application NOTE

Using the BASrouter with a Lynx Controller

Installing and operating the BASrouter (BASRT-B, 35 mm DIN-rail mount) with several Centraline Lynx controllers is simple and straightforward. Once the BASrouter is properly installed and configured, all the connected Lynx controllers can be accessible from BACnet/IP.

Lynx Controllers

Centraline manufactures a line of BACnet MS/TP controllers for unitary and VAV applications that can be accessible from BACnet/IP once the BASrouter is in place. The information in the application note is applicable to each BACnet MS/TP model.

BACnet MS/TP data from the Lynx controllers are carried over a two-wire non-isolated twisted-pair network. Lynx controllers auto-baud. They wait until a head-end device — usually a building controller — to send out frames so connected controllers can "wake-up" and set their speed to that of the building controller.

The BASrouter takes the place of the building controller so its data rate must be set during configuration thereby allowing the Lynx controllers to automatically match their data rate with that of the BASrouter.

Power Wiring

A typical wiring diagram is shown. Like the BASrouter, the Lynx controllers incorporate a 24 VAC half-wave rectified power supply meaning that the BASrouter and the Lynx controllers can share the same AC power source as long as the COM pin on the BASrouter and the 24VAC COM pin on the Lynx controllers are connected together as shown. If separate power sources are used then an earth connection must be shared by the COM and 24VAC COM pins. The BASrouter requires about 4 VA of power while Lynx controller consumption varies with the model. Verify that adequate power is available when sharing a transformer. Notice the grounding requirements in the wiring diagram.
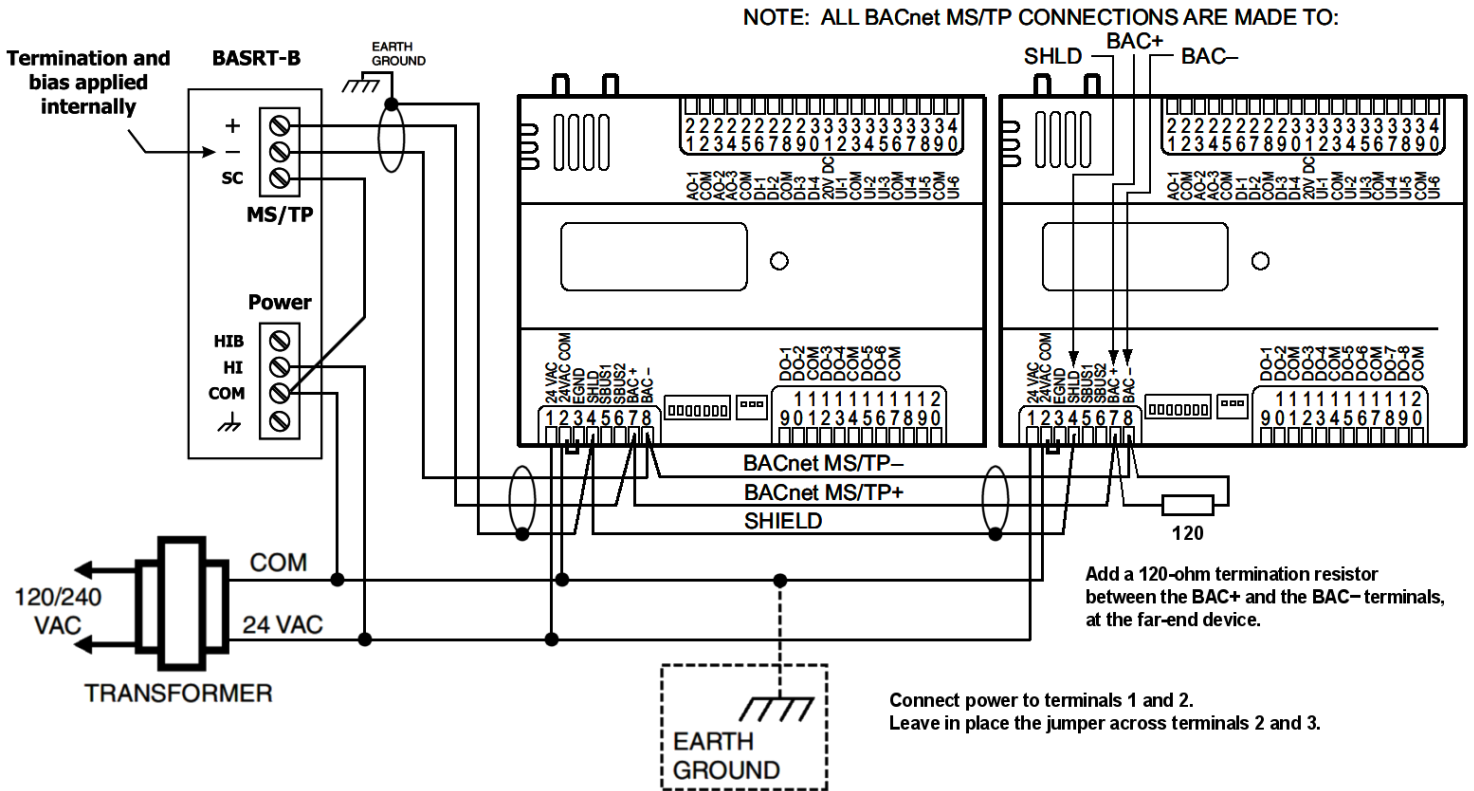

