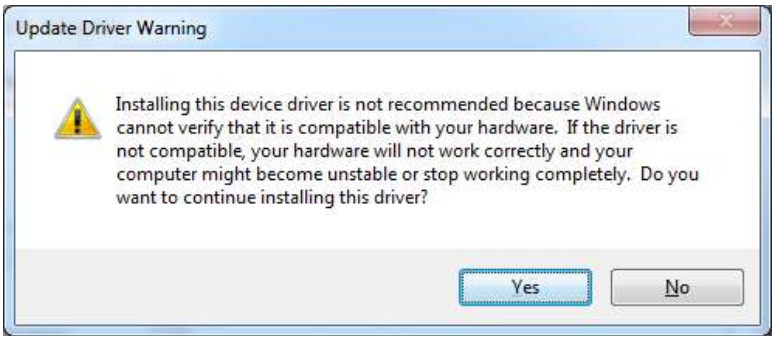

Figure 45

Step 10: Wait for Windows to install driver

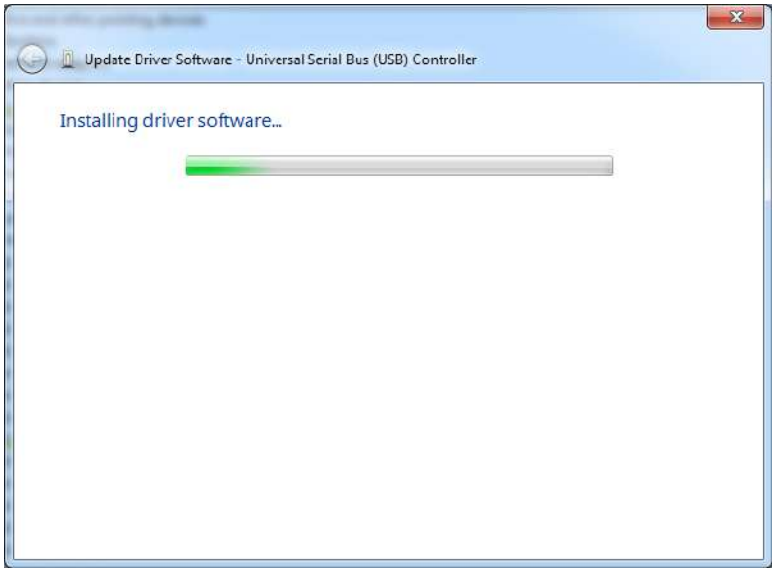

Figure 46

Step 11: After installation, installed device will be shown in Device Manager window

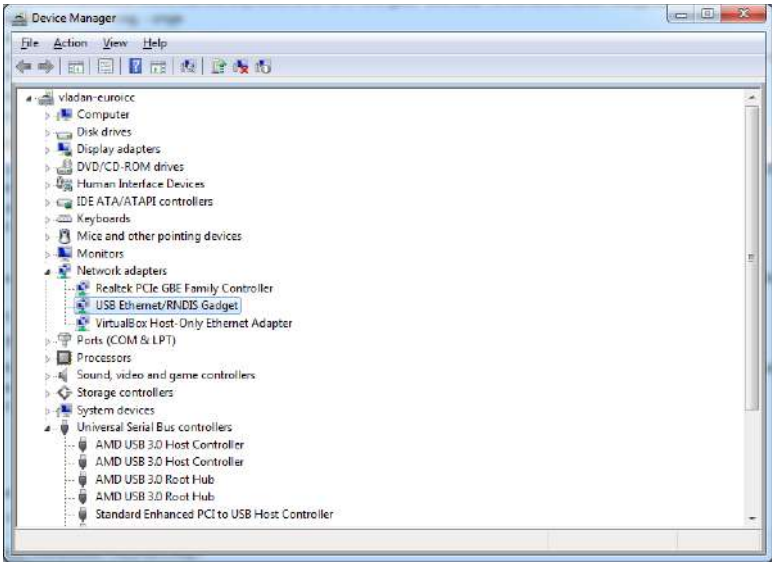

Figure 47

Step 12: In your web browser, enter the immutable IP address of the BACnet router, http://10.0.0.1. The router module will then display "Login to web server" page, and you can proceed with configuration by going to chapter 4.

4.6 For MAC OS

When USB cable is plugged into the MAC OS computer, it should detect the new hardware and connect automatically as Ethernet interface ***RNDIS/Ethernet Gadget***. To check if this is the case, follow the next three steps.

Step 1: Open System Preferences → Network

Figure 48

Step 2: Check if RNDIS/Ethernet Gadget Status is "Connected"

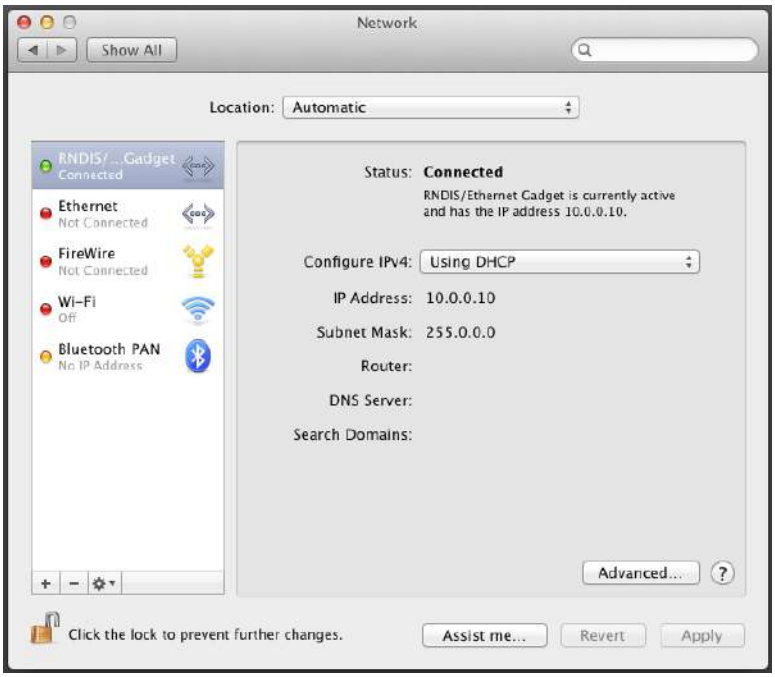

Figure 49

Step 3: In your web browser, enter the immutable IP address of the BACnet router, http://10.0.0.1. The router module will then display "Login to web server" page, and you can proceed with configuration by going to chapter 4.

4.7 For Linux

When USB cable is plugged into the Linux computer, it should detect the new hardware and connect automatically as ***Network Interface***. To check if this is the case, follow the next two steps.

