

TEC Series Wireless Thermostat Controller System

Technical Bulletin

Code No. LIT-12011414
Software Release 4.1
Issued October 6, 2008
Supersedes March 17, 2008

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TEC Series Wireless Thermostat Controller System Technical Bulletin

Document Introduction

This document describes how to commission and configure a TEC Wireless Thermostat Controller System on a Metasys® network, including how to:

- configure TEC Wireless Thermostat Controller addresses, which is explained in greater detail in the appropriate installation instructions
- configure TEC20 Coordinator network address values
- map TEC Wireless Thermostat Controller objects on a Metasys network
- troubleshoot a TEC Wireless Thermostat Controller System application

This document neither describes how to locate, install, or program TEC Wireless Thermostat Controllers nor how to locate and install TEC20 Coordinators.

Refer to the *Wireless Metasys® System Location Guide (LIT-12011294)* or the appropriate TEC Installation Instructions listed in Table 1 for more information on these topics.

Related Documentation

See Table 1 to locate information in related documentation.

Table 1: TEC Wireless Thermostat Controller System Related Documentation (Part 1 of 2)

For Information On	See Document	LIT or Part Number
Applications, Features, Benefits, and an Overview of the TEC Wireless Thermostat Controller System	<i>TEC Series Wireless Thermostat Controller System for Staged Equipment Product Bulletin</i>	<i>LIT- 12011400</i>
	<i>TEC Series Wireless Thermostat Controller System for Fan Coil and Zoning Equipment Product Bulletin</i>	<i>LIT- 12011401</i>
Planning Locations of TEC Wireless Thermostat Controller System Components	<i>Wireless Metasys System Location Guide</i>	<i>LIT- 12011294</i>
Mounting, and Wiring TEC20 Coordinators	<i>TEC20 Wireless Coordinator Installation Instructions</i>	<i>Part No. 24-9890-781</i>

Table 1: TEC Wireless Thermostat Controller System Related Documentation (Part 2 of 2)

For Information On	See Document	LIT or Part Number
Mounting, Wiring, and Programming TEC Wireless Thermostat Controllers	<i>TEC2001-3 Single-Stage Wireless Thermostat Controller Installation Instructions</i>	<i>Part No. 24-9890-714</i>
	<i>TEC2002-3 Heat Pump Wireless Thermostat Controller Installation Instructions</i>	<i>Part No. 24-9890-722</i>
	<i>TEC2003-3 Multi-Stage Wireless Network Thermostat Controller Installation Instructions</i>	<i>Part No. 24-9890-730</i>
	<i>TEC2004-3 Multi-Stage Economizer Wireless Thermostat Controller Installation Instructions</i>	<i>Part No. 24-9890-749</i>
	<i>TEC2045-2 Wireless Thermostat Controller with Single Proportional Output and One-Speed Fan Control Installation Instructions</i>	<i>Part No. 24-9890-757</i>
	<i>TEC20x6(H)-2 Series Wireless Network Thermostat Controllers with Two Outputs, Dehumidification Capability, and Three Speeds of Fan Control Installation Instructions</i>	<i>Part No. 24-9890-765</i>
	<i>TEC20x7-2 Series Wireless Thermostat Controllers with Two Outputs Installation Instructions</i>	<i>Part No. 24-9890-773</i>
General Information on BACnet® Master-Slave/Token-Passing (MS/TP) Communications	<i>MS/TP Communications Bus Technical Bulletin</i>	<i>LIT-12011034</i>
General Information on BACnet Internet Protocol (IP) Communications	<i>BACnet Controller Integration with NAE/NCE Technical Bulletin</i>	<i>LIT-1201531</i>
Connecting to, Commissioning, Operating, and Troubleshooting the Network Automation Engine (NAE)	<i>NAE Commissioning Guide</i>	<i>LIT-1201519</i>
Using the System Configuration Tool (SCT) Software, Creating, Editing, and Downloading Archive Databases	<i>SCT Technical Bulletin</i>	<i>LIT-1201534</i>
Definitions and Routine Operating Procedures for Metasys System Extended Architecture Software and User Interface (UI)	<i>Metasys system Help</i>	<i>LIT-1201793¹</i>
Definitions and Routine Operating Procedures for Controller Configuration Tool (CCT) Software and User Interface	<i>Controller Configuration Tool (CCT) Help</i>	<i>LIT-12011147¹</i>
General Network and Information Technology (IT) Definitions, Concepts, Recommendations, and Requirements	<i>Network and IT Guidance for the BAS Professional Technical Bulletin</i>	<i>LIT-12011279</i>

1. This LIT numbers represents a printer friendly version of the Help.

Primer on Wireless Mesh Networks Using ZigBee® Technology

Overview

The ZigBee™ standard is a global open networking standard that defines a low-cost, low-power, two-way wireless communication system. Its development comes from the ZigBee Alliance, an organization of manufacturers devoted to providing a cost-effective wireless networking technology for use in commercial and residential applications. The primary advantages that ZigBee technology brings to the marketplace include the following:

- high reliability and security
- low power with multiyear battery life
- low complexity at an economic cost

ZigBee Communications Technology

The ZigBee network is a Personal Area Network (PAN) based on the Institute of Electrical and Electronic Engineers (IEEE) 802.15.4 standard for low power, low duty-cycle wireless transmitting systems. Devices on the network use Direct Sequence Spread Spectrum (DSSS) wireless technology and operate on the 2.4 GHz Industrial, Science, Medical (ISM) band.

Devices on the ZigBee network are different from devices using Bluetooth® technology and wireless Universal System Bus (USB) devices in that they form a mesh network between nodes. Mesh networks are a type of daisy chaining from one device to another. This technique expands the typically short range of an individual node into a much larger, widespread network consisting of multiple nodes.

The Medium Access Control (MAC) layer uses a Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) mechanism. This layer transmits beacon requests, synchronizations, and message retries. The physical layer of the ZigBee network uses the 2.4 GHz radio band. Channels 11 to 26 are available in this band. See Figure 2.

ZigBee Device Types

The ZigBee specification defines three kinds of devices that can be part of a ZigBee network: a coordinator, one or more routers, and one or more end devices.

Coordinator

A coordinator is a required network component. One coordinator is permitted on each wireless network. It acts as a parent device, initiating network formation, which involves channel selection and network identification.

Router

A router is an optional network component. One or more routers are permitted on each wireless network. Routers act as parent devices, participating in multi-hop message routing. They relay messages between nodes and allow child nodes to connect to them. Routers can talk to other routers and to end devices.

End Device

An end device is an optional network component. One or more end devices are permitted on each wireless network. End devices may be low-power, child devices that are typically battery powered. They do not communicate directly to other devices but rely on their parent to forward and buffer messages for them.

ZigBee Network Topologies

A ZigBee network can adopt one of three topologies: star, tree, or mesh (Figure 1). The topology defines how a message is routed from one node to another. A star network has a central node through which all messages pass. A tree network has a top node with a branch and leaf structure below in which messages travel up and down the tree as necessary. A mesh network is a modified tree network in which some leaves are linked, enabling messages to travel across the tree when a suitable route is available. The TEC Series Wireless Thermostat Controller System uses a mesh network.

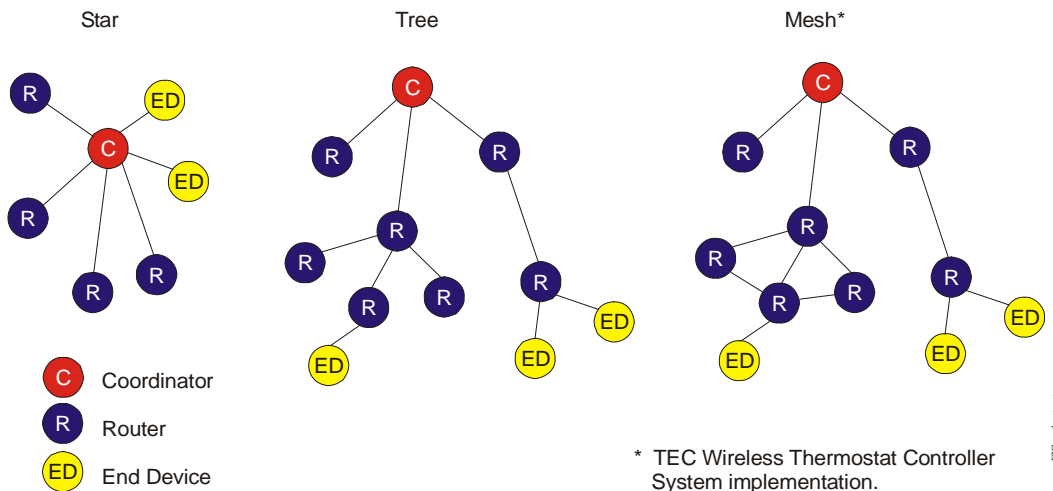


Figure 1: Topologies for Wireless Network

Parent and Child Devices

In a wireless ZigBee network, a parent is a device that assigns unique network addresses to other child nodes as they join the network. Any coordinator or router can be a parent to other routers and end devices, but the coordinator is always a parent device. When a router or end device joins the network, it selects a parent from a group of routers or the coordinator. The selected parent may not always be the closest node, since the router or end device selects a parent based on signal strength and its proximity to the coordinator. Once the router joins the network, it no longer relies on its parent for communication; however, once an end device joins, it continues to rely on its parent for all two-way communication.

Self-Healing, Multi-Hop Network

The ZigBee network is further characterized as a self-healing, multi-hop network. If a wireless communication path experiences interference or drops out, the network automatically reroutes the message through an alternate path to form a new wireless communication path. Each message is received, then retransmitted as it hops along from node to node until it reaches its final destination. Within a ZigBee network, a single message is allowed to hop 10 times between the source and destination node.

TEC Series Wireless Thermostat Controller System Implementation of ZigBee Technology

The TEC Series Wireless Thermostat Controller system implements ZigBee technology as follows:

- The TEC20 Coordinator is the ZigBee coordinator. The TEC20 Coordinator is a parent to the TEC Wireless Thermostat Controllers.
- The TEC Wireless Thermostat Controllers are ZigBee routers. The TEC Wireless Thermostat Controllers serve as children to a TEC20 Coordinator. The TEC Wireless Thermostat Controllers are also the ZigBee end devices.
- The system uses the ZigBee Home Automation Profile.

ZigBee Channels

A ZigBee network has 16 channels available for use. The TEC Series Wireless Thermostat Controller System uses only channels 15, 20, and 25. These channels were selected for the TEC Series Wireless Thermostat Controller System because they do not overlap with channels used on a Wireless Fidelity (WiFi) network. To illustrate, Figure 2 is a diagram showing the channel spacing of the ZigBee and WiFi networks. Notice that the TEC Series Wireless Thermostat Controller system does not interfere with the WiFi network.

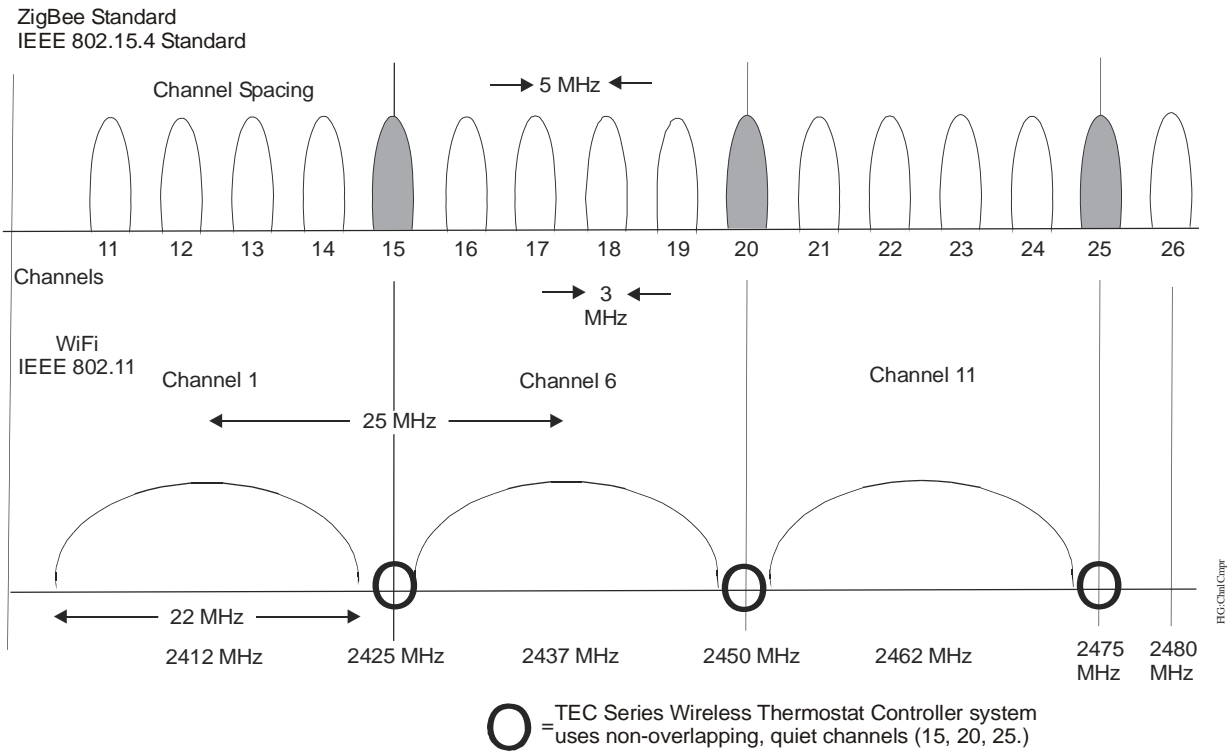


Figure 2: Comparing Channel Spacing of the ZigBee and WiFi Networks

TEC Wireless Thermostat Controller System Overview

TEC Wireless System Primer

A TEC Series Wireless Thermostat Controller System consists of:

- a supervisory controller, such as an NAE35/45/55 or NCE25 controller
- at least one TEC20 Coordinator
- multiple TEC Wireless Thermostat Controllers

A TEC20 Coordinator enables the TEC Wireless Thermostat Controllers to communicate with the supervisory controller, which schedules zone occupancy of the wireless system, collects trend data, overrides points, and monitors alarms. The TEC Series Wireless Thermostat Controller System confirms and synchronizes data transmissions between the TEC Wireless Thermostat Controllers and TEC20 Coordinators.

Together, these components provide wireless monitoring and temperature control of building Heating, Ventilating, and Air Conditioning (HVAC) equipment. Figure 3 illustrates a simple TEC Wireless Thermostat Controller System using a BACnet MS/TP or BACnet Internet Protocol (IP) Version of the TEC20 Coordinator.

Component Descriptions

Supervisory Controllers

The TEC Series Wireless Thermostat Controller System interfaces with Web-enabled, Ethernet-based, supervisory controllers that connect BAS networks to IP networks and the Web, such as the NAE35/45/55 and NCE25 controllers. These supervisory controllers provide scheduling, alarm and event management, trending, energy management, data exchange, dial-out capability, and password protection. With a computer running Microsoft® Internet Explorer® Web browser Version 6.0 (or later), you can browse to a configured NAE35/45/55 or NCE25, and monitor and control BAS field devices in the Metasys User Interface (UI) on the supervisory controller.

TEC20 Coordinators

A TEC20 Coordinator provides a wireless interface between a supervisory controller and the TEC Wireless Thermostat Controllers, allowing the exchange BACnet IP (TEC20-3C model) or BACnet MS/TP (TEC20-6C model) messages.

The TEC20 Coordinator initiates the formation of the wireless mesh network – one is required per wireless mesh network. Each TEC20 Coordinator and the TEC Wireless Thermostat Controllers assigned to it share a Personal Area Network Identification (PAN ID).

A TEC20 Coordinator requires a 15 VDC power source. An optional remote-mount antenna and cable is available to allow transmission when the supervisory controller is mounted inside a metal panel.

TEC Wireless Thermostat Controllers

Depending on the model, the TEC Wireless Thermostat Controllers can communicate sensed temperature, setpoint temperature, and other data with an associated supervisory controller and control a variety of fan coil and zoning equipment. The TEC Wireless Thermostat Controllers are designed for indoor, intra-building applications only.

The TEC Wireless Thermostat Controllers can also serve as repeaters to extend the range of the BACnet data communications within the wireless mesh network.

Component Quantities

A TEC Series Wireless Thermostat Controller System can support up to:

- 100 TEC Wireless Thermostat Controllers per MS/TP trunk on the supervisory controller
- 254 TEC Wireless Thermostat Controllers integrated through BACnet IP on a supervisory controller
- 30 TEC Wireless Thermostat Controllers per TEC20 Coordinator

Each increment of 30 TEC Wireless Thermostat Controllers requires one additional TEC20 Coordinator. See Table 2 for component quantities.

Table 2: TEC Wireless System Component Quantities

Number of TEC Wireless Thermostat Controllers	TEC20 Coordinators Required
1-30	1
31-60	2
61-90	3
91-100	4

TEC Wireless Thermostat Controllers can be added as repeaters, as required, to extend range and provide redundant pathways. TEC Wireless Thermostat Controllers serving only as repeaters do not count towards the totals shown in Table 2; however, indiscriminate use of TEC Wireless Thermostat Controllers as repeaters can lead to reduced performance.

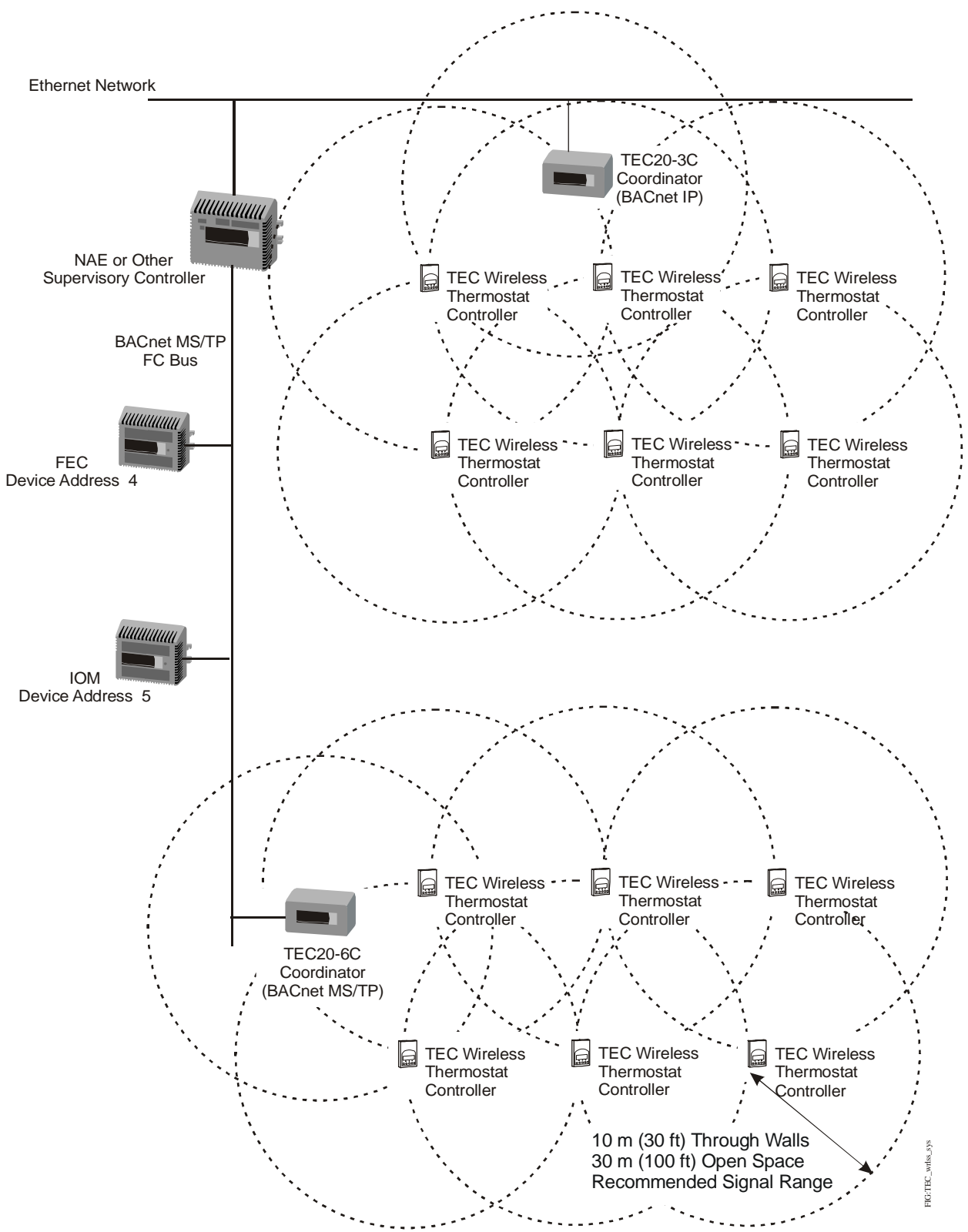


Figure 3: TEC Series Wireless Thermostat Controller System

TEC Series Wireless Communication

The TEC Series Wireless Thermostat Controller System uses DSSS RF wireless technology and operates on the 2.4 GHz ISM band. The system meets the IEEE 802.15.4 standard for low power, low duty-cycle RF transmitting systems and are compatible with wireless mesh networks compliant with the ZigBee standard. The TEC Thermostat Controllers use a transmission power of 10 mW.

A successful TEC Series Wireless Thermostat Controller System requires that a minimum RF (wireless) signal strength is maintained between the TEC20 Coordinators and TEC Wireless Thermostat Controllers. TEC20 Coordinator and TEC Wireless Thermostat Controller locations are important considerations in system design. Distance, metal objects, and other obstructions can reduce or completely block the RF signal transmission between a TEC20 Coordinator and TEC Wireless Thermostat Controllers.

Wireless Signal Transmission Range

Line-of-sight transmission ranges between a TEC20 Coordinator and a TEC Wireless Thermostat Controller (or between TEC Wireless Thermostat Controllers) can be less than the maximum distances shown in Table 3. The effective transmission range for indoor applications varies because of RF (wireless) signal absorption and reflection due to metal obstructions, walls (or floors), and furniture found in typical building interiors.

Table 3: Recommended Transmission Ranges between Two TEC Devices

Type	Distance
Through Walls	10 m (30 ft)
Open Space	30 m (100 ft)

Wireless Interference and Security

The TEC Series Wireless Thermostat Controller System is designed to minimize the potential for wireless interference with other wireless applications. In most commercial environments, the TEC Series Wireless Thermostat Controller System should not encounter or generate significant wireless interference, even in environments that are saturated with competing WiFi applications and cell phones. The system should not interfere with other wireless systems for the following reasons:

- No common frequencies are between the cell phone bands and the 2.4 GHz ISM band where the wireless system operates; therefore, interference should not occur with cell phone transmissions.
- The 802.11 and 802.15.4 standards both use DSSS wireless technology, and are specified and required by the Federal Communications Commission (FCC) to be simple noise sources for each other. This is a major advantage for DSSS technology, as each system's transmissions typically result in only a slight increase in background noise.

Other wireless systems should not interfere with the system for the following reasons:

- Cell phones do not operate on the 2.4 GHz ISM band; therefore, cell phone transmissions should not interfere with the wireless system.
- When a wireless system encounters WiFi transmissions in the 2.4 GHz ISM band, most of the transmissions appear merely as noise, with insignificant or no impact on wireless system communication.
- Wireless interference and transmission failures are usually prevented by maintaining an adequate distance between wireless transmitting devices. If a wireless device operating at 2.4 GHz (for example, WiFi access points) is located at least 3 m (10 ft) from TEC Series Wireless Thermostat Controller System components, there should be no interference.
- Tests indicate that WiFi channel 11 transmissions should not significantly interfere with a TEC Series Wireless Thermostat Controller System unless the WiFi access points are within 3 m (10 ft) of the TEC20 Coordinator and the access points are transmitting at full power almost continuously.
- Although the compatibility of WiFi and ZigBee products is based on standards and good design, other sources can interfere with both WiFi and the wireless system by overloading the bands with continuous transmissions at very high levels. 2.4 GHz cordless phones and some older phone headsets can cause RF interference. Do not use these anywhere near a wireless system or other WiFi applications. Additionally, some camera and sound systems are continuous frequency modulation transmitters. Keep these out of the WiFi environment to ensure optimal operation.

For more information on wireless interference and security, refer to the *Wireless Metasys System Location Guide (LIT-12011294)*.

Field Bus (BACnet MS/TP) or BACnet (BACnet IP) Integrations

The TEC Wireless Thermostat Controllers and TEC20 Coordinators are defined to an integration in the Metasys User Interface (UI). The Insert Integration Wizard in the Metasys UI guides you through the process of inserting an integration into the supervisory controller. After the integration is inserted into the supervisory controller, you can insert TEC20 Coordinators and integrate the TEC Wireless Thermostat Controllers as field points on the TEC20 Coordinator.

The field points of all TEC Wireless Thermostat Controllers associated with a TEC20 Coordinator are brought into one of three subfolders of the TEC20 Coordinator:

- Binary Values
- Analog Values
- Multi-State Values

BACnet MS/TP Limitations

TEC20 Coordinators each count as a single device in the BACnet MS/TP trunk limitations. TEC Wireless Thermostat Controllers do not count toward device limitations; however, they do count towards the number of point limitations on a supervisory controller.

BACnet IP Limitations

Parameters on TEC Wireless Thermostat Controllers that are integrated into the supervisory controller as points count towards number of point limitations per supervisory controller.

Applications to Avoid

Locations or applications that prohibit cellular telephones or Wireless Fidelity (WiFi) systems are unsuitable for the wireless products. Examples include:

- operating rooms or radiation therapy rooms
- validated environments
- department of defense applications requiring Diacap certification (for example, military bases and military hospitals)

Do not use the products in applications that cannot tolerate intermittent interference, or where:

- critical control features would impact life-safety or result in large monetary loss, including secondary (backup) life-safety applications
- data centers, production lines, or critical areas would be shut down
- loss of critical control would result from loss of data from humidity or temperature sensor communications
- operation of exhaust fans or Air Handling Units (AHUs) would impair a purge or pressurization mode
- missing data would invalidate reporting required by the customer security points being monitored

Detailed Procedures

Requirements

To commission and configure a TEC Series Wireless Thermostat Controller System application, you need the following:

- at least one TEC20 Coordinator
- up to 30 TEC Wireless Thermostat Controllers per TEC20 Coordinator

Note: Each FC Bus on the supervisory controller may have a maximum of 100 TEC Wireless Thermostat Controllers.

- a supervisory controller that is commissioned, configured, and connected to an IP network
- a computer (laptop preferred) with Microsoft Internet Explorer Web browser Version 6.x or Version 7.0
- an Ethernet crossover cable for directly connecting your computer to the TEC20 Coordinator
- two Ethernet patch cables to connect the receiver and your computer to the Metasys network
- a copy of the job site building and HVAC plans and specifications

This procedure assumes that you have:

- upgraded the supervisory controller to Release 4.0
- selected PAN ID and CHANNEL for each grouping of a TEC20 Coordinator and up to 30 TEC Wireless Thermostat Controllers
- installed TEC20 Wireless Configuration Tool on your computer

Overview

To install a TEC Wireless System, follow these steps:

1. Plan the locations of the devices in the TEC Series Wireless Thermostat Controller System. See *Locating a TEC Series Wireless Thermostat Controller System.*
2. Install each TEC Wireless Thermostat Controller. See *Install Each TEC Wireless Thermostat Controller and Configure Its Wireless Network Settings.*
3. Configure each TEC Wireless Thermostat Controller's wireless network settings (the PAN ID, CHANNEL, and COM ADDRESS). See *Install Each TEC Wireless Thermostat Controller and Configure Its Wireless Network Settings.*
4. Configure the TEC Wireless Thermostat Controllers for the HVAC equipment using the TEC Wireless Configuration Tool. See *Configure the TEC Wireless Thermostat Controllers for the HVAC Equipment* and *Commission the TEC20 Coordinator and Discover the TEC Wireless Thermostat Controllers.*

5. Install the TEC20 Coordinator according to job site plans, *Wireless Metasys System Location Guide (LIT-12011294)* and the *TEC20 Wireless Coordinator Installation Instructions (Part No. 24-9890-781)*. See *Install the TEC20 Coordinator*.
6. Configure the TEC20 Coordinator's PAN ID and Channel to start the wireless mesh network. See *Configure the TEC20 Coordinator's PAN ID and Channel to Start the Wireless Mesh Network*.
7. Discover the TEC Wireless Thermostat Controllers as field points to a TEC20 Coordinator. See *Map the TEC Wireless Thermostat Controllers to the Metasys UI*.
8. Commission the TEC20 Coordinator using the TEC Wireless Configuration Tool. See *Commission the TEC20 Coordinator and Discover the TEC Wireless Thermostat Controllers*.
9. Discover/Define the TEC20 Coordinator as a device in the Metasys UI. See *Configuring a BACnet IP Version of a TEC Wireless System in the Metasys UI* or *Configuring a BACnet MS/TP Version of a TEC Wireless System in the Metasys UI*.
10. Once the installation is complete, check the Status Light Emitting Diode (LED) on each TEC Wireless Thermostat Controller to make certain the TEC controller has connected to the TEC20 Coordinator and to help validate a reliable mesh network is in place.

Locating a TEC Series Wireless Thermostat Controller System

Keep these points in mind when planning the location of your TEC Wireless Thermostat Controller System components:

- The recommended maximum distance between every TEC Wireless Thermostat Controller is 10 m (30 ft) through walls, and 30 m (100 ft) in open spaces.
- Every TEC Wireless Thermostat Controller should be within wireless transmission range of at least two other TEC Wireless Thermostat Controllers.
- The TEC20 Coordinator should be within a wireless transmission range of at least two TEC Wireless Thermostat Controllers.
- You must locate the TEC20 Coordinator on the same floor or building level as the associated TEC Wireless Thermostat Controllers.
- Each TEC Coordinator supports up to 30 TEC Wireless Thermostat Controllers. TEC Wireless Thermostat Controllers serving only as repeaters do not count towards this total; however, indiscriminate use of TEC Wireless Thermostat Controllers as repeaters can lead to reduced performance.
- If a TEC Wireless Thermostat Controller is not within wireless transmission range of at least two TEC Wireless Thermostat Controllers or a TEC20 Coordinator, then add TEC Wireless Thermostat Controllers to function as repeaters and provide multiple wireless data pathways.

- Typical job sites include a number of major and minor obstructions in the final occupied space. The quantity and locations of the system components are directly affected by the number and location of obstructions.

To locate the components:

1. On the floor plan, mark the intended locations of all the TEC Wireless Thermostat Controllers. See Figure 4.

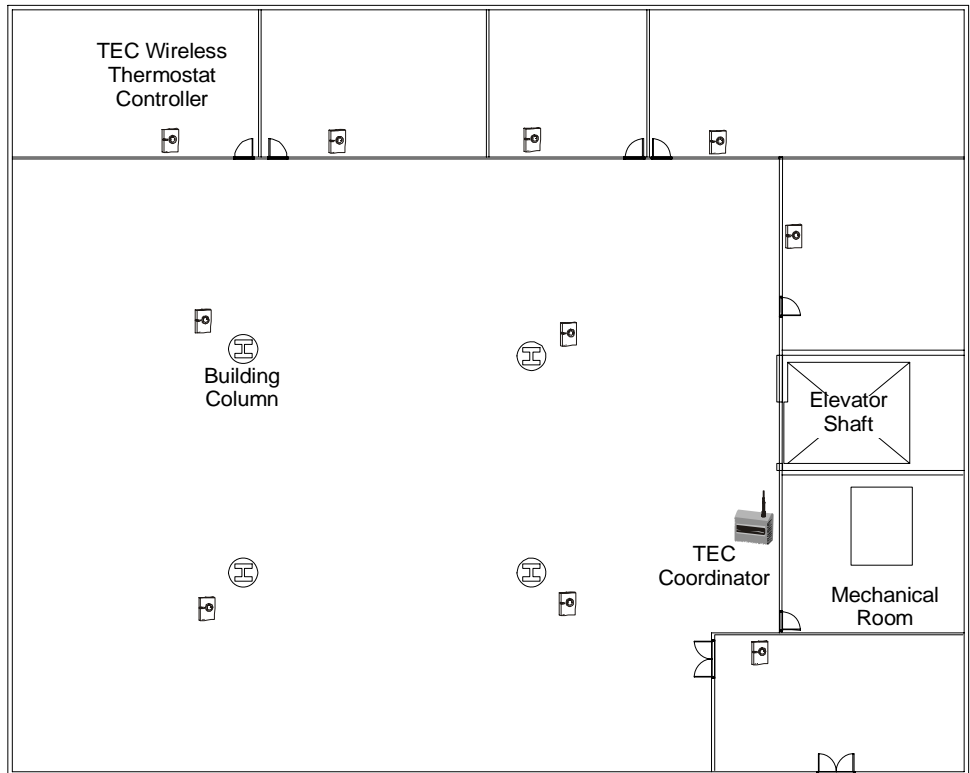


Figure 4: Building Floor Plan with TEC Wireless Thermostat Controller System

2. Identify all of the obstructions on the building floor plans; for example, elevator shafts, metal equipment, equipment rooms, concrete block walls, and duct work. See Figure 4.
3. Locate the TEC20 Coordinator near the center of the space. See Figure 4. The TEC20 Coordinator antenna should be in direct, unobstructed line of sight with a minimum of two TEC Wireless Thermostat Controllers. See Figure 4.

