Honeywell

EXPERION PKS

RELEASE 515

Fault Tolerant Ethernet Bridge Implementation Guide

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CHAPTER

1

ABOUT THIS GUIDE

This document provides information for implementing a Fault Tolerant Ethernet supervisory network between Experion Servers and C200/C300 Controllers through the Fault Tolerant Ethernet Bridge module. It includes module installation, configuration, operation, and service data.

Revision	Date	Description
A	November 2019	Initial release of the document.

CHAPTER

2

INTRODUCTION

2.1 Overview

The Experion system supports supervisory level communications over Honeywell's Fault Tolerant Ethernet (FTE) network using the Fault Tolerant Ethernet Bridge module. It also supports supervisory level communications over a ControlNet network or Ethernet network using a ControlNet Interface (CNI) module or Ethernet module, respectively.

> **ATTENTION**
>
> You cannot mix the supervisory network types on an Experion Server or Station. For example, If your Server is currently using a ControlNet supervisory network, you cannot add a Fault Tolerant Ethernet supervisory network to the Server for simultaneous communication with different controllers. Of course, you can replace the ControlNet network with a FTE network, if desired.

Since Fault Tolerant Ethernet technology provides a highly available networking scheme using commercial network interface cards (NIC) and Ethernet switches, the preferred supervisory network type is Fault Tolerant Ethernet.

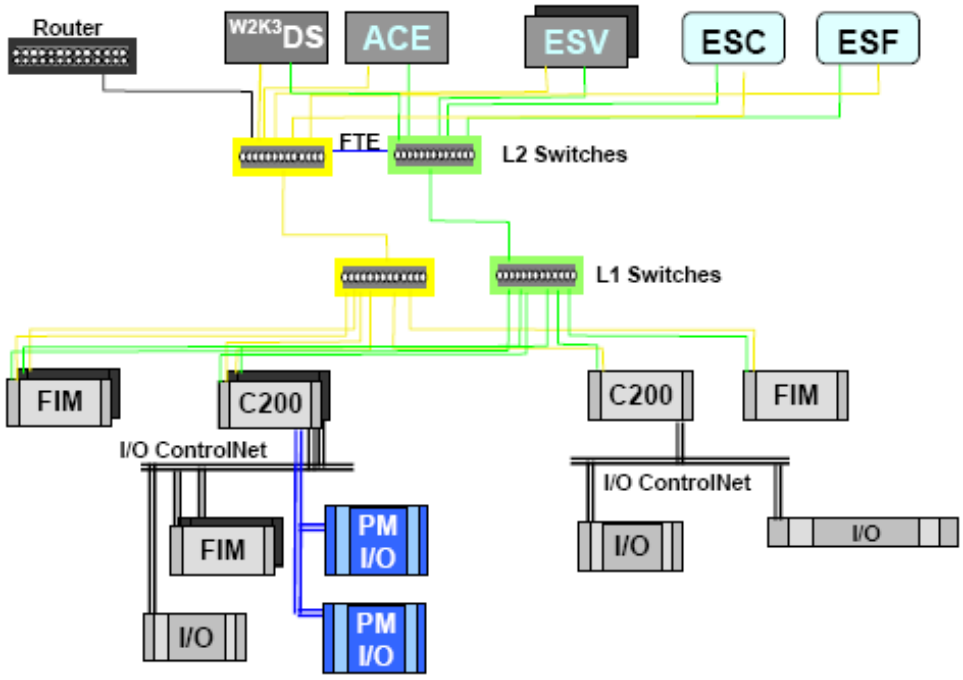
For more information about Honeywell's Fault Tolerant Ethernet, refer to the *Fault Tolerant Ethernet Overview and Implementation Guide*.

2.1.1 Functional Overview and Guidelines

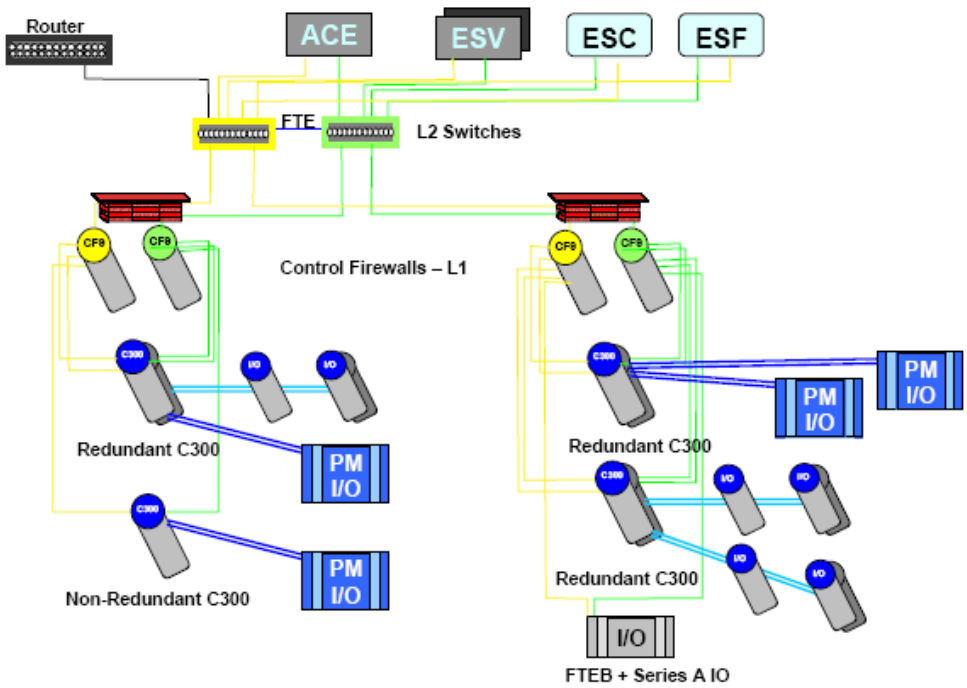
The following figure shows a basic Experion system topology with C200 Controller using a Fault Tolerant Ethernet supervisory network. The Experion system still provides the same configuration, control, and monitor functions as it does with a ControlNet supervisory network. However, the following guidelines are unique to Fault Tolerant Ethernet supervisory networks.