Step 1: Click System Tray Icon for Network

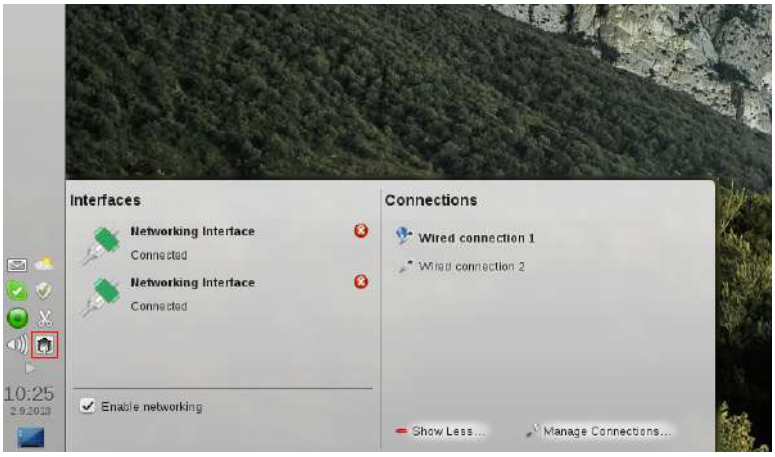

Figure 50

Step 2: Select Network Interface, check if it is Connected, and if IP address is in the range [10.0.0.10 – 10.0.0.40]

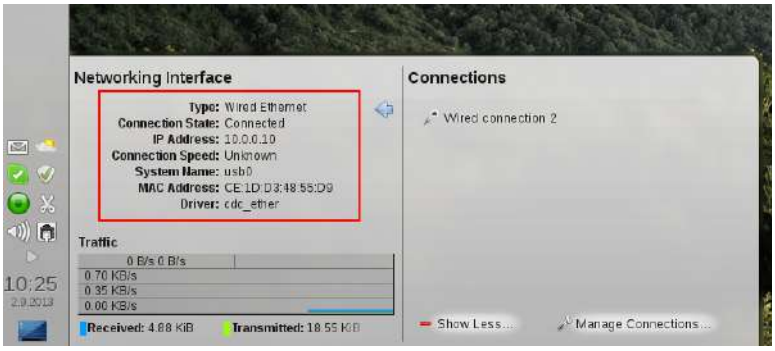

Figure 51

5 Web BACnet Router Control (start | stop | restart)

Figure 52: WBR Controls

Main page can be used for router control. Either because the user wants to upload new configuration for the router, or some other reason, router can be started, stopped and restarted. Each of these commands can be issued to the device by pressing the appropriate buttons, as shown on the Figure 52

6 Web BACnet Router Status (run | error | idle | bad configuration)

Figure 53: WBR Status

There are three lights visible on the Configuration page, which are the mirror image of the three LEDs on the device; these LEDs are labeled: RUN – green, IDLE – yellow, ERR – red. Their current state is indicative of the general status of WBR. Descriptions of these states are:

- Run – green light is on
- Idle – yellow light goes on and off
- Error – red light is on
- Bad configuration – green and red lights alternate between on and off.

7 View BACnet devices

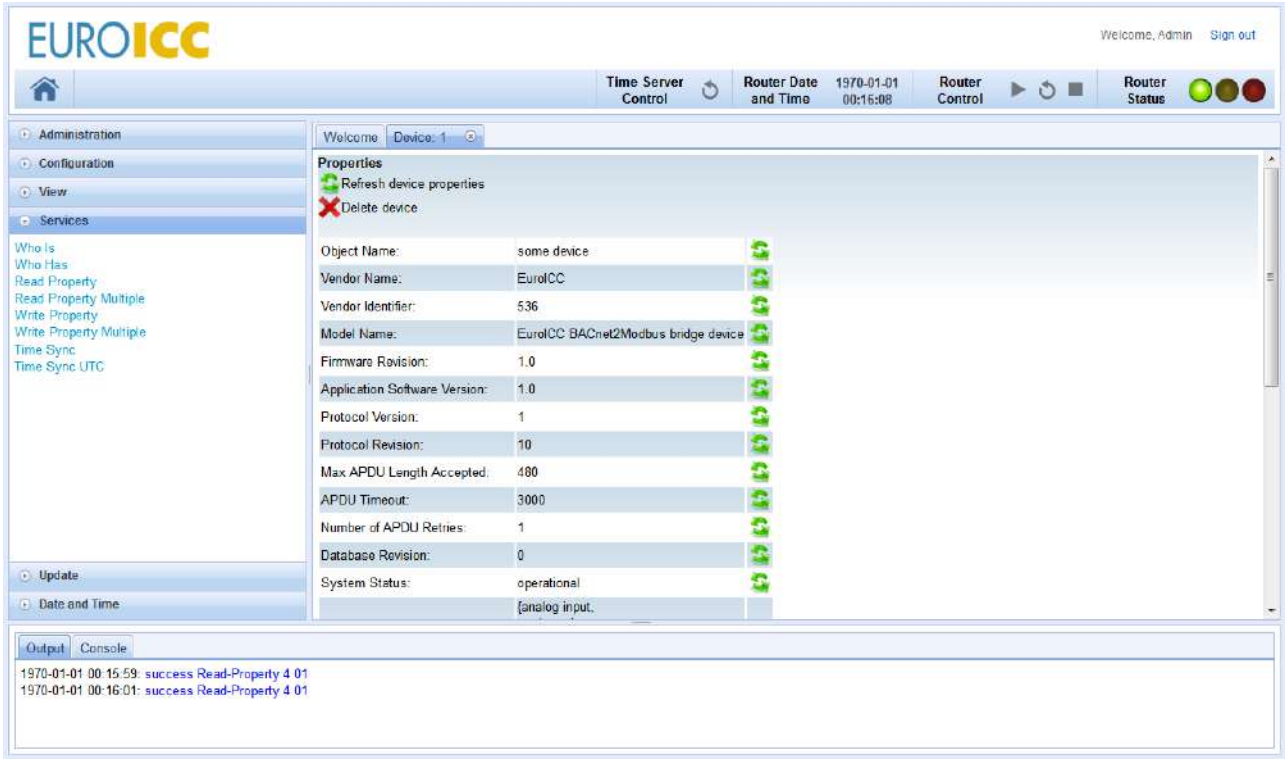

Figure 54: View BACnet devices tab

View page gives hierarchical summary of all BACnet networks and devices and objects on those networks. In order for a device or an object to be visible on the View page, they must be previously accessed by the WBR in some way (e.g. Who-Is, Who-Has, Read-Property). For each visible device, list of their properties and queried objects can be seen.

It is also possible to either refresh the values of all device properties or to remove the device and all of its objects. The buttons for these functionalities are on the top of the Device tab.

2.15 Change BACnet properties

Figure 55: Change value command

Some properties of BACnet objects are writable, and can be changed via Write-Property service. There is also a shortcut for this operation in the View panel, as shown in the Figure 55

8 Supported BACnet services

Services tabs offers eight BACnet services, which are:

- Who-is Service
- Who-has Service
- ReadProperty Service
- ReadProperty Multiple Service
- WriteProperty Service
- WriteProperty Multiple Service
- Timesync
- Timesync UTC