4. On your floor plans, draw a circle around each TEC Wireless Thermostat Controller and TEC20 Coordinator, to help determine the wireless signal range. Draw a 30-m (100-ft) diameter (15-m [50-ft] radius) circle if the device is transmitting in an open space (large circle). Draw a 10-m (30-ft) diameter (5-m [15-ft] radius) circle if the device is transmitting through walls (small circle). See Figure 5.

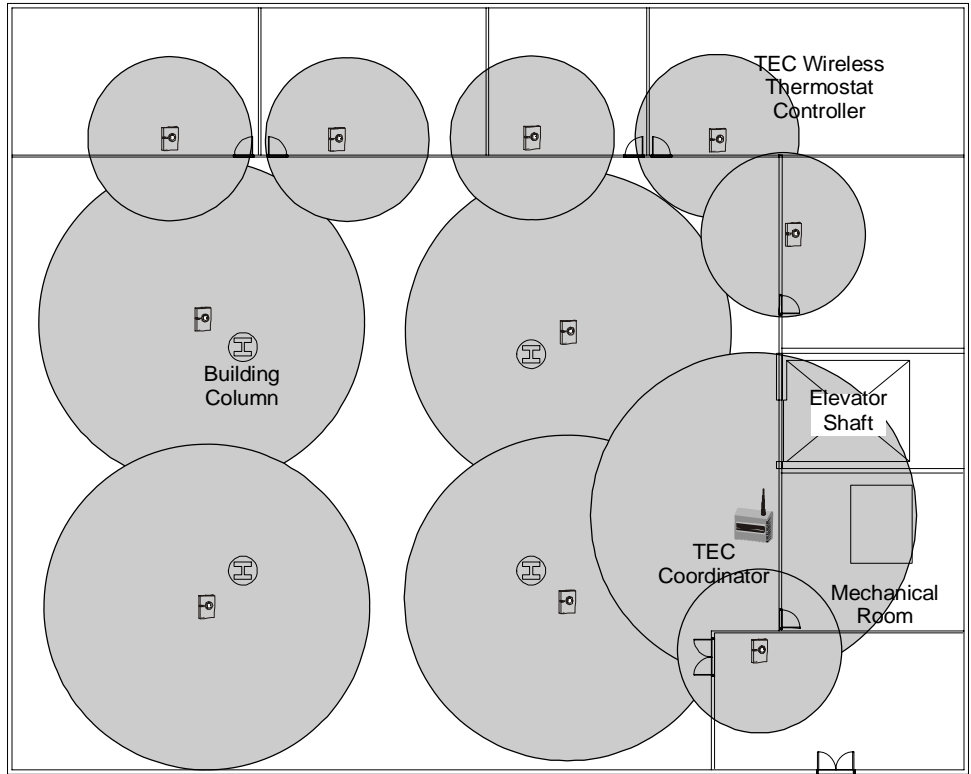


Figure 5: Building Floor Plan with TEC Wireless Thermostat Controllers and Circles Representing Wireless Signal Range

5. On your floor plan, if you have the circles that do not overlap with each other, add TEC Wireless Thermostat Controllers to serve as repeaters, filling in the gaps so that every circle overlaps with at least two other circles, providing multiple wireless transmission paths between wireless products in the network.
 - a. On your floor plans, draw a 30-m (100-ft) diameter (15-m [50-ft] radius) circle around each TEC Wireless Thermostat Controller used as a repeater in an open area. See Figure 6.

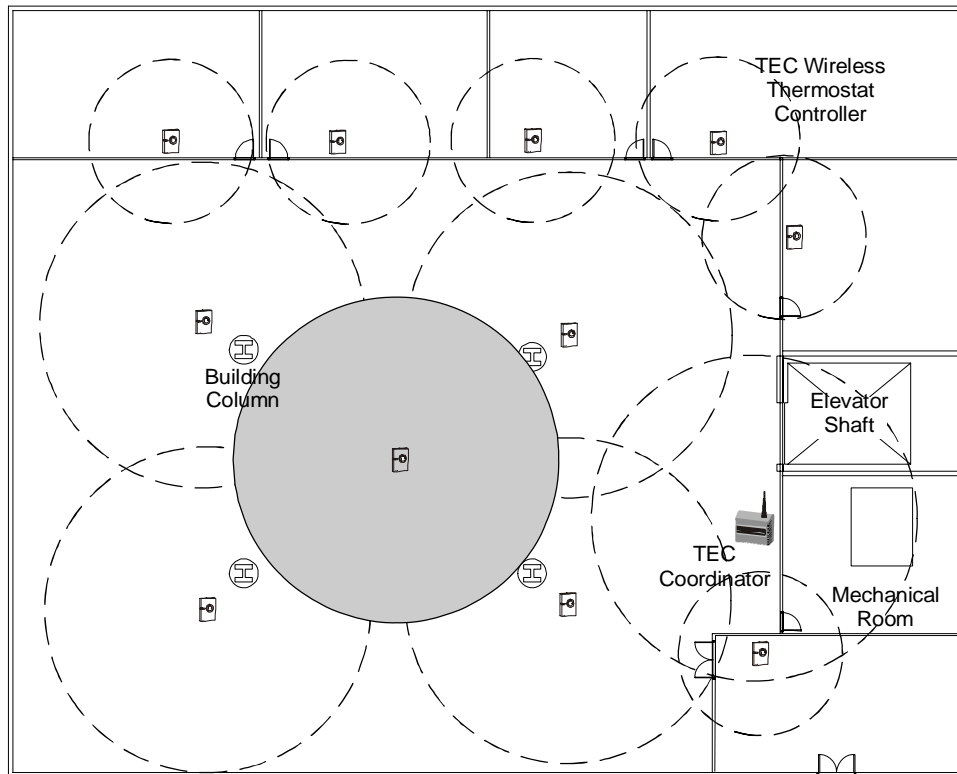


Figure 6: Add TEC Wireless Thermostat Controllers as Repeaters in Open Areas

- b. On your floor plans, draw both a small 10-m (30-ft) diameter (5-m [15-ft] radius) circle and a large 30-m (100-ft) diameter (15-m [50-ft] radius) circle around each TEC Wireless Thermostat Controller used as a repeater to transmit through open spaces and walls. See Figure 7.

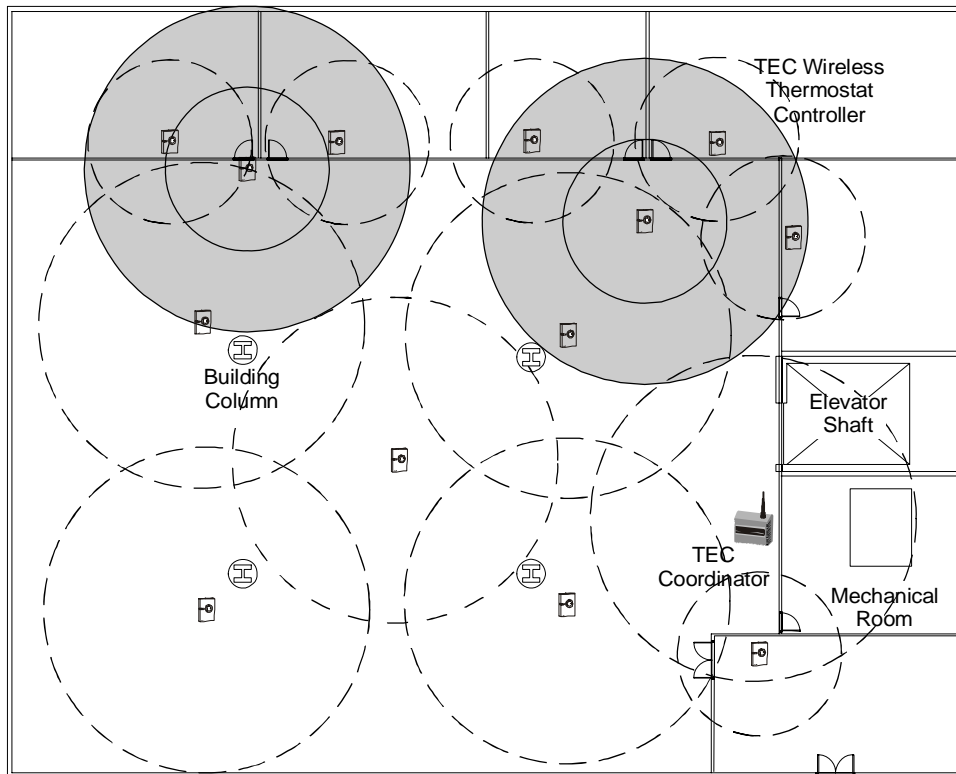


Fig. TEC01004

Figure 7: Add TEC Wireless Thermostat Controllers as Repeaters in Open Areas and through Walls

6. Verify that each component's wireless transmission range overlaps with at least two other components. See Figure 8.

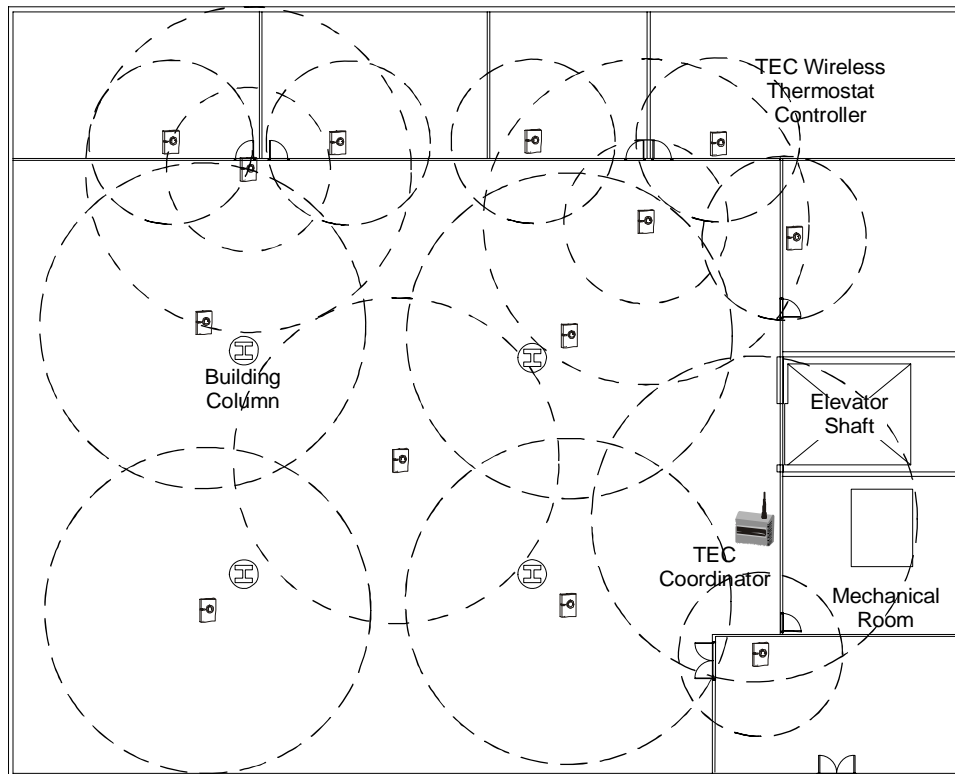


Figure 8: Building Floor Plan with TEC Series Wireless Thermostat Controller System, including Repeaters

Install Each TEC Wireless Thermostat Controller and Configure Its Wireless Network Settings

Install each TEC Wireless Thermostat Controller and configure its wireless network settings. For more information, refer to the job site plans, the *Wireless Metasys System Location Guide (LIT-12011294)*, and the appropriate TEC Wireless Thermostat Controller Installation Instructions. See Table 1.

Installation

1. Install the TEC Wireless Thermostat Controllers according to the *Wireless Metasys System Location Guide (LIT-12011294)* and the appropriate TEC Wireless Thermostat Controller Installation Instructions. See Table 1.
2. Wire the TEC Wireless Thermostat Controller to the HVAC equipment.
3. Apply power to the TEC Wireless Thermostat Controller.
4. Remove the cover of the TEC Wireless Thermostat Controller to view the Status LED.

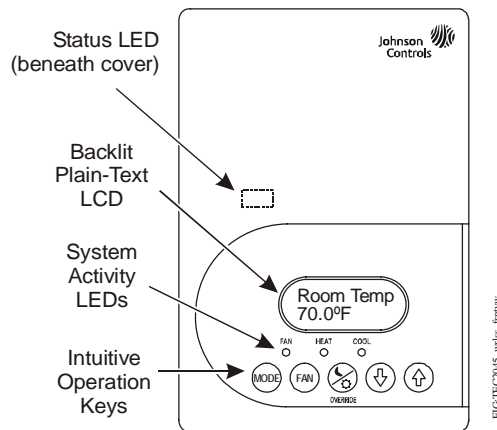


Figure 9: Front Cover of TEC2045 Thermostat Controller

Note: The Status LED should blink once to indicate power-on.

Note: After 5 seconds, the Status LED should blink twice to indicate that self-test passed.

Configuring Wireless Network Settings

IMPORTANT: For every thermostat reporting to a TEC20 Coordinator, be sure you set the same **PAN ID** and **Channel** value on the TEC20 Coordinator and all associated TEC Wireless Thermostat Controllers. A maximum of 30 TEC Wireless Thermostat Controllers can be associated with a TEC20 Coordinator. **Do not** reuse a **PAN ID** on this or any other wireless system in the same building.

Configure the TEC Wireless Thermostat Controllers as directed in the *Configuring the Thermostat Controller* section of the corresponding Installation Instructions document (see Table 1) for the particular model TEC Wireless Thermostat Controller.

Use the following process to configure the wireless mesh network.

1. Scroll to the **Com. Address** menu item and use the UP/Down Key to select a **Com Address** for each TEC Wireless Thermostat Controller (1 to 254). This address must be unique to each TEC Wireless Thermostat Controller on the same TEC20 Coordinator.
2. Scroll to the **PAN ID** menu item and use the UP/Down Key to select a **PAN ID** (1 to 500).
3. Scroll to the **Channel** menu item and use the UP/Down Key to select a **Channel** (11 to 26). Use channel 15, 20, or 25.

Note: Use these same **PAN ID** and **Channel** values for every TEC Wireless Thermostat Controller (and the associated TEC20 Coordinator) on the same wireless mesh network.

Note: If using the recommended installation procedure (and only if the TEC Coordinator has already been configured to the same **PAN ID** and **Channel**), the **Status** LED should blink 1 long and 4 short blinks during each 5 second interval if the TEC Wireless Thermostat Controller can communicate with the TEC20 Coordinator.

You can locally set the rest of the parameters for each TEC Wireless Thermostat Controller now (see the corresponding Installation Instructions in Table 1).

Configure the TEC Wireless Thermostat Controllers for the HVAC Equipment

Configure the TEC Wireless Thermostat Controllers as directed in the appropriate TEC Wireless Thermostat Controller Installation Instructions (see Table 1) for the particular model TEC Wireless Thermostat Controller.

Install the TEC20 Coordinator

Use the following procedure to install the TEC 20 Coordinator. For more information, refer to the job site plans, the *TEC20 Wireless Coordinator Installation Instructions (PN 24-9890-781)* and the *Wireless Metasys System Location Guide (LIT-12011294)*.

1. Install the TEC20 Coordinator and appropriate antenna, using the *TEC20 Wireless Coordinator Installation Instructions (Part No. 24-9890-781)* and the *Wireless Metasys System Location Guide (LIT-12011294)*.
2. Remove the cover of the TEC20 Coordinator and connect the backup battery to the battery connector on the bottom of the circuit board. See Figure 10.

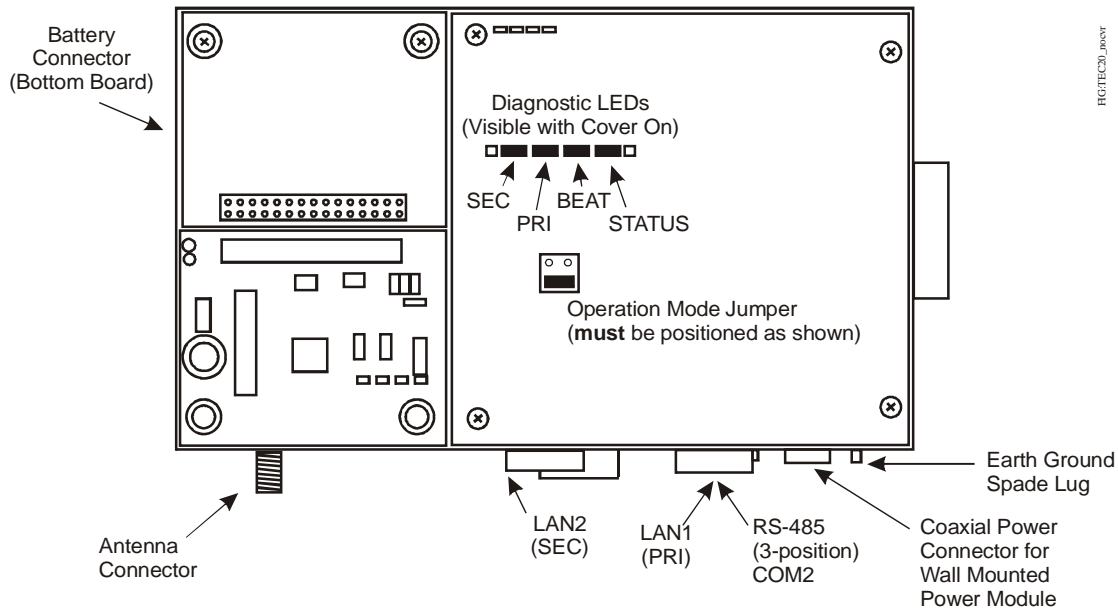


Figure 10: TEC20 Coordinator (Cover Removed)

3. For the TE20-6C-2 (MS/TP version), wire the TEC20 Coordinator on the MS/TP FC bus of the supervisory controller and install the supplied ferrite according to the included instructions.

For the TE20-3C-2 (IP version), connect the TEC20 Coordinator on the Ethernet network with the supervisory controller using the LAN1 Connector and install the supplied ferrite according to the included instructions.

4. Apply power to the TEC20 Coordinator and check the diagnostic LEDs. The STATUS (see Figure 10) and Wireless Communication Status (see Figure 11) LEDs light. After the TEC20 Coordinator finishes its self-test sequence (up to 2 minutes), the BEAT LED blinks approximately once per second.

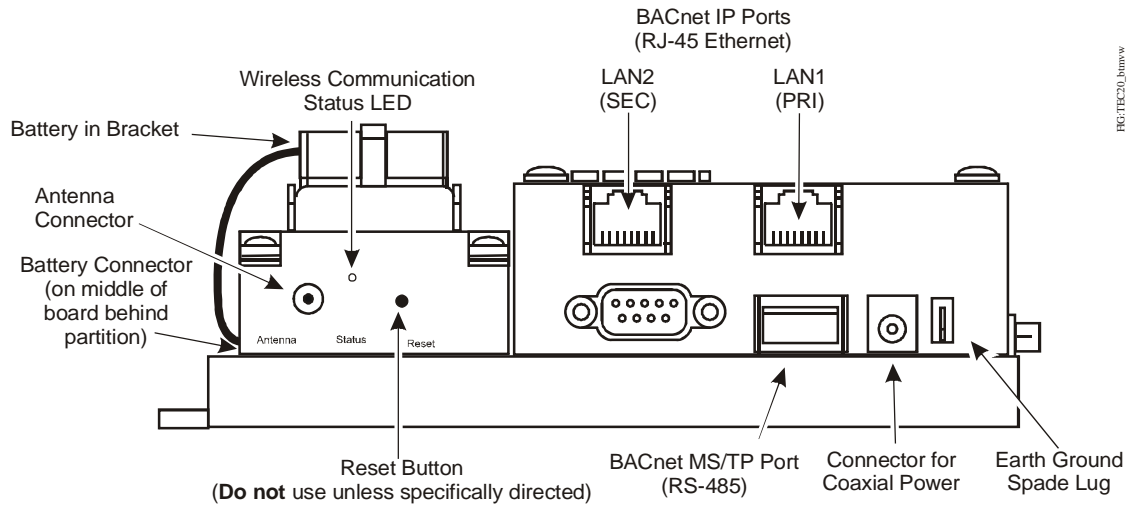


Figure 11: TEC20 Coordinator, Bottom View (Cover Removed)

Configure the TEC20 Coordinator's PAN ID and Channel to Start the Wireless Mesh Network

Use the following procedure to configure the TEC20 Coordinator's PAN ID and Channel to start the wireless mesh network.

1. Connect the TEC20 Coordinator and your computer.

To directly connect the TEC20 Coordinator and computer, use a crossover cable:

- a. Attach one end of a standard category-5 Ethernet Unshielded Twisted Pair (UTP) crossover cable to the LAN1 (PRI) RJ-45 Ethernet connector on the TEC20 Coordinator.
- b. Attach the other end of the crossover cable to the network port on the computer.

To connect the TEC20 Coordinator through a hub to the computer, use patch cables:

- a. Attach one end of a standard category-5 Ethernet unshielded twisted pair (UTP) patch cable to the LAN1 (PRI) RJ-45 Ethernet connector on the TEC20 Coordinator.
- b. Attach the other end of the patch cable to a network port on the hub.
- c. Attach one end of the second patch cable to a network port on the hub.
- d. Attach the other end of the second patch cable to the network port on the computer.

2. Power up the TEC20 Coordinator.
3. Record your computer's current IP settings, then reassign your computer's IP address for its Ethernet LAN adapter (if necessary, refer to Microsoft Windows® online Help for information about configuring TCP/IP settings).
4. For this initial connection to a factory-shipped TEC20 Coordinator, configure your computer to use an IP address in the same subnet as the TEC20 Coordinator, as well as a matching subnet mask.

When shipped, a new TEC20 Coordinator is pre-configured with an IP address in the range of: 192.168.1.12 n (**PRI** port is enabled, **SEC** port is disabled) where the last numeral (n) in the IP address matches the last numeral in the TEC20 Coordinator serial number. In all cases, the default subnet mask is 255.255.255.0.

Set the IP address of your computer in the range: 192.168.1.1 to 192.168.1.254 with a subnet mask of: 255.255.255.0

Note: Do not assign your computer the identical IP address as the TEC20 Coordinator's factory-assigned IP address.

5. Start the TEC Wireless Configuration Tool. The TEC Wireless Configuration Tool should search for any TEC20 Coordinators on the network.

6. When the search finishes, select the TEC20 Coordinator that has the expected IP address.

Note: If the TEC20 Coordinator is connected to a building network, devices other than TEC20 Coordinators may appear in this list. This tool does not connect to those devices.

Note: The last numeral (*n*) in the IP address matches the last numeral in the TEC20 Coordinator serial number value as indicated on the label inside the TEC20 Coordinator.

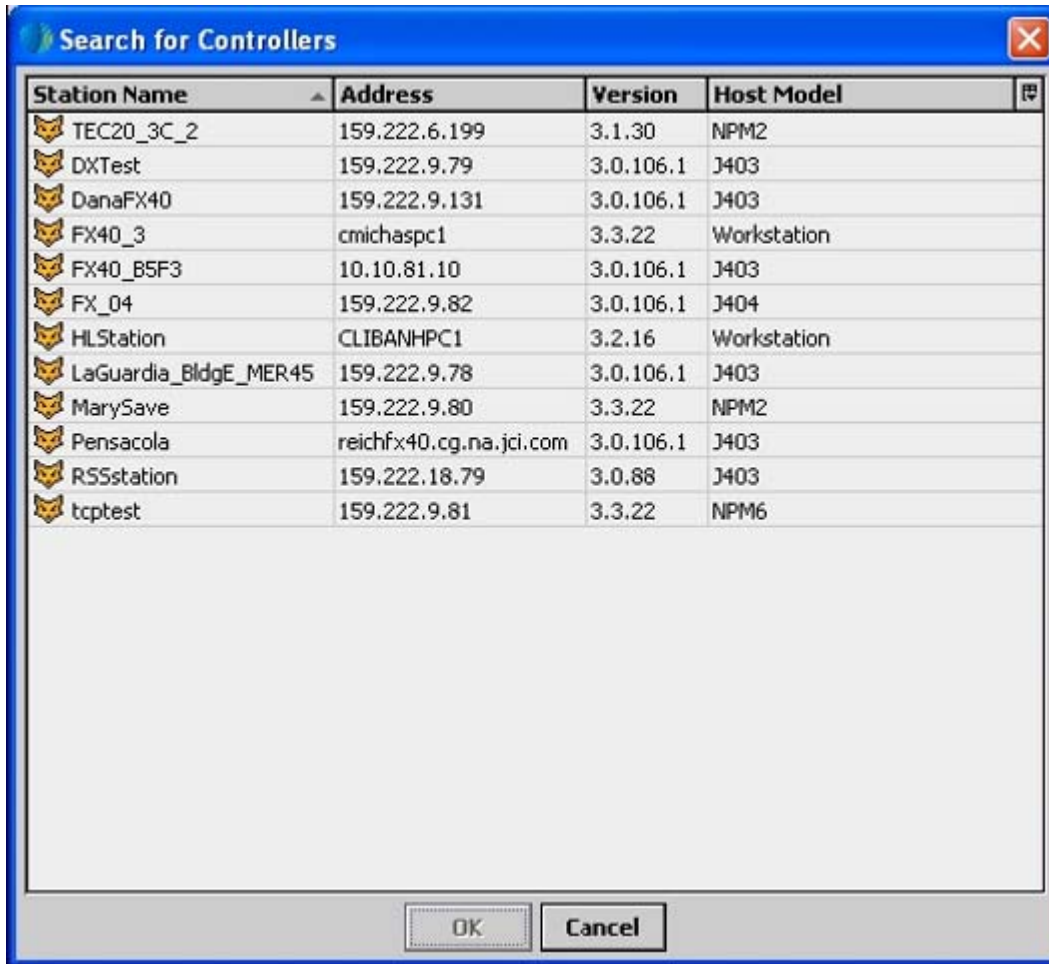


Figure 12: Selecting a TEC20 Coordinator

7. Log into the TEC20 Coordinator.

The default user name is: **admin**

The default password is: (no password - leave this blank)

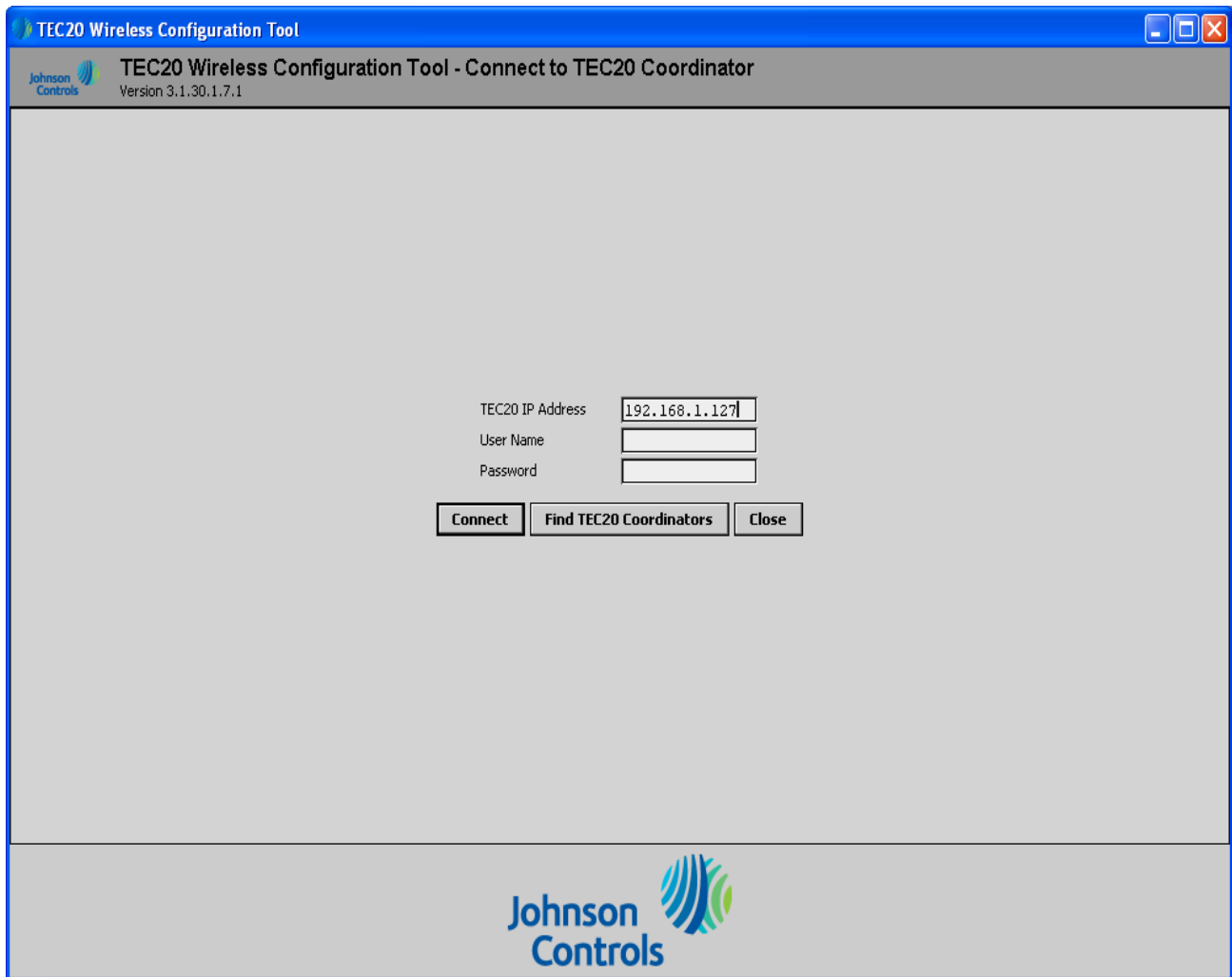


Figure 13: Connecting to the TEC20 Coordinator

8. On the **TEC20 Coordinator Settings** tab in the **ZigBee Settings** field:
 - a. Set the **ZigBee PAN ID** to the job plans. The default address is 0. Select a value from 1 to 500.
 - b. Set the **Channel Select** to the job plans. Use only channel 15, 20, or 25.

Note: Use these same **PAN ID** and **Channel** values for every TEC Wireless Thermostat Controller (and the associated TEC20 Coordinator) on the same wireless mesh network.

 - c. Press **Save ZigBee Settings** to start the wireless network.

