



Using the BASrouter with a Trend IQ Controller

application NOTE



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BASrouter — BACnet® Multi-Network Router

Setting up the TCP/IP to MS/TP BACnet BASrouter on a TREND BMS Network



BASrouter
(BASRT-B)

Using Titan Window Controllers NVC-1204 on MS/TP

BASautomation®

CONTEMPORARY CONTROLS®

AN-BASRTND-BA1





Using the BASrouter with a Trend IQ Controller

Contemporary Controls' BASrouter line resides within our BASautomation - Building on BACnet family of network connectivity products.

Installing and operating the BASrouter (BASRT-B, 35 mm DIN-rail mount) is simple and straightforward. Once the BASrouter is

properly installed and configured, all connected controllers can be accessible from BACnet/IP.

BACnet MS/TP controllers for unitary and VAV applications can be accessible from BACnet/IP once the BASrouter is in place. BACnet MS/TP data from the controllers are carried over a two-wire non-isolated twisted-pair network.

Configuring the BASrouter

Configuring the BASrouter with a web browser is straight forward. Both the BACnet/IP and MS/TP sides of the router need to be configured. The following settings apply to the BASrouter itself.

A unique Device Instance must be assigned to the BASrouter. If you are only connecting to a BACnet/IP network and not to a BACnet Ethernet network, leave the Ethernet Network default number at 0.

Typically, use the BACnet/IP UDP Port default of BAC0. Set the IP Address, Subnet and Gateway accordingly.

For the MS/TP MAC address of the BASrouter, we suggest the default address of 0 for this application.

MAC address 0 gives the router the first opportunity to grab the token. Select a unique MS/TP Network for the MS/TP segment. Set Max Master to 127. The Max Master settings should be the same for all devices on the network. Max Info Frames are not critical. Select a value between 30 and 100.

Do not configure the Advanced screen unless you must enable the BBMD feature for IP router traversal. Consult the BASrouter application guide for more information on sub-netted networks.

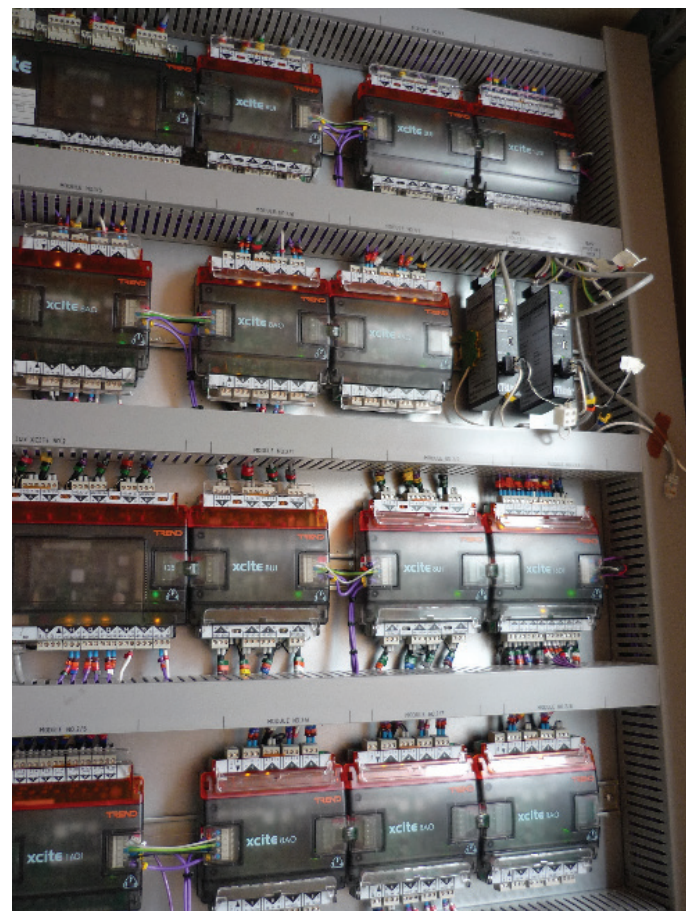
When you are finished with the settings, save the changes.