- Each FTE Bridge module must be assigned a unique **Device Index**.
- The same Experion Server cannot support simultaneous ControlNet or Ethernet and Fault Tolerant Ethernet communications to different C200 Process Controllers (also known as C200 Controllers).

- Must use a downlink ControlNet interface module to support remote I/O over a ControlNet segment.
- The Fault Tolerant Ethernet Bridge module provides 10 megabits per second (Mbps) Ethernet connectivity. All Ethernet switches must be 10/100 Mbps with a minimum 1 gigabits per second fast backplane to minimize latency.



Beginning with Experion R300, the C300 Controller will reside on the same FTE network as the FTE Bridge module and support C300 to C200 peer-to-peer communications. The C300 can communicate directly with Series A - Chassis I/O through a FTE Bridge module mounted in the I/O chassis, as shown in the following figure. A C300 can also communicate with ControlNet resident devices, like Programmable Logic Controllers (PLC), and so on, through a FTE Bridge module mounted in a chassis with a ControlNet Interface module (CNI) or Ethernet module.



2.2 Getting Started

Before getting started, you must perform the following:

- Install Experion software
- Install FTE supervisory network
- Determine wiring requirements
- Enure to have a knowledge of all the assumptions

2.2.1 Installing Experion Software

Refer to the *Software Installation and Upgrade Guide* for details about installing the Experion software. The Fault Tolerant Ethernet Bridge is compatible with Experion software release R200 or greater.

2.2.2 Installing FTE supervisory network

Refer to:

- *Fault Tolerant Ethernet Installation and Service Guide* for details about installing Fault Tolerant Ethernet as the supervisory network.
- *Fault Tolerant Ethernet Overview and Implementation Guide* for general information about implementing a FTE network.

2.2.3 Determining wiring requirements

You will need category 5 shielded twisted pair cable with 100 ohm impedance and electrical characteristics supporting transmission rates of up to 100 Mbps to connect the Fault Tolerant Ethernet Bridge and NIC to switch ports. The cable must be compliant with the TIA/EIA-568A wiring standard as well as the 100BaseTX IEE-802.3u specification. Ensure the cable is appropriate for your planned routing method and meets both national and local electrical and fire codes.

Refer to the *Fault Tolerant Ethernet (FTE) Specification and Technical Data EP03-500-200* for details about FTE cable usage and available Honeywell pre-configured cables.

If you have access to the internet, you can visit the Belden Wire and Cable Company web site at http://www.belden.com/ for helpful technical data on a wide variety of wire and cable types.

2.2.4 Assumptions

The current software release is running on your Experion Server and all applicable FTE nodes. This includes the FTE driver and the BOOTP Server service.

The reader must have knowledge about Ethernet and the Transmission Control Protocol/Internet Protocol (TCP/IP).

For more information about TCP/IP and internet working, refer to:

- Internet working with TCP/IP - Vol. 1, 2nd ed., by Douglas E Comer (ISBN 0-13-216987-8)
- The Ethernet Management Guide - Keeping The Link (ISB 0-07-046320-4)
- An Introduction to TCP/IP (ISBN 3-540-96651-X)
- Computer Networks by Andrew S. Tanenbaum (ISBN 0-13-162959-X)

2.3 Conventions

The following table summarizes the terms and type representation conventions used in this Guide.

Term/Type Representation	Meaning	Example
click	Click left mouse button once. (Assumes cursor is positioned on object or selection.)	Click the Browse button.
double-click	Click left mouse button twice in quick succession. (Assumes cursor is positioned on object or selection.)	Double click the Station icon.
drag	Press and hold the left mouse button while dragging cursor to new screen location and then release the button. (Assumes cursor is positioned on object or selection to be moved.)	Drag the PID function block onto the Control Drawing.
right-click	Click right mouse button once. (Assumes cursor is positioned on object or selection.)	Right-click the AND function block.
<F1>	Keys to be pressed are shown in angle brackets.	Press <F1> to view the online Help.
<Ctrl>+<C>	Keys to be pressed together are shown with a plus sign.	Press <Ctrl>+<C> to close the window.
File->New	Shows menu selection as menu name followed by menu selection.	Click File->New to start new drawing.
>D:\setup.exe<	Data to be keyed in at prompt or in an entry field.	Key in this path location >D:\setup.exe<.

CHAPTER

3

INSTALLATION

3.1 About FTE Bridge Module

> **ATTENTION**
>
> Ensure you review the pre-installation considerations and approval body notifications included in the *Control Hardware Installation Guide* before you install any Experion system component.