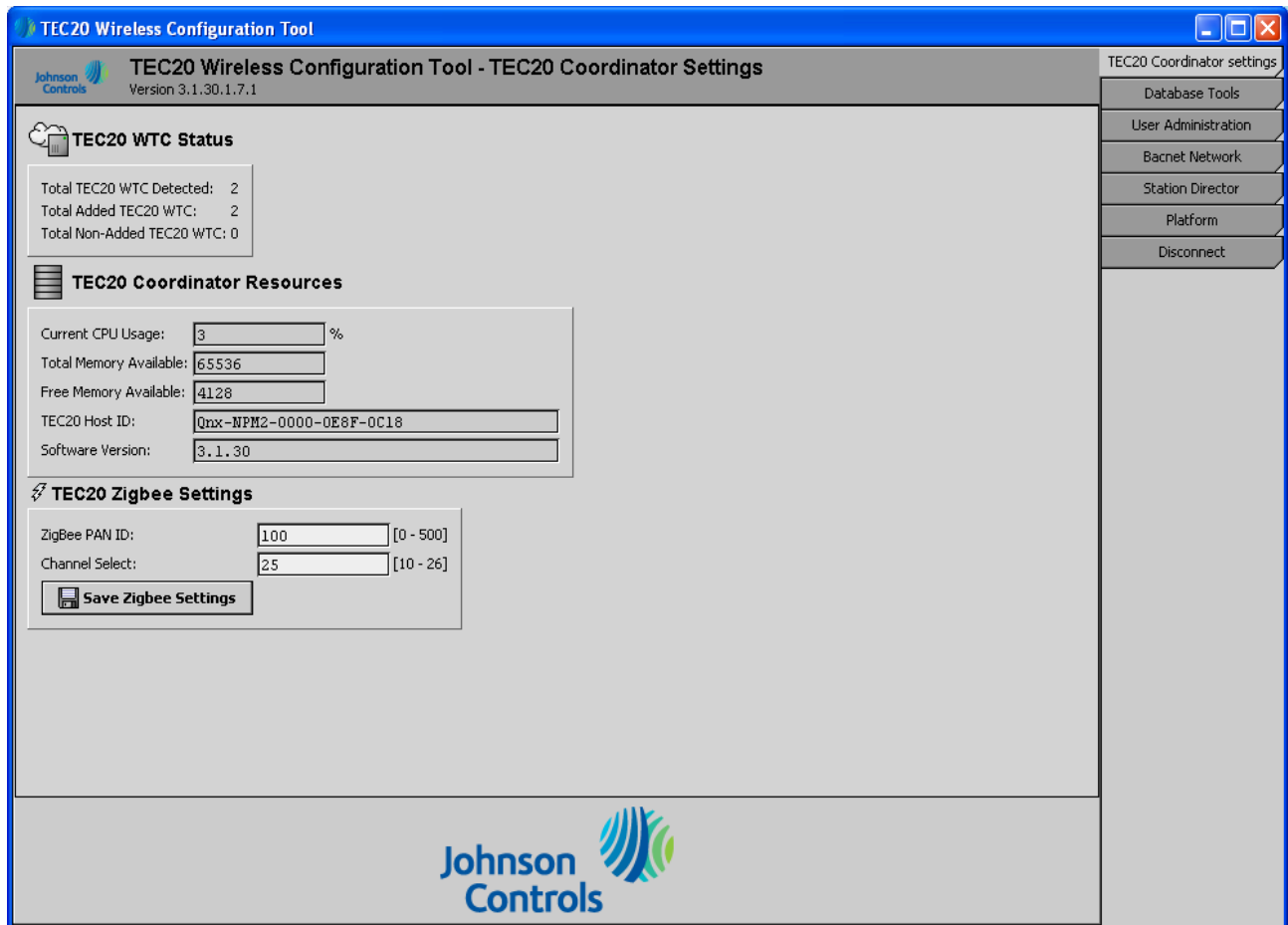


Figure 14: Wireless Configuration Tool - TEC20 Coordinator Settings Tab

9. Disconnect from the TEC20 Coordinator by selecting the Disconnect tab and selecting the disconnect button.
10. Restore your computer's IP settings, which you recorded earlier in this procedure.

Evaluating Wireless Communications

To evaluate wireless communication, check the Wireless Communication Status LED on the TEC20 Coordinator and TEC Wireless Thermostat Controllers. See Figure 11 and Table 4.

Table 4: Wireless Communication Diagnostic LED

Name	Color	Descriptions
Wireless Communication Status (near antenna)	Green	1 short blink = Power On 2 short blinks = Power On, wireless communication memory initialized 3 short blinks = Power On, wireless communication memory initialized, internal communications established 4 short blinks = Power On, wireless communication memory initialized, internal communications established, wireless network successfully started 4 short blinks and 1 long blink = Power On, wireless communication memory initialized, internal communications established, wireless network successfully started, wireless communication with thermostats active

Commission the TEC20 Coordinator and Discover the TEC Wireless Thermostat Controllers

1. Start the Wireless Configuration Tool. When the Wireless Configuration Tool first starts, it searches its subnet for TEC20 Coordinators.
2. When the search completes, select the TEC20 Coordinator that has the expected IP address.

Note: If the TEC20 Coordinator is connected to a building network, devices other than TEC20 Coordinators may appear in this list. This tool does not connect to those devices.

Note: The last numeral (*n*) in the IP address matches the last numeral in the TEC20 Coordinator serial number value as indicated on the label inside the TEC20 Coordinator. (This only applies to the default, fixed IP address.)

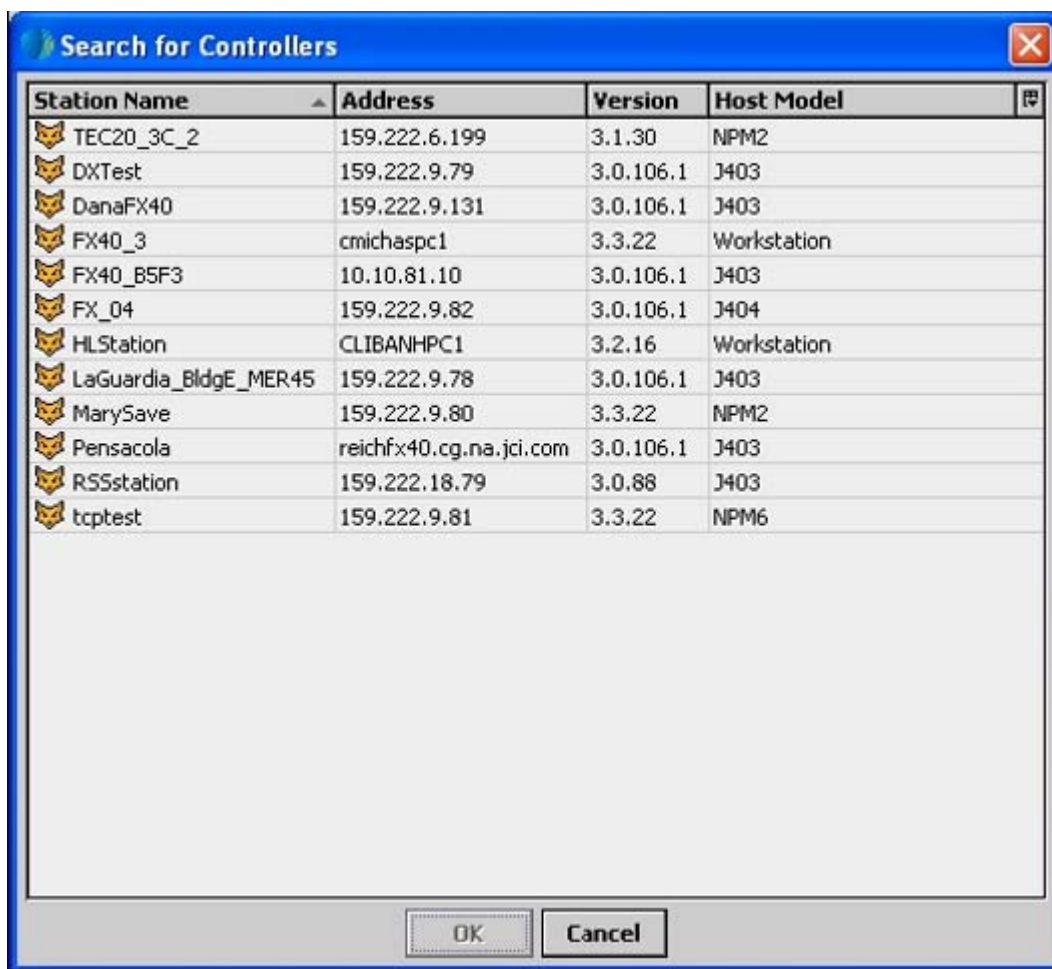


Figure 15: Selecting a TEC20 Coordinator

3. Log into the TEC20 Coordinator.

The default user name is: **admin**

The default password is: (no password - leave this blank)

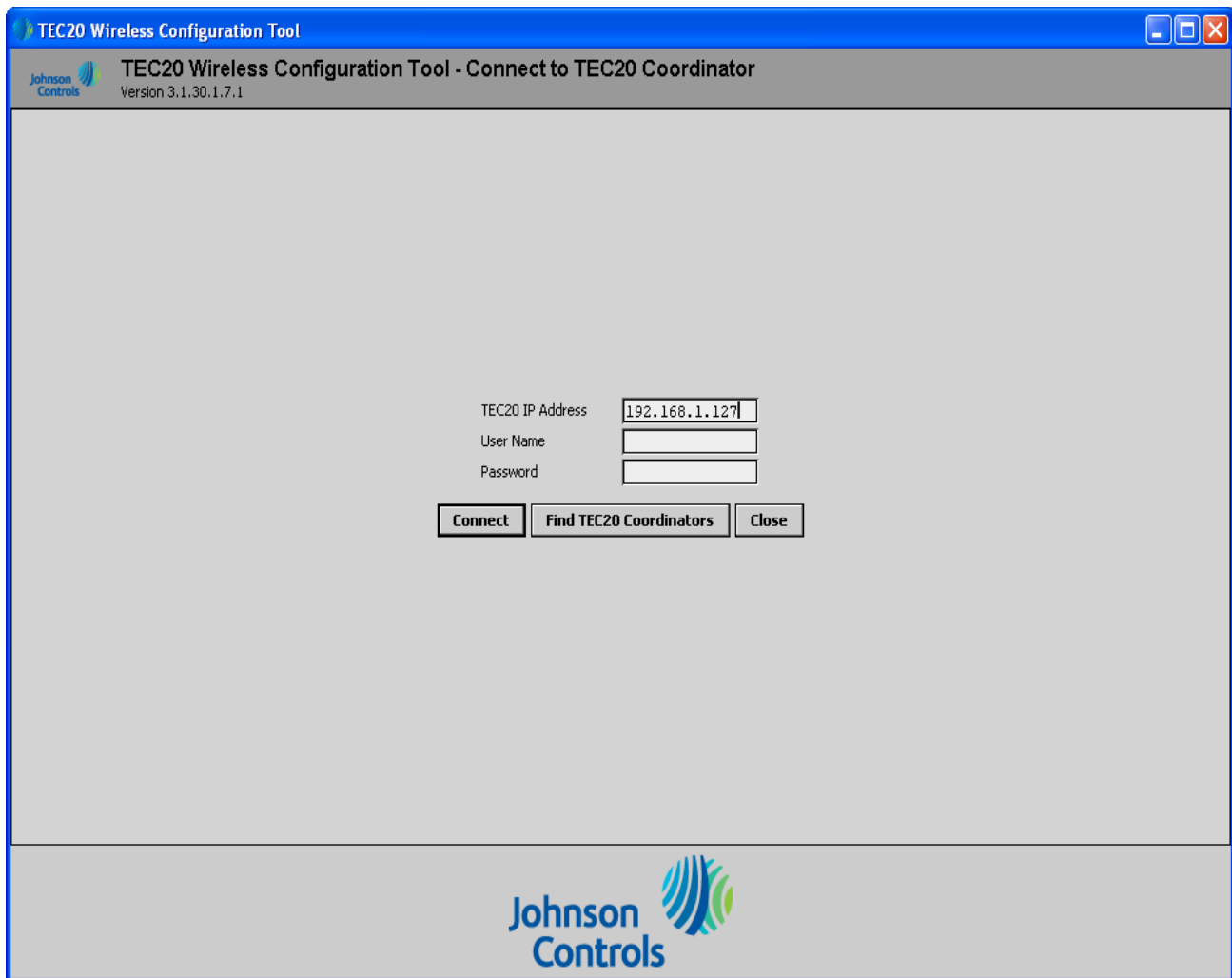


Figure 16: Connecting to the TEC20 Coordinator

4. Select the Database Tools Tab to navigate to the Database Tools page.

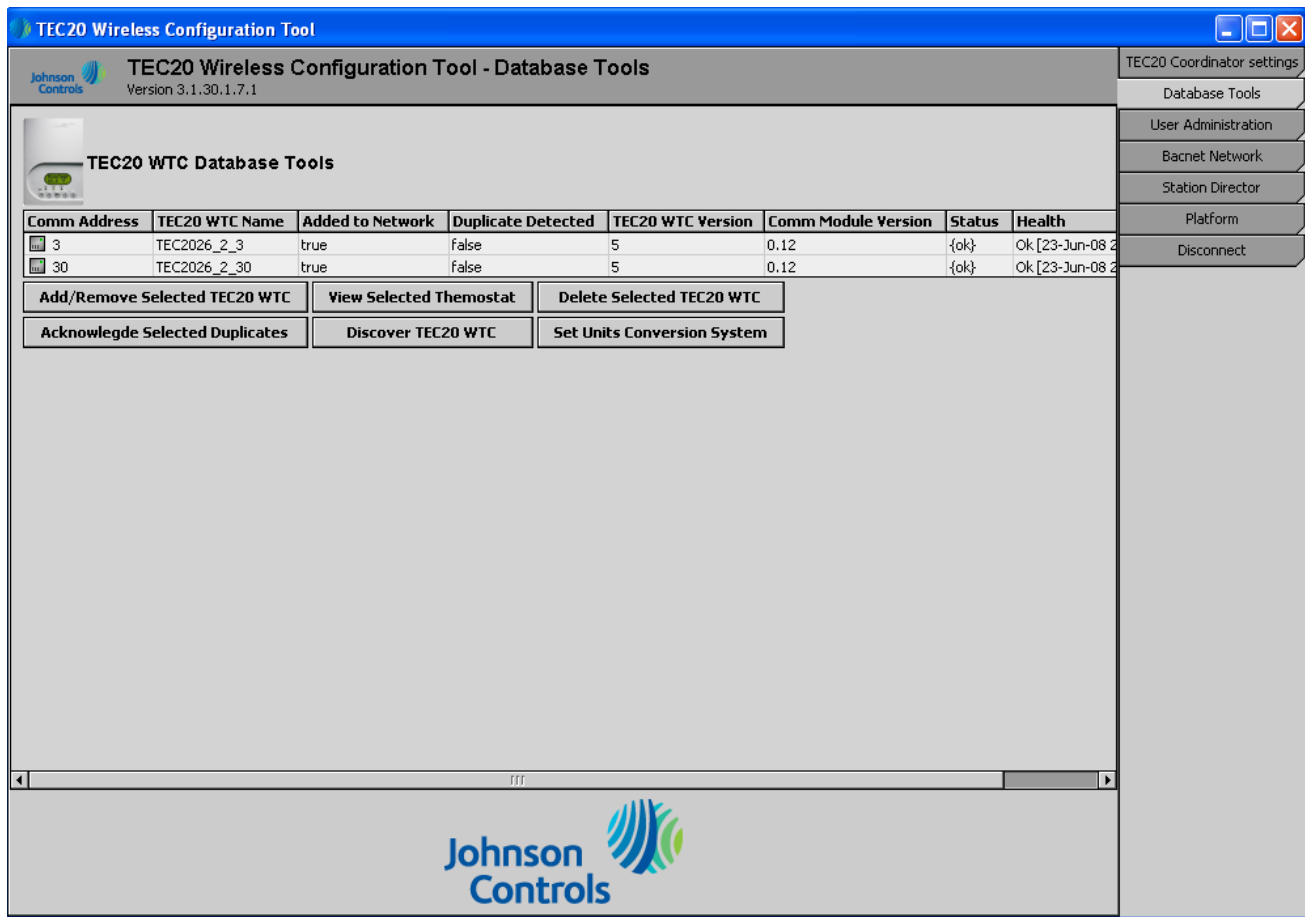


Figure 17: Select a TEC Wireless Thermostat Controller (WTC) for Remote Configuration

5. Select **Discover TEC WTC**. This selection finds any TEC Wireless Thermostat Controllers on the same Channel and PAN ID as the TEC20 Coordinator.

Note: It may take up to 2 minutes after a TEC Wireless Thermostat Controller is set to a Channel and PAN ID before the TEC20 Coordinator can discover a TEC Wireless Thermostat Controller.

6. Confirm that the number of installed and commissioned TEC Wireless Thermostat Controllers matches the job plans. If there is not a match, see *Appendix 2: Troubleshooting*.
7. Select all the TEC Wireless Thermostat Controllers.
8. Click **Add/Remove Selected TEC WTC** to create the BACnet objects for the TEC Wireless Thermostat Controllers.

Note: The **Added to Network** column in the table should change from false to true.

9. Select the **BACnet Network** tab to navigate to the BACnet Configuration page. See *BACnet Configuration*

BACnet Configuration

BACnet MS/TP Version

- a. Insert a **BACnet Object ID**. Change the default value of -1 to a value that is unique to the network. All BACnet Object IDs must be unique.
- b. Insert a **Network Number**. Change from the default value of 1 to match the network number of the rest of the devices on the MS/TP bus. The Johnson Controls systems default is 2000. In a multi-vendor system, Network Numbers must be managed. All devices on the same trunk must have the same network number.
- c. Insert an **MS/TP Address**. Valid addresses are 4 to 127. This address must be unique on the NAE's MS/TP network. The default is 100. Make this address unique to the MS/TP trunk.

Note: For best performance, use sequential addressing. Refer to *MS/TP Communications Bus Technical Bulletin, LIT-12011034* for more information.

- d. Insert the **MS/TP Baud Rate**. Select the rate to match the baud of the RS485 port to which the Coordinator is connected. The default setting is 38.4 K.

Note: If the supervisory controller is set to another baud setting, use that baud setting instead.

- e. **MS/TP Status** must have a value of {ok}. If the value is {disabled}, select the Enable button. This changes the value to {ok}.

Select the **Save** button to save changes.

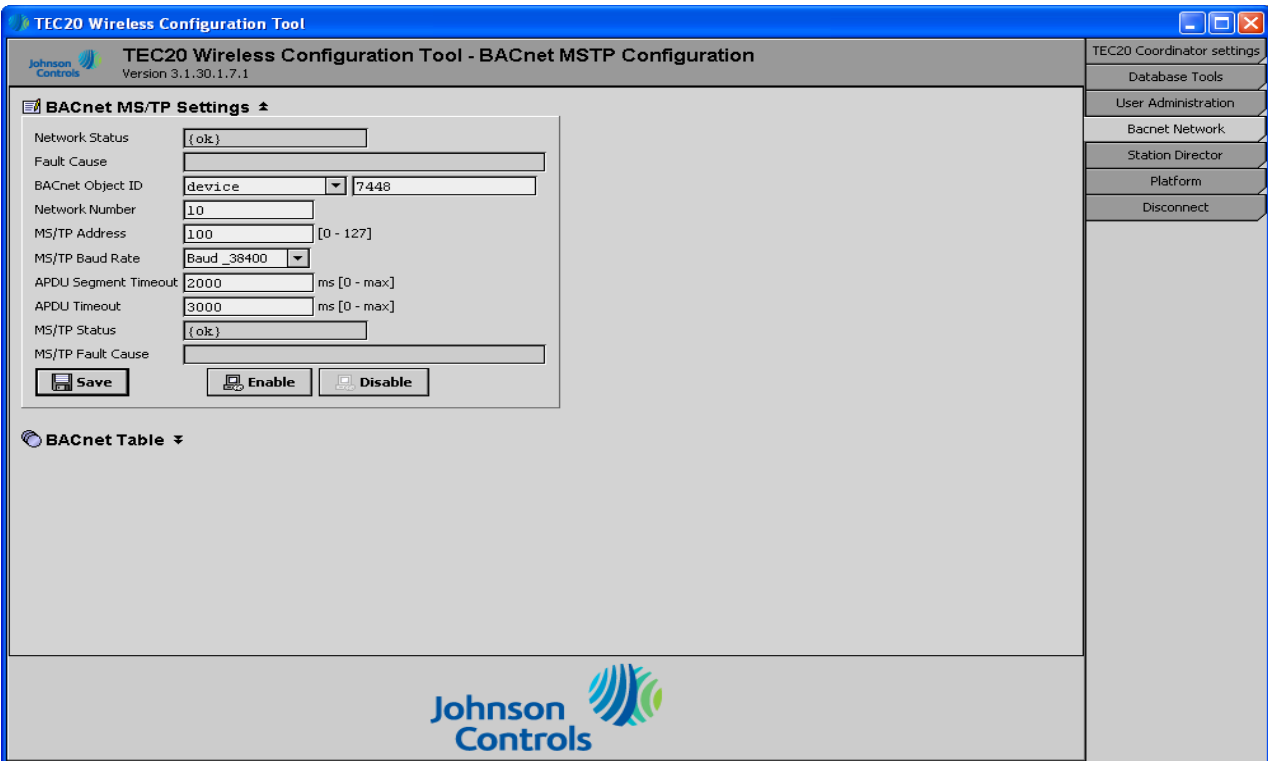


Figure 18: BACnet MS/TP Settings

BACnet IP Version

1. Insert a **BACnet Object ID**. Change the default value of -1 to a value that is unique to the network. All BACnet Object IDs must be unique. If the BACnet IP Status is {disabled}, click the Enable button.
2. Insert a **Network Number**. Change from the default value of 1 to match the network number of the rest of the devices on the IP bus. The Johnson Controls systems default is 1001. In a multi-vendor system, Network Numbers must be managed.

3. Select the **Save** button to save changes.

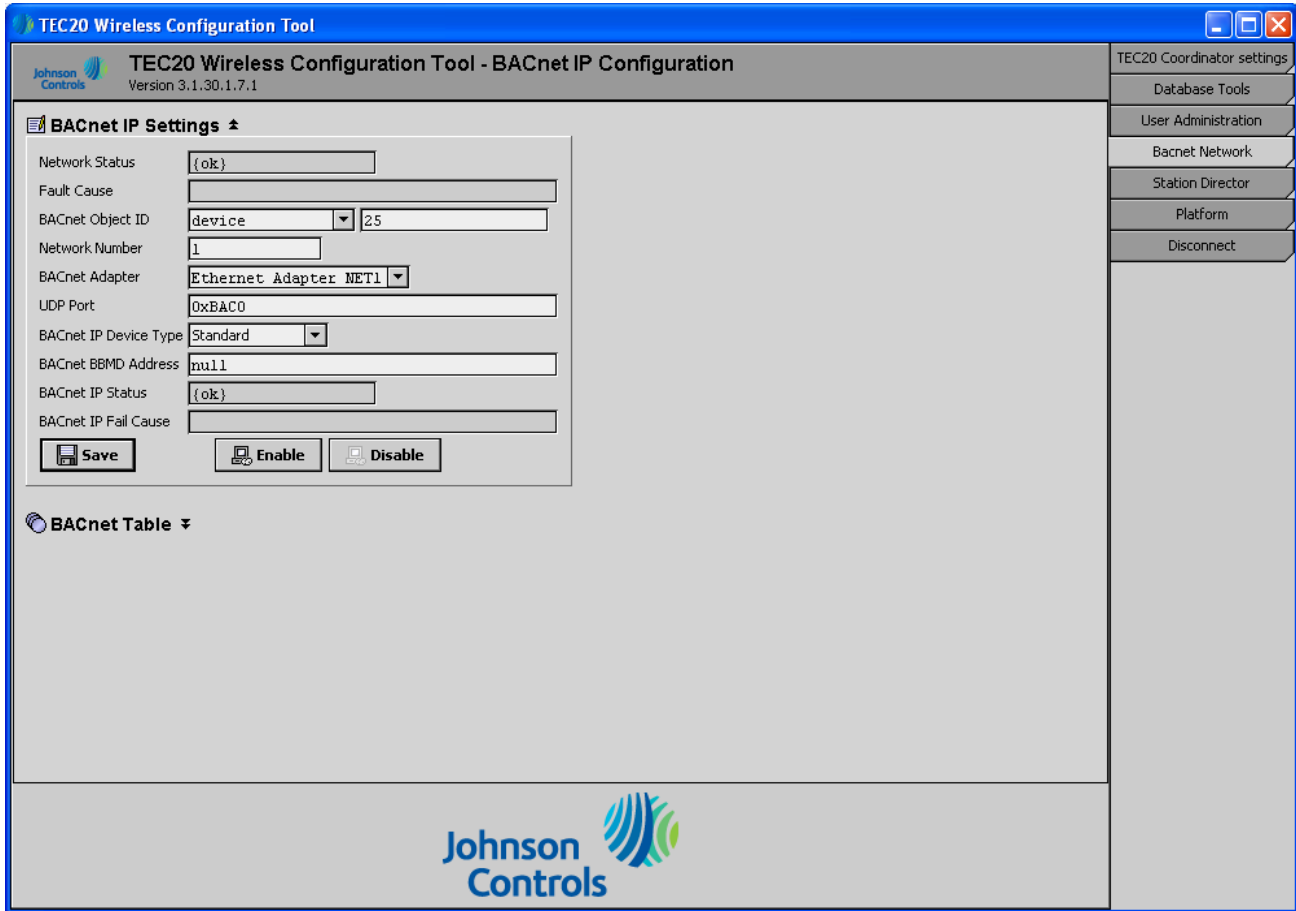


Figure 19: BACnet IP Settings

4. Select the **Platform** tab to navigate to the Configuration Tool > Platform Operation page.
5. Select the TCP/IP Configuration hotspot to configure automatic IP Address assignment. Obtain the following information from the facility's IT department.
 - a. Insert a **Hostname** for the TEC20 Coordinator.
 - b. Insert a **DNS Domain** that the TEC20 Coordinator belongs in.
 - c. Insert **DNS Server(s)** for the TEC20 Coordinator.
 - d. Click the **Save TCP/IP** button.

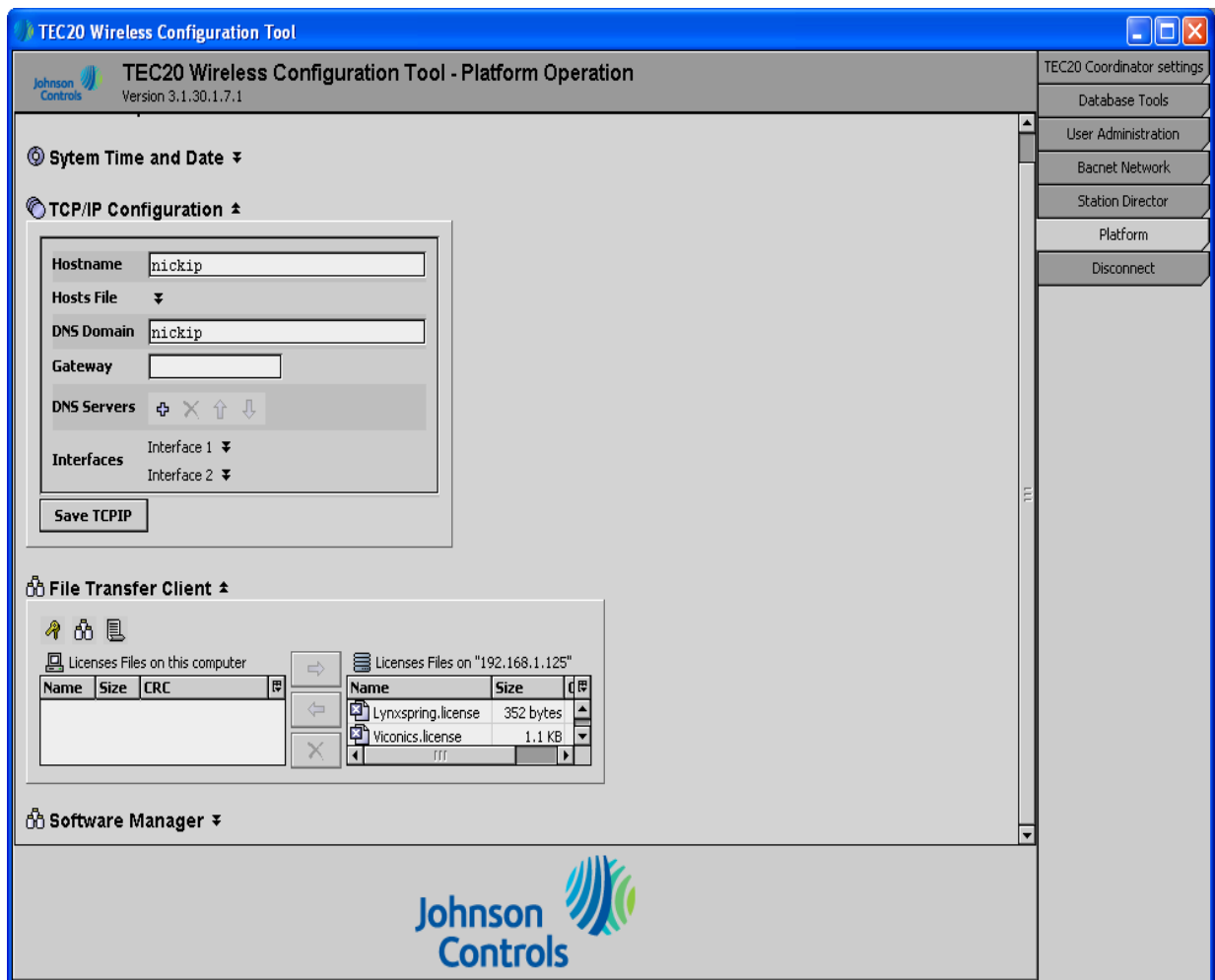


Figure 20: Platform Tab

6. Select the **Disconnect** button to end the configuration session.
7. Unplug the crossover cable from the TEC20 Coordinator and your computer. Put the Ethernet cable back if this was originally a BACnet IP system.
8. Change the IP address of your computer back to its original setting.
9. End the TEC Wireless Configuration Tool Software session.

Configuring a BACnet IP Version of a TEC Wireless System in the Metasys UI

To set up a BACnet IP version of a TEC Wireless System, you must create a BACnet integration in the supervisory controller using the Metasys UI and then insert the receiver and sensor objects into the wireless integration.

BACnet Integration Overview

To set up a TEC Wireless application in the supervisory controller using the Metasys UI:

1. Connect to the supervisory controller and browse to the Metasys UI.
2. Insert a BACnet integration into the supervisory controller with the **Insert Integration Wizard** in the Metasys UI on the supervisory controller.
3. Insert a TEC20-3C Coordinator into the wireless supervisor integration with **Insert Field Device Wizard** in the Metasys UI on the supervisory controller.
4. Add/associate the TEC Wireless Thermostat Controller objects to the wireless receiver with the **Insert Field Point Wizard** in the Metasys UI on the supervisory controller.

Note: If you have inserted the BACnet integration, TEC20-3C coordinator, and TEC Wireless Thermostat Controllers into an archive database with the SCT, you must also download the new/edited archive database to the target supervisory controller on the Metasys network to complete the configuration.

Inserting a BACnet Integration to a Supervisory Controller

The first step in configuring a Wireless TEC system in the Metasys UI on the target supervisory controller is inserting a BACnet integration to the supervisory controller.

To insert a BACnet Integration into a supervisory controller:

1. Log on to the target supervisory controller and display the **NAE Focus** screen (Figure 21).

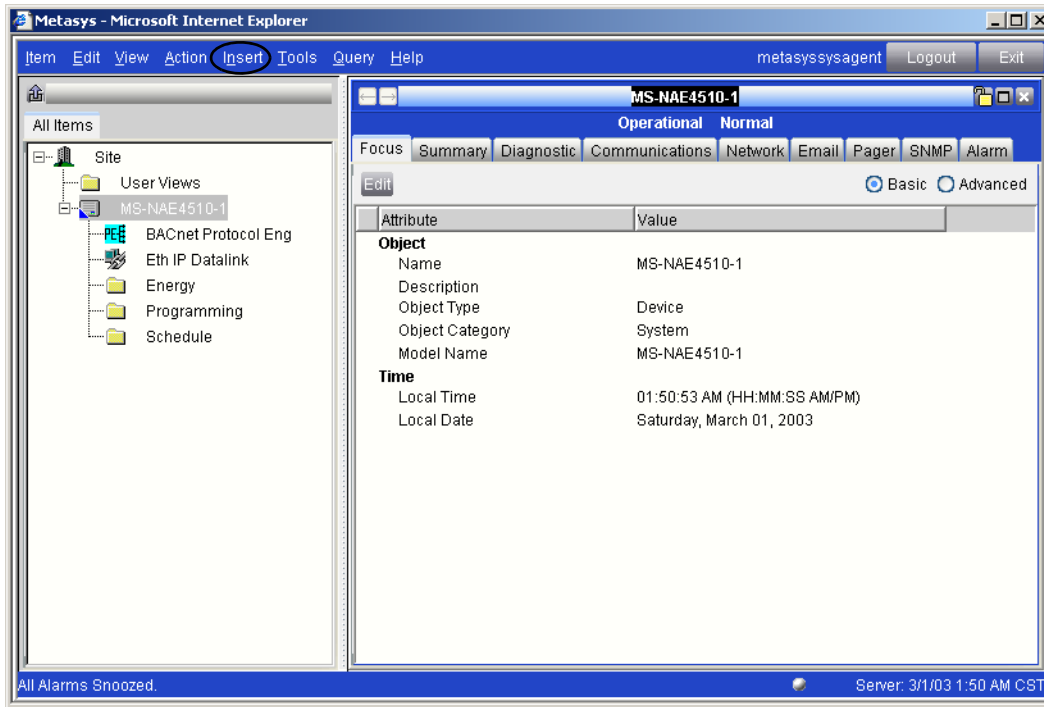


Figure 21: NAE Focus Screen

2. Click **Insert** on the menu bar (Figure 21), and then click **Integration** on the drop-down menu to open the **Insert Integration Wizard - Select Object Type** screen (Figure 22).