A free, easy and convenient tool for testing BACnet networks is the BACnet Discovery Tool. It is described at:

<http://www.ccontrols.com/pdf/Essentials0911.pdf>

And it can be downloaded from:

<http://www.ccontrols.com/sd/bdt.htm>



IQ3 Controllers with BASrouters

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Web Page Configuration

(Figure 1)

Device Name	BASRT-B0050b6
Device Instance	0
Ethernet Network	0
BACnet/IP UDP Port 1	BAC0
BACnet/IP Network 1	1
IP Address	192.168.92.68
IP Subnet	24
IP Gateway	192.168.92.1
MS/TP MAC	0
MS/TP Network	2001
Max Masters	127
Max Info Frames	100
MS/TP Baudrate	38400 ▼
MS/TP Tolerance	<input checked="" type="radio"/> Strict <input type="radio"/> Lenient

Save Changes

MAC Address 00-50-DB-00-50-B6

Firmware Revision 2.6.9

BASRT-B Configuration

Advanced

Status

Security





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Configuring the TREND Network

Configure Trend Network: Standard controller setup, IP addresses, Subnet Masks, Unique LAN and OS Numbers

Set up of BACnet Router TCP/IP Side - (See Figure 1, p.3)

- Device Instance:** Unique number for use by the TCP/IP side of the router. (See Figure 2, p.6, Item B)
- Ethernet Network:** Left as default 0.
- BACnet/IP UDP Port 1:** Left as default BAC0. Should be OK to use this as long as other devices are also using this port (Most do.)
- BACnet/IP Network 1:** Set as 1. Use this as the Network number for the TCP/IP side of the device in Trend BACnet network discovery. (See Figure 2, Item A)
- IP Address:** To be in the same range as Trend devices.
- IP Subnet:**
24 = 255.255.255.0
16 = 255.255.0.0
- IP Gateway:** Same as those used in Trend.

Set up of BACnet Router MS/TP Side

- MS/TP Mac Address:** 0 – 127. Needs to be a unique number. Each of the devices to be discovered on the MS/TP side will also require a unique MAC Address, in this case 49. In the case of the Titan window Controllers, used MAC addresses 50-53. Continuous addresses will save confusion.
- MS/TP Network:** Set as 9. Can be between 1-65535. Use this as the Network number for the MS/TP side of the device in Trend BacNet network discovery. (See Figure 2, Item D)
- Max Masters:** Highest address used on the MS/TP Side. 127 is default.
- Max Info frames:** Left at 80.
- MS/TP Baud Rate:** All devices on the MS/TP side of the network MUST be on the same baud rate. In this case, both the BASrouter and the Titan Window Controllers are set to 38400.
- MS/TP Tolerance:** Set to lenient. Allows simple device discovery and information exchange.

Set Up Devices on the MS/TP Network

Mac Address	Device Address	Baud Rate
50	80	38400
51	81	38400
52	82	38400
53	83	38400

The information in the table below is to be set into the MS/TP network devices.





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Configure Trend Network in SET

The standard TREND network should be able to be mapped as usual.

1. Connect laptop to network via Network Switch
2. Set up communications via vCNC
3. Follow instructions in IQ3/BACnet Quick Start Guide

Once added, refresh. The devices that should be discovered are the Trend BACnet device (Figure 2, item C) and the TCP/IP side of the BACnet router (Figure 2, item B). Manually add the MS/TP side of the BACnet network (Figure 2, item D). Once added, refresh. If this does not discover the devices shut down SET and restart. Devices should be discovered upon restart. MS/TP is slower than TCP/IP discovery, so can take a few minutes to discover the devices. After discovering the devices, add the BACnet network to Project view in SET as standard. Drag and drop the discovered devices from the MS/TP network in system view to the created LAN in project view. (See Figure 3, p.6). Make sure all information contained in the NTD parameters device is correct as per setup (Figure 3).