Electrostatic discharge can damage integrated circuits or semiconductors if you touch backpanel connector pins. Follow these guidelines when you handle a module:

- Touch a grounded object to discharge static potential
- Wear an approved wrist-strap grounding device
- Do not touch the backpanel connector or connector pins
- Do not touch circuit components inside the module
- If available, use a static safe workstation
- When not in use, keep the module in its static shield box or bag

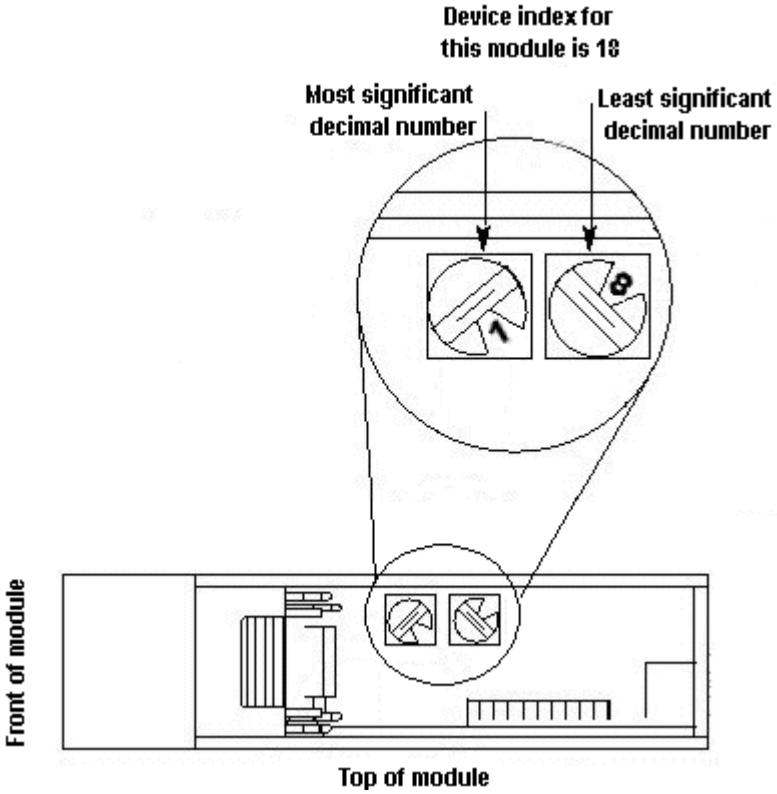
3.1.1 Setting unique Device Index

To set a unique Device Index for the Fault Tolerant Ethernet Bridge module before it is installed

1. If applicable, remove the FTE Bridge module from its shipping container.
2. Locate the pair of binary-coded decimal rotary switches on the top of the module.

> **ATTENTION**
>
> If the FTE Bridge module is being installed in a redundant chassis pair (RCP), ensure to set the Device Index for the FTE Bridge module to be installed in the Primary chassis to be an odd number. Then, set the Device Index for the FTE Bridge module to be installed in the Secondary chassis to be the next higher even number.
>
> For example, if you set the Device Index to 17 for the Primary FTE Bridge module, you would set the Device Index for the Secondary FTE Bridge module to 18.

3. Viewing the top of the switches, use your fingers to set the left-hand switch to the desired most significant decimal number and the right-hand switch to the desired least significant decimal number. The applicable setting range is 01 to 99. For example, to set a Device Index equal to "18"; set the left switch to "1" and right one to "8".



4. If applicable, repeat this procedure to set the Device Index for the Secondary FTE Bridge module for a redundant chassis pair configuration.

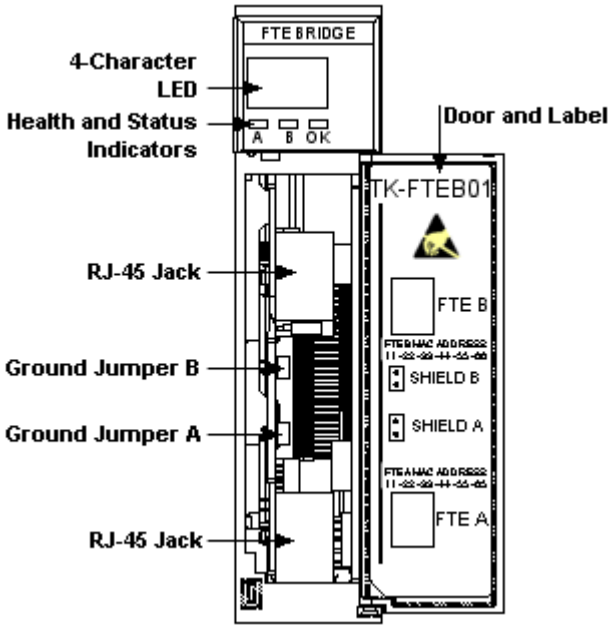
3.1.2 Checking cable shield ground jumper

Prerequisites

- The shield for the shielded twisted pair cable must be connected to ground at only one end. Ensure the cable shield ground jumper on the FTE Bridge module is positioned correctly to either ground the pair of cables to the chassis or isolate them from the chassis.
- Ensure the chassis is grounded as outlined in the *Control Hardware Installation Guide*.

To check or set the ground jumper for the port A cable (yellow) and port B cable (green)

1. Open the front door on the FTE Bridge module.
2. Locate the hardware jumpers designated as **SHIELD A** and **SHIELD B**.