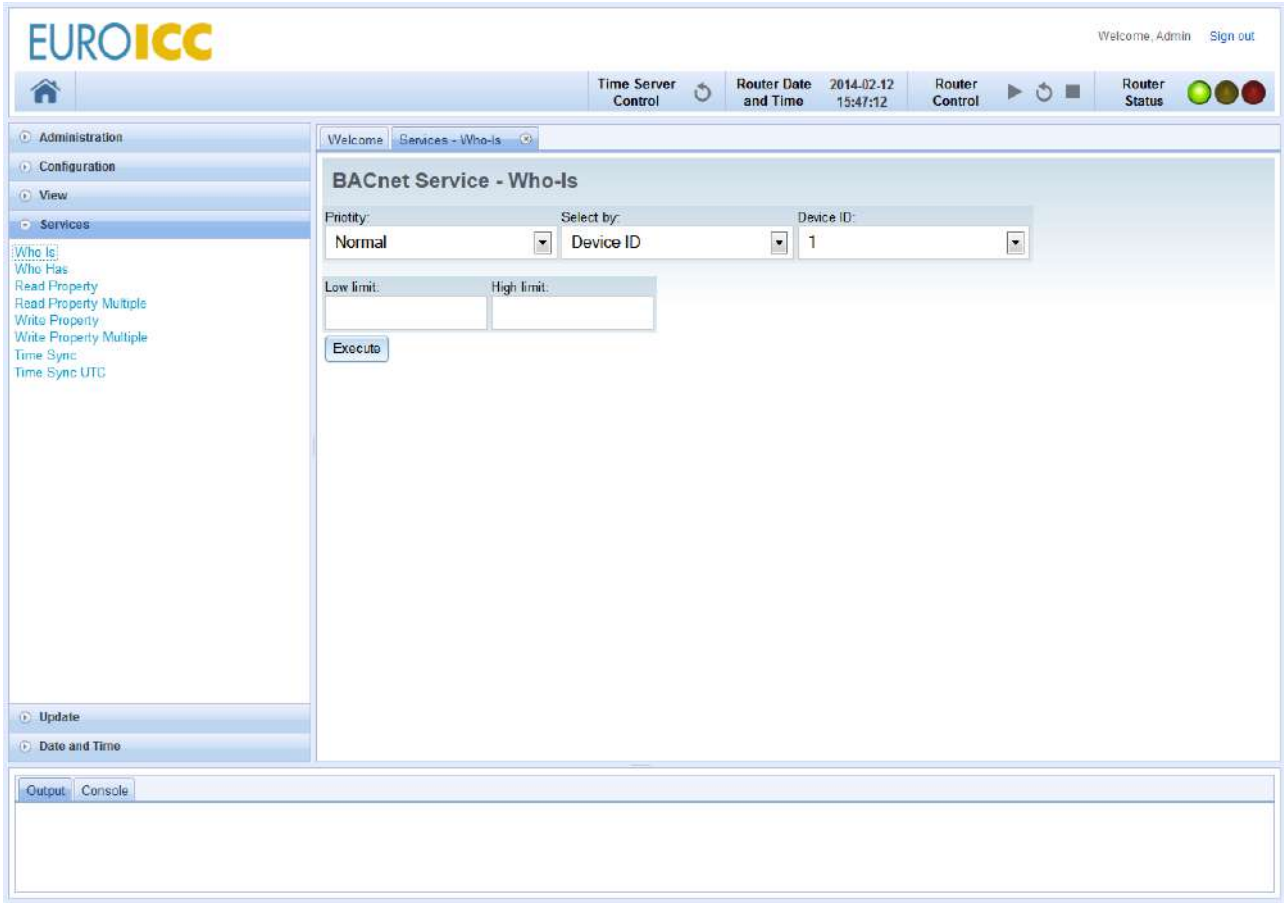

Figure 56: BACnet services

User can set network priority of the message, as well as the addressing method. BACnet services require target network and MAC, but WBR offers two new ways of addressing: by device ID and by device name. These addressing modes are available only for devices which were already queried by the WBR in the past. Standard format of MAC address is one bytes address from 00 to FF, and in case of BACnet/IP communication MAC has 6 bytes address contain IP address and port, which in most cases is from BAC0 to BACF (e.g. 192.168.0.45:BAC0).

2.16 Who-is Service

The Who-Is service is used by a client BACnet user to determine the device object identifier, the network address, or both, of other BACnet devices that share the same internetwork. It is the default service type selected when you open ***Services*** page.

For every service type supported, Object types and Properties are explained in Chapter 9 of this manual.

2.17 Who-has Service

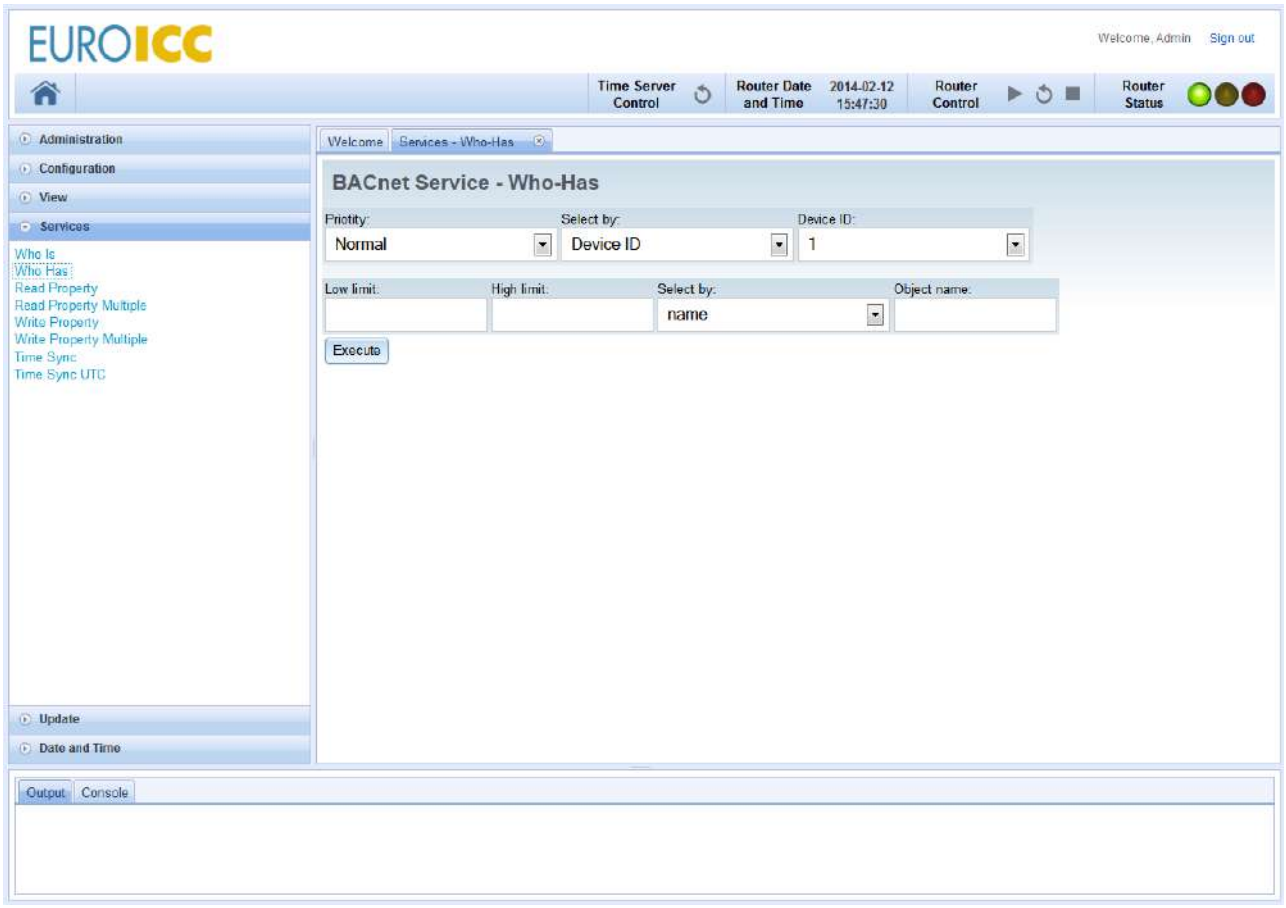

Figure 57: Who-has selected service type

The Who-Has service is used by a client BACnet user to identify the device object identifiers and network addresses of other BACnet devices which contain an object with a given *Object_Name* or a given *Object_Identifier*.