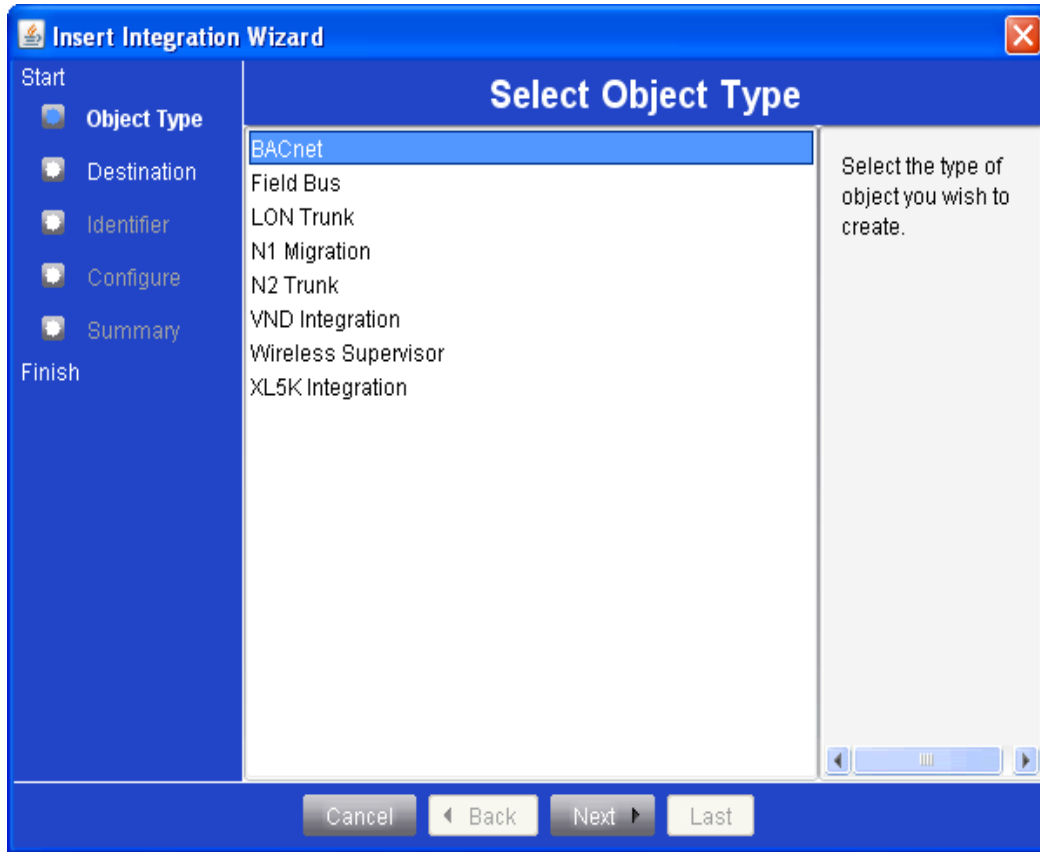


Figure 22: Insert Integration Wizard - Select Object Type Screen

3. Select **BACnet** and then click **Next** (Figure 22) to open the **Insert Integration Wizard - Destination** screen (Figure 23).

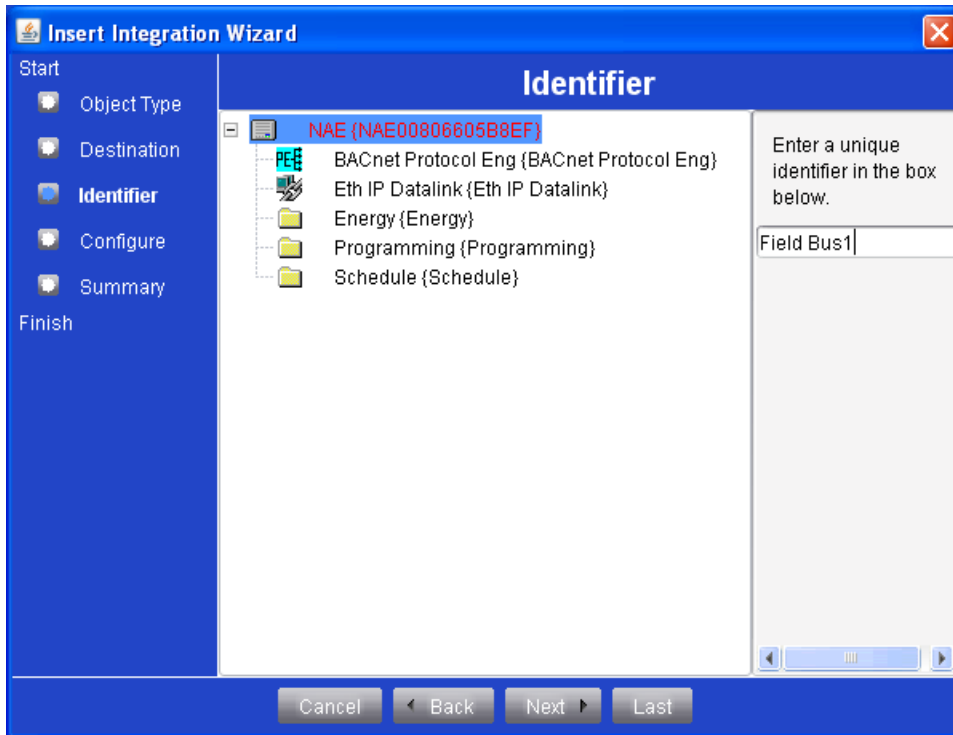


Figure 23: Insert Integration Wizard - Destination Screen

4. Select the destination supervisory controller for the BACnet integration from the navigation tree, and then click **Next** (Figure 23) to open the **Insert Integration Wizard - Identifier** screen (Figure 24).

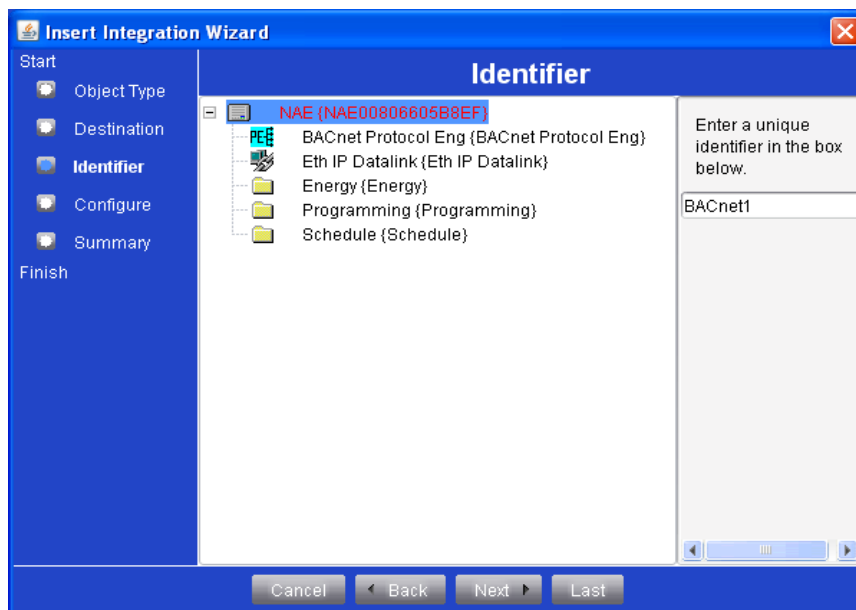


Figure 24: Insert Integration Wizard - Identifier Screen

5. Enter a unique identifier in the field in the upper right corner of the **Insert Integration Wizard - Identifier** screen (Figure 24), and then click **Next** to open the **Insert Integration Wizard - Configure** screen (Figure 25).

Attribute	Value	Units
Object		
Name	BACnet1	
Description		
Object Type	BACnet	
Object Category	System	
Communication		
Periodic Update	60	seconds
Process Identifier		
Device Discovery Range	Listof[0]	
Preserve Discovered Devices	True	
Poll Delay		ms
Count	0	

Figure 25: Insert Integration Wizard - Configure Screen

6. Edit the Name, Description, and Object Category values as required in the **Insert Integration Wizard - Configure** screen (Figure 25).

7. Click **Next** to open the **Insert Integration Wizard - Summary** screen (Figure 26).

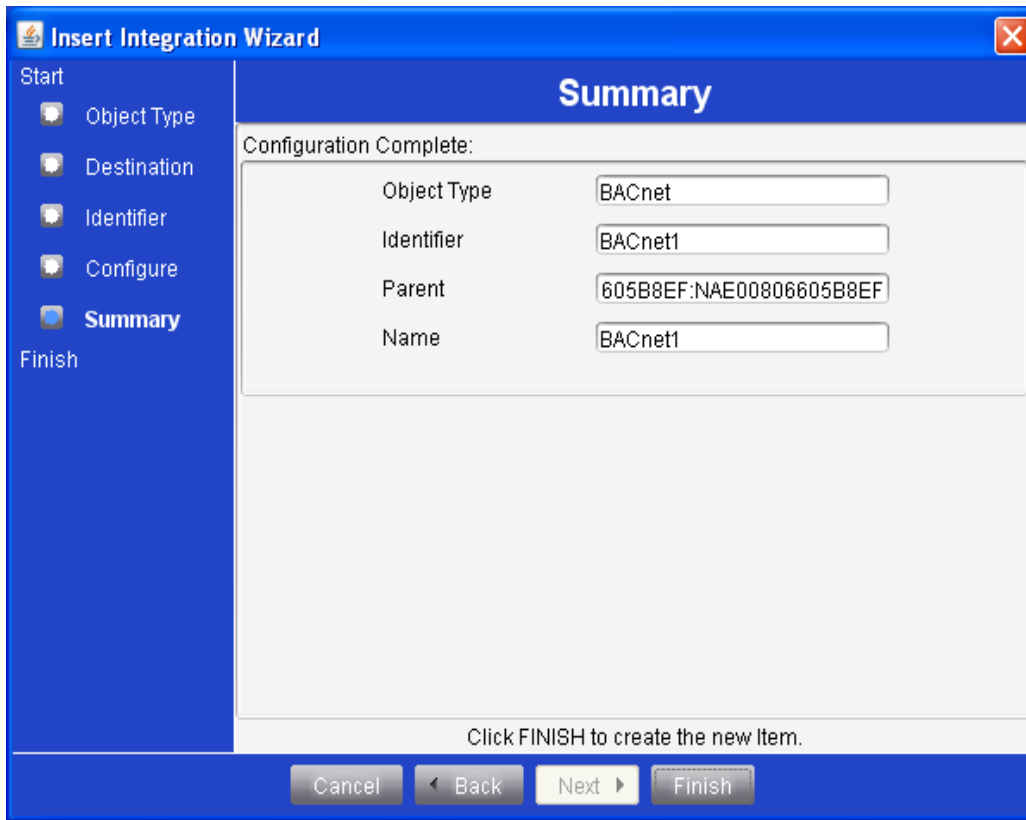


Figure 26: Insert Integration Wizard - Summary Screen

8. Review the **Summary** screen values (Figure 26):
 - Click **Back** to go to a previous screen and edit a value (Figure 26).
 - Click **Finish** to save the displayed values (Figure 26).

Note: An **Extension Wizard** screen may appear after you click **Finish**. If it does, close the **Extension Wizard** by clicking **Done** to go to the **Insert Field Device Wizard - Destination** screen (Figure 23). In the Insert Field Device Wizard - Destination screen, you can insert a TEC20-3C Coordinator into the BACnet integration you just created. See [*Inserting a TEC20-3C Coordinator into a BACnet Integration*](#).

For information on creating extensions using the Extension Wizard, refer to the Metasys system *Help* in the Metasys UI.

Inserting a TEC20-3C Coordinator into a BACnet Integration

To insert a TEC20-3C Coordinator into a BACnet integration:

1. Open the **BACnet Focus** screen (Figure 27), and click **Insert** on the menu bar to open the Insert drop-down menu.

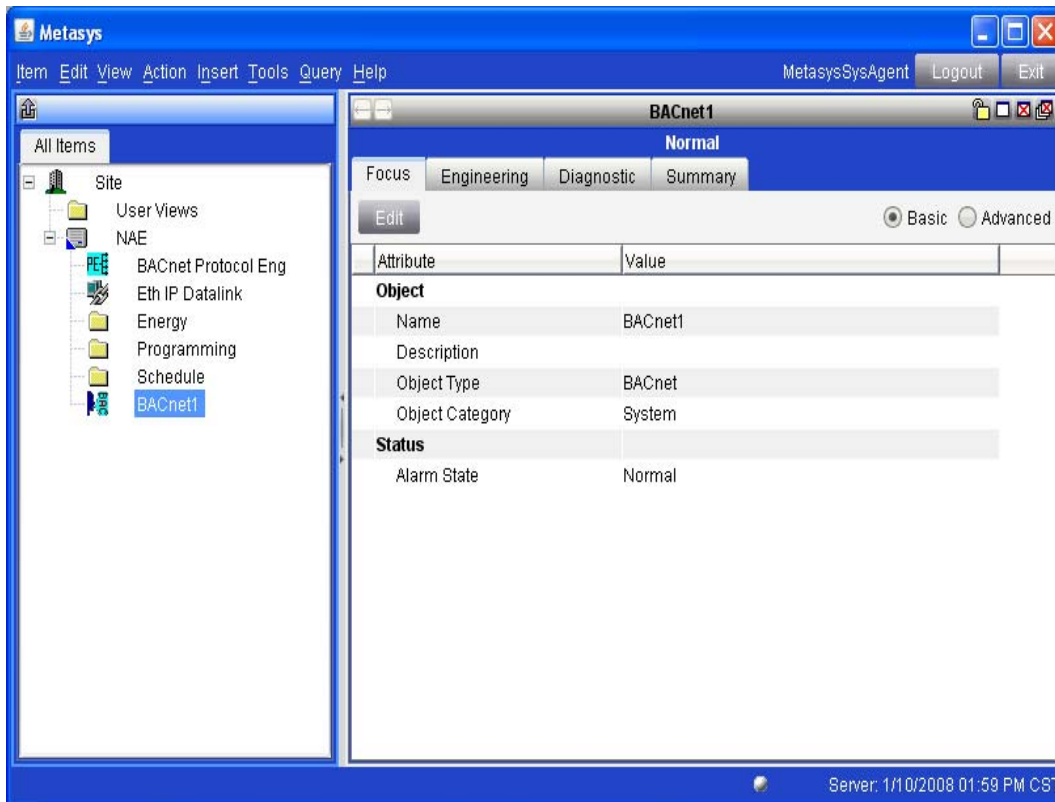


Figure 27: BACnet Focus Screen

2. Select **Field Device** on the **Insert** drop-down menu to open the **Insert Field Device Wizard - Destination** screen (Figure 28).

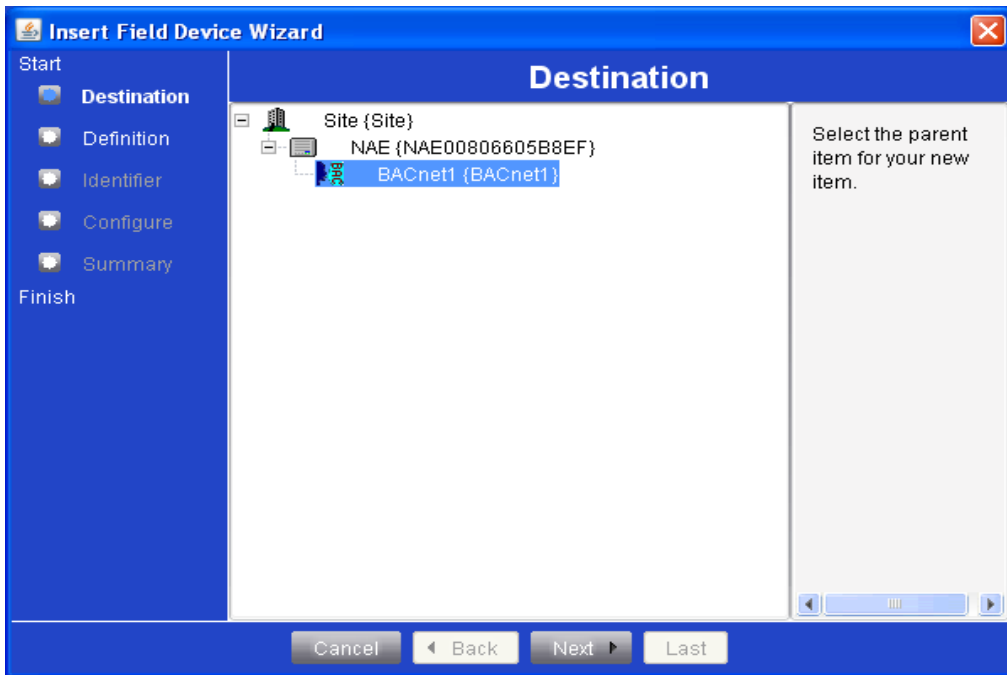


Figure 28: Insert Field Device Wizard - Destination Screen

3. Select the destination (a BACnet integration) from the navigation tree for the field device (TEC20-3C Coordinator), and then click **Next** (Figure 28) to open the **Insert Field Device Wizard - Select Definition Mode** screen (Figure 29).

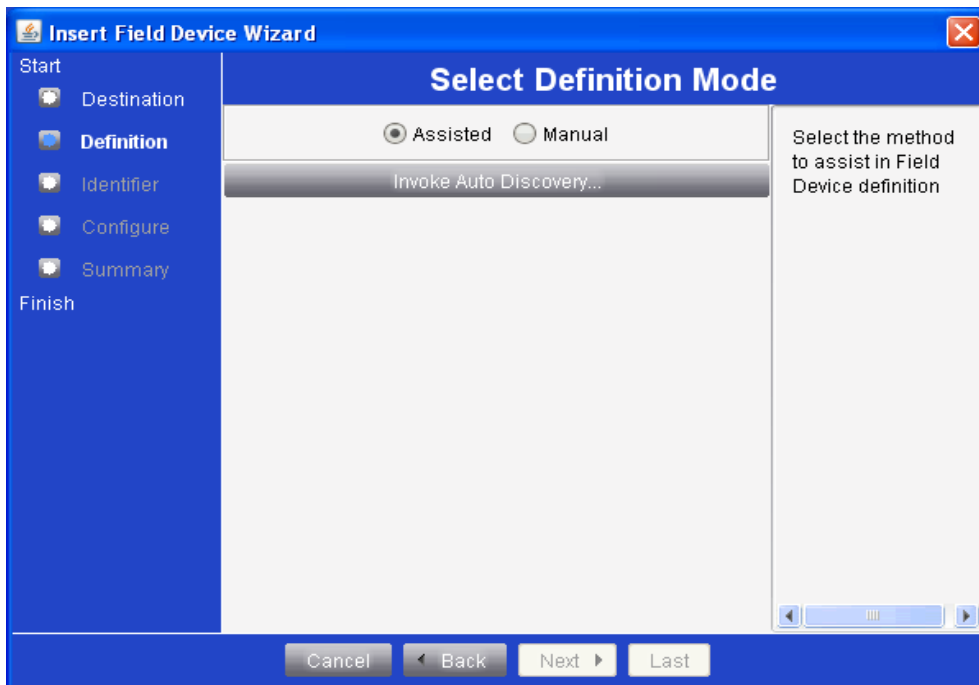


Figure 29: Insert Field Device Wizard - Select Definition Mode Screen

4. In the **Insert Field Device Wizard - Select Definition Mode** screen, select the **Assisted mode**, and click **Invoke Auto Discovery**.
5. The **Wizard Auto Detect Utility** screen appears (Figure 30). The supervisory controller discovers all BACnet/IP devices that are correctly configured on its IP subnet. To continue, select the device (TEC20 Coordinator) you want to integrate.

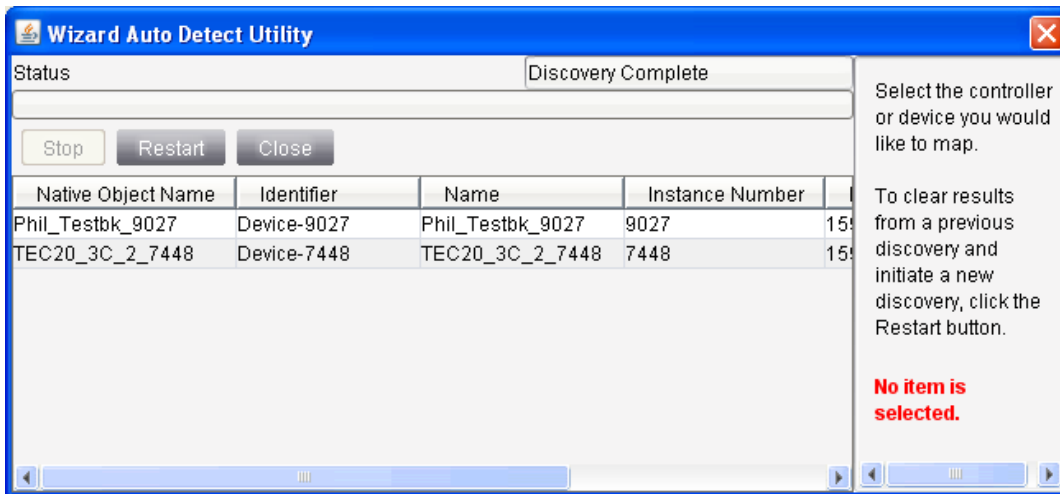


Figure 30: Wizard Auto Detect Utility

Note: As soon as you select a device, the Wizard Auto Detect Utility closes and the **Insert Field Device Wizard - Identifier** screen (Figure 31) appears.

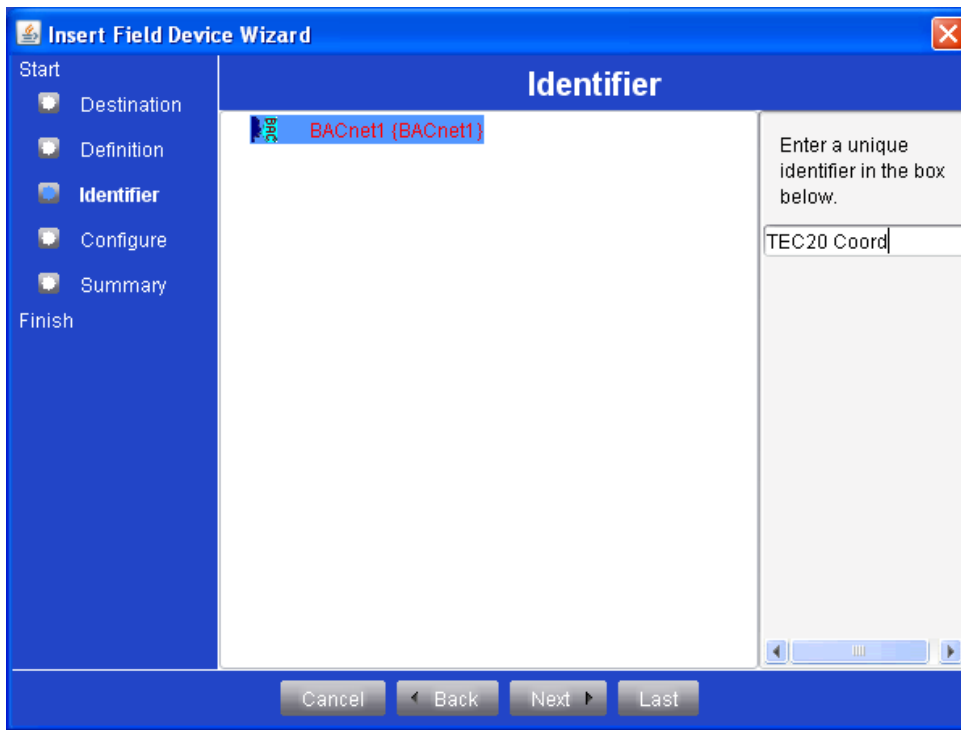


Figure 31: Insert Field Device Wizard - Identifier Screen

6. Enter a unique identifier in the field in the upper right corner of the **Insert Field Device Wizard - Identifier** screen (Figure 31), and then click **Next** to open the **Insert Field Device Wizard - Configure** screen (Figure 32).

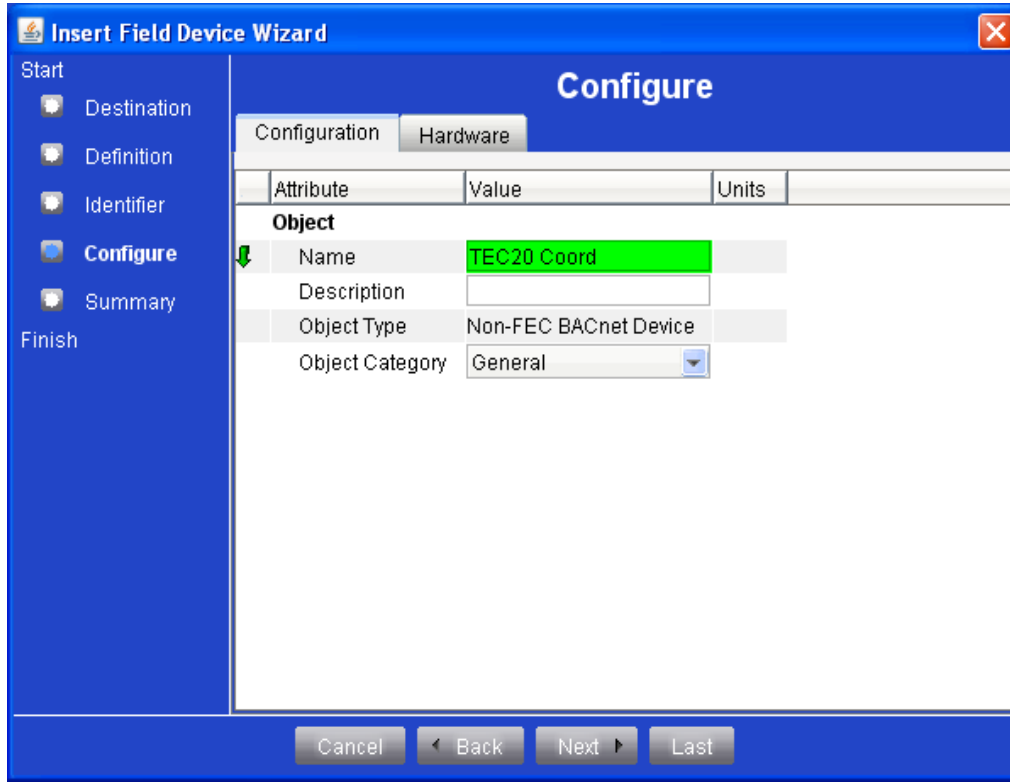


Figure 32: Insert Field Device Wizard - Configure Screen

7. Enter the Name and Description in the editable fields on the **Insert Field Device Wizard - Configure** screen (Figure 32); then click **Next** to go to the **Insert Field Device Wizard - Summary** screen (Figure 33).



Figure 33: Insert Field Device Wizard - Summary Screen

8. Review the **Insert Field Device Wizard - Summary** screen values (Figure 33) and then click one of the following:
 - **Back** to go to a previous screen and edit a value
 - **Finish** to save the displayed values

Note: An **Extension Wizard** screen may appear after you click **Finish**. Close the **Extension Wizard** by clicking **DONE** to go to the **Insert Point Wizard - Destination** screen (Figure 35). In the **Insert Point Wizard - Destination** screen, you can insert/associate a TEC Wireless Thermostat Controller as field points to the TEC20-3C Coordinator (field device) you just created.

For information on creating extensions using the **Extension Wizard**, refer to the Metasys system *Help* in the Metasys UI.

Configuring a BACnet MS/TP Version of a TEC Wireless System in the Metasys UI

To set up a BACnet MS/TP version of a TEC Wireless System, you must create a Field Bus integration in the Metasys UI and then insert the receiver and sensor objects into the wireless integration.

Field Bus Integration Overview

To set up a TEC Wireless application in the Metasys UI:

1. Connect to the supervisory controller and browse to the Metasys UI.
2. Insert a Field Bus integration into the supervisory controller with the **Insert Integration Wizard** in the Metasys UI on the supervisory controller.
3. Insert a TEC20-6C Coordinator into the wireless supervisor integration with **Insert Field Device Wizard** in the Metasys UI on the supervisory controller.
4. Add/associate the TEC Wireless Thermostat Controller objects to the wireless receiver with the **Insert Field Point Wizard** in the Metasys UI on the supervisory controller.

Note: If you have inserted the Field Bus or BACnet integration, TEC20-6C coordinator, and TEC Wireless Thermostat Controllers into an archive database with the SCT, you must also download the new/edited archive database to the target supervisory controller on the Metasys network to complete the configuration.

Inserting a Field Bus Integration to an NAE Supervisory Controller

The first step in configuring a Wireless TEC system in the Metasys UI on the target supervisory controller is inserting a field bus integration to the supervisory controller.

To insert a Field Bus Integration into an NAE supervisory controller:

1. Log on to the target supervisory controller and display the **NAE Focus** screen (Figure 34).

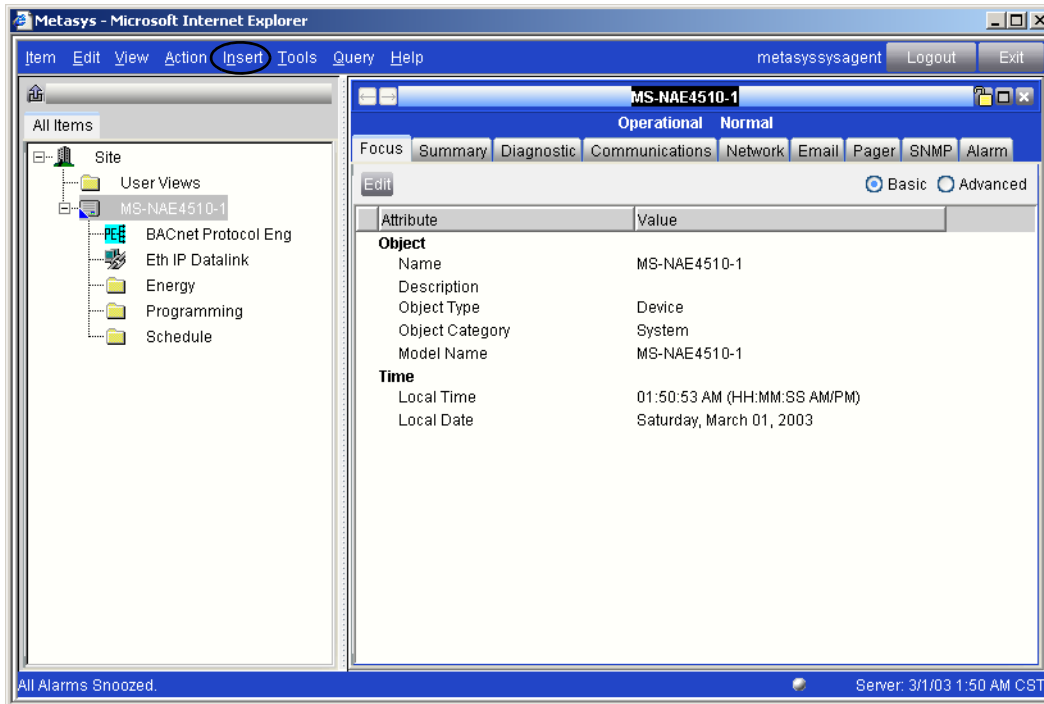


Figure 34: NAE Focus Screen

2. Click **Insert** on the menu bar (Figure 34), and then click **Integration** on the drop-down menu to open the **Insert Integration Wizard - Select Object Type** screen (Figure 35).