3. To ground the shield on the **FTE A** link cable end connected to the FTE Bridge module to the chassis, install the jumper across the pins for **SHIELD A**.
4. To let the shield on the **FTE A** link cable end connected to the FTE Bridge module "float" (or not be connected to any source of electrical potential), remove the jumper from across the pins for **SHIELD A**.

> **TIP**
> To remove the jumper and keep it handy for future use, just put it on one jumper pin.

5. To ground the shield on the **FTE B** link cable end connected to the FTE Bridge module to the chassis, install the jumper across the pins for **SHIELD B**.
6. To let the shield on the **FTE B** link cable end connected to the FTE Bridge module "float" (or not be connected to any source of electrical potential), remove the jumper from across the pins for **SHIELD B**.
7. If applicable, repeat this procedure for the other FTE Bridge module in a redundant chassis pair (RCP).

3.1.3 About MAC addresses

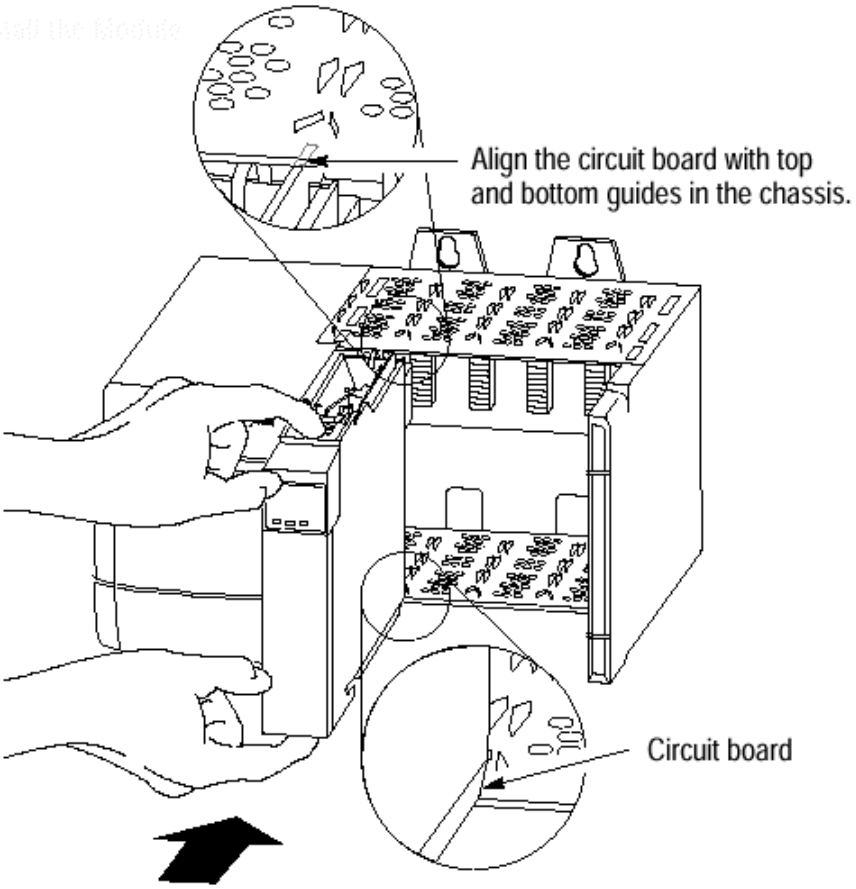
Every FTE Bridge module comes with factory assigned media access control (MAC) addresses for both FTE links. The FTE B link MAC address equals the FTE A link MAC address plus one. The assigned MAC addresses are recorded on a label on the door of the FTE Bridge module.

3.1.4 Installing FTE Bridge module (TC-FTEB01/TK-FTEB01)

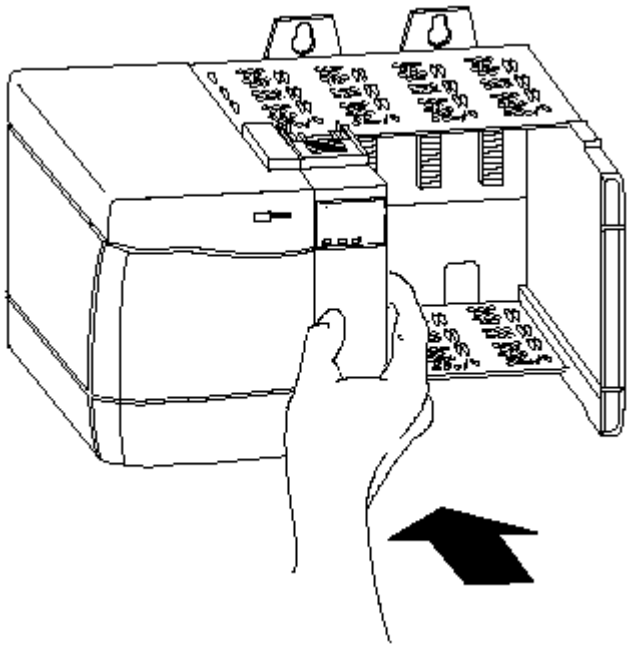
> **ATTENTION**
>
> The following procedure assumes that the chassis has been installed and grounded as outlined in the Control Hardware Installation Guide, and power is not applied.

To insert the FTE Bridge module into the chassis

1. Align the module's circuit board with the top and bottom chassis guides for the planned slot location. Typically, slot 0 is reserved for the communication module. (Remember that slot numbering is zero-based and the left most slot is number "0".)