2.18 ReadProperty Service

The ReadProperty service is used by a client BACnet user to request the value of one property of one BACnet Object.

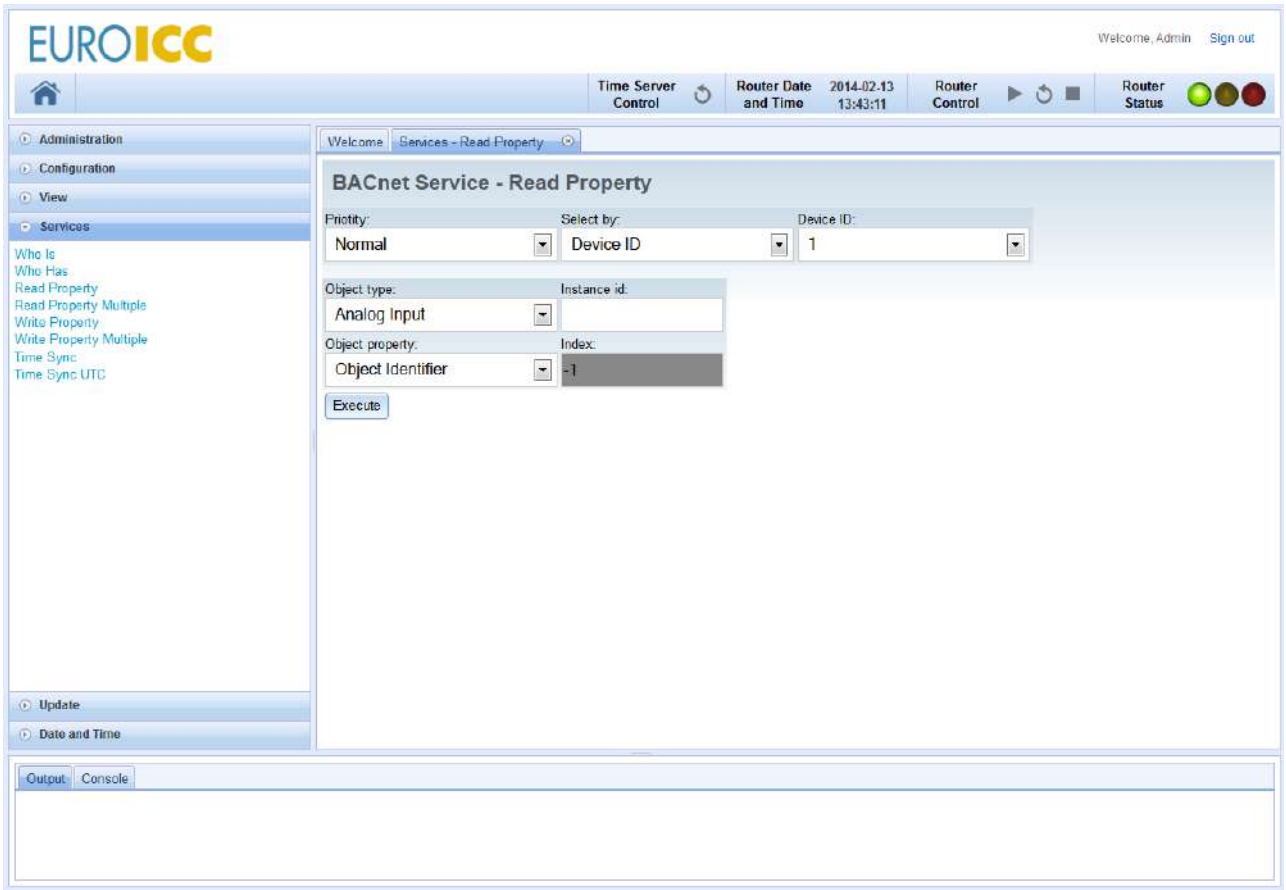

Figure 58: ReadProperty service type

2.19 ReadPropertyMultiple Service

The ReadPropertyMultiple service is used by a client BACnet user to request the values of one or more specified properties of one or more BACnet Objects on a single device.

