Configure the BASgatewaySX for Modbus Serial to Modbus TCP Routing

BACnet is the most widely used protocol in the building automation industry today, while Modbus remains popular due to its simplicity and long-standing reliability.

The BASgatewaySX (BASGSX-M1) provides gateway functionality between Modbus Serial (RTU or ASCII) and BACnet/IP as well as between Modbus TCP and BACnet/IP. This functionality is primarily used to integrate Modbus devices with a building management system (BMS). However, if communication between Modbus Serial and Modbus TCP devices is needed, the BASgatewaySX can simultaneously function as a Modbus Serial (RTU and ASCII) to Modbus TCP router.

The BASgatewaySX has one 10/100 Mbps Ethernet port for Modbus TCP and BACnet/IP and an opto-isolated Modbus EIA-485 serial port for Modbus RTU or Modbus ASCII devices. Up to 200 Modbus serial devices represented by up to 2,000 polled points can share the gateway's single Modbus EIA-485 port. BACnet COV notification is supported on 200 points (100 Analog and 100 Binary points).

In Router Mode, the BASgatewaySX functions solely as a network-layer router with no BACnet involvement. Therefore, device object configuration and point mapping are not required.

This application note explains how to configure the BASgatewaySX to operate as a Modbus Serial to Modbus TCP router.

Modbus TCP devices can operate as clients, servers, or client/servers. When a Modbus TCP client needs to communicate with a Modbus RTU device, the client must treat the Modbus RTU device as if it were a Modbus TCP server. This means the device must be addressed using both a Modbus ID and an IP address.

The Modbus ID (slave address) will be the native Modbus ID of the Modbus RTU device connected to the BASGSX-M1, and the IP address will be that of the BASGSX-M1. This is the basis of Modbus RTU-to-Modbus TCP routing.

When a Modbus TCP client communicates with an actual Modbus TCP server, all communication occurs over Ethernet without any involvement from BASgatewaySX. However, if a Modbus TCP client communicates with a Modbus serial device, the BASgatewaySX routes the message to the corresponding serial bus.
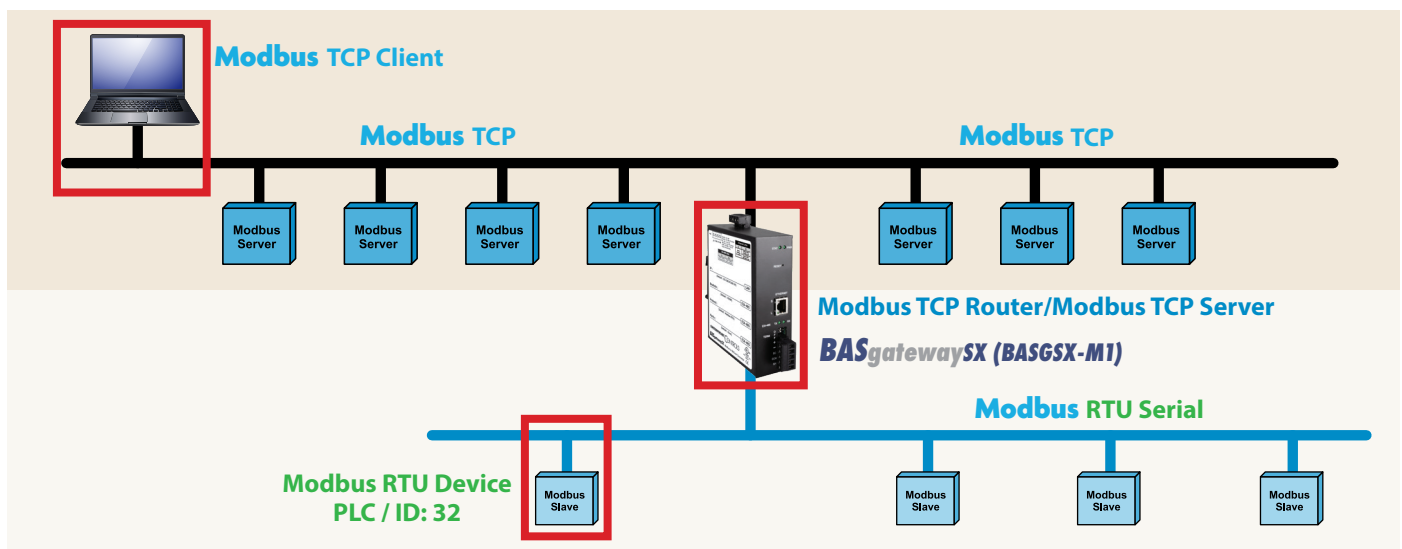
In this example, we connected a:

- PC (running the Modbus TCP client)
- BASgatewaySX (Modbus TCP server)
- Modbus RTU PLC (Modbus serial device)

Remember, the BASgatewaySX can route data from a Modbus serial device to a Modbus TCP client without mapping or special configuration, only the Modbus settings need to be configured as follows:

- The Modbus RTU parameters on the BASgatewaySX must match the parameters of the Modbus RTU PLC—specifically protocol, baud rate, and parity.
- The BASGSX-M1 IP settings must be within the same IP range and subnet as the Modbus TCP client. This ensures that the Modbus TCP client can communicate with the BASgatewaySX (acting as the Modbus TCP server) without connection issues.

1. Configure the gateway to use the same Modbus protocol, baud rate, and parity as the Modbus serial device.

    a. Verify and note the configuration settings in the Modbus RTU PLC.

       NOTE: In this application, we connected a CLICK Series PLC from AutomationDirect and used CLICK Programming Software to set up and access the device configuration.

       Port 3 supports Modbus RTU communication over RS-485.
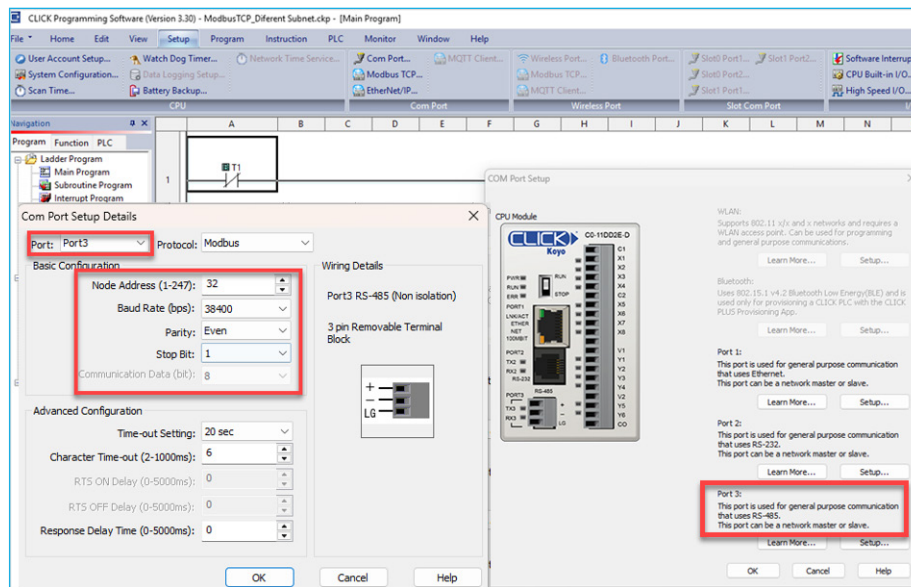
    b. Verify and note the configuration settings for Port 3 (in this example):

        - Protocol: Modbus RTU
        - Modbus ID (Node Address): 32
        - Baud rate: 38400
        - Parity: Even

   c. Configure these Modbus parameters on the BASgatewaySX **Configure Settings** screen.

2. Confirm that the BASGSX-M1 IP settings are in same range and subnet as the Modbus TCP client.

    a. In this example, a local PC runs a virtual Modbus TCP client, so the PC and the BASGSX-M1 must be within in the same IP range and subnet:

    10.0.0.0/20 (10.0.0.1 to 10.0.15.254)
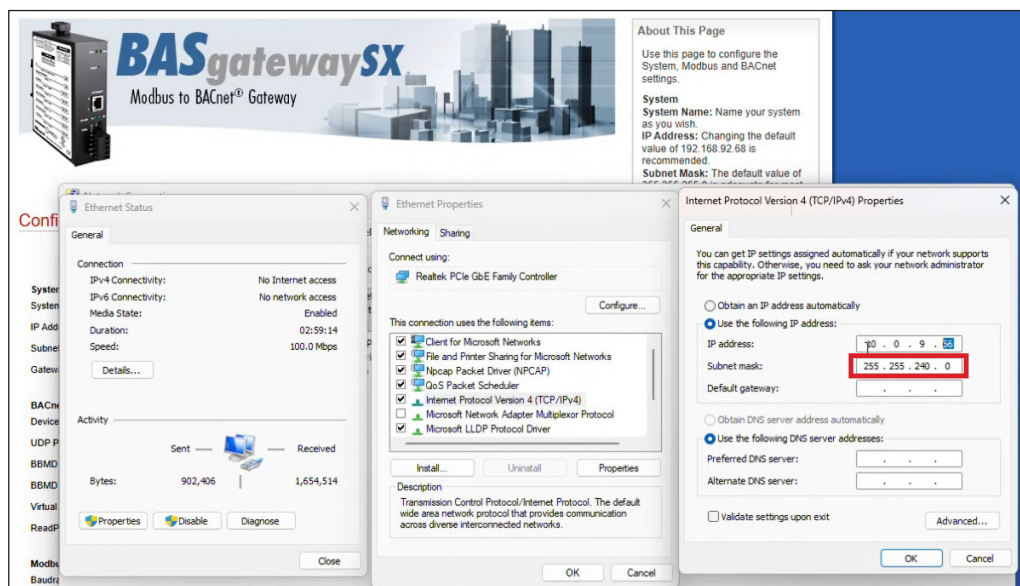
b. On the Modbus TCP client, verify that the IP Address is in the same range and subnet as the BASGSX-M1: **10.0.0.99/20**

The BASgateway default Modbus TCP server port is 502.
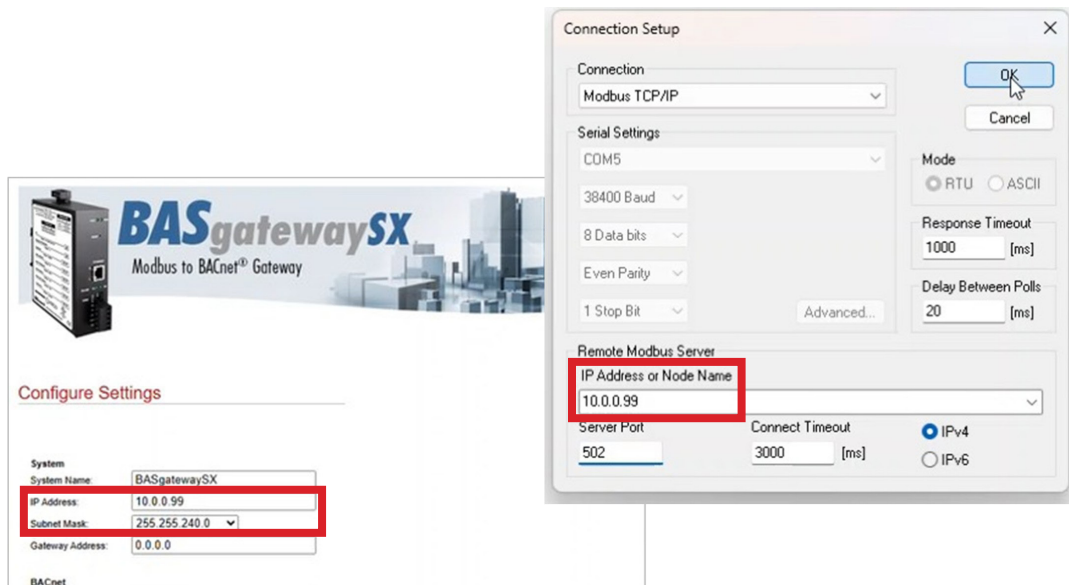
To route multiple Modbus serial devices connected to the BASGSX-M1, repeat the process described above:

- The BASGSX-M1's protocol, baud rate, and parity settings must match the setting on the Modbus serial device.
- The BASGSX-M1's IP settings must be within the same IP range and subnet as the Modbus TCP client.
- The Modbus RTU devices that are going to be routing to Modbus TCP will be Modbus TCP server that will be addressed with the IP of the BASGSX-M1 and the Modbus ID of the actual Modbus RTU device.