2. Slide the module into the chassis, until the module's locking tabs "click" into position. The module is fully installed when it is flush with the power supply or other installed modules.

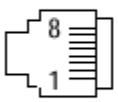


3. Repeat Steps 1 and 2 to install other modules, as required.
4. Go to the next Section Attaching FTE cables.

3.1.5 Attaching FTE cables

> **ATTENTION**
>
> Unless the location is known to be non-hazardous, do not:
>
> - Connect or disconnect cables
> - Install or remove modules while the Control system is powered.

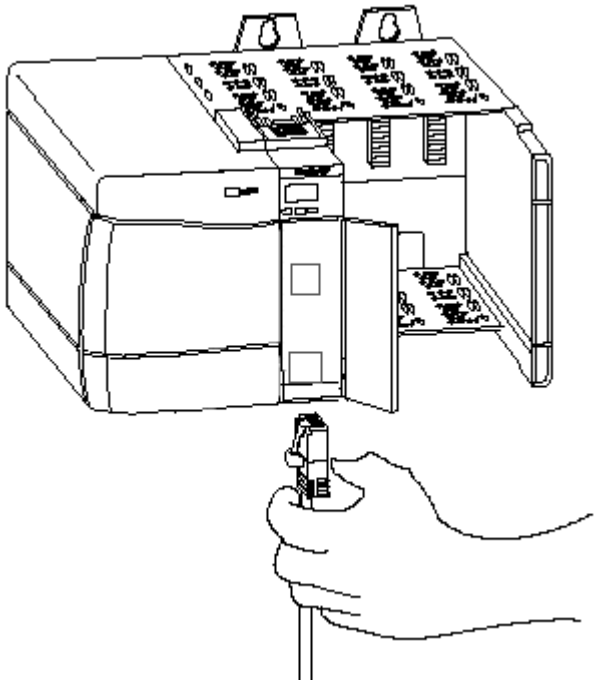
The FTE Bridge module includes two RJ-45 modular jacks located behind its front door. They provide redundant Ethernet media connections for FTE ports A and B. The dust boots on the cables are color coded yellow for port A and green for port B. The following figure shows the pin out for the 8-pin RJ-45 connector.



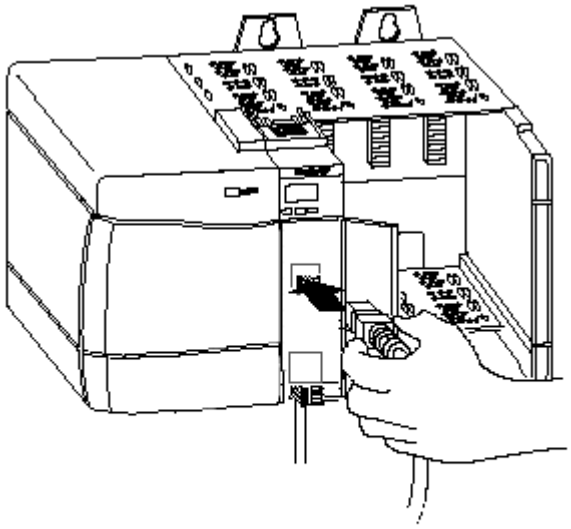
Pin Number	Description
1	TD+ (Transmit positive polarity of twisted pair output)
2	TD– (Transmit negative polarity of twisted pair output)
3	RD+ (Receive positive polarity of twisted pair input)
4	NC (No Connection)
5	NC (No Connection)
6	RD– (Receive negative polarity of twisted pair input)
7	NC (No Connection)
8	NC (No Connection)
Exterior Shield	(Cable/connector chassis ground shield)

To connect the FTE port A and port B cables to the FTE Bridge module

1. Open the module's door and plug the **FTE A** Link cable RJ-45 plug with yellow dust boot into the bottom port A jack, so it locks into place.



2. Plug the **FTE B** Link cable RJ-45 plug with green dust boot into the top port B jack, so it locks into place.



3. Dress cables so they exit the bottom of the module and close the front door.
4. Connect the other end of the cable to the Ethernet switch port. Ensure to make all Supervisory FTE network connections.

CHAPTER

4

CONFIGURATION

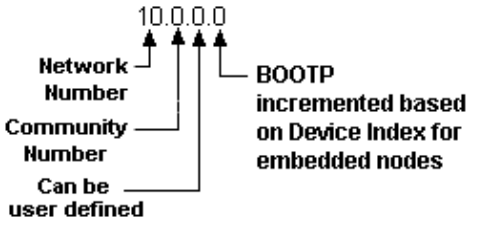
4.1 Things to consider before configuring FTE bridge

This section provides the following considerations for configuring FTE bridge.

- Address configuration considerations
- Other configuration considerations
- I/O memory usage considerations

4.1.1 Address configuration considerations

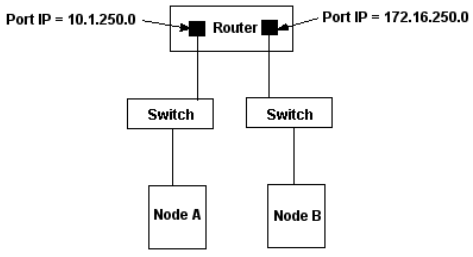
The following table provides an overview of things you must consider for the listed IP address assignment.

Address Assignment	Default	Considerations
Base IP Address	10.0.0.0	 • The first number in the address represents the **network number** • Refer to the *Fault Tolerant Ethernet Overview and Implementation Guide* for more information about IP addressing.