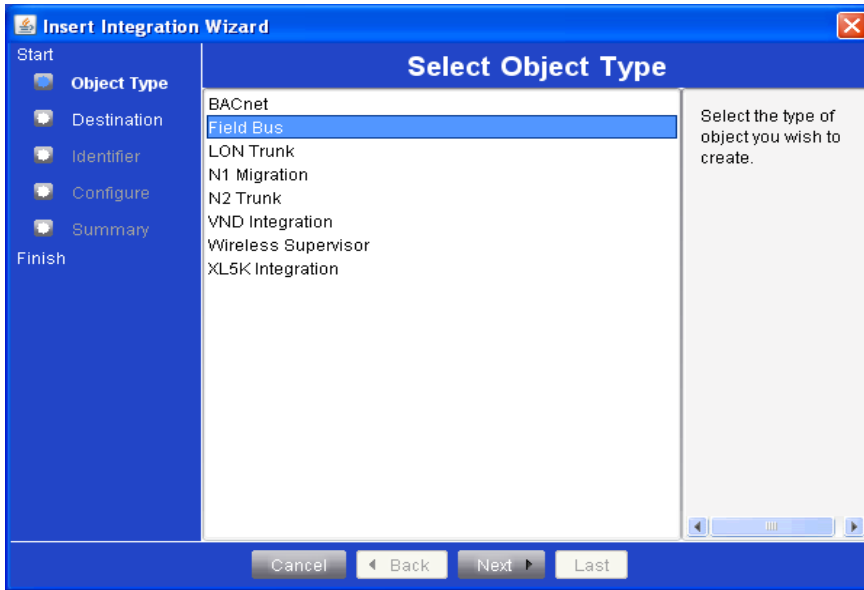


Figure 35: Insert Integration Wizard - Select Object Type Screen

3. Select **Field Bus** and then click **Next** (Figure 35) to open the **Insert Integration Wizard - Destination** screen (Figure 36).

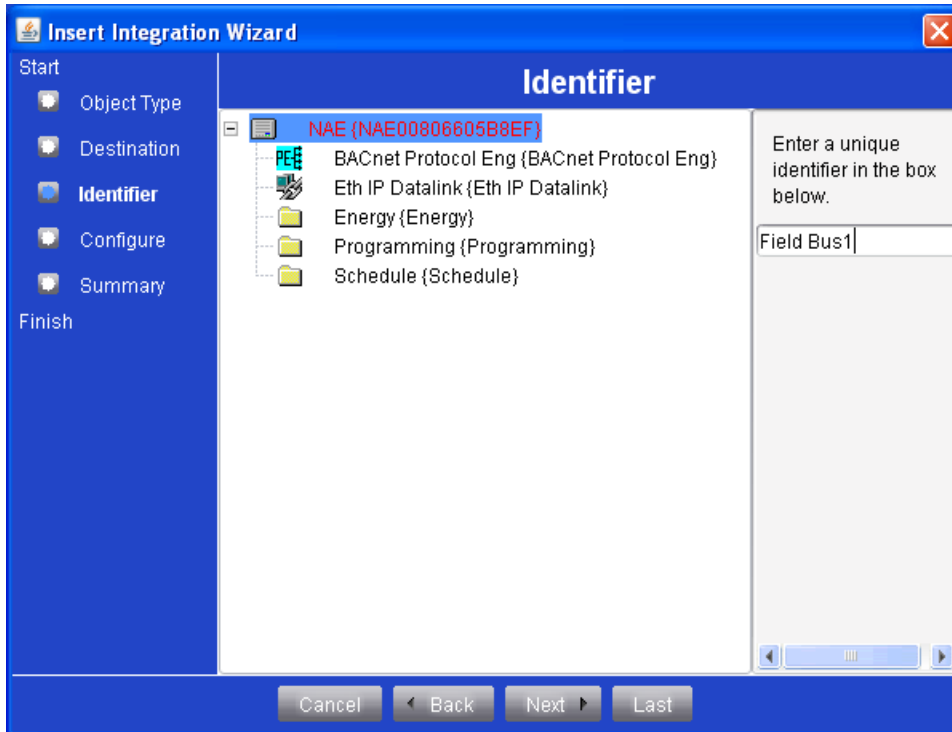


Figure 36: Insert Integration Wizard - Destination Screen

4. Select the destination supervisory controller for the field bus integration from the navigation tree, and then click **Next** (Figure 36) to open the **Insert Integration Wizard - Identifier** screen (Figure 37).

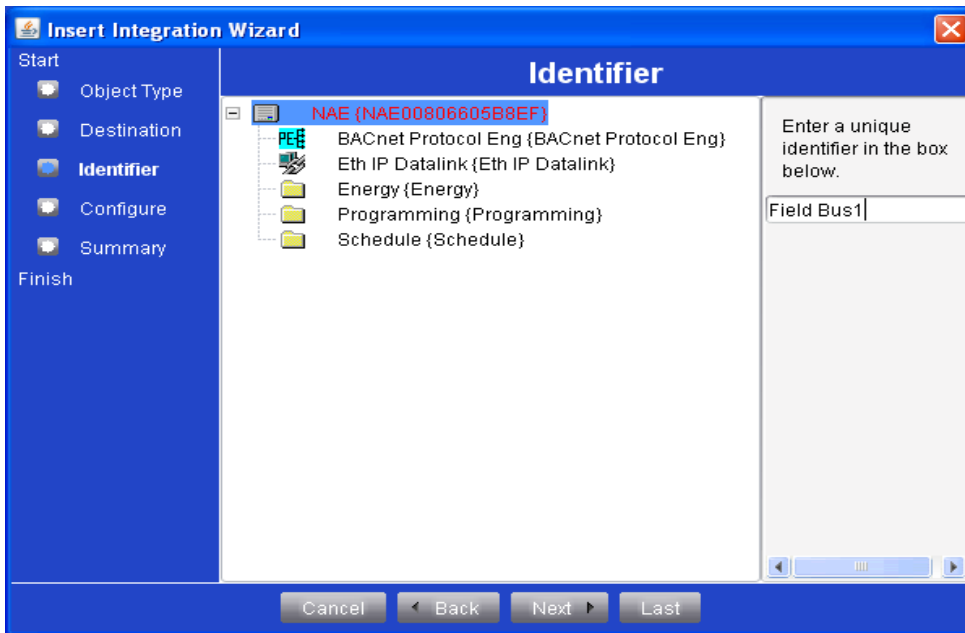


Figure 37: Insert Integration Wizard - Identifier Screen

5. Enter a unique identifier in the field in the upper right corner of the **Insert Integration Wizard - Identifier** screen (Figure 37), and then click **Next** to open the **Insert Integration Wizard - Configure** screen (Figure 38).

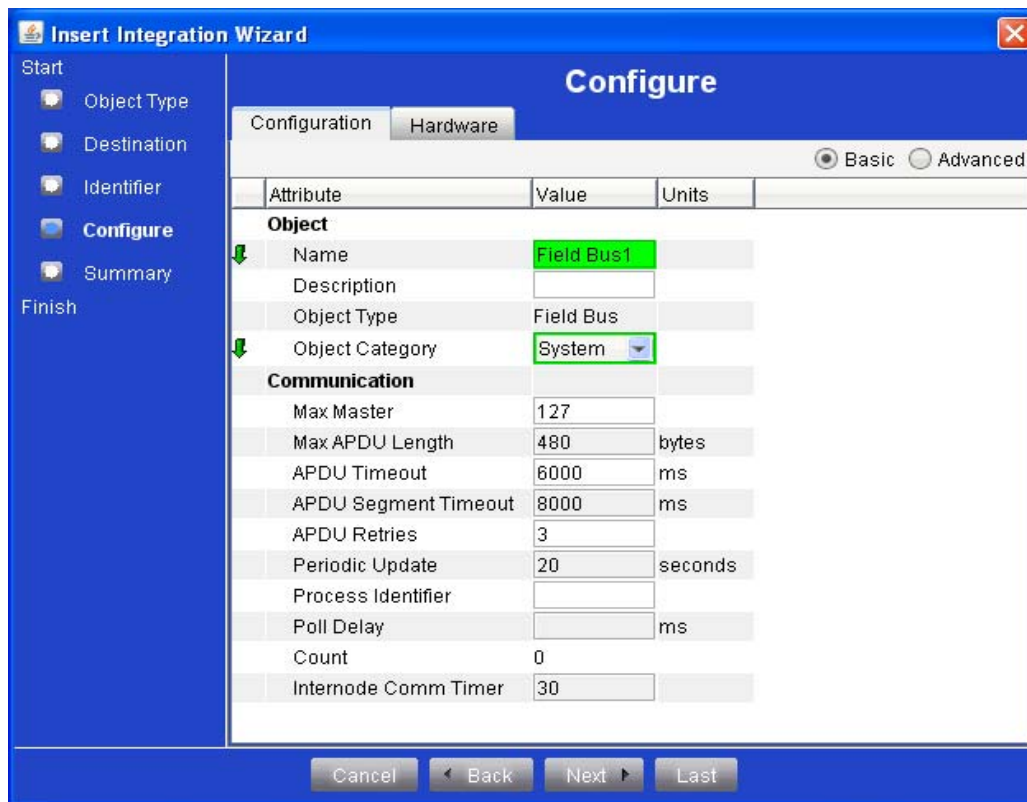


Figure 38: Insert Integration Wizard - Configure Screen

6. Edit the Name, Description, and Object Category values as required in the **Insert Integration Wizard - Configure** screen (Figure 38).

7. Click **Next** to open the **Insert Integration Wizard - Summary** screen (Figure 39).

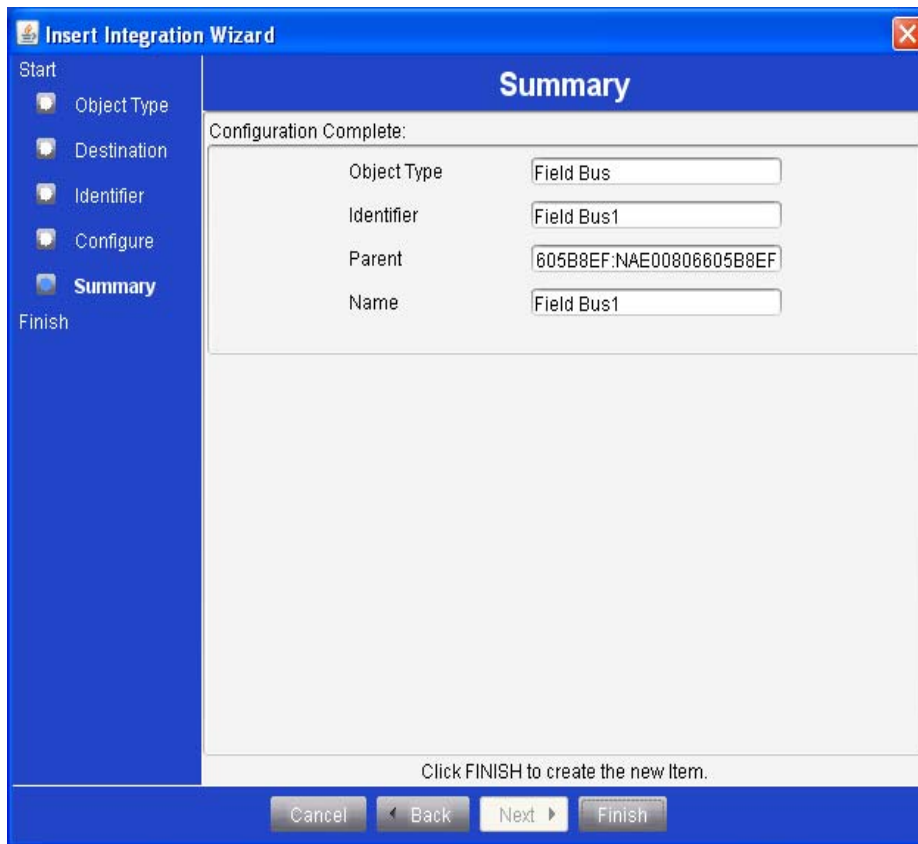


Figure 39: Insert Integration Wizard - Summary Screen

8. Review the **Summary** screen values (Figure 39):
 - Click **Back** to go to a previous screen and edit a value (Figure 39).
 - Click **Finish** to save the displayed values (Figure 39).

Note: An **Extension Wizard** screen may appear after you click **Finish**. If it does, close the **Extension Wizard** by clicking **Done** to go to the **Insert Field Device Wizard - Destination** screen (Figure 41). In the Insert Field Device Wizard - Destination screen, you can insert a TEC20-6C coordinator into the field bus integration you just created. See *[Inserting a TEC20-6C Coordinator into a Field Bus Integration](#)*.

For information on creating extensions using the Extension Wizard, refer to the Metasys system *Help* in the Metasys UI.

Inserting a TEC20-6C Coordinator into a Field Bus Integration

To insert a TEC20-6C Coordinator into a field bus integration:

1. Open the **Field Bus Focus** screen (Figure 40), and click **Insert** on the menu bar to open the Insert drop-down menu.

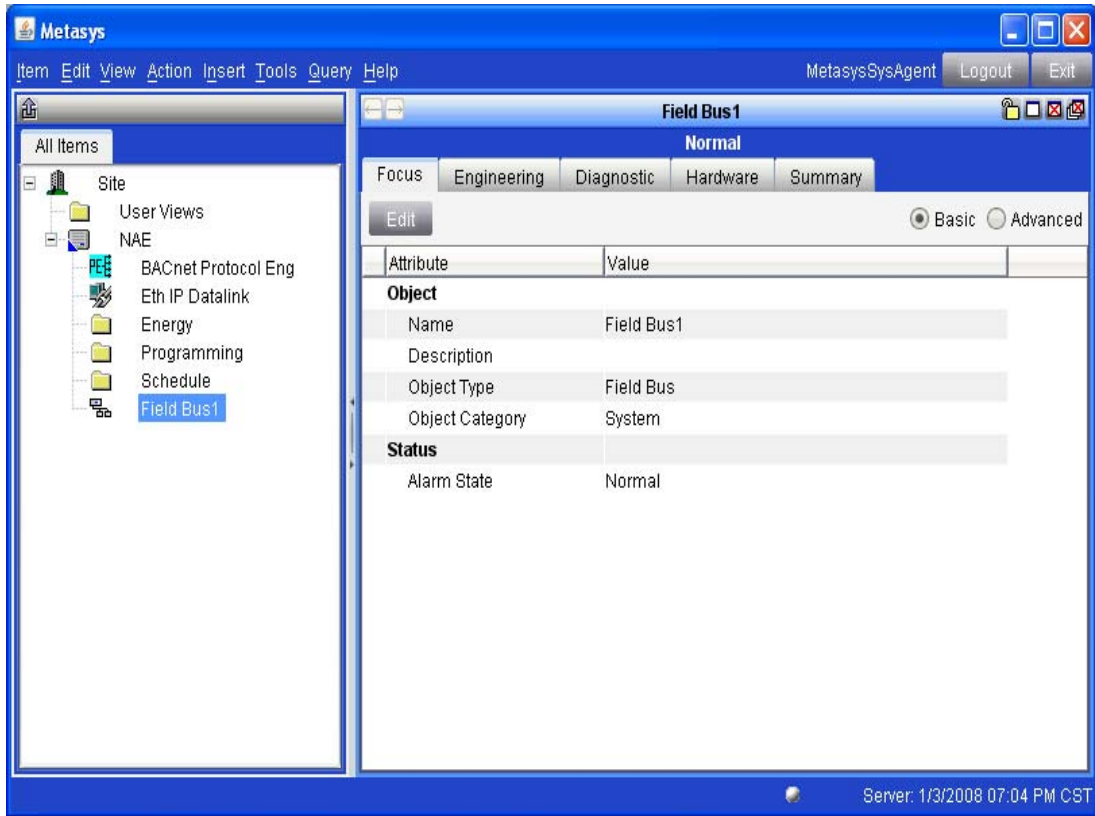


Figure 40: Field Bus Focus Screen

2. Select **Field Device** on the **Insert** drop-down menu to open the **Insert Field Device Wizard - Destination** screen (Figure 41).

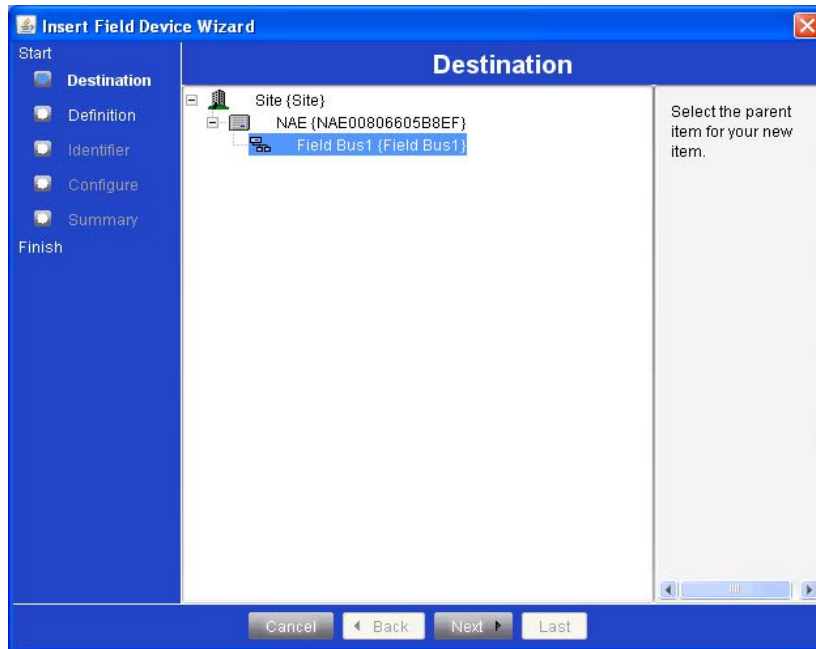


Figure 41: Insert Field Device Wizard - Destination Screen

3. Select the destination (a field bus integration) from the navigation tree for the field device (TEC20-6C Coordinator), and then click **Next** (Figure 41) to open the **Insert Field Device Wizard - Select Definition Mode** screen (Figure 42).

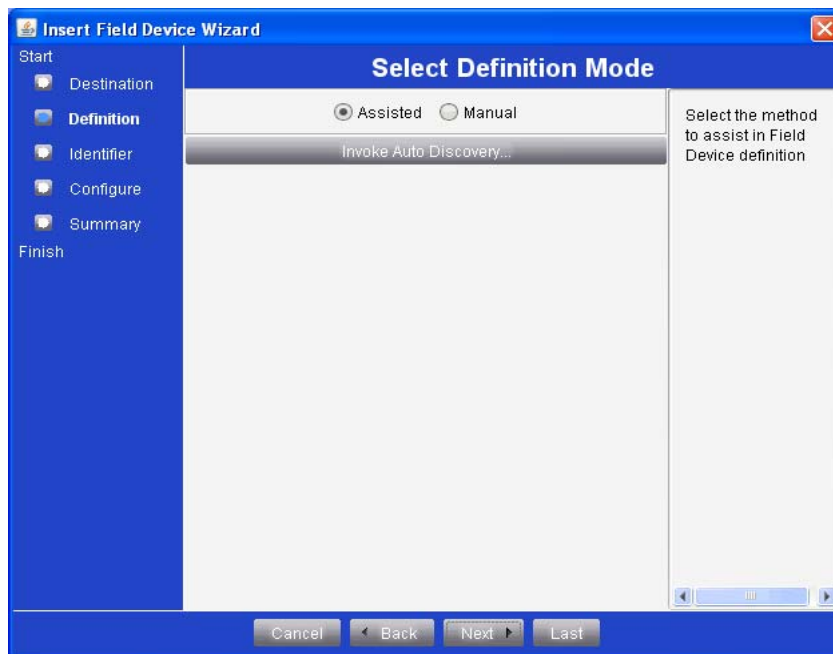


Figure 42: Insert Field Device Wizard - Select Definition Mode Screen

4. In the **Insert Field Device Wizard - Select Definition Mode** screen, select the **Assisted mode**, and click **Invoke Auto Discovery**.
5. The **Wizard Auto Detect Utility** screen appears (Figure 43). The supervisory controller discovers all devices that are correctly configured on its MS/TP Trunk. To continue, select the device (TEC20 Coordinator) you want to integrate.

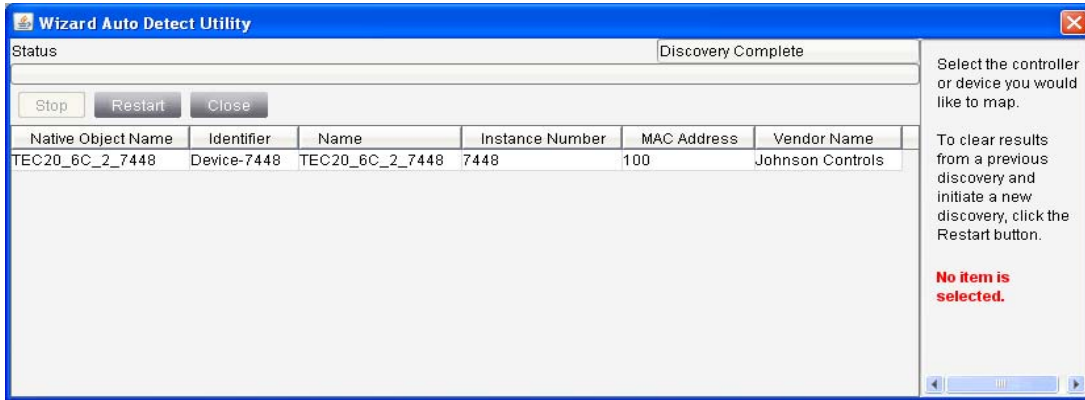


Figure 43: Wizard Auto Detect Utility

As soon as you select a device, the Wizard Auto Detect Utility closes and the **Insert Field Device Wizard - Identifier** screen (Figure 44) appears.

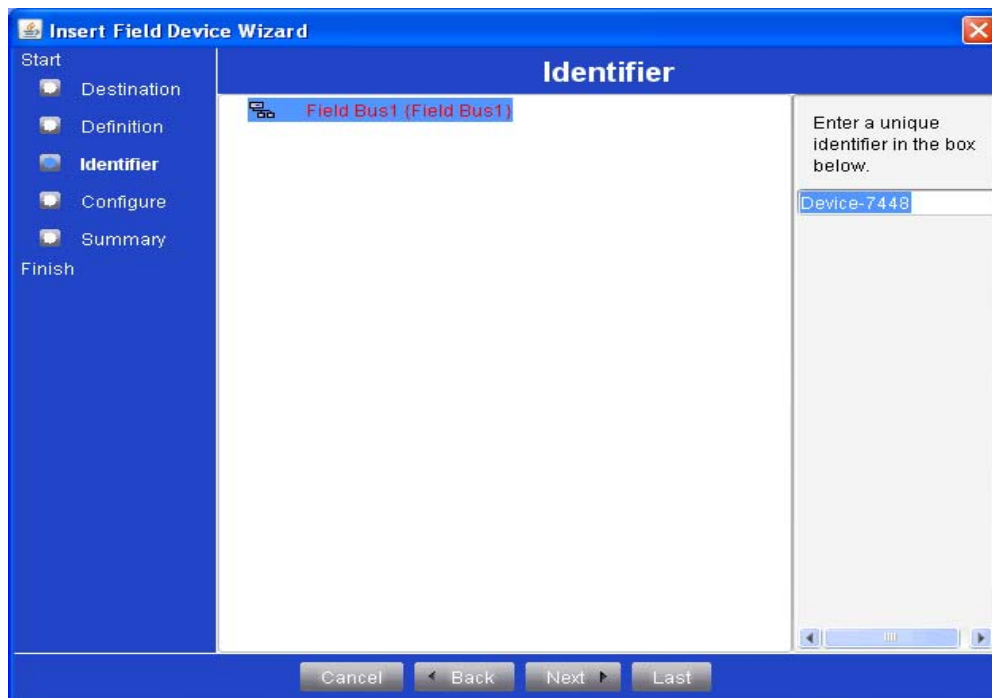


Figure 44: Insert Field Device Wizard - Identifier Screen

6. Enter a unique identifier in the field in the upper right corner of the **Insert Field Device Wizard - Identifier** screen (Figure 44), and then click **Next** to open the **Insert Field Device Wizard - Configure** screen (Figure 45).

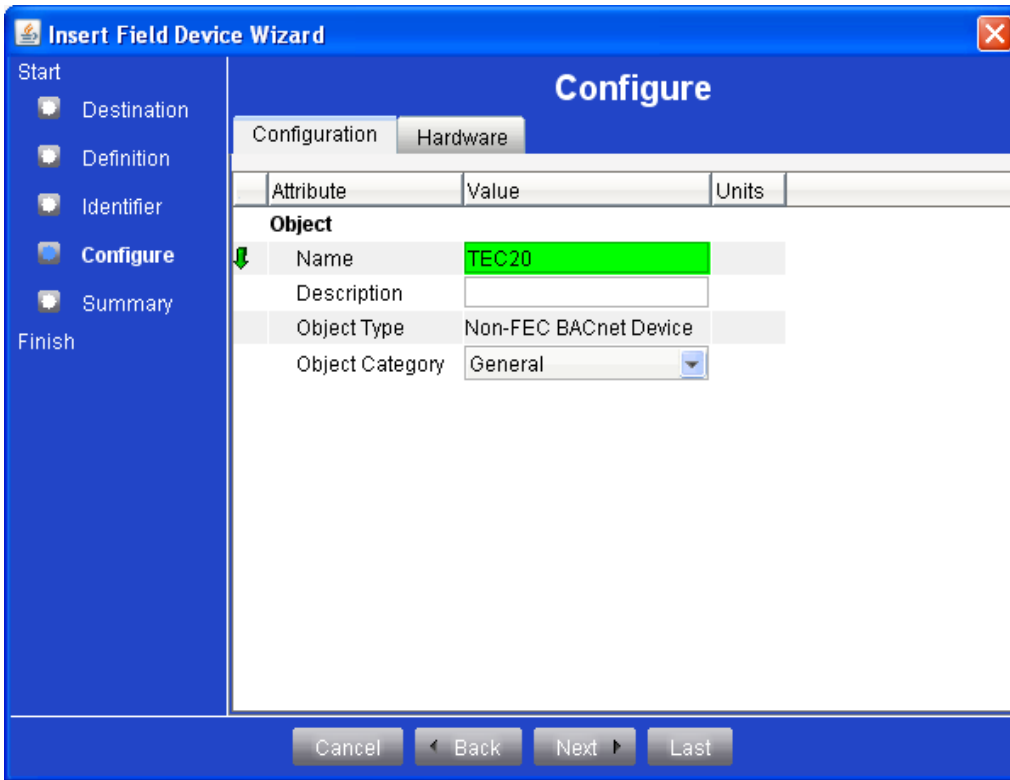


Figure 45: Insert Field Device Wizard - Configure Screen

7. Enter the Name and Description in the editable fields on the **Insert Field Device Wizard - Configure** screen (Figure 45); then click **Next** to go to the **Insert Field Device Wizard - Summary** screen (Figure 46).

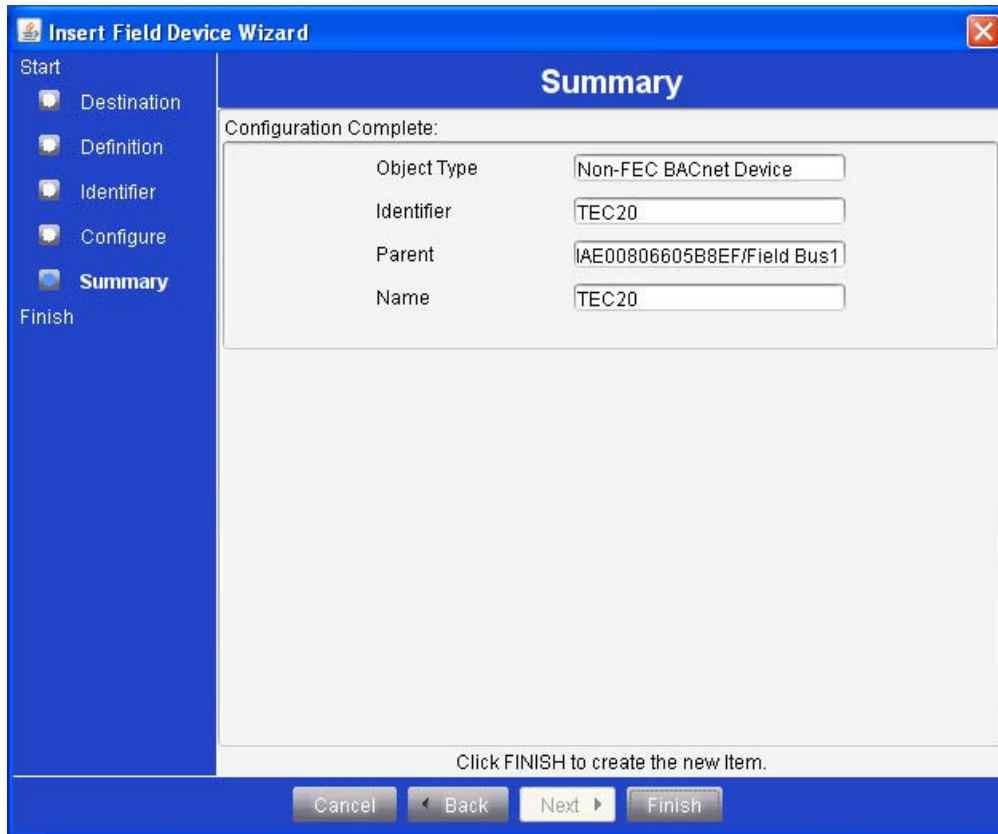


Figure 46: Insert Field Device Wizard - Summary Screen

8. Review the **Insert Field Device Wizard - Summary** screen values (Figure 46) and then click one of the following:
 - **Back** to go to a previous screen and edit a value
 - **Finish** to save the displayed values

Note: An **Extension Wizard** screen may appear after you click **Finish**. Close the **Extension Wizard** by clicking **DONE** to go to the **Insert Point Wizard - Destination** screen (Figure 48). In the **Insert Point Wizard - Destination** screen, you can insert/associate a TEC Wireless Thermostat Controller as field points to the TEC20-6C Coordinator (field device) you just created.

For information on creating extensions using the **Extension Wizard**, refer to the Metasys system *Help* in the Metasys UI.

Map the TEC Wireless Thermostat Controllers to the Metasys UI

After you insert a TEC20 Coordinator (field device) into the field bus integration on the supervisory controller, you can associate TEC Wireless Thermostat Controller (field points) to the receiver using the **Insert Point Wizard**.

Note: You can associate up to 30 TEC Wireless Thermostat Controllers per TEC20 Coordinator and up to 100 TEC Wireless Thermostat Controllers per trunk.

To associate a TEC Wireless Thermostat Controller to a TEC20 Coordinator:

1. Log into the supervisory controller using the Metasys UI.
2. Start up Internet Explorer Web Browser and connect to the supervisory controller over Ethernet.
3. From the Metasys UI, perform a point discovery on the TEC20 Coordinator.
4. Select the TEC20 Coordinator and insert the desired field points.
5. Verify that all of the TEC20 Coordinators have been discovered.
6. For each TEC20 Coordinator, from the Metasys UI, perform a point discovery on the TEC20 Coordinator.
7. Open a **TEC20 Coordinator Focus** screen in the Metasys UI, and then click **Insert** on the menu bar (Figure 47) to open the drop-down menu.