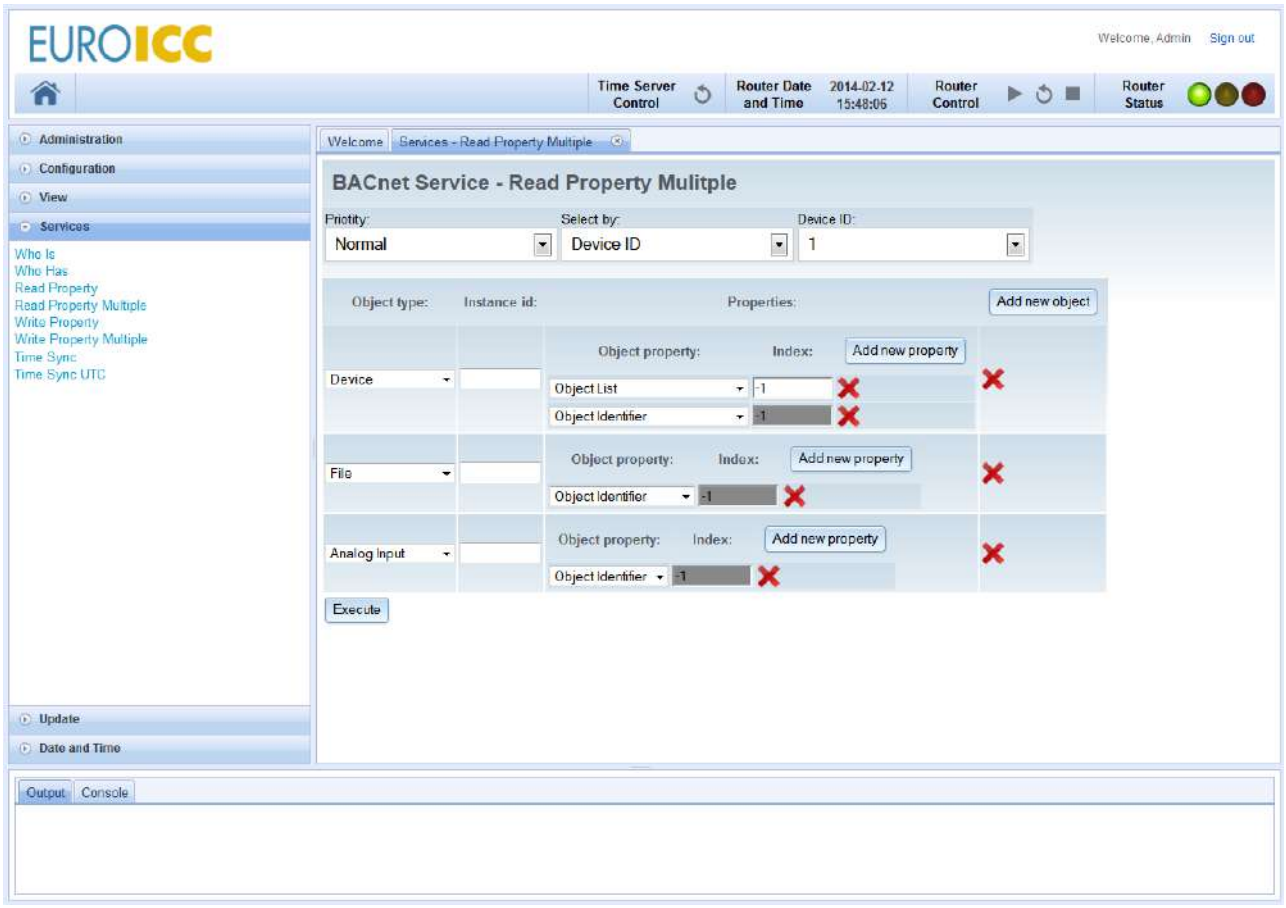

Figure 59: ReadPropertyMultiple service type

2.20 WriteProperty Service

The WriteProperty service is used by a client BACnet user to modify the value of a single specified property of a BACnet object.

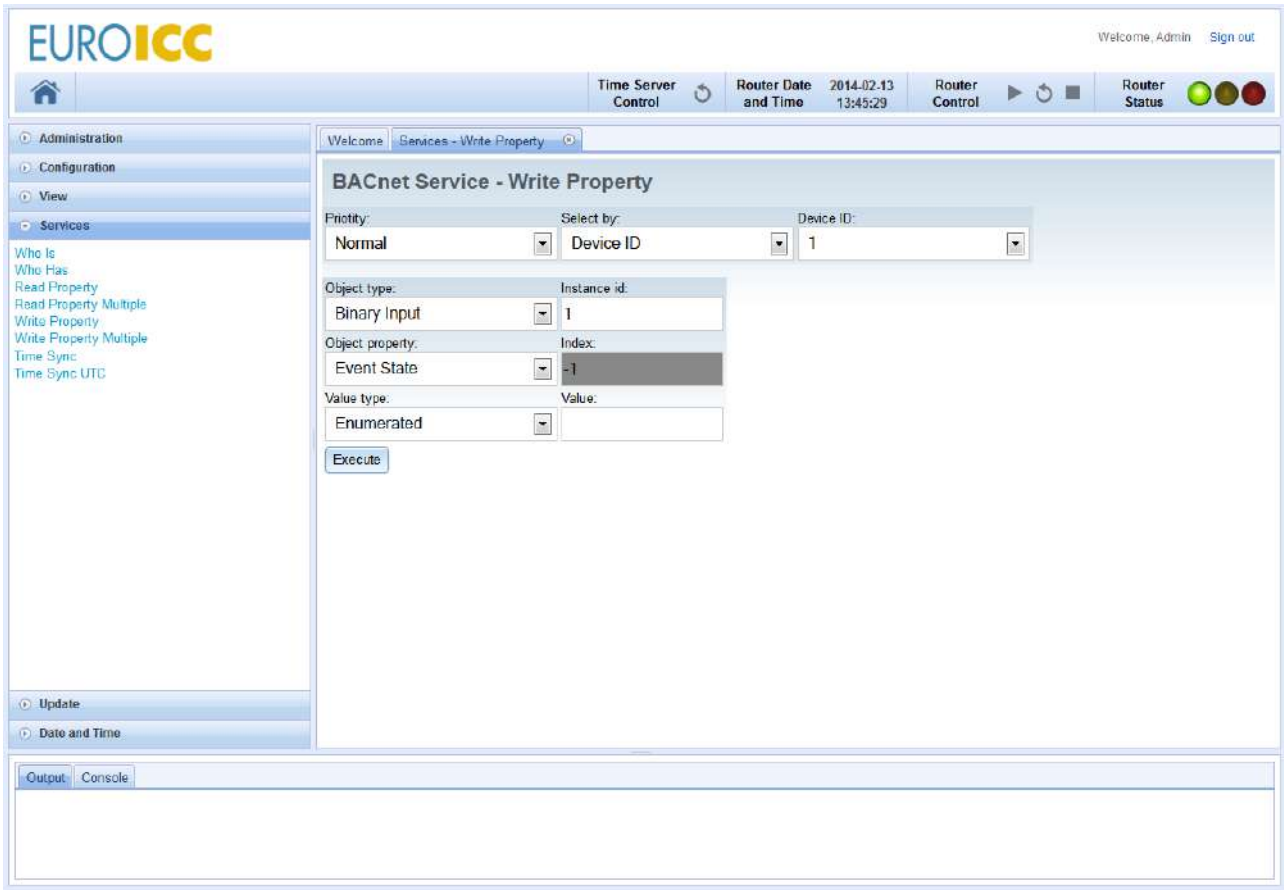

Figure 60: WriteProperty service

2.21 WritePropertyMultiple Service

The WritePropertyMultiple service is used by a client BACnet user to modify the value of one or more specified properties of a BACnet object.

Properties shall be modified by the WritePropertyMultiple service in the order specified in the 'List of Write Access Specifications' parameter, and execution of the service shall continue until all of the specified properties have been written to or a property is encountered that for some reason cannot be modified as requested.