Address Assignment	Default	Considerations

		• The second number in the address represents the **community number**.
		• The third number can be user defined.
		• The last number represents the embedded node's **Device Index**.
		  • The default value for the last number must be 0.
		  • The BOOTP server dynamically assigns the FTE Bridge modules IP address by incrementing the last two numbers to equal the unique Device Index setting for the module. For example, if the configured base IP address is 10.100.0.0 and the FTE Bridge module's Device Index is 89, the BOOTP server dynamically assigns 10.100.0.89 as the FTE Bridge module's IP address. If the configured base IP address is 172.20.0.0 and the FTE Bridge Module's Device Index is 1, the BOOTP server dynamically assigns 172.20.0.1 as the FTE Bridge module's IP address. See *Setting unique Device Index* in this document for details.

Subnet Mask	255.255.0.0	The Subnet Mask maps FTE communities into Ethernet subnets. Refer to the *Fault Tolerant Ethernet Overview and Implementation Guide* for more information about IP addressing. Routers use subnets to filter messages, the router ignores messages within a port's subnet, and messages to other subnets are forwarded to the appropriate port. The subnet mask configured within a Control Builder **System Preferences** dialog applies only to the embedded nodes (FTE Bridge modules) communicating with that Server's BOOTP service. The subnet mask can be used within an FTE community to enhance the security of embedded

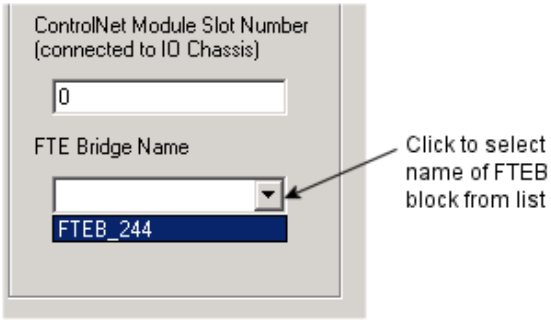
Address Assignment	Default	Considerations
		nodes. There are a number of websites that provide more information about subnet masks and how to make subnet calculations. For example, the subnetonline.com site *http://www.subnetonline.com/index.html* provides access to online calculators.
Default Gateway	0.0.0.0	Use a default gateway to facilitate communications between nodes residing on different networks with different network numbers. **Do not change the default value (0.0.0.0) unless instructed to do so by network services**. Refer to the *Fault Tolerant Ethernet Overview and Implementation Guide* for more information about IP addressing. The default gateway must be set to the IP address of the router that connects the two networks. Given the example shown below, "Node A" and "Node B" could not communicate with each other without the default gateway defined. The default gateway for "Node A" would be the IP address of the port it connects to at its router - 10.1.250.0; the default gateway for "Node B" would be 172.16.250.0, which is the IP address for its router port. 

4.1.2 Other configuration considerations

The following table summarizes other things you must consider before configuring the FTE Bridge module.

What you must consider	And, why
Do **not** include other	Avoid conflicts in address assignments.

What you must consider	And, why
BOOTP servers on network other than Honeywell BOOTP servers bundled with Experion software.	
Dynamic Host Configuration Protocol (DHCP) server	If DHCP server is present, ensure it is configured **not** to respond to BOOTP request to avoid incorrect address range assignments.
Non-Embedded Node IP Address Assignment	Only embedded FTE nodes (FTE Bridge module) receive IP addresses from the BOOTP server based upon the **Base IP Address** and their **Device Index**. Refer to the *Fault Tolerant Ethernet Overview and Implementation Guide* for more information about IP addressing.
Multiple Clusters within One FTE Community	You can have multiple Server clusters within one FTE Community and configure up to 200 nodes, including 99 physical FTE Bridge modules within one community.
BOOTP Support	The Honeywell enhanced BOOTP protocol provides automatic, consistent IP Address assignment for FTE Bridge modules based upon the **Base IP Address** and their **Device Index**. It allows address assignment to both FTE links. It also provides a way to identify FTE modules by type and several other enhancements. The FTE Bridge module implements all features of Honeywell enhanced BOOTP protocol, but it does not expose the MAC addresses to the user.
Duplicate Address Detection	The FTE Bridge module is designed to gracefully join the FTE network during module startup. It first determines if any other module uses the same IP address; and, in case of address conflict, it does not join a network but instead transitions to "no address" state waiting for a new address assignment.
FTE Bridge module as RSLinx-Like Driver	The FTE Bridge module acts like an RSLinx-like driver for Control Data Access and Control Builder. The driver name is FTEB module tag. Once you add the FTE Bridge Module block to Control Builder, it is added to the internal list of drivers.
Control Processor Module (CPM), Fieldbus Interface Module (FIM), and I/O Link Module (IOLIM)	Once you configure the FTE Bridge module block in Control Builder, you can configure CPM, FIM, and IOLIM on the FTE by selecting FTEB as the RSLinx-like driver.

What you must consider	And, why
Configuration on FTE.	
Series A I/O Module Configuration on FTE with C200	There is no change in I/O module configuration for FTE supervisory network, since the way the CPM accesses I/O data is unchanged.
Series A I/O Module Configuration on FTE with C300	When you assign a Series A - Chassis I/O module to a C300 block in Control Builder, you must configure the name of the FTE Bridge block that represents the FTEB mounted in the Series A I/O chassis to identify the communications path to the IOM on its configuration form. The following illustration shows an excerpt of the FTE Bridge Name field that appears on the IOM's configuration form when the IOM is assigned to a C300 block. 