Lynx Unitary Controller

Lynx VAV Controller

BASautomation®

Shared Transformer Wiring Diagram

Communication Wiring

The Lynx controllers utilize a two-wire, non-isolated MS/TP network while the BASrouter supports a 3-wire isolated MS/TP network. If possible, install the BASrouter at one end of the MS/TP segment. This will be called the near-end. Follow Centraline cabling and grounding recommendations. Notice that Centraline requires that the shield be carried to the head-end where it is then earthed. Connect the data pair as shown observing polarity. A common ground reference is required in order for the MS/TP transceivers to operate properly. **Connect the SC pin and the COM pins together on the BASrouter.** Make sure an earth connection exists between all the controllers and the BASrouter when separate power sources are involved. This helps protect the data lines from excessive common-mode voltages that could damage the transceivers or create data errors. Although the Lynxs

utilize 1/4 EIA-485 load transceivers, it is recommended not to exceed 63 controllers on a network. The BASrouter consumes one load. If possible, try to limit the network to about 45 controllers to improve responsiveness. Apply a 120-ohm terminator to the last controller on the far-end of the MS/TP segment. The BASrouter has internal bias and termination applied (default configuration) so the near-end is already terminated and should not receive an external terminator. Do not apply any external bias. If the BASrouter is installed mid-span, termination and bias can be disabled by removing jumpers inside the BASrouter. In this situation, external bias and termination would need to be applied at the near-end while external termination is applied to the far-end. A mid-span installation of the BASrouter should be avoided.

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* 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 of 0. However, this is the default address for all Centraline MS/TP devices — so all Lynxs should be set to a different address before attaching them to the network. 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 since the default setting of the Lynx is 127. This can be changed using the Lynx tool. 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.

Lynx controllers auto-baud, meaning they remain silent until a device, such as a building controller, begins sending frames. Once traffic is sensed, the Lynx controllers match their data rate to that of the traffic. Instead of a building controller, a BASrouter is used. Set the MS/TP *Baudrate* to a typical rate such as 38,400 or 76,800. For MS/TP Tolerance, select *Lenient*.

Do not bother with 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.

Configuring the Lynx controllers

Consult Centraline for installation instructions.

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

Using BDT to verify MS/TP Communication

The BACnet Discovery Tool is a BACnet/IP application for Windows® that is easy to install and use. It is an excellent means for discovering and verifying communication with MS/TP devices that are being accessed through BACnet/IP routers such as those available from Contemporary Controls: the **BASRT-B** DIN-rail mounted BACnet/IP-to-MS/TP router — or its portable counterpart, the **BASRTP-B**. At Contemporary Controls we use BDT with equipment from different BACnet vendors to prove our routers operate with different equipment configurations.

It can be downloaded for free at:
www.ccontrols.com/sd/bdt.htm

Using the Search function, BDT transmits BACnet *Who-Is* messages and a progress bar appears.

When BDT has completed its search, the progress bar will disappear, the discovered BACnet devices will be listed in the main window and the number of discovered devices will be reported in the Devices Discovered field — similar to the display below.
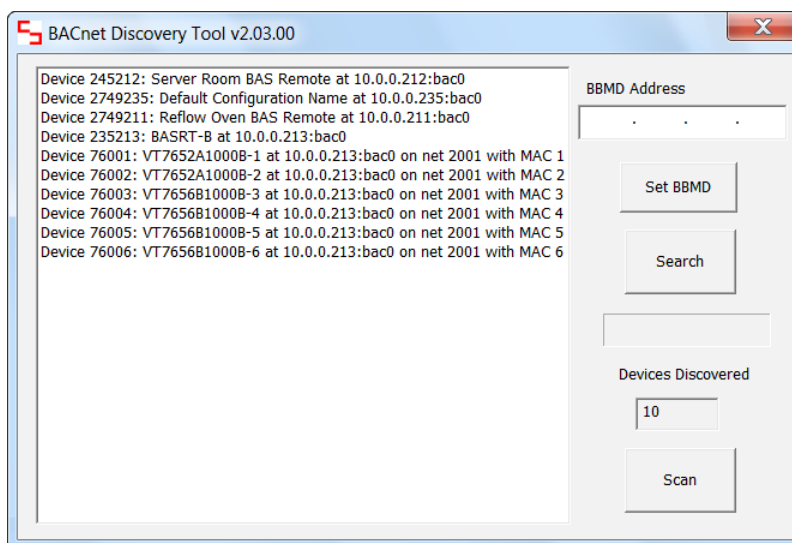
As shown in the sample screen above, each device identifies

- 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*