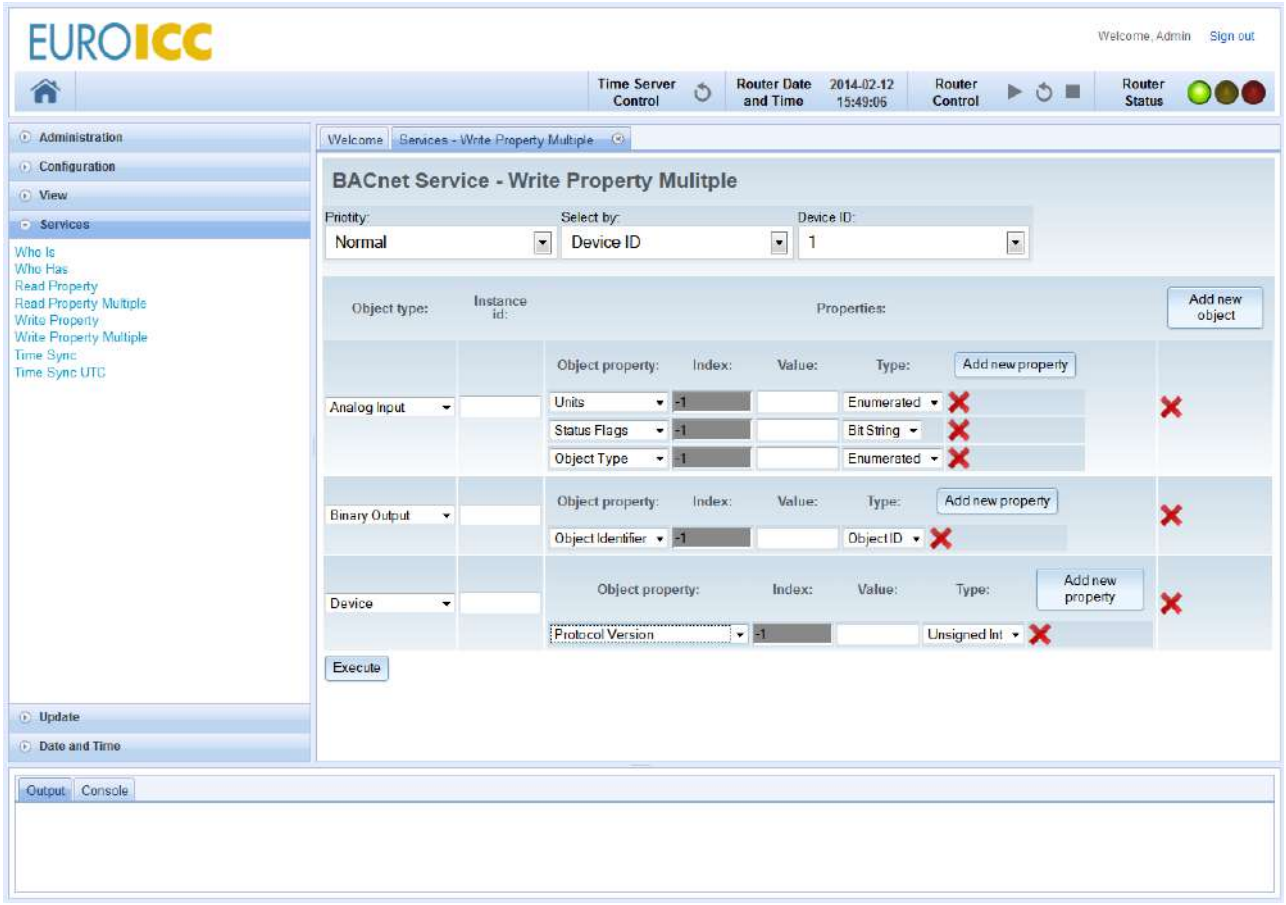

Figure 61: WritePropertyMultiple service

2.22 Timesync and Timesync-UTC Service

Time synchronization in BACnet can be done with two protocols: Timesync and Timesync UTC. Both send current time on WBR to other devices, and the difference is that Timesync sends local time, and Timesync UTC sends UTC time. For example, if WBR is set to CET (UTC +1), and it is currently 14:51:32 2013-11-12 in local time, Timesync would send that time, but Timesync UTC would send 13:51:32 2013-11-12.

9 Supported BACnet Objects and Properties

BACnet departs from traditional industry conventions with its object-oriented nomenclature. The industry has long used the general-purpose term "points", which could refer to sensor inputs, control outputs or control values, with different characteristics according to manufacturer.

BACnet instead defines a standard set of "*Objects*", each of which has a standard set of "*Properties*"; that describe the Object and its current status to other devices on the BACnet internetwork. It is through these properties that the Object may be controlled by other BACnet devices.

The WBR can send commands to the following Object types:

- Analog Input
- Analog Output
- Analog Value
- Binary Input
- Binary Output
- Binary Value
- Multi-state Input
- Multi-state Output
- Multi-state Value
- Device
- File

For each Object type, there are Object properties, explained in the following table:

Object type	**Object property**
Analog Input / Analog Value	Object Identifier
	Object Name
	Object Type
	Present Value

	Status Flags
	Event State
	Out Of Service
	Units
Analog Output	Object Identifier
	Object Name
	Object Type
	Present Value
	Status Flags
	Event State
	Out Of Service
	Units
	Relinquish Default
Binary Input	Object Identifier
	Object Name
	Object Type
	Present Value
	Status Flags
	Event State

	Out Of Service
	Polarity
Binary Output	Object Identifier
	Object Name
	Object Type
	Present Value
	Status Flags
	Event State
	Out Of Service
	Polarity
	Relinquish Default
Binary Value	Object Identifier
	Object Name
	Object Type
	Present Value
	Status Flags
	Event State
	Out Of Service

Device	Object Identifier
	Object Name
	Object Type
	System Status
	Vendor Identifier
	Vendor Name
	Model Name
	Firmware Revision
	Application Software Version
	Protocol Services Supported
	Object Types Supported
	Protocol Services Supported
	Protocol Version
	Protocol Revision
	Object List
	Max APDU Length Accepted
	Segmentation Supported
	APDU Timeout

	Number Of APDU Retries
	Database Revision
	Local Time
	Local Date
	Location
Multi-state Input / Multi-state Value	Object Identifier
	Object Name
	Present Value
	Status Flags
	Event State
	Out Of Service
	Number of States
Multi-state Output	Object Identifier
	Object Name
	Present Value
	Status Flags
	Event State
	Out Of Service
	Number of States

	Relinquish Default
File	Object Identifier
	Object Name
	File Type
	File Size
	Archive
	Read Only
	File Access Method
	Record Count

10 MODBUS Services

The Modbus protocol provides the internal standard that the Modicon controllers use for parsing messages. During communications on a Modbus network, the protocol determines how each controller will recognize a message addressed to it, determine the kind of action to be taken, and extract any data or other information contained in the message. If a reply is required, the controller will construct the reply message and send it using Modbus protocol.

When Modbus-to-BACnet page is open, MODBUS services can be defined for every MODBUS device on network, services that WBR support is:

- Read coils
- Read discrete inputs
- Read holding registers
- Read input registers
- Write single coil
- Write single register
- Write multiple coils
- Write multiple registers
- Read file record
- Write file record