To set up prior to creating IC Comms: (Live Site)

1. Add the BACnet LAN in system view
2. In Project View create new LAN(s) for BACnet devices
3. Drag & Drop devices from System View to Project View relevant LAN
4. Give each NTD (Non Trend Device) a Trend address

NB: If not a Live Site, above can be added as per normal O/S addressing

Set up IC Comms to above created devices

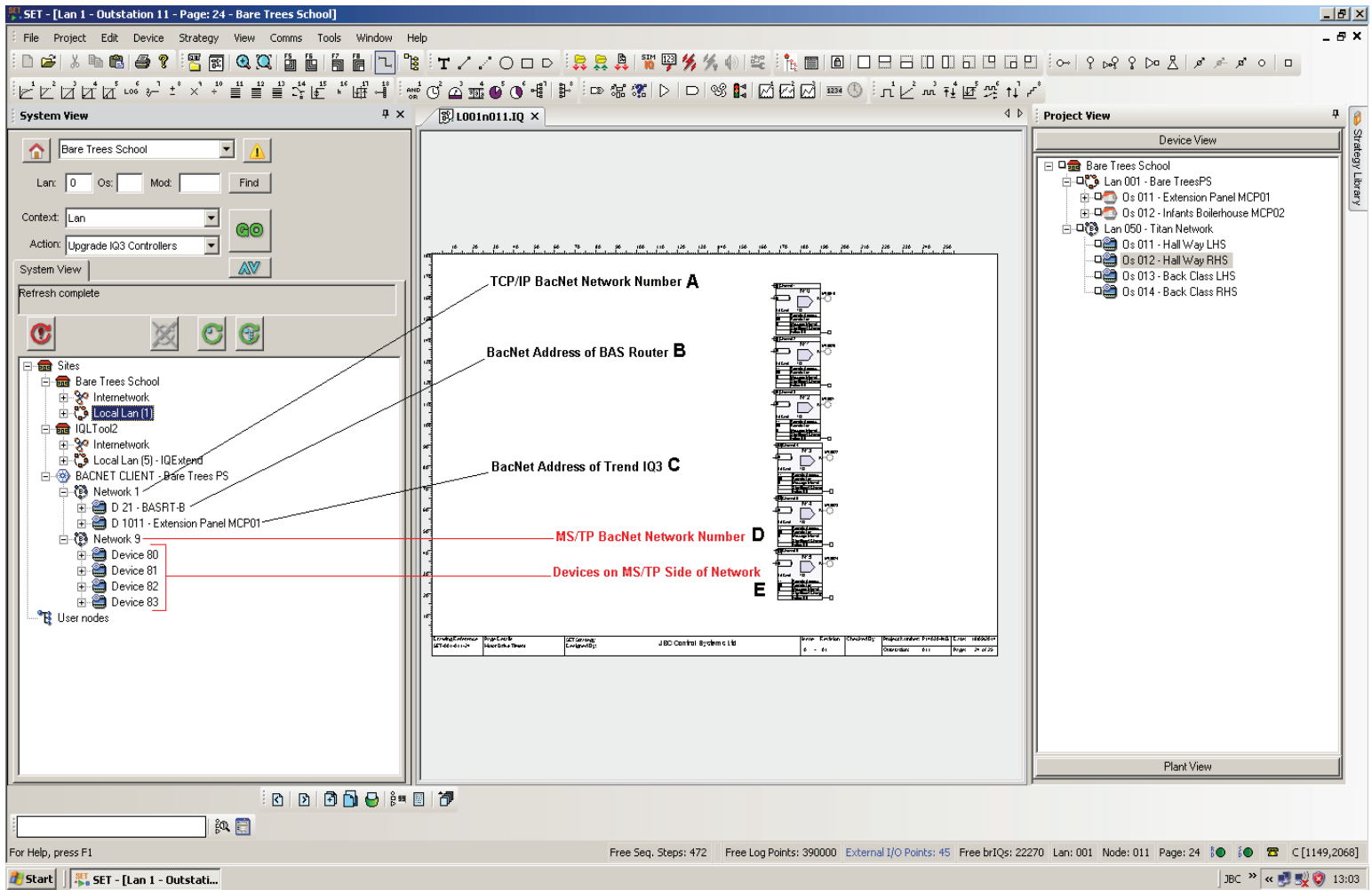
1. Click on device in Project View, brings up NTD Parameters window NB: this is an Address Module with Attribute matching available
2. Select IC Comms
3. Select BACnet
4. Select remote bit
5. Put in Trend style remote address and LAN
6. Bring back 'present value'
7. If it is a temperature – attach an internal sensor and a plot