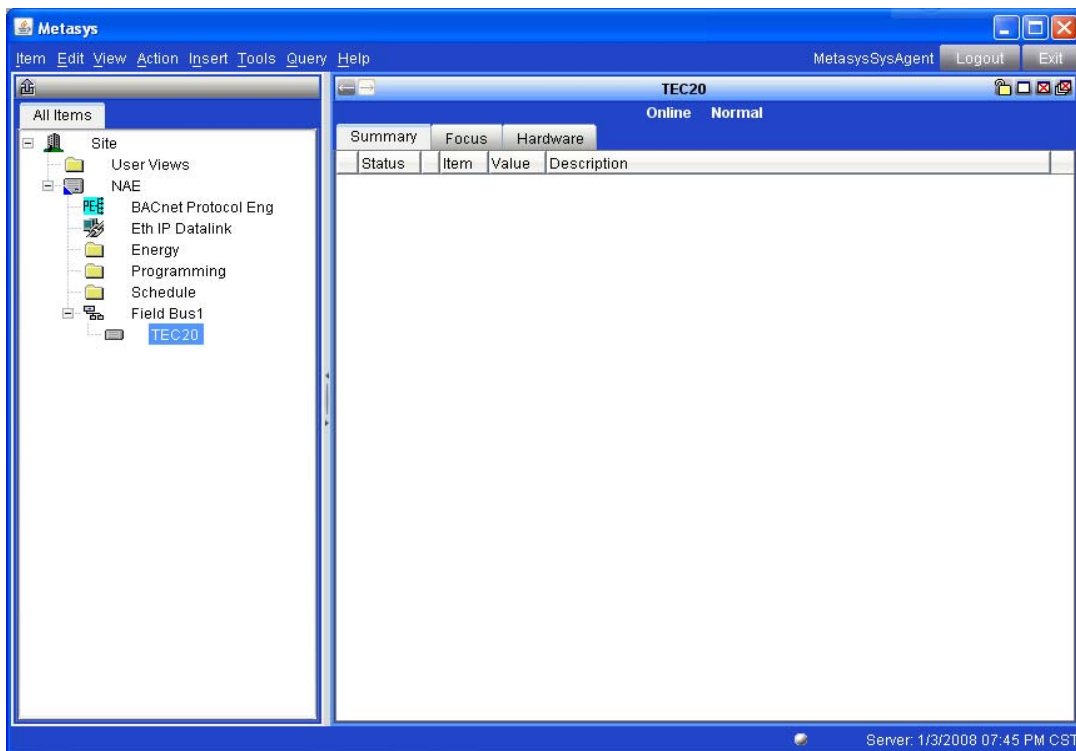


Figure 47: TEC20 Focus Screen

8. Select **Field Point** on the drop-down menu to display the **Insert Point Wizard - Destination** screen (Figure 48).

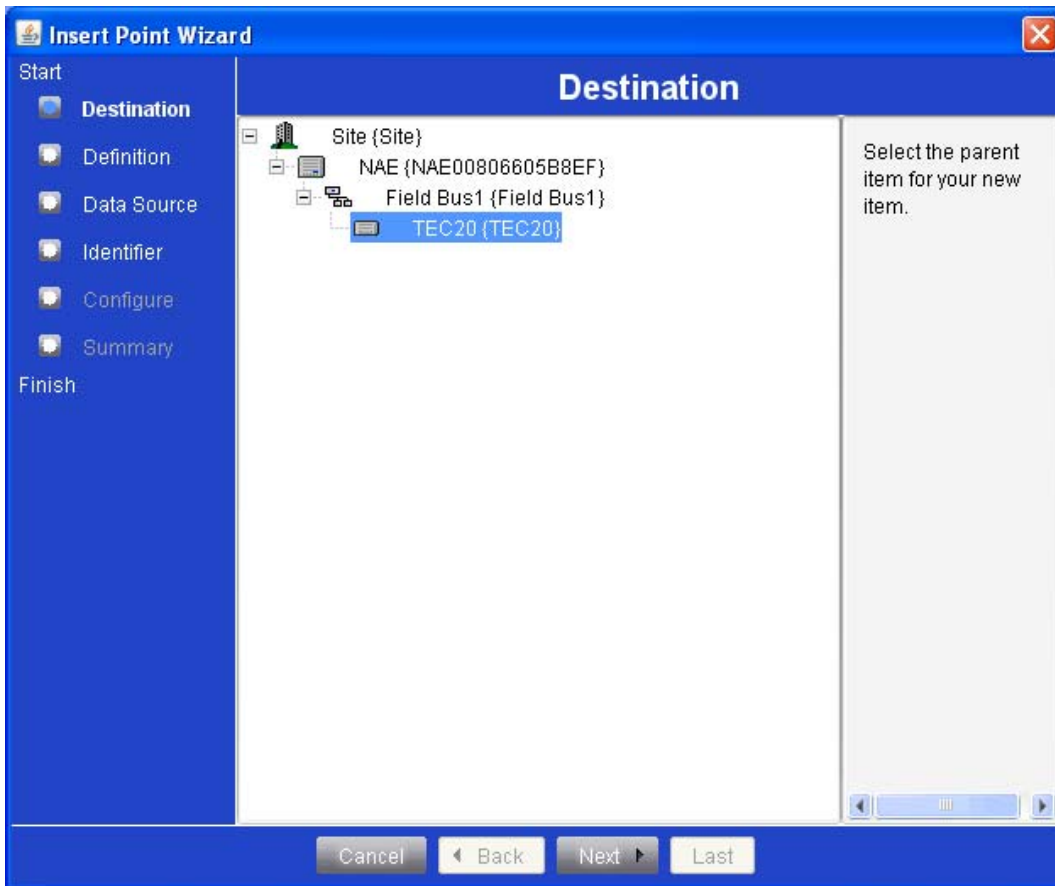


Figure 48: Insert Point Wizard - Destination Screen

9. Select the destination TEC20 Coordinator from the navigation tree and click **Next** (Figure 48) to open the **Insert Point Wizard - Definition** screen (Figure 49).

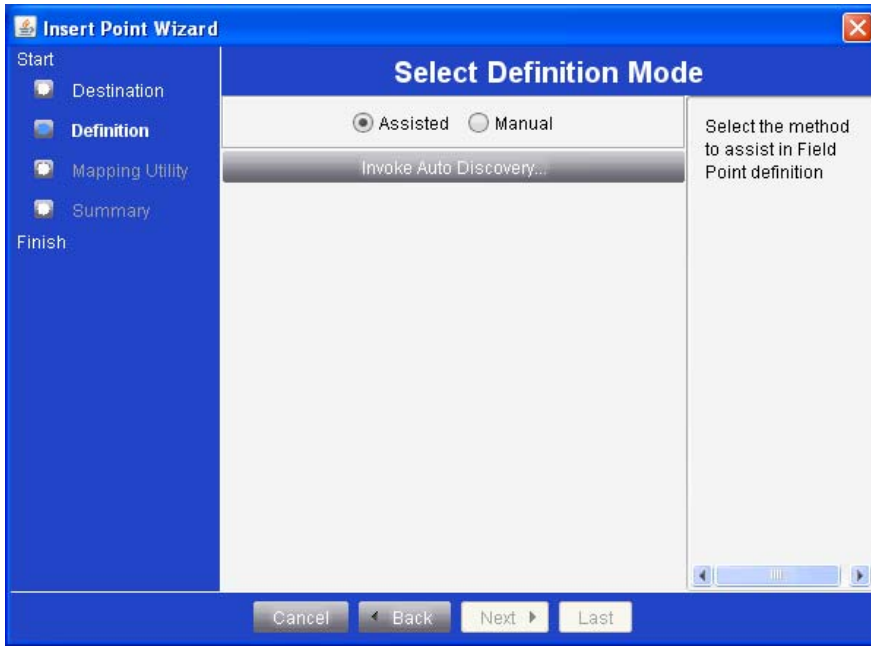


Figure 49: Insert Point Wizard - Select Definition Mode Screen

10. Select Assisted and click **Invoke Auto Discovery**. The **Wizard Auto Detect Utility** screen (Figure 50) appears.

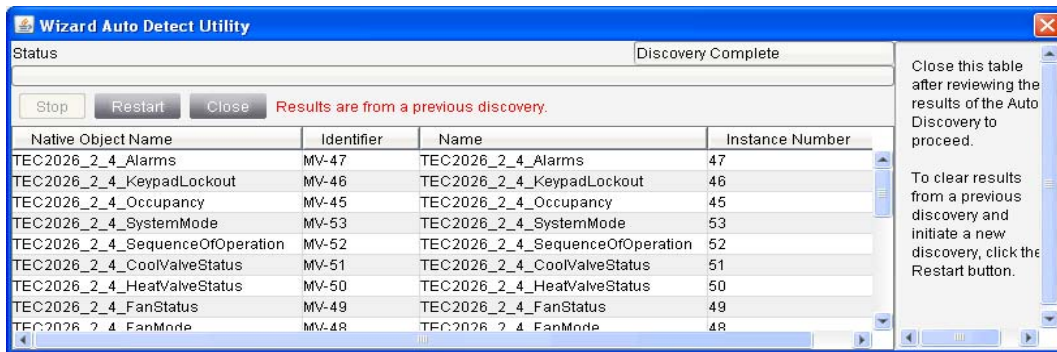


Figure 50: Wizard Auto Detect Utility

In the Wizard Auto Detect Utility, the supervisory controller discovers all points that are associated with the TEC20 Coordinator. After the Utility is done discovering, simply click **Close** to continue on to the **Point Mapping Utility** screen (Figure 51).

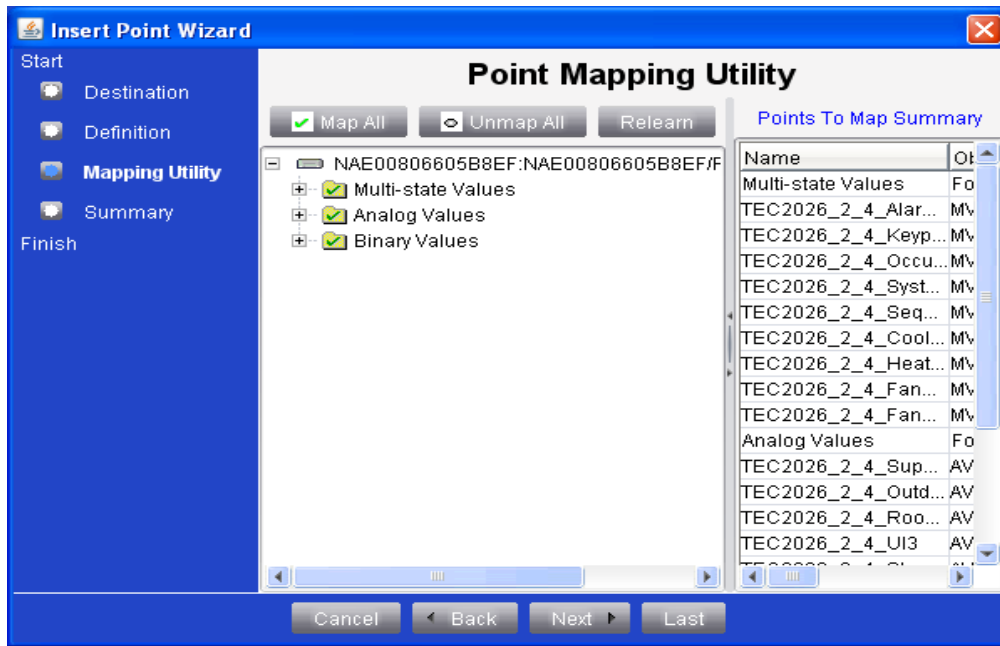


Figure 51: Point Mapping Utility

11. Using the Point Mapping Utility, double click on the points you wish to integrate. Alternatively, you can use **Map All** to map all points the Utility discovered. Refer to the Metasys system *Help* for information about the attributes on this screen.

12. Review the **Insert Point Wizard - Summary** screen values (Figure 52) and then click one of the following:

- **Back** to go to a previous screen and edit a value
- **Finish** to save the displayed values

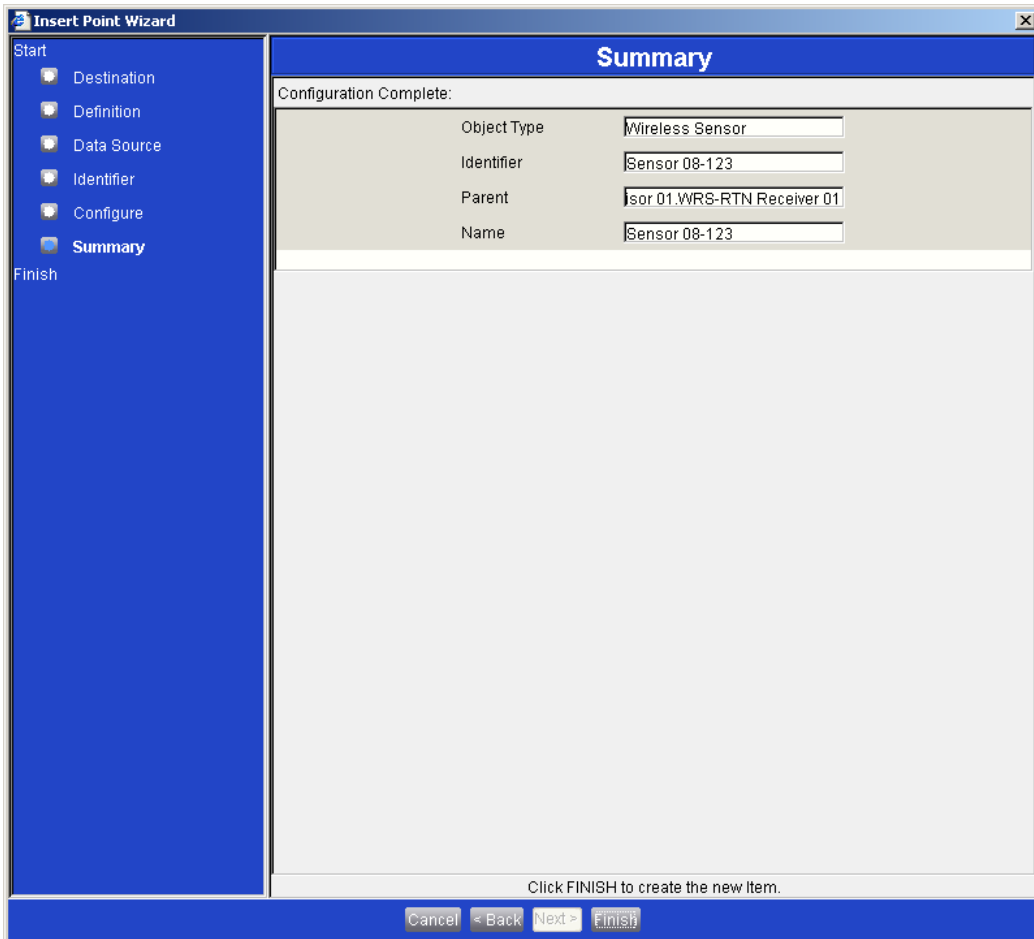


Figure 52: Insert Point Wizard - Summary Screen

13. Repeat this procedure for any remaining objects associated with the TEC20 Coordinator.

The TEC Wireless Thermostat Controllers are now defined to the TEC20 Coordinator as field points in the Metasys UI.

Appendix 1: TEC Wireless Thermostat Controller Objects Tables

See Table 5 for information on objects used by TEC Wireless Thermostat Controllers for fan coil and zoning equipment control. See Table 6 for information on objects used by TEC Wireless Thermostat Controllers for staged equipment control.

Table 5: Supported Objects Used by TEC Wireless Thermostat Controllers for Fan Coil and Zoning Equipment Control (Part 1 of 2)

Object Name	Type ¹	Object Property ²	TEC2045-2	TEC2016-2	TEC2016H-2	TEC2026-2	TEC2026H-2	TEC2036-2	TEC2036H-2	TEC2046-2	TEC2046H-2	TEC2056-2	TEC2056H-2	TEC2027-2	TEC2047-2
Temperature Status															
RoomTemp	AV	R/W	x	x	x	x	x	x	x	x	x	x	x	x	x
OutdoorTemp	AV	R/W	x	x	x	x	x	x	x	x	x	x	x	x	x
RoomHumidity	AV	R/W						x	x			x	x		
Supply Temp	AV	R	x	x	x	x	x	x	x	x	x	x	x	x	x
Setpoints															
OccCoolSetpoint	AV	R/W	x	x	x	x	x	x	x	x	x	x	x	x	x
OccHeatSetpoint	AV	R/W	x	x	x	x	x	x	x	x	x	x	x	x	x
StandByCoolSetpoint	AV	R/W	x		x	x	x	x	x	x	x	x	x	x	x
StandByHeatSetpoint	AV	R/W	x		x	x	x	x	x	x	x	x	x	x	x
UnOccCoolSetpoint	AV	R/W	x	x	x	x	x	x	x	x	x	x	x	x	x
UnOccHeatSetpoint	AV	R/W	x	x	x	x	x	x	x	x	x	x	x	x	x
DehumidRHSetpoint	AV	R/W						x	x			x	x		
Main Commands															
OccupancyCommand	MV	R/W	x	x	x	x	x	x	x	x	x	x	x	x	x
EffectiveOccupancy	MV	R	x	x	x	x	x	x	x	x	x	x	x	x	x
SequenceOfOperation	MV	R/W	x		x	x	x	x	x	x	x	x	x	x	x
SystemMode	MV	R/W	x		x	x	x	x	x	x	x	x	x	x	x
FanMode	MV	R/W	x		x	x	x	x	x	x	x	x	x		
KeypadLockout	MV	R/W	x		x	x	x	x	x	x	x	x	x	x	x
DehumidLockout	BV	R/W						x	x			x	x		
Main Status															
PIHeatingDemand	AV	R	x		x	x	x	x	x	x	x	x	x	x	x
PICoolingDemand	AV	R	x		x	x	x	x	x	x	x	x	x	x	x
DehumidStatus	BV	R						x	x			x	x		
Alarms	MV	R	x	x	x	x	x	x	x	x	x	x	x	x	x
HeartbeatDelay	AV	R	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 5: Supported Objects Used by TEC Wireless Thermostat Controllers for Fan Coil and Zoning Equipment Control (Part 2 of 2)

Object Name	Type ¹	Object Property ²	TEC2045-2	TEC2016-2	TEC2016H-2	TEC2026-2	TEC2026H-2	TEC2036-2	TEC2036H-2	TEC2046-2	TEC2046H-2	TEC2056-2	TEC2056H-2	TEC2027-2	TEC2047-2
Output Status															
FanStatus	MV	R	x	x	x	x	x	x	x	x	x	x	x		
AuxStatus	BV	R	x	x	x	x	x	x	x	x	x	x	x	x	x
AuxCommand	BV	R/W	x	x	x	x	x	x	x	x	x	x	x	x	x
BI1Status	BV	R	x	x	x	x	x	x	x	x	x	x	x	x	x
BI2Status	BV	R	x	x	x	x	x	x	x	x	x	x	x	x	x
UI3 Status	BV	R	x	x	x	x	x	x	x	x	x	x	x	x	x
PIRMotionStatus	BV	R	x	x	x	x	x	x	x	x	x	x	x	x	x

1. AV = Analog Value
BV = Binary Value
MV = Multi-State Value
2. R = Read Only
R/W = Read/Write

Table 6: Supported Objects used by TEC Wireless Thermostat Controllers for Staged Equipment Control (Part 1 of 2)

Object Name	Type ¹	Object Property ²	TEC2001-3	TEC2002-3	TEC2003-3	TEC2004-3
Temperature Status						
RoomTemp	AV	R/W	x	x	x	x
OutdoorTemp	AV	R/W	x	x	x	x
SupplyTemp	AV	R	x	x	x	x
Setpoints						
OccCoolSetpoint	AV	R/W	x	x	x	x
OccHeatSetpoint	AV	R/W	x	x	x	x
UnOccCoolSetpoint	AV	R/W	x	x	x	x
UnOccHeatSetpoint	AV	R/W	x	x	x	x
Main Commands						
OcupancyCommand	MV	R/W	x	x	x	x
EffectiveOccupancy	MV	R	x	x	x	x
SystemModeRTU	MV	R/W	x		x	x
SystemModeHPU	MV	R/W		x		
FanMode	MV	R/W	x	x	x	x
KeypadLockout	MV	R/W	x	x	x	x

Table 6: Supported Objects used by TEC Wireless Thermostat Controllers for Staged Equipment Control (Part 2 of 2)

Object Name	Type ¹	Object Property ²	TEC2001-3	TEC2002-3	TEC2003-3	TEC2004-3
Main Status						
PIHeatingDemand	AV	R	x	x	x	x
PICoolingDemand	AV	R	x	x	x	x
EconomizerOutput	AV	R				x
Alarms	MV	R	x	x	x	x
HeartbeatDelay	AV	R	x	x	x	x
Output Status						
GFanStatus	BV	R	x	x	x	x
W2 Status	BV	R	x	x	x	x
W1 Status	BV	R			x	x
Y1 Status	BV	R	x	x	x	x
Y2 Status	BV	R		x	x	x
ReversingValveStatus	BV	R		x		
AuxStatus	BV	R	x	x	x	x
DI1Status	BV	R	x	x	x	x
DI2Status	BV	R	x	x	x	x

1. AV = Analog Value
BV = Binary Value
MV = Multi-State Value
2. R = Read Only
R/W = Read/Write

Appendix 2: Troubleshooting

Use Table 7 to identify symptoms and their possible causes. After you determine the possible causes, use Table 8 to take corrective action.

Table 7: Identifying Symptoms and Possible Causes (Part 1 of 3)

Symptom	Identification	Possible Cause
TEC Wireless Thermostat Controller Cannot Communicate with TEC20 Coordinator	Status (wireless communications) LED does show two- (or more) blink code.	Communications card became loose during shipping.
		Defective Device (TEC Wireless Thermostat Controller)
No Power to TEC Wireless Thermostat Controller	Status (wireless communications) LED does not Flash.	Communications card became loose during shipping.
		TEC Wireless Thermostat Controller is not powered.
		Defective Device (TEC Wireless Thermostat Controller)
TEC Wireless Thermostat Controller Cannot Find Wireless Network	Status (wireless communications) LED does show two- (or more) blink code.	Device (TEC20 Coordinator) was not installed following guidelines.
		TEC20 Coordinator is not powered.
		TEC Wireless Thermostat Controller is too far from another TEC Wireless Thermostat Controller or TEC20 Coordinator.
		Device (TEC Wireless Thermostat Controller) was not installed following guidelines.
		PAN ID mismatch
		Channel mismatch
High NAE Usage	Metasys UI indicates processor utilization above 80%.	Too many TEC Wireless Thermostat Controllers are mapped to the NAE.
TEC20 Coordinator Is Unable to Communicate with TEC Wireless Thermostat Controllers	None of the TEC Wireless Thermostat Controller Status (wireless communications) LEDs indicate that the wireless network is found.	TEC20 Coordinator is mounted in a metal enclosure.
		PAN ID mismatch
		Channel mismatch
		TEC20 Coordinator and a ZFR1810 are conflicting.
		A wireless interference source is installed near the TEC20 Coordinator.
		Another TEC20 Coordinator (in range) has a duplicate PAN ID and Channel.
TEC Wireless Thermostat Controller Points Are Unreliable	Metasys UI indicates an unreliable values for a TEC Wireless Thermostat Controller points.	TEC Wireless Thermostat Controller has been added to the TEC20 Coordinator's database multiple times.
		Another TEC20 Coordinator (in range) has a duplicate PAN ID and Channel.

Table 7: Identifying Symptoms and Possible Causes (Part 2 of 3)

Symptom	Identification	Possible Cause
TEC Wireless Thermostat Controller Points Are Not Found During a Point Discovery in Metasys UI	Metasys UI does not show all of the TEC Wireless Thermostat Controllers in the Coordinator's points list.	TEC Wireless Thermostat Controller has not been added to the TEC20 Coordinator's database.
		Another TEC20 Coordinator (in range) has a duplicate PAN ID and Channel.
		TEC Wireless Thermostat Controller has duplicate short address.
None of the TEC20 Coordinator LEDs Are ON	All TEC20 Coordinator LEDs are OFF.	TEC20 Coordinator is not powered.
		Loose Power connection on TEC20 Coordinator
		Defective TEC20 Coordinator
		Incorrect voltage supplied to TEC20 Coordinator.
Computer Cannot Communicate with TEC20 Coordinator	TEC20 Coordinator Wireless Configuration Tool software does not connect with TEC20 Coordinator.	Connected to wrong Ethernet port on TEC20 Coordinator.
		Wrong IP Address is entered
		PC IP Address is set to incorrect subnet.
		PC IP Address is set to conflicting address.
		Wrong User Name is entered.
		Wrong Password is entered.
TEC Wireless Thermostat Controller Is Not Discovered by the TEC20 Coordinator	TEC Wireless Thermostat Controller does not show up in TEC20 Coordinator Database tab.	TEC Wireless Thermostat Controller has Duplicate Com Address.
		PAN ID mismatch.
		Channel mismatch.
		Another TEC20 Coordinator (in range) has a duplicate PAN ID and Channel.
TEC20 Coordinator Sees Fewer TEC Wireless Thermostat Controllers Than Installed on System	Coordinator sees fewer TEC Wireless Thermostat Controllers on Settings page than installed on system.	TEC Wireless Thermostat Controller has Duplicate Com Address.
		PAN ID mismatch.
		Channel mismatch.
		Another TEC20 Coordinator (in range) has a duplicate PAN ID and Channel.

Table 7: Identifying Symptoms and Possible Causes (Part 3 of 3)

Symptom	Identification	Possible Cause
Wireless Parameters Are Not Accessible in TEC Wireless Thermostat Controller Menu	Com Address, PAN ID, and Channel are not menu items in TEC Thermostat Controller Configuration menu	TEC Thermostat Controller being configured is not a wireless version of the product.
		Wireless communications card was field added to a non-wireless TEC Thermostat Controller.
TEC20 Coordinator Sees More TEC Wireless Thermostat Controllers Than Expected	Total Thermostats Detected in Coordinator Settings page is higher than expected.	TEC Wireless Thermostat Controller belonging to another TEC20 Coordinator is configured with the wrong PAN ID and Channel.
		Another wireless TEC system with the same PAN ID and Channel is overlapping this network.
Wireless FECs Do Not Integrate Into the TEC20 Coordinator or Metasys System	A ZFR1800 Series device installed in a TEC Series Wireless Thermostat Controller System.	Wirelessly enabled FECs on a TEC Series Wireless Thermostat Controller System
Temperature Units (°C or °F) Did Not Change on All Thermostats	After using the TEC Wireless Configuration Tool to change the units of measurement on TEC Wireless Thermostat Controllers, some TEC Wireless Thermostat Controllers still show the previous units of measurement (°C or °F).	Not All TEC Wireless Thermostat Controllers Selected For Change of Units (°C or °F)

Table 8: Taking Corrective Action (Part 1 of 4)

Cause	Troubleshooting Step	Remedy
Communications Card Became Loose During Shipping	Remove cover of TEC Wireless Thermostat Controller. Visually inspect the Communications card (circuit board next to terminal blocks). Ensure that it is seated correctly and the bottom connector is pushed in.	Return the unit. In case of emergency, remove power and reseat card on the connector.
Defective Device (TEC Wireless Thermostat Controller or TEC20 Coordinator)	(Not Applicable)	Replace the defective device (TEC Wireless Thermostat Controller or TEC20 Coordinator).
Incorrect Voltage Applied to TEC20 Coordinator	(Not Applicable)	Supply 15 VDC to the TEC20 Coordinator
TEC Wireless Thermostat Controller Is Not Powered	Ensure 24 VAC is connected to 24- HOT and 24+ COM connector on TEC Wireless Thermostat Controller.	Connect +24 VAC to TEC Wireless Thermostat Controller terminals.
	Ensure 24VAC measured across the 24- HOT and 24+ COM connector on TEC Wireless Thermostat Controller.	Troubleshoot mechanical equipment to determine why 24 VAC is not being supplied.
TEC20 Coordinator Is Not Powered	Ensure power cord is plugged into Coordinator power connector.	Replace power supply.
	Ensure that +15 VDC is being supplied to the TEC20 Coordinator.	
Device (TEC Wireless Thermostat Controller or TEC20 Coordinator) Not Installed According to Guidelines.	(Not Applicable)	Install device(s) according to guidelines. See Table 1.

Table 8: Taking Corrective Action (Part 2 of 4)

Cause	Troubleshooting Step	Remedy
TEC Wireless Thermostat Controller Is Too Far from Another TEC Wireless Thermostat Controller or TEC20 Coordinator	Check TEC Wireless Thermostat Controller communications LED. If LED indicates that No Network was found.	<p>Add a TEC Wireless Thermostat Controller as a repeater between the low signal TEC Wireless Thermostat Controller and the next closest TEC Wireless Thermostat Controller.</p> <p>Additional repeaters may be needed if TEC Wireless Thermostat Controllers are still not communicating effectively.</p>
Connected to Wrong Ethernet Port on TEC20 Coordinator	(Not Applicable)	Use LAN1 port.
Wrong IP Address Is Entered.	(Not Applicable)	Enter correct IP address, obtained from facility's IT department.
PC IP Address Is Set to Incorrect Subnet	(Not Applicable)	Set PC IP address to correct subnet, obtained from facility's IT department.
PC IP Address Is Set to Conflicting Address.	(Not Applicable)	Enter non-conflicting IP address, obtained from facility's IT department.
Wrong (User Name or Password) Is Entered.	(Not Applicable)	Enter valid User Name or Password.
TEC Wireless Thermostat Controller Has Duplicate COM Address.	(Not Applicable)	Manually enter the correct, non-conflicting IP address. Obtain from facility's IT department.
PAN ID Mismatch	Ensure that the PAN ID on the TEC Wireless Thermostat Controllers match the PAN ID of the Coordinator	Change the PAN ID on all devices within the same wireless network to match.
Channel Mismatch	Ensure that the Channel on the TEC Wireless Thermostat Controllers match the Channel of the Coordinator	Change the Channel on all devices within the same wireless network to match. Use channel 15, 20, or 25 to reduce interference from WiFi systems.
Too Many TEC Wireless Thermostat Controllers Are Mapped to the NAE	<ol style="list-style-type: none"> 1. Identify all TEC Wireless Thermostat Controllers associated with this wireless network. 2. If more than 30 TEC Wireless Thermostat Controllers are installed per TEC20 Coordinator, remove a TEC Wireless Thermostat Controller farthest from Coordinator. 3. Repeat removing TEC Wireless Thermostat Controllers until system is stable. 	It is recommended that each Coordinator support up to 30 TEC Wireless Thermostat Controllers.
	<ol style="list-style-type: none"> 1. Identify all devices associated to the NAE on a single trunk. 2. If more than 100 TEC Wireless Thermostat Controllers are mapped to a Metasys system, remove a TEC Wireless Thermostat Controller from the system. 3. Repeat removing TEC Wireless Thermostat Controllers until the system is stable. 	It is recommended that each NAE trunk support up to 100 TEC Wireless Thermostat Controllers.