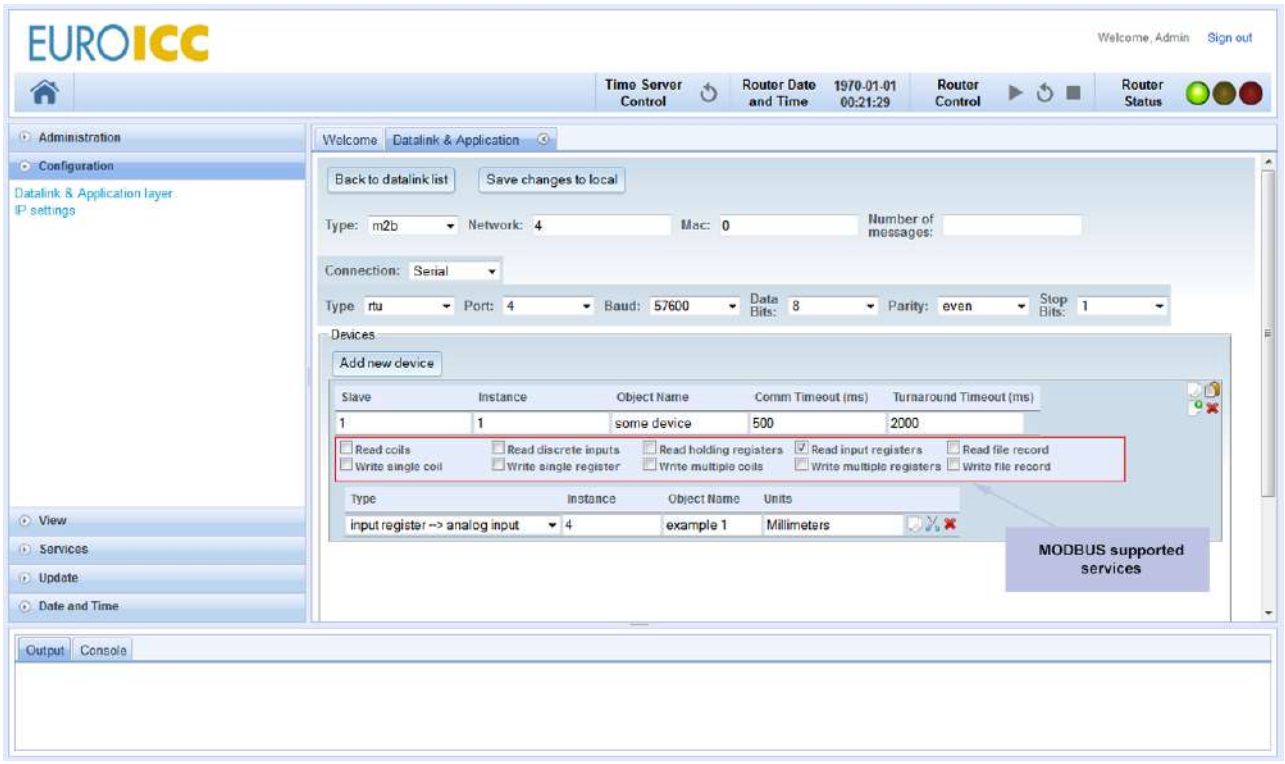

Figure 62: Modbus supported services

11 Update Web BACnet Router

Update Web BACnet Router is used for updating firmware on WBR. To update firmware, follow these steps:

1. Download the update for WBR from http://store.euroicc.com/1-web-bacnet-router-c4wbr02.html and save it on your computer.

2. Click on “Upload firmware” and select the update file from your computer.

3. When uploading is successfully completed, click “Upgrade” to upgrade the firmware for WBR from the uploaded file.

4. After successful update, WBR will initiate soft restart.

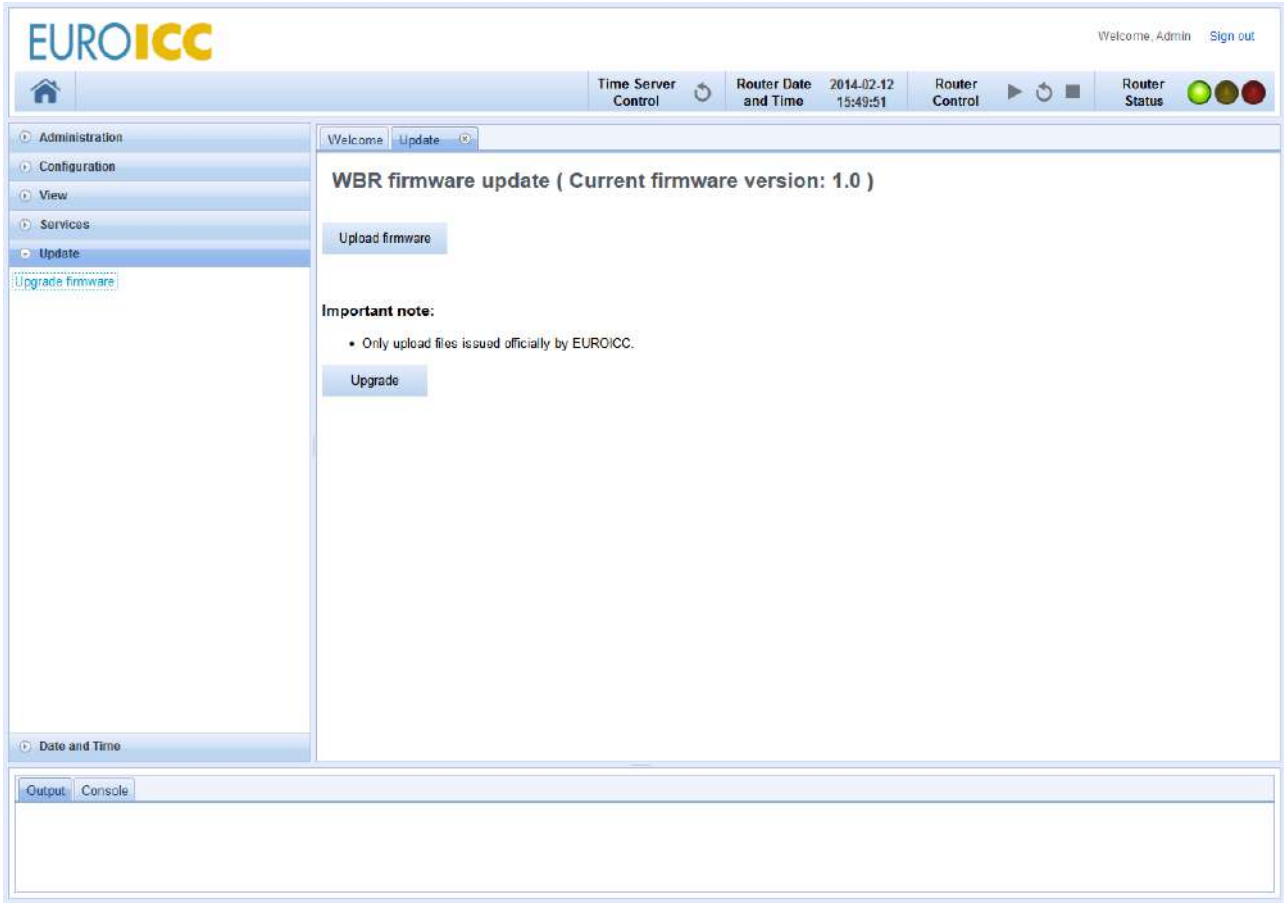

Figure 63: Update WBR tab

Note: Only files issued by EUROICC should be uploaded and used to update Web BACnet Router Firmware.

12 Setup Network Time Protocol (NTP)

NTP is a protocol designed to synchronize the clocks of computers over a network. Web BACnet Router has data and time configuration on Main Manu selecting Date and Time.

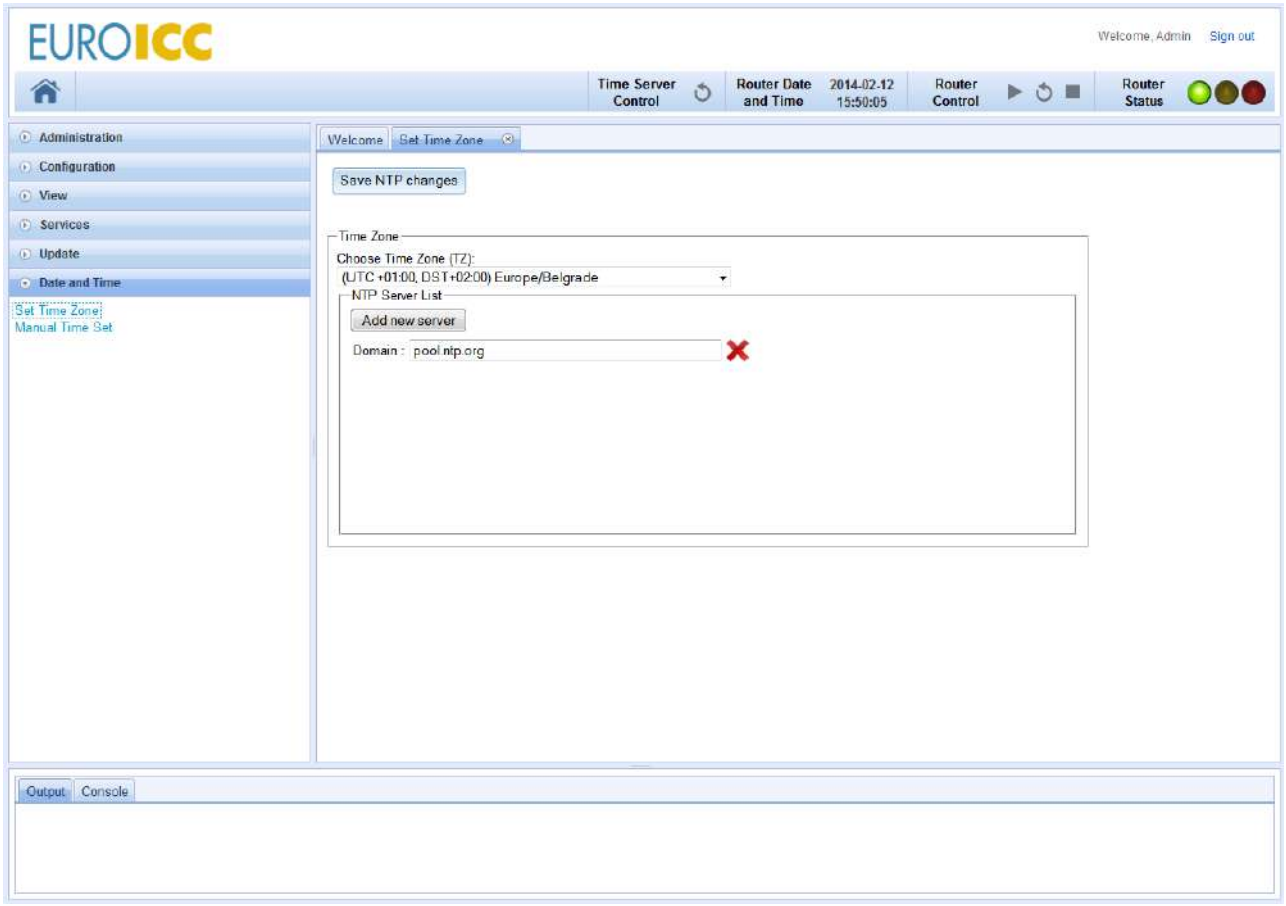

Figure 64: Setup time zone

NTP can be configured by choosing local time zone and adding NTP server in NTP server list. Also NTP can be configured manually on Manual Time Set tab showing on Figure 65.

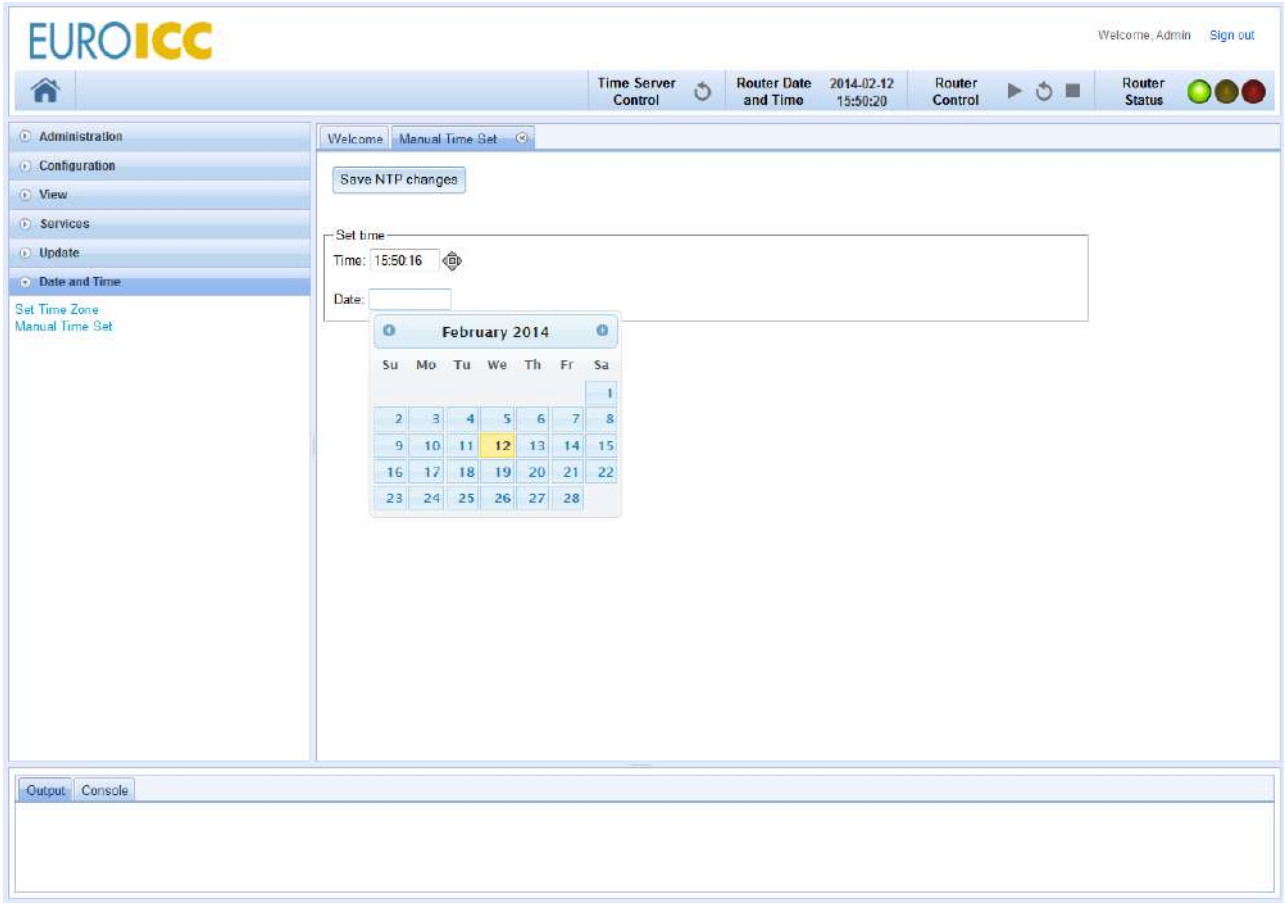

Figure 65: Manual Time Set Tab

13 NTP Control (restart)

Main setup page, if it's needed, can send command to restart NTP server on Web BACnet Router which is show on Figure 66.

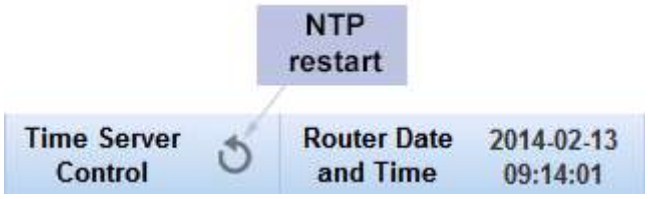

Figure 66: NTP control panel