Notes:

1. Ensure site vCNC's have addresses other than 1010
2. Trend relies on IC comms for IQ3/BAC to BACnet device comms. Total of 250 IC comms available for comms including normal Trend IC Comms
3. TOPS and SET cannot run together
4. Alerton Controllers are shipped with default Device instance of 9999



Using the BASrouter with a Trend IQ Controller



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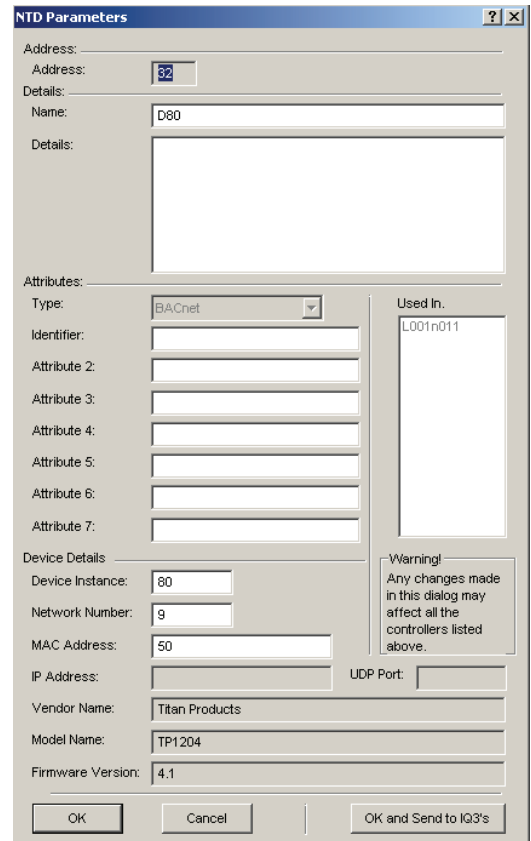
Note

- 1.
- 2.
- 3.
- 4.

(Figure 2)

TOPS and 963

- If it is first use of TOPS configure TOPS using the configuration wizard
- Run up 963
- Click Devices
- Add new site – put BACnet in the title
 - i. Select Remote Site
 - ii. IP Connection
 - iii. Put in 'TOPS' 963 PC Address – this is embedded and is 27.0.0.1
 - iv. Port is 10101 – address of virtual CNC in TOPS (fixed)
NB: Make sure O/Ss have not got VCNC of 10101 as well to avoid 963 comms being set to use it and clashing
 - v. Tick permanent connection
- Learn site – should end up with a 'TOPS' symbol that can be Right Clicked to enter configuration
- Alternative is to open Web Browser and type in: <http://localhost:81/login>
- User name is – admin
- No password
- Select BACnetwork <NEXT>
- Configure network driver is self populating but Device Instance has to be unique between 1 & 4.1 million e.g. Salisbury = 2021601 (Project No. + 01)



(Figure 3)

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Using the BASrouter with a Trend IQ Controller

- <Discover Devices>
- Drag required items to database
- 'Add all' creates populated TOPS network
- Automatically learns devices
- Now learn devices in 963 as usual
- Learnt info from a BACnet device in 963 will show as follows in device viewer:

ANALOGUE VALUE (AV)	=	KNOB
ANALOGUE INPUT (AI)	=	SENSOR
ANALOGUE OUTPUT (AO)	=	DRIVER
BINARY VALUE (BV)	=	SWITCH
BINARY INPUT (BI)	=	DIGITAL INPUT
BINARY OUTPUT (BO)	=	DIGITAL OUTPUT
- Need to set up a separate 'site' on 963 to communicate with TREND devices
- Properties need to be set to use one of the Outstation's vCNC
- BACnet values can be dragged and dropped as required on to graphics

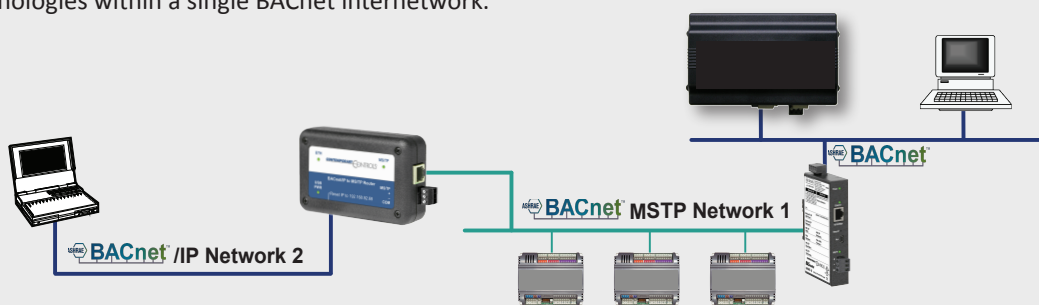
Notes:

1. NTD's can be seen on Web Pages of IQ3/BAC as long as there is at least 1 IC comm.
2. SET can browse TOPS using same connection info as 963
3. Ignore BACnet Alarm Manager and BACnet Schedule Manager
4. Broad split of Inputs, Adjustments, Outputs

BASrouter — BACnet® Multi-Network Router

The BASrouter provides stand-alone routing between BACnet networks such as BACnet/IP, BACnet Ethernet, and BACnet MS/TP — thereby allowing the system integrator to mix BACnet network technologies within a single BACnet internetwork.

The BAS Router has two physical communication ports. One is a 10/100 Mbps Ethernet port and the other is an optically isolated MS/TP port. Router configuration is accomplished via a web page.



BASrouter

BAS Portable Router — BACnet® Multi-Network Router

The BAS Portable Router provides stand-alone routing between BACnet networks such as BACnet/IP, BACnet Ethernet, and BACnet MS/TP — thereby allowing the system integrator to mix BACnet network technologies within a single BACnet internetwork. There are two physical communication ports on the BAS Portable Router. One is a 10/100 Mbps Ethernet port and the other an isolated MS/TP port. Configuration is accomplished via a web page.



**BASrouter
Portable**

BASrouterLX — High-Performance BACnet® Router with Diagnostic Capabilities

The BASrouterLX is rugged and mounts on 35-mm DIN-rail and is powered from a 24 VAC/VDC (± 10%) source. Its half-wave rectified power supply allows sharing of power with other half-wave devices. There are two ports on the unit — one Ethernet and one EIA-485.

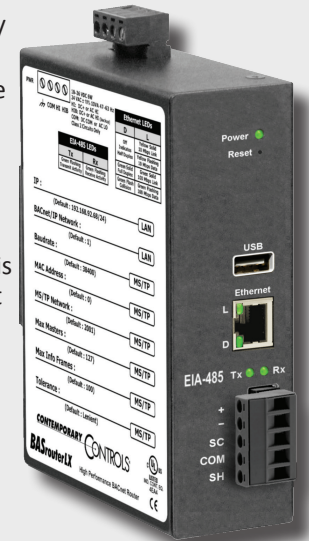
The optically-isolated EIA-485 serial port allows for connection to either 2-wire or 3-wire MS/TP networks using a removable 5-pin terminal block. Up to 31 full-load or 62 half-load EIA-485 devices can share the serial bus at data rates between 9.6 and 115.2 kbps. Internal jumpers provide 120Ω termination and bias. These jumpers can be removed for mid-span installations.