For details of the FTEB Reference parameter, see its description in the Control Builder Parameter Reference at *FTEBBLOCK*.

4.1.3 I/O memory usage considerations

When the C200 Controller or the FTE Bridge module with C300 Controller makes a connection with a Chassis Series A, or Series A or H rail I/O Module (IOM), the module allocates I/O buffer memory to support the I/O connection data exchange. The C200 Controller and the FTE Bridge module each have total I/O buffer limits and each IOM has I/O buffer size requirements. The sum of all IOM buffers required/configured must be less than the C200 Controller or FTE Bridge module total available. It is unlikely that you will encounter this limitation unless you are using a Serial Interface Module (SIM), Profibus, or DeviceNet interface with your system as well.

Available I/O memory and the required memory per module

The following table lists the available I/O memory and the required memory per module type for reference.

Available I/O Buffer Memory Capacity		
Controller or I/O Gateway Module	I/O Memory Available	Controller or I/O Gateway Module

Available I/O Buffer Memory Capacity		
1 C200 CPM	18564 bytes	1 C200 CPM
1 FTEB Module (when used with C300)	8096 bytes	1 FTEB Module (when used with C300)

I/O Buffer Memory Table		
Chassis Series A I/O Modules [1]	**Rockwell I/O Modules**	**I/O Memory Required per Module (bytes)**
TC_IAH061	1756-IF6I	152
TC_IAH161	1756-IF16	200
TC_IDA161	1756-IA16	132
TC_IDD321	1756-IB32/B	132
TC_IDJ161	1756-IB16I	132
TC_IDK161	1756-IA16I	132
TC_IDW161	1756-IM16I	132
TC_IDX081	1756-IA8D	144
TC_IDX161	1756-IB16D	144
TC_IXL061	1756-IT6I	152
TC_IXL062	1756-IT6I2	152
TC_IXR061	1756-IR6I	152
TC_OAH061	1756-OF6CI	180
TC_OAV061	1756-OF6VI	180
TC_OAV081	1756-OF8	196
TC_ODA161	1756-OB16I	136
TC_ODD321	1756-OB32	136
TC_ODJ161	1756-OB16I	136
TC_ODK161	1756-OA16I	136
TC_ODX081	1756-OA8D	152
TC_ODX161	1756-OB16D	152

I/O Buffer Memory Table		
TC_ORC081	1756-OX8I	136
TC_ORC161	1756-OW16I	136
Serial Interface Module		732 + (1 to 7 additional connections) * 732
DeviceNet - DNET_IM		364 + output data size + input data size
Profibus - PBIM_SST		600 + output data size + input data size
Series A Rail I/O Modules [1]		**I/O Memory Required per Module (bytes)**
TC_FIAH81	1794-IE8	136
TC_FID161	1794-IB16	132
TC_FIDA81	1794-IA8	132
TC_FIL081	1794-IT8	140
TC_FIR081	1794-IR8	140
TC_FOA041	1794-OE4	140
TC_FOD161	1794-OB16P	128
TC_FODA81	1794-OA8	128
TC_FOR081	1794-OW8	128
Series H Rail I/O Modules [1]		**I/O Memory Required per Module (bytes)**
TC_PIA082		140
TC_PIB161		120
TC_PIL081		136
TC_POA081		160
TC_POB041		132

[1] The C300 with FTE Bridge module only supports the following chassis-based Modules:

- Serial Interface Module

I/O Buffer Memory Table

- DeviceNet - DNET_IM
- Profibus - PBIM_SST
- Pulse Input

4.2 Configuring FTE Bridge

ATTENTION

The procedures in this section assume that you:

- Have installed the Experion release R300 software and have the Control Builder application running. If you have not installed the Experion software, refer to the *Software Installation and Upgrade Guide* for details. If you have not launched Control Builder, refer to the *Control Building Guide* for details.
- Have installed and configured your Fault Tolerant Ethernet network. If you have not installed the FTE network, refer to the *Fault Tolerant Ethernet Overview and Implementation Guide*, and setup your FTE supervisory network before continuing with this procedure.
- Are making initial IP address settings before any FTE Bridge module has been configured or powered up.
- Are configuring the components on a Server connected to the FTE supervisory network. If you are configuring the components offline on a Station or computer that is connected to another network, be careful when entering the IP addresses.

4.2.1 Setting up addresses

The procedure to check the base IP address, subnet mask, and default gateway settings is found in the System Preferences section of the *Control Building User's Guide*.