Table 8: Taking Corrective Action (Part 3 of 4)

Cause	Troubleshooting Step	Remedy
<p>TEC20 Coordinator and a ZFR1810 Are Conflicting</p>	<ol style="list-style-type: none"> 1. Find any ZFR1810 that is within a 100 ft radius of any TEC Wireless Thermostat Controller or TEC20 Coordinator in the network. 2. Ensure PAN OFFSET on the ZFR1810 and the PAN ID on the TEC20 Coordinator are different. 	<p>Change PAN ID of all the TEC Wireless Thermostat Controller or TEC20 Coordinator in one of the wireless networks.</p>
	<ol style="list-style-type: none"> 1. Find any ZFR1810 that is within a floor above and below of any TEC Wireless Thermostat Controller or TEC20 Coordinator in the network. 2. Ensure PAN OFFSET on the ZFR1810 and the PAN ID on the TEC20 Coordinator are different. 	<p>Change PAN ID of all the TEC Wireless Thermostat Controllers or TEC20 Coordinator in one of the wireless networks.</p>
<p>A Wireless Interference Source Is Installed Near the TEC20 Coordinator</p>	<p>Identify sources of wireless interferences. These can include, radio antennas, microwave ovens, ZFR1800 Series Wireless Field Bus System devices, wireless security devices, wireless LAN access points, paging systems, and cordless phones.</p>	<p>Move the TEC20 Coordinator antenna at least 2 ft away from any RF noise source.</p>
<p>Another TEC20 Coordinator (in Range) Has a Duplicate PAN ID and Channel</p>	<ol style="list-style-type: none"> 1. Find any TEC20 Coordinator that is within a 100 ft radius of any TEC Wireless Thermostat Controller or TEC20 Coordinator in the network. 2. Ensure PAN ID and Channel on the TEC Coordinators are unique. 	<p>Change PAN ID and Channel of all the TEC Wireless Thermostat Controllers or TEC20 Coordinators in one of the wireless networks.</p>
	<ol style="list-style-type: none"> 1. Find any TEC20 Coordinator that is within a floor above and below of any TEC Wireless Thermostat Controller or TEC20 Coordinator in the network. 2. Ensure PAN ID and Channel on the TEC Coordinators are unique. 	<p>Change PAN ID and Channel of all the TEC Wireless Thermostat Controllers or TEC20 Coordinators in one of the wireless networks.</p>
<p>TEC Wireless Thermostat Controller Has Duplicate Short Address</p>	<ol style="list-style-type: none"> 1. Check Metasys UI to find offline device(s). 2. Find the offline TEC Wireless Thermostat Controller. Enter its configuration menu. 	<ol style="list-style-type: none"> 1. Change PAN ID to an unused number. Wait 10 seconds. 2. Change PAN ID to correct number. Wait 10 seconds. 3. Ensure TEC Wireless Thermostat Controller Communications LED shows that it reconnects to the wireless network.
<p>TEC Wireless Thermostat Controller Has Not Been Added to the TEC20 Coordinator's Database</p>	<ol style="list-style-type: none"> 1. Connect to the TEC20 Coordinator using the TEC20 Wireless Configuration Tool software. 2. In the Database Tools screen, select the TEC Wireless Thermostat Controller that is not in the database. 	<p>Click on the Add/Remove Selected Thermostat button. The Added to Network indication should be true when the TEC Wireless Thermostat Controller is added to the network.</p>

Table 8: Taking Corrective Action (Part 4 of 4)

Cause	Troubleshooting Step	Remedy
<p>TEC Wireless Thermostat Controller Has Been Added to the TEC20 Coordinator's Database Multiple Times</p>	<ol style="list-style-type: none"> 1. Connect to the TEC20 Coordinator using the TEC20 Wireless Configuration Tool software. 2. In the Database Tools screen, select all instances of the TEC Wireless Thermostat Controller that is in the database multiple times. 	<p>Click on the Add/Remove Selected Thermostat button. The Added to Network indication should be false when all the TEC Wireless Thermostat Controllers are removed to the network.</p>
	<ol style="list-style-type: none"> 1. Connect to the TEC20 Coordinator using the TEC20 Wireless Configuration Tool software. 2. In the Database Tools screen, select one instance of the TEC Wireless Thermostat Controller that is in the database multiple times. 	<p>Click on the Add/Remove Selected Thermostat button. The Added to Network indication should be true when the TEC Wireless Thermostat Controller is added to the network.</p>
<p>TEC Thermostat Controller Being Configured Is Not a Wireless Version</p>	<p>(Not Applicable)</p>	<p>Use a TEC Wireless Thermostat Controller.</p>
<p>Wireless Communications Card Was Field-Added to TEC Thermostat Controller</p>	<p>(Not Applicable)</p>	<p>Use a TEC Wireless Thermostat Controller.</p>
<p>TEC Wireless Thermostat Controller Belonging to Another TEC20 Coordinator Is Configured with the Wrong PAN ID and Channel</p>	<p>(Not Applicable)</p>	<p>Configure the TEC Wireless Thermostat Controller with the correct PAN ID and Channel.</p>
<p>Another TEC Wireless System with the Same PAN ID and Channel Is Overlapping This System.</p>	<p>(Not Applicable)</p>	<p>Change the PAN ID and Channel settings for one of the two TEC Wireless systems.</p>
<p>Wireless FECs on Wireless TEC System</p>	<p>(Not Applicable)</p>	<p>Wireless TECs and Wireless FECs are not currently interoperable. Remove the wireless FEC from the system.</p>
<p>Not All TEC Wireless Thermostat Controllers Selected for Change of Units (°C or °F)</p>	<ol style="list-style-type: none"> 1. Connect to the TEC20 Coordinator using the TEC20 Wireless Configuration Tool software. 2. In the Database Tools screen, select the instance of the TEC Wireless Thermostat Controller that shows the wrong system of measurement (°C or °F). 	<ol style="list-style-type: none"> 1. Select the Add/Remove Selected TEC WTC button to remove the TEC Wireless Thermostat Controller from the database. 2. Select the Add/Remove Selected TEC WTC button to add the TEC Wireless Thermostat Controller into the database. 3. Select the View Selected Thermostat button. 4. Verify that the correct unit of measurement (°C or °F) now displays.

Appendix 3: Wireless Configuration Tool

TEC Wireless Configuration Tool

When the search completes, select the TEC20 Coordinator that has the expected IP address.

Note: If the TEC20 Coordinator is connected to a building network, devices other than TEC20 Coordinators may appear in this list. This tool does not connect to those devices.

Note: The last numeral (*n*) in the IP address matches the last numeral in the TEC20 Coordinator serial number value as indicated on the label inside the TEC20 Coordinator. This only applies to the default IP address of 192.168.1.12*n*.

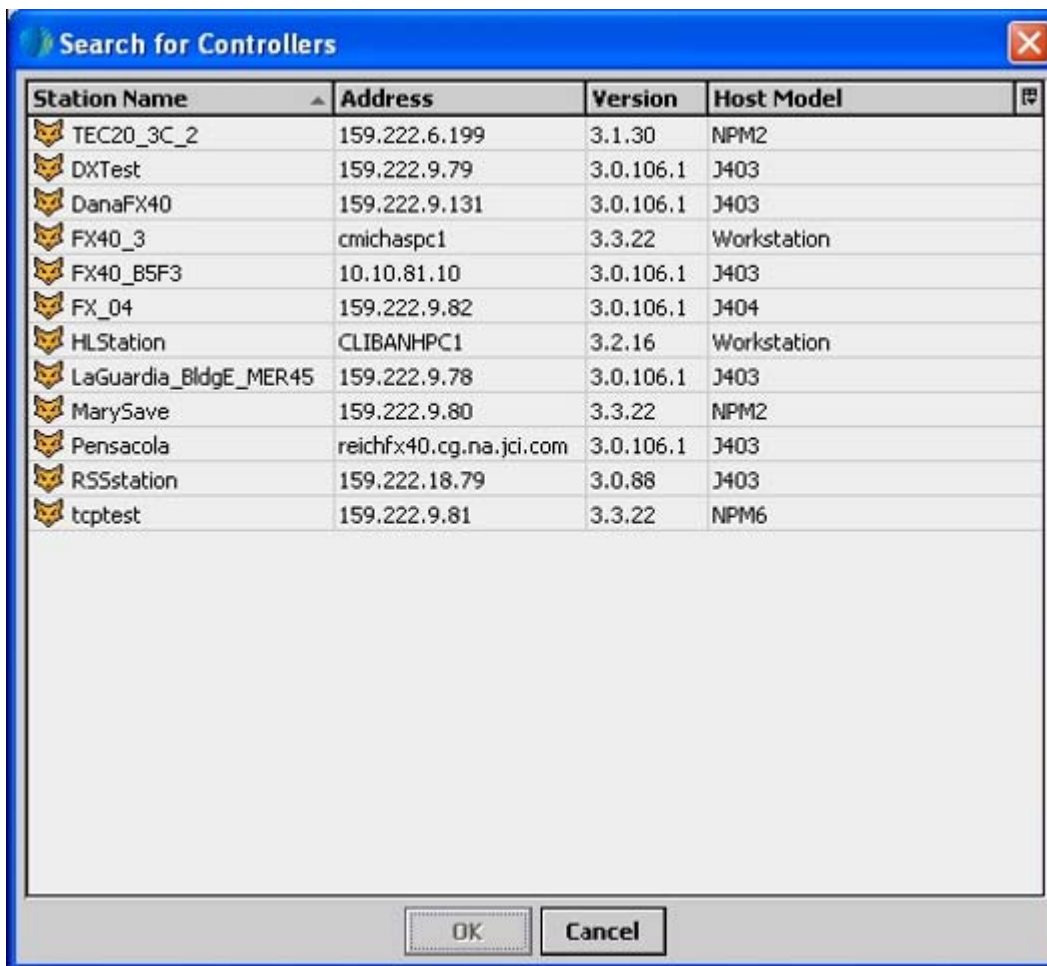


Figure 53: Selecting a TEC20 Coordinator

Log into the TEC20 Coordinator.

The default user name is: **admin**

The default password is: (no password - leave this field blank)

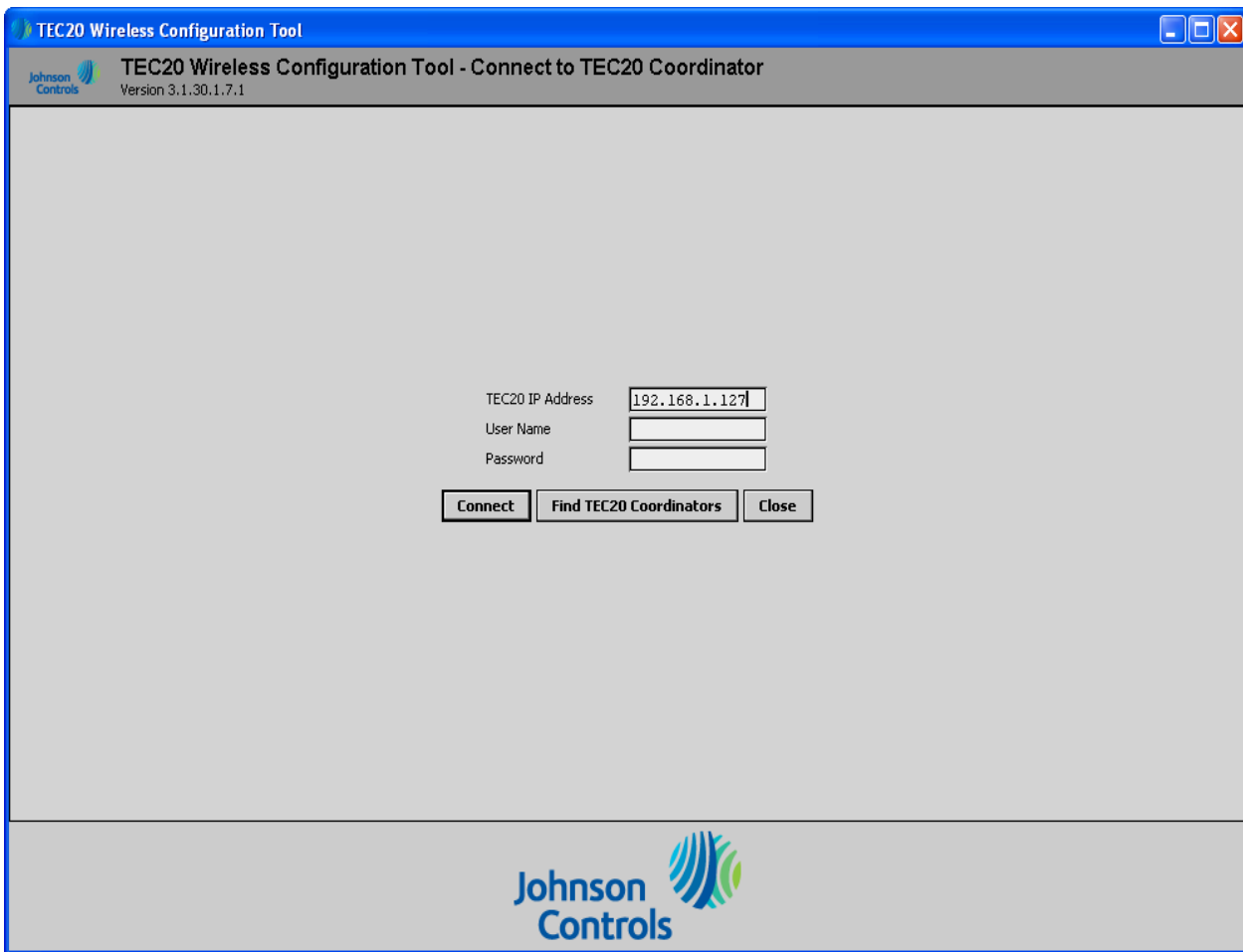


Figure 54: Connecting to the TEC20 Coordinator

TEC20 Coordinator Settings

The first tab on top after initial connection, TEC20 Coordinator Settings, allows basic configuration of the TEC20 Coordinator.

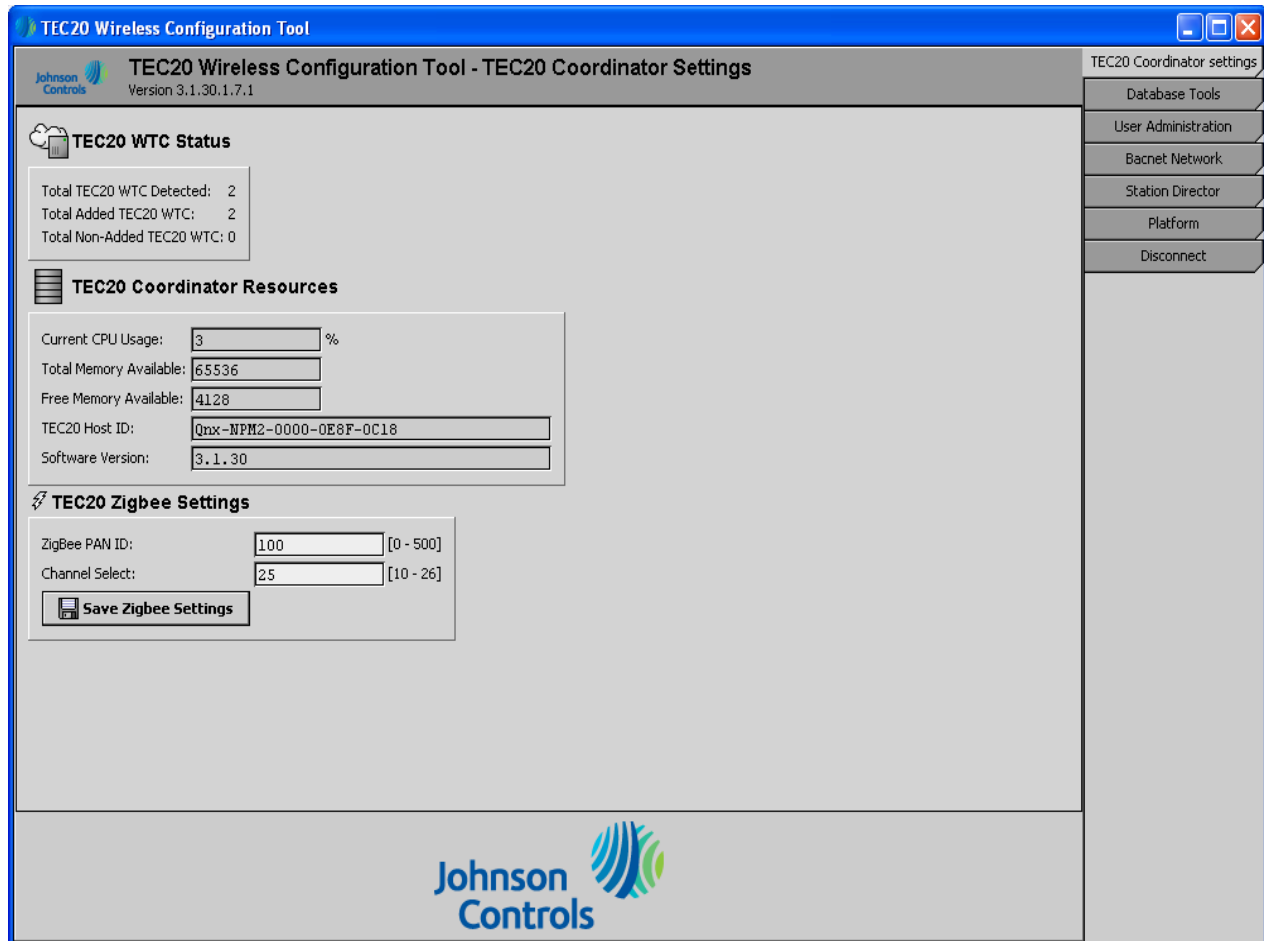


Figure 55: TEC20 Wireless Configuration Tool - TEC20 Coordinator Settings

TEC WTC Status

Total TEC WTCs Detected indicates the total number of TEC Wireless Thermostat Controllers currently detected by the TEC20 Coordinator. This number includes all TEC Wireless Thermostat Controllers either in the database or not.

Total Added TEC WTCs indicates the total number of TEC Wireless Thermostat Controllers currently in the TEC20 Coordinator database. The objects for these TEC Wireless Thermostat Controllers are available for integration as objects in the NAE.

Total Non-Added TEC WTCs indicates the total number of TEC Wireless Thermostat Controllers currently **not** in the TEC20 Coordinator database. The objects for these TEC Wireless Thermostat Controllers are **not** available for integration as objects in the NAE.

TEC20 Coordinator Resource

The TEC20 Coordinator resource count gives a general indication of the CPU and memory usage of the TEC20 Coordinator. It also indicates the currently assigned Host ID of the TEC20 Coordinator and the current software version used.

Zigbee Settings

Use these settings to set the values of the ZigBee configuration for the TEC20 Coordinator and associated TEC Wireless Thermostat Controllers.

ZigBee PAN ID sets the Personal Area Network Identification (PAN ID). Range is from address 1 to 500.

Channel Select sets channel frequency used by the TEC20 Coordinator. Range is from channel 11 to 26 (2405 MHz to 2480 MHz with 5 MHz channel spacing). See Figure 2. Use Channel 15, 20, or 25 to reduce interference from WiFi systems.

IMPORTANT: For every thermostat reporting to a TEC20 Coordinator, be sure you set the **same PAN ID** and **Channel** value at both the TEC20 Coordinator and the thermostat(s). We recommend a maximum of 30 TEC Wireless Thermostat Controllers be associated with a TEC20 Coordinator.

Database Tools

This section configures the thermostat database for the TEC20 Coordinator.

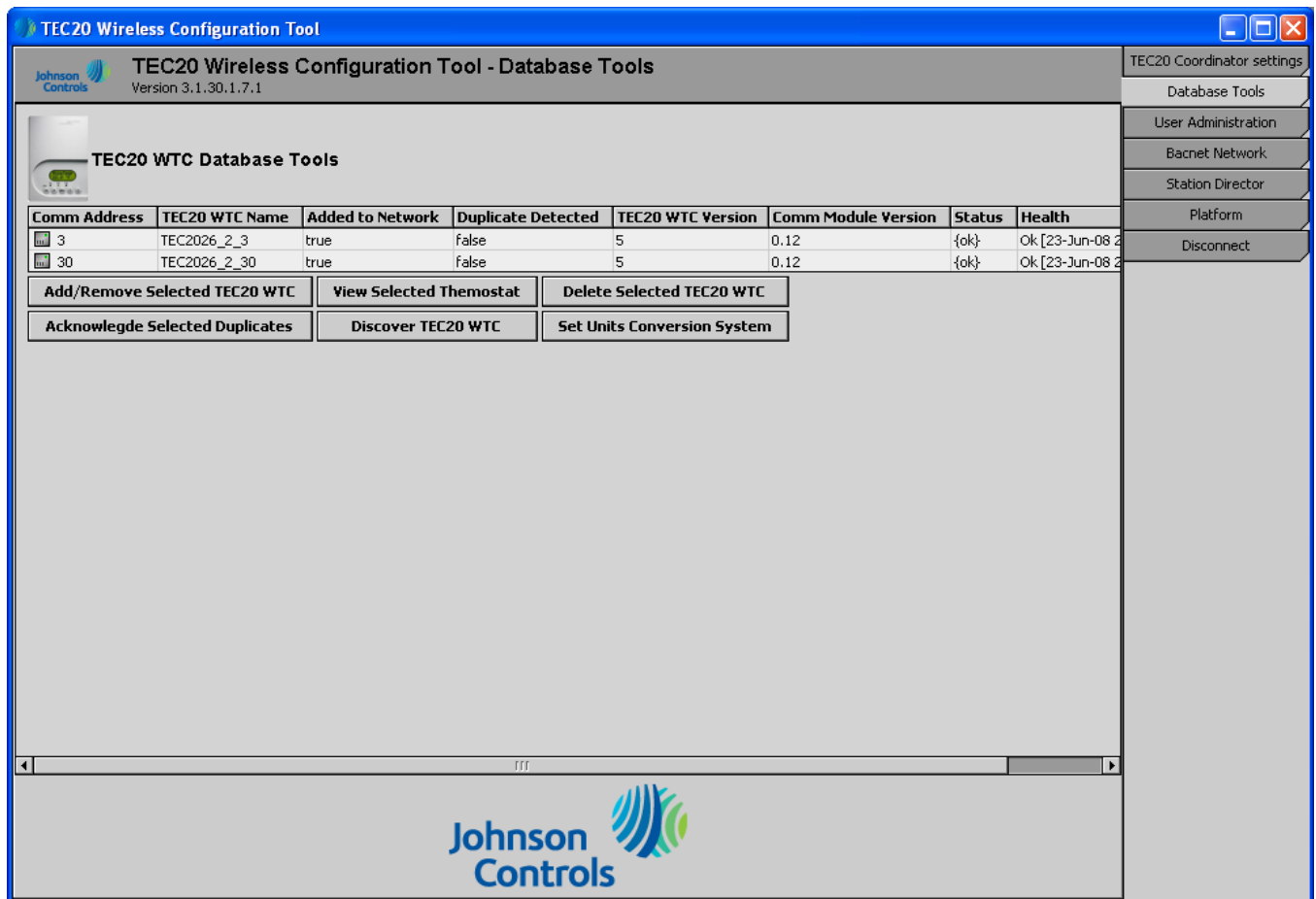


Figure 56: Database Tools

The main screen table lists the TEC Wireless Thermostat Controllers detected by the TEC20 Coordinator that:

- have the same **PAN ID** and **Channel** settings as the TEC20 Coordinator
- that are within the wireless transmission range of the system
- have been discovered using the Wireless Configuration Tool

Comm Address is the wireless device address parameter configured locally on each individual TEC Wireless Thermostat Controller.

IMPORTANT: The Comm Address for each TEC Wireless Thermostat Controller on the wireless network must be uniquely numbered, from 1 to 254.

TEC20 WTC Name is the TEC Wireless Thermostat Controller's specific name in the database. The name is constructed of the thermostat model number and its **Comm address**. For example, a TEC2026-2 Wireless Thermostat Controller with a **Comm address** of 21 carries a name in the database of TEC2026_2_21.

Added to Network

- True = thermostat controller already added to the TEC20 Coordinator database. When the TEC20 Coordinator is discovered by the NAE, this TEC Wireless Thermostat Controller's points are available for integration.
- False = thermostat controller **not** added to the TEC20 Coordinator database. When the TEC20 Coordinator is discovered by the NAE, this TEC Wireless Thermostat Controller's points are **not** available for integration.

Duplicate Detected. This is used for troubleshooting a network if the same Comm Address was set at more than one TEC Wireless Thermostat Controller reporting to the same TEC20 Coordinator. Both would be reported with the same thermostat name (if the same model number are used) and both would carry the same Comm Address.

False = TEC Wireless Thermostat Controller Comm address **not** duplicated. Indicates a normal condition.

True = TEC Wireless Thermostat Controller Comm address is duplicated. Indicates an **abnormal** condition. Take the following actions to correct this duplication:

- a. Physically re-address all of the TEC Wireless Thermostat Controllers with duplicate Comm addresses to new Comm addresses **not** used in the current database.
- b. On the **Database Tools** screen, select all of the duplicates in the database.
- c. Use the **Acknowledge Selected Duplicates** button to refresh the database.
- d. Wait until the next validation (up to 5 minutes) for the system to acknowledge the change.

TEC20 WTC Version indicates the current software version of the wireless communication module installed inside the TEC Wireless Thermostat Controller.

Comm Module Version indicates the firmware version of the communication module.

Status indicates the current communications status of each TEC Wireless Thermostat Controller wireless node. OK indicates that the TEC Wireless Thermostat Controller is communicating with the TEC20 Coordinator. See Table 9.

Health indicates the current status of each TEC Wireless Thermostat Controller wireless node. **OK** indicates that the TEC Wireless Thermostat Controller is communicating with the TEC20 Coordinator. The date and time indicate the last time a communication event was received by the TEC20 Coordinator from that TEC Wireless Thermostat Controller. See Table 9

Table 9: Status and Health Indicators

Indicator	Condition		
	Everything Working	Communication Failure	Duplicate Comm Address Detected ¹
Background Color	White	Yellow	Orange
Status Column	{ok}	{down, alarm, unackedAlarm}	{fault}
Health Column	OK [<i>time last OK status was validated</i>]	Fail [<i>time last failed status was validated</i>] Heartbeat Failed	OK [<i>time last OK status was validated</i>]

1. To correct this problem, refer to the Duplicate Detected column description. Once corrected, the fault status clears within the five minutes.

Add/Remove Selected TEC20 WTC

The Database Tools tab displays all the TEC Wireless Thermostat Controllers discovered by the TEC20 Coordinator. However, these TEC Wireless Thermostat Controllers are not automatically added to the TEC20 Coordinator's database and the associated points are not automatically created for these TEC Wireless Thermostat Controllers.

To integrate the selected TEC Wireless Thermostat Controllers through BACnet, you first need to add the TEC Wireless Thermostat Controllers to the network, which means that all associated BACnet points are created and the device is ready to be integrated through the BACnet network.

View Selected Thermostat

This view (Figure 57) lets you look at all the current objects of a selected TEC Wireless Thermostat Controller. This view does not refresh automatically. If a refresh is needed, close the window and reopen it to obtain the updated values of the objects.

In order to manually override an analog input in a TEC Wireless Thermostat Controller, the analog input object must be set to Out of Service. The **Out of Service** column indicates if a point is Out of Service. This indication only applies to the following analog input points/objects:

- RoomTemp
- OutdoorTemp
- RoomHumidity

If prompt is equal to:

- False = point is Read-only object
- True = point is Read/Write point

Note: Refer to the Metasys system *Help* for information on how to read, write, or setpoints to **Out of Service**.

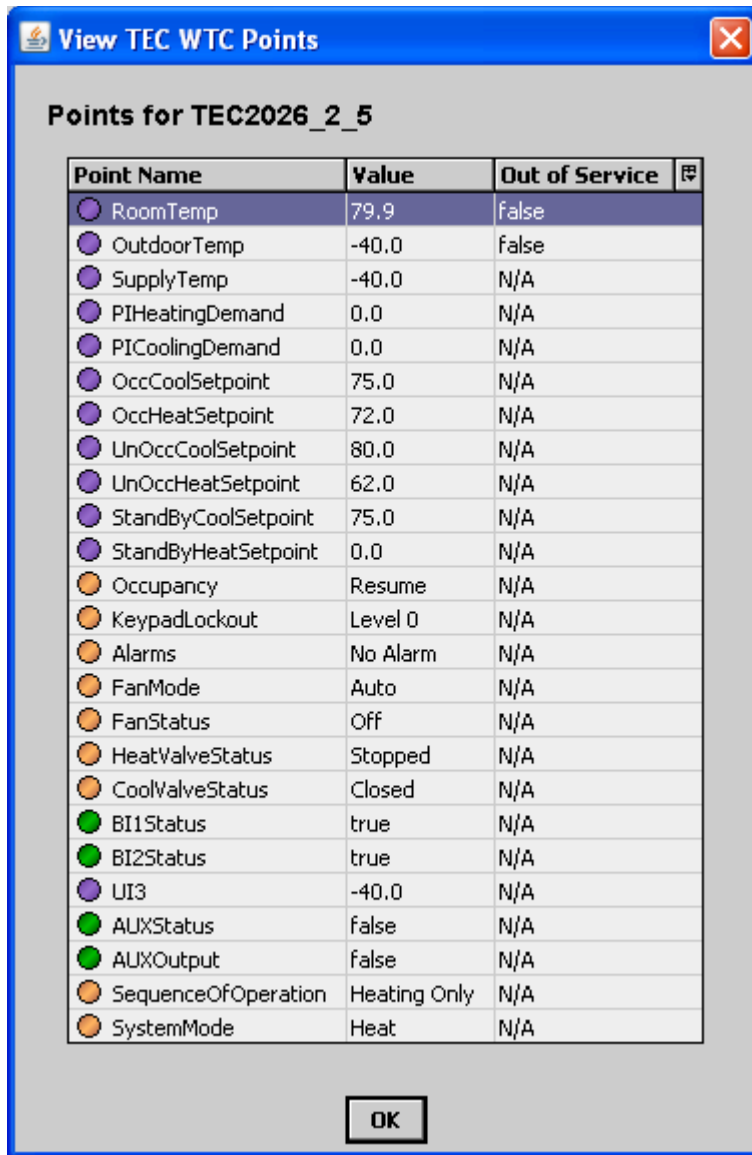


Figure 57: Viewing Points on a Selected TEC Wireless Thermostat Controller

Delete Selected TEC20 WTC

This action completely removes the selected TEC Wireless Thermostat Controller and all its associated BACnet points from the database. Use this function if a COMM Address is modified or if a TEC Wireless Thermostat Controller was discovered by mistake (the TEC Wireless Thermostat Controller should have been discovered by another TEC20, for example).

Note: If the TEC Wireless Thermostat Controller is still present over the network, it reappears in the database when the next message is received by the TEC20 Coordinator from the TEC Wireless Thermostat Controller.

Acknowledge Selected Duplicates

Acknowledge Selected Duplicates scans the database for duplicate **COMM Addresses** in the database. If any duplicates are found in the database, they appear as highlighted entries. See **Table 9**.

Follow these steps to correct the duplicate addresses:

1. Physically re-address all of the duplicate thermostat address to **COMM Addresses** not used in the current database.
2. Delete all the duplicates in the database using the **Add/Remove Selected Thermostat** button.
3. Use the **Discover Thermostat** button to refresh the database and discover the thermostat controllers with new **COMM Addresses**.

Discover TEC20 WTC

Discover Thermostat launches the TEC20 Coordinator discovery process. This process:

- brings into the TEC20 Coordinator database any TEC Wireless Thermostat Controller that is newly added to the network
- brings into the database any TEC Wireless Thermostat Controller that has had its **Comm Address** modified since that TEC Wireless Thermostat Controller was initially added to the database

Note: Once the new discovery process is finished and the database is refreshed, be sure to delete from the database any thermostat controller that is no longer used. This eliminates all the associated points that could be mapped to the NAE.

Set Units Conversion System

Use this to change the units system (SI/metric or English/Imperial) that the TEC20 Coordinator uses. Once you change units, all TEC Wireless Thermostat Controllers that are currently added to the database are removed and re-added using the **Add/Remove Selected TEC20 WTC** button. Thermostats that are not removed and re-added continue to show the previous units system.

User Administration

This tab is used to assign users and set access rights to the TEC20 Coordinator for commissioning and testing.

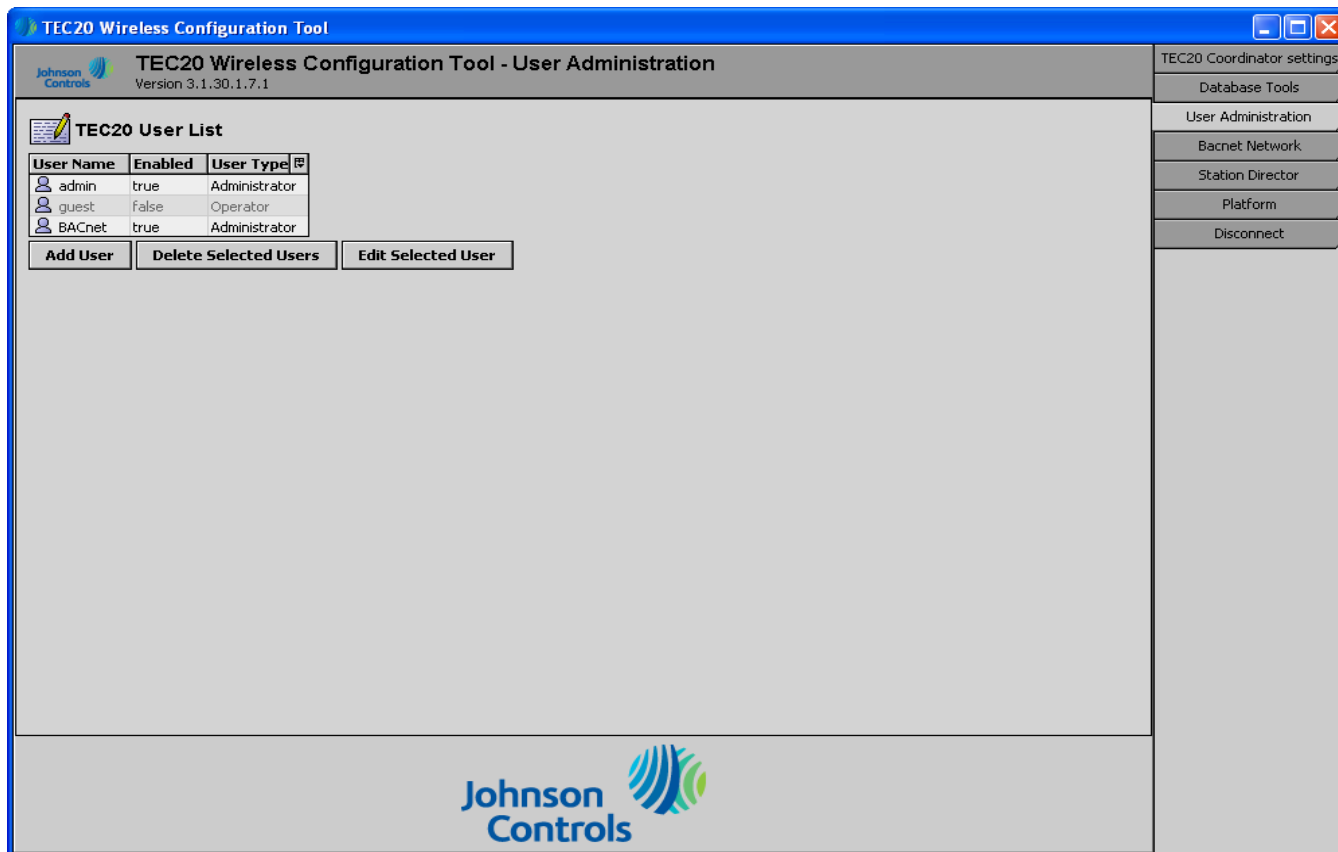


Figure 58: User Administration Tab

Add User

Add User adds users to the TEC20 Coordinator and sets their access rights.

1. In the **User Name** field, enter desired user name for the new user.
2. In the **Password** field, enter desired password for the new user.

Note: Password is case sensitive.

3. In the **Confirm** field, enter again the desired password for new user.
4. Select the **User Type**:
 - **Administrator** grants access all functions of the TEC20 Coordinator.
 - **Supervisor** grants access to all functions required for the commissioning of the TEC20 Coordinator.

- **Operator** grants access in view mode only without the possibility of doing any modifications.

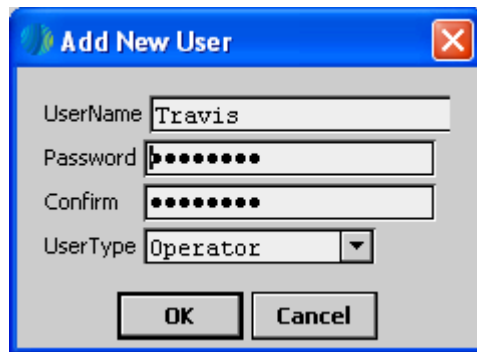


Figure 59: Adding a New User

Delete Selected User

Delete Selected User deletes a selected user from the current TEC20 Coordinator user list.

Edit Selected User

Edit Selected User allows you to edit the profile or password of a selected user from the current user list. If **Enabled** is set to **True**, the user has access to the TEC20 Coordinator. If **Enabled** is set to **False**, the user does not have access to the TEC20 Coordinator; however, the user profile remains in the user list, in case the user profile needs to be re-activated at a later time.

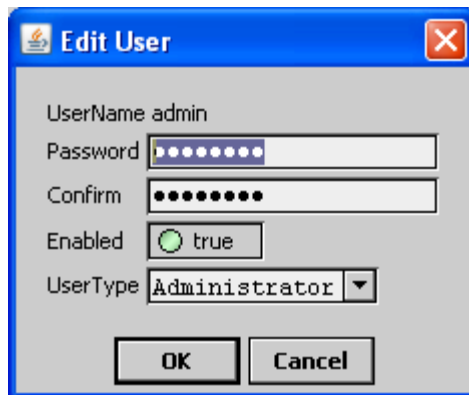


Figure 60: Editing a User

BACnet Settings

This tab is used to set all BACnet IP or BACnet MS/TP settings for the TEC20 Coordinator.

BACnet MS/TP Settings

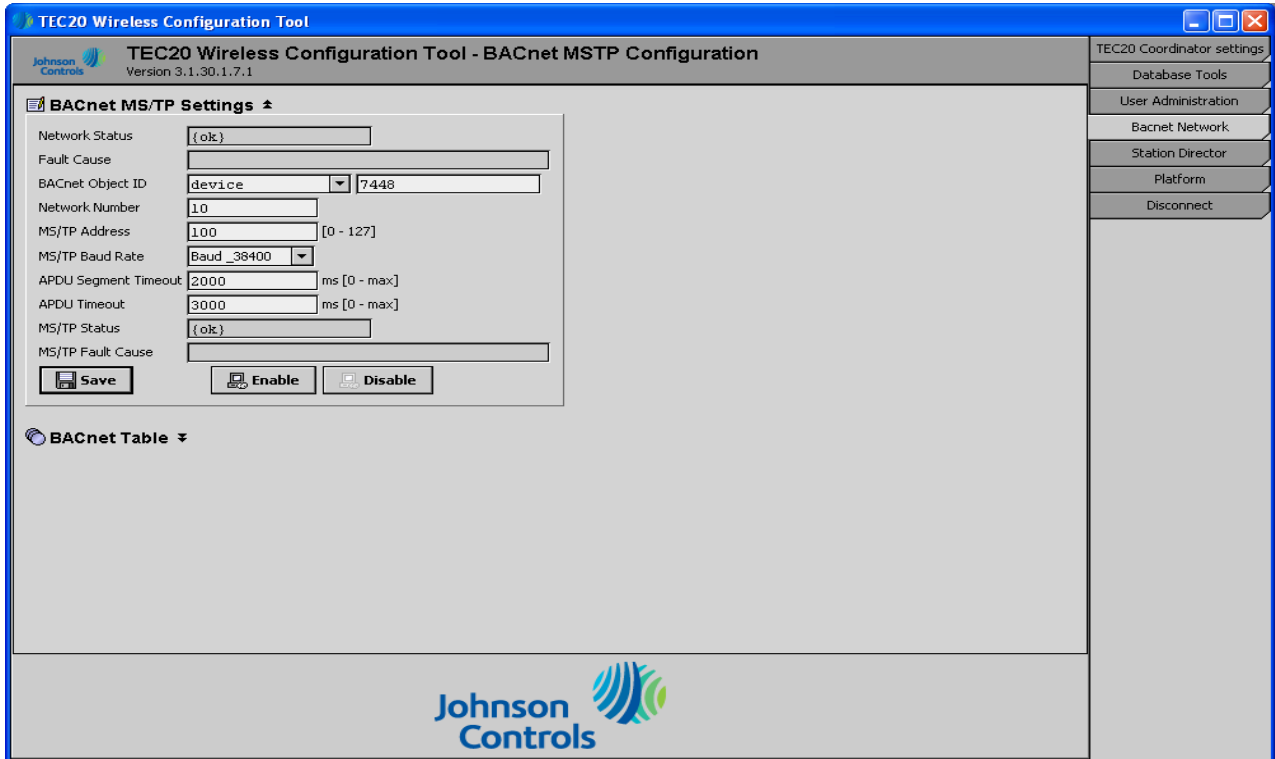


Figure 61: BACnet MS/TP Settings

BACnet Object ID is the currently assigned BACnet Device Object Identifier of the TEC20 Coordinator. It is a unique identification number of a device on a BACnet network. Usable range is from 0 to 4194302.

Network Number is the currently assigned network number for the TEC20 Coordinator. Usable range is from 1 to 65534.

MSTP Address is the BACnet MS/TP address of the TEC20 Coordinator. Use a value from 4 to 127. Addresses 1 through 3 are reserved. Default address is 100.

MSTP Baud Rate is the communication speed of the MS/TP trunk. This value must match the NAE's setting, which is usually 38400.

APDU Segment Timeout should match the values in the NAE.

APDU Timeout should match the values in the NAE.

BACnet IP Settings

TEC20 Wireless Configuration Tool - BACnet IP Configuration
Version 3.1.30.1.7.1

BACnet IP Settings

Network Status: {ok}

Fault Cause: []

BACnet Object ID: device | 25

Network Number: 1

BACnet Adapter: Ethernet Adapter NET1

UDP Port: 0xBAC0

BACnet IP Device Type: Standard

BACnet BBMD Address: null

BACnet IP Status: {ok}

BACnet IP Fail Cause: []

Save Enable Disable

BACnet Table

Johnson Controls

Figure 62: BACnet IP Settings

BACnet Object ID is the currently assigned BACnet Device Object Identifier of the TEC20 Coordinator. It is a unique identification number of a device on a BACnet network. Usable range is from 0 to 4194302.

Network Number is the currently assigned network number for the TEC20 Coordinator. Usable range is from 1 to 65534.

UDP Port is the User Datagram Protocol (UDP) port number assigned to the device if the TEC20 Coordinator is to be accessible remotely through an Internet connection.

BACnet IP Device Type defines the type of Internet Protocol (IP) connectivity required:

- **Standard** is used when the TEC20 Coordinator is connected to a LAN and is **not** required to be accessed or have connectivity through an Internet WAN connection.
- **Foreign Device** is not used.

- **BACnet/IP Broadcast Management Device (BBMD)** is used when the TEC20 Coordinator is connected to a LAN and is required to be accessed or have connectivity through an Internet WAN connection.
- **BACnet BBMD Address** defines the Internet network address of the TEC20 Coordinator when **BBMD** is enabled and remote Internet connectivity is required. Usable range is from 1 to 65534.

BACnet Table

The BACnet Table shows/contains/indicates all available points in the TEC20 Coordinator database. These points are available (for integration) to be discovered by the NAE.

The current table view represents the actual BACnet point current value inside the TEC20 Coordinator.

Target Name	Object Name	Object Type	Inst Num	Value	Reliability	BACnet Writable
RoomTemp	TEC2026_2_3_RoomTemp	analogValue	30	75.1 °F {ok} @ def	No Fault Detected	no
OutdoorTemp	TEC2026_2_3_OutdoorTemp	analogValue	31	-40.0 °F {ok} @ def	No Fault Detected	no
SupplyTemp	TEC2026_2_3_SupplyTemp	analogValue	32	-40.0 °F {ok} @ def	No Fault Detected	no
PIHeatingDemand	TEC2026_2_3_PIHeatingDemand	analogValue	33	0.0 % {ok} @ def	No Fault Detected	no
PICoolingDemand	TEC2026_2_3_PICoolingDemand	analogValue	34	0.0 % {ok} @ def	No Fault Detected	no
OccCoolSetpoint	TEC2026_2_3_OccCoolSetpoint	analogValue	35	24.0 °F {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
OccHeatSetpoint	TEC2026_2_3_OccHeatSetpoint	analogValue	36	22.0 °F {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
UnOccCoolSetpoint	TEC2026_2_3_UnOccCoolSetpoint	analogValue	37	26.5 °F {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
UnOccHeatSetpoint	TEC2026_2_3_UnOccHeatSetpoint	analogValue	38	16.5 °F {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
StandByCoolSetpoint	TEC2026_2_3_StandByCoolSetpoint	analogValue	39	-18.0 °F {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
StandByHeatSetpoint	TEC2026_2_3_StandByHeatSetpoint	analogValue	40	-18.0 °F {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
Occupancy	TEC2026_2_3_Occupancy	multiStateValue	30	Resume {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
KeypadLockout	TEC2026_2_3_KeypadLockout	multiStateValue	31	Level 0 {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
Alarms	TEC2026_2_3_Alarms	multiStateValue	32	No Alarm {ok} @ def	No Fault Detected	no
FanMode	TEC2026_2_3_FanMode	multiStateValue	33	Auto {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
FanStatus	TEC2026_2_3_FanStatus	multiStateValue	34	Off {ok} @ def	No Fault Detected	no
HeatValveStatus	TEC2026_2_3_HeatValveStatus	multiStateValue	35	Stopped {ok} @ def	No Fault Detected	no
CoolValveStatus	TEC2026_2_3_CoolValveStatus	multiStateValue	36	Stopped {ok} @ def	No Fault Detected	no
BI1Status	TEC2026_2_3_BI1Status	binaryValue	30	Deactivated {ok} @ def	No Fault Detected	no
BI2Status	TEC2026_2_3_BI2Status	binaryValue	31	Deactivated {ok} @ def	No Fault Detected	no
UI3	TEC2026_2_3_UI3	analogValue	41	-40.0 {ok} @ def	No Fault Detected	no
AUXStatus	TEC2026_2_3_AUXStatus	binaryValue	32	Off {ok} @ def	No Fault Detected	no
AUXOutput	TEC2026_2_3_AUXOutput	binaryValue	33	Off {ok} @ def	No Fault Detected	no
SequenceOfOperation	TEC2026_2_3_SequenceOfOperation	multiStateValue	37	Heating Only {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
SystemMode	TEC2026_2_3_SystemMode	multiStateValue	38	Off {ok} @ def	No Fault Detected	in1,in2,in3,in4,in5,inf
RoomTemp	TEC2026_2_30_RoomTemp	analogValue	435	75.4 °F {ok} @ def	No Fault Detected	no
OutdoorTemp	TEC2026_2_30_OutdoorTemp	analogValue	436	-40.0 °F {ok} @ def	No Fault Detected	no

Figure 63: BACnet Point Table

Target Name is the assigned TEC Wireless Thermostat Controller point name.

Object Name is the default assigned BACnet point name. The current assigned BACnet point name is automatically derived:

model number_TEC Wireless Thermostat Controller Comm Address_Target Name.

A TEC2026-2 Wireless Thermostat Controller with a Comm Address of 21 for the room temperature point carries a BACnet point name of:
TEC2026_2_21_RoomTemp.

Object Type defines the type of point BACnet associated with the TEC Wireless Thermostat Controller.

Value shows the current value of the points.

Instance Number is a unique identifier of point, based on point type, generated automatically and internally by the TEC20 Coordinator.

Reliability indicates reliability of data coming into the TEC20 Coordinator, based on the last transmission received.

BACnet Writable indicates whether this point can be written to from the NAE.

Station Director

IMPORTANT: This is advanced troubleshooting information. **Do not change any settings on this tab.**

This tab is used for diagnostic purposes only and displays current information on the internal operation of the TEC20 Coordinator.

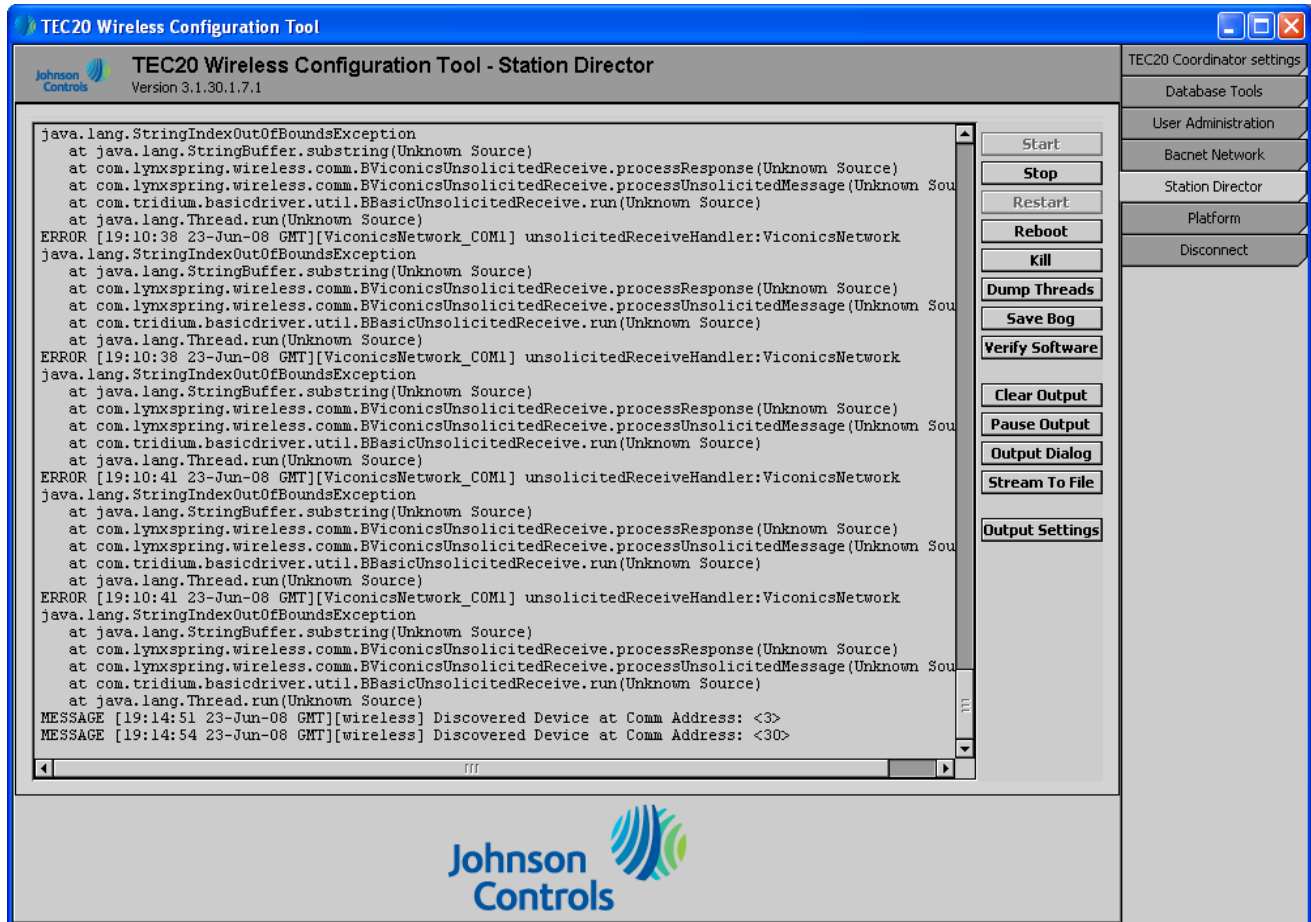


Figure 64: Station Director

Platform

This tab sets up different functions of the TEC20 Coordinator:

- Station Copier
- System Time and Date
- TCP/IP Configuration
- File Transfer Client
- Software Manager

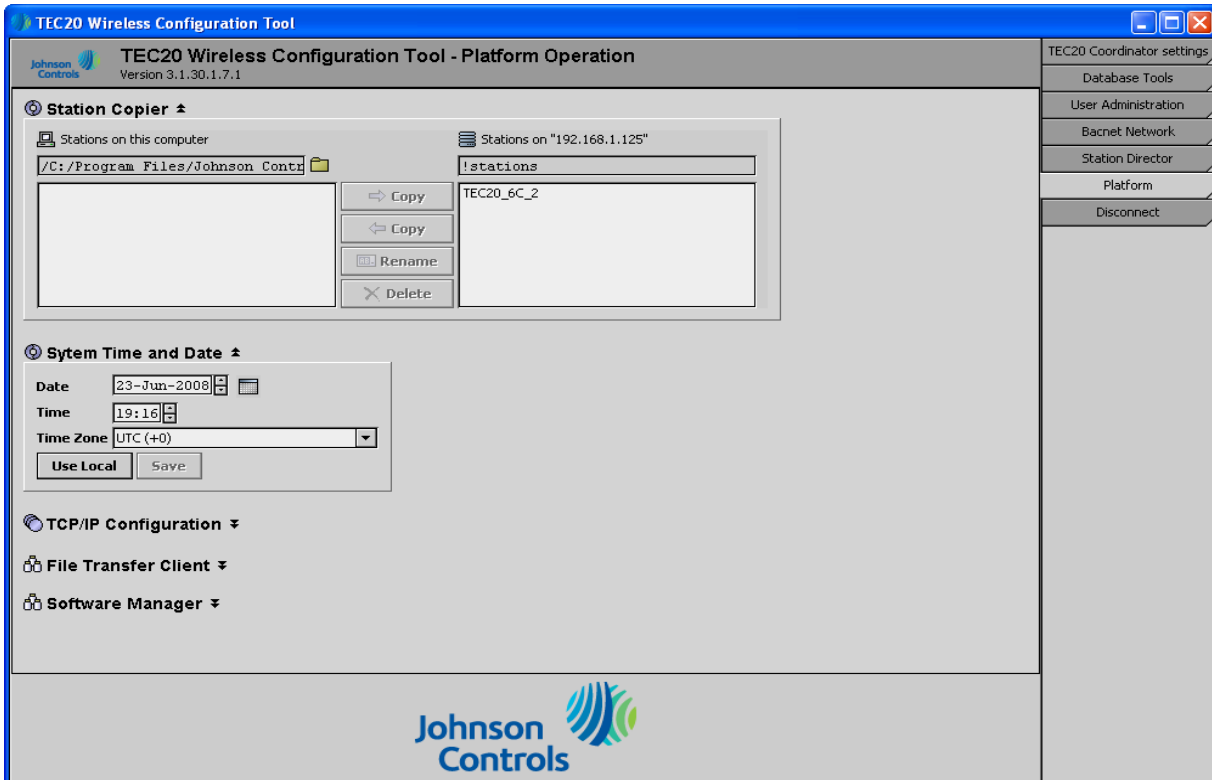


Figure 65: Platform Configuration Tab - Station Copier and System Time and Date

Station Copier

The Station Copier is only used to install a new version of the TEC20 Coordinator operating system software.

The important functions are:

- Copy from left to right to install a new TEC20 Coordinator operating system from a local drive to the TEC20 Coordinator.
- Copy from right to left save the current TEC20 Coordinator operating system in the TEC20 Coordinator to backup to a local drive.
- Use the Rename button to rename the TEC20 Coordinator operating system name.

- Use the delete button to delete a operating system that is no longer in use (older version on the TEC20 Coordinator operating system).

System Time and Date

Use this to set the time and date information for the TEC Series Wireless Thermostat System. Use the local date and time.

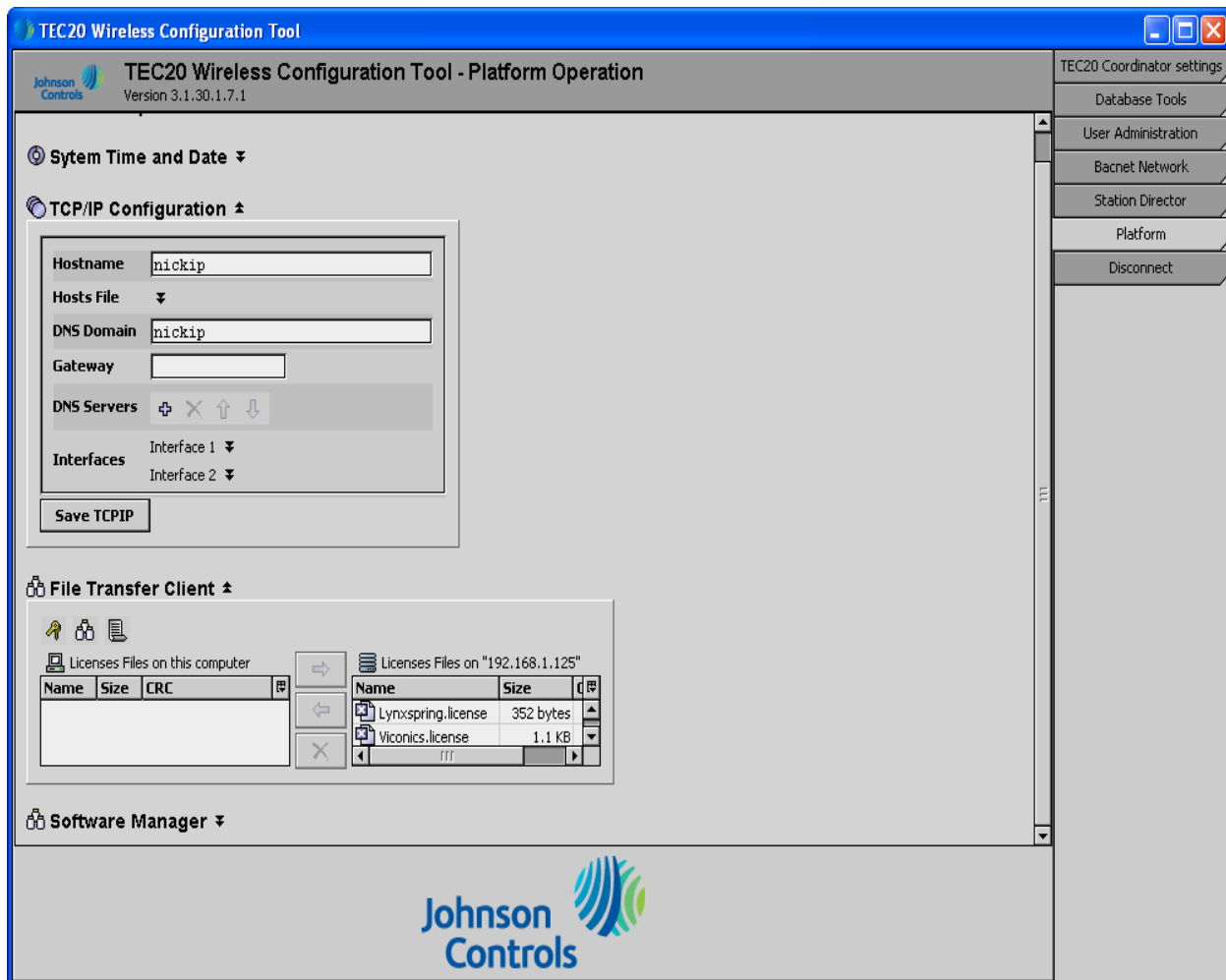


Figure 66: Platform Configuration Tab - TCP/IP Configuration and File Transfer Client

TCP/IP Configuration

DNS Domain is the TCP/IP Domain Name System (DNS) domain this host belongs to, if DNS domains are used.

Gateway is the IP address for the device that forwards packets to other networks or subnets.

DNS Servers shows the IP address for one or more DNS servers, each of which can automate associations between hostnames and IP addresses. Included are icons to Add (to enter IP address of server), Delete, and move Up/Down (to set the DNS search order).

Interface 1 sets the local device IP settings for the primary Ethernet port.

Interface 2 sets the local device IP settings for the secondary Ethernet port.

ID is a read-only OS identifier for the hardware interface.

Description is a read-only text string such as **Ethernet Adapter**.

Adapter Enabled is a read-only checkbox that indicates whether the Ethernet port is usable.

DHCP is a checkbox to specify using Dynamic Host Configuration Protocol (DHCP) instead of static IP addressing. Successful use requires a DHCP server installed on your network. If enabled, other interface fields such as IP Address and Subnet Mask become read-only, as these are assigned by the DHCP server after the TEC20 Coordinator reboots.

IMPORTANT: Do not enable DHCP unless you are sure that your network has one or more DHCP servers. Otherwise, the TEC20 Coordinator may become unreachable over the network.

Note: In general (for stability), static IP addressing is recommended over DHCP.

Note: Only the Primary Ethernet connection **PRI** (NET1, LAN1) can be enabled to use DHCP. The secondary Ethernet connection **SEC** (NET2, LAN2) can only use static IP addressing.

IP Address is the currently configured IP address for the specific adapter.

Subnet Mask is the static IP subnet mask used by this host.

DHCP Server applies only if DHCP is enabled. This shows read-only address of the DHCP server from which this host last obtained its IP address settings.

DHCP Lease Granted applies only if DHCP is enabled. This shows a read-only timestamp of when the DHCP lease started.

DHCP Lease Expires applies only if DHCP is enabled. This shows a read-only timestamp of when the DHCP lease expires and needs renewal.

File Transfer Client

Do not use this feature unless directed by the Field Support Center.

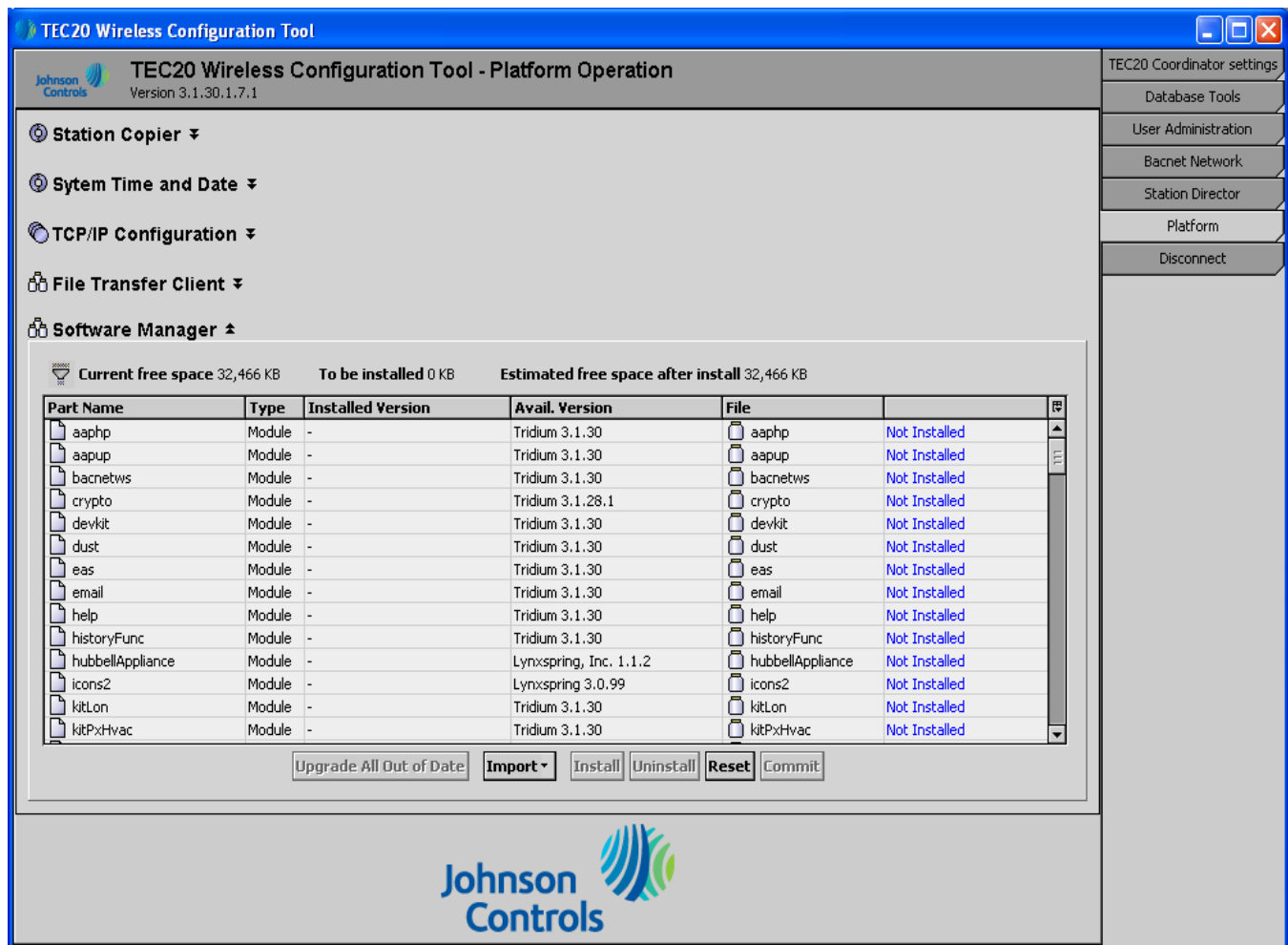


Figure 67: Software Manager

Software Manager

IMPORTANT: Do not use this feature unless specifically directed by the Johnson Controls Field Support Center.

Software Manager displays a list of all currently installed modules and their version.