The Ethernet port offers a shielded RJ-45 connector. Through auto-negotiation and Auto-MDIX, it automatically matches connections to the attached equipment. Thus, either CAT5 straight-through or crossover cable can be used to attach to the BACnet/IP network at either 10 or 100 Mbps speed. MS/TP slave devices do not participate in token passing but can be made

accessible throughout the complete MS/TP address range using either Manual Slave Address Binding or Automatic Slave Discovery. Once they are known, the BASgatewayLX functions as their proxy.

A resident web server allows for commissioning, and troubleshooting via a standard web browser. A reset switch is provided on the router to return the unit to the factory default IP and password settings. Five LEDs are provided.

The power LED indicates that proper power is being provided. Two Ethernet LEDs indicate link status, data activity, data rate and duplex. Two EIA-485 LEDs indicate transmission and reception of data.



BASrouterLX

Capturing MS/TP Traffic with the BASrouterLX

The BASrouterLX is a high-performance router with diagnostic capabilities. It has a faster processor and more memory than the BASrouter or Portable BASrouter. One feature that the BASrouterLX has over the BASrouter Portable BASrouter is the ability to capture MS/TP traffic and present that traffic to a PC connected on the BACnet/IP side of the BASrouterLX. Installed on the same PC that is used for browsing is the Wireshark protocol analyser.

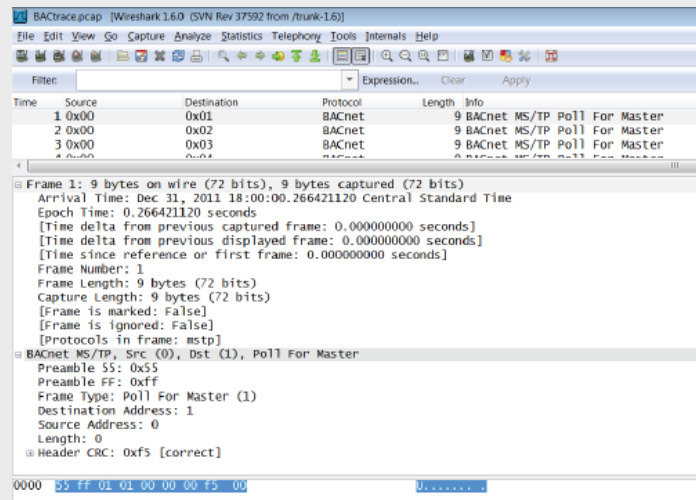
It can be downloaded for free from Wireshark.org. Intended for analysing packets sent over Ethernet, Wireshark can also decode packets sent over a serial bus like MS/TP thanks to its built-in BACnet decoder.

Capturing serial data remotely is a handy feature when verifying proper MS/TP network activity without the requirement of installing specialized interfacing hardware to the MS/TP bus. As a background task, the BASrouterLX continuously records the last 3900 messages sent over MS/TP including both data and token passes.

As shown in the sample screen at right each device identifies...

- the Device Instance number of the responding device
- the Device Name of the device
- the IP Address and UDP Port number through which the device was contacted
- and (for MS/TP master devices) the MS/TP Network number and MS/TP MAC Address

By depressing the Generate MS/TP Wireshark File, those last 3900 messages are converted to a “pcap” format file for viewing by a Wireshark. Once the conversion is made, depressing the View MS/TP Traffic button sends the captured file to the attached PC for Wireshark viewing. BACnet protocol decoding is built into this free but powerful protocol analyser so the system integrator can study the traffic for any anomalies while verifying that all serial devices are participating in the token pass. No special configuration is involved. Any properly installed BASrouterLX is ready to transfer captured MS/TP at anytime.



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