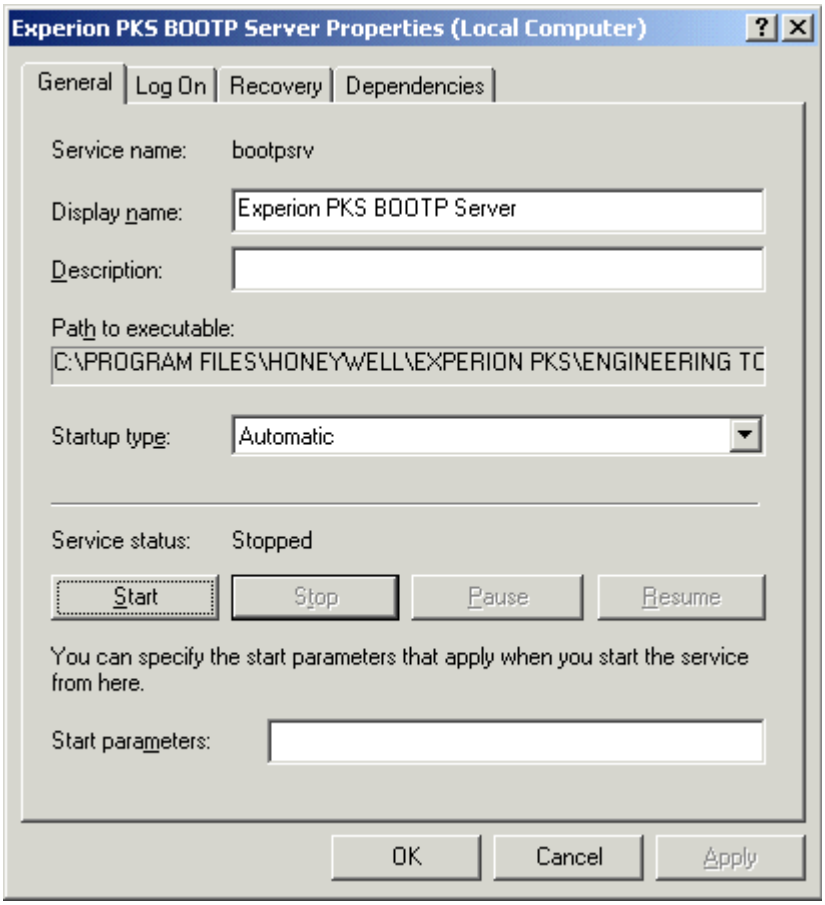
4.2.2 Checking status of BOOTP server service

TIP

If BP is being displayed on the module's front-panel display and the BOOTP Server service is already running, try stopping and re-starting the service to re-establish the correction after FTE is configured correctly.

To confirm that the BOOTP Server service is running

1. On the taskbar, click the **Start** button, and then click **Settings** > **Control Panel**.
   Opens the **Control Panel** window.
2. Double-click the **Administrative Tools** icon.
   Opens the **Administrative Tools** window.
3. Double-click the **Services** icon.
   Opens the **Services** window.
4. In the vertical scroll bar, use the scroll box to scroll items in the open window to find the **Experion BOOTP Server** service.
   Confirm that Started is listed in the Status column for the service.
5. If:
   - Started is listed, go to Step 9.
   - If Status column is blank, go to Step 6.
6. Double-click the Experion BOOTP Server icon.
   Opens the Experion BOOTP Server Properties dialog.



> **TIP**
> If the Start button is unavailable, the BOOTP Server service is started. If the Stop button is unavailable, the BOOTP Server service is stopped, You can use these buttons to stop and start the BOOTP service, as required.

7. Click the **Start** button.
   Initiates service start function and opens the **Service Control** dialog to track progress.
8. After the **Service Control** dialog closes, check that the **Service status** is Started and the **Start** button is unavailable.
   Confirm that service has started.
9. Click the **OK** button.
   Closes **Experion BOOTP Server Properties** dialog.
10. Click the Close button .
    Closes Services window.
11. Click the Close button .
    Closes **Administrative Tools** window.
12. This completes the procedure.
    Go to the next section.

4.2.3 Creating FTE bridge module block

> **ATTENTION**
>
> - You must create the FTE Bridge module function block before creating blocks for Control Processor Module (CPM), Fieldbus Interface Module (FIM), and I/O Link Interface Module (IOLIM), so you can specify the FTE Bridge block name as the **Driver Name** on the configuration forms for the latter blocks.
> - Also, you must create the FTE Bridge module function block in Control Builder before you can view it in the Network Tools **(NTools)** utility.

Use the following procedure to create a tagged function block to represent the installed FTE Bridge module. This procedure assumes that you have configured a valid base IP address through the Embedded FTE tab on the System Preferences dialog. See the previous *Setting up addresses* procedure. You cannot create a FTE Bridge module block with an invalid address (0.0.0.0).

To create FTE bridge module

1. In Control Builder, click the **File** menu, and then choose **New** > **Interface Modules** > **FTEB-FTE Bridge Module**.

   Opens **SYSTEM:FTEB Block, FTEB_XX- Parameters [Project]** configuration form. Where XX equals a system assigned unique number.

   > **TIP**
   >
   > The block name can be up to 16 characters long and must contain at least one letter (A-Z). It must not contain an embedded space or leading space, and dots are allowed in parameter naming only.

2. Type the desired block name in the **Name** box or accept the assigned name. The Unique name identifies the component within Control Builder views and Station displays. Press the TAB key.

   Moves cursor to **Associated Asset** box.

3. Click the  button to the right of the **Associated Asset** box.

   The **Point Selection** dialog box appears.

4. Select an asset from those configured in the Enterprise Model Database to set the Scope of Responsibility (SOR) for the point.

   > **ATTENTION**
   >
   > No validation is done at the configuration time. If you enter an asset that does not exist in the points database, the associated asset for the point reverts to the server point. If the asset does exist but is not an area-enabled asset, then the first area-enabled asset up the tree is used for the SOR of that device. A subsequent upload of that device point to Control Builder returns the area-enabled asset and not the original non-assignable asset entered.

   Moves cursor to **Device Index** box.

5. Type the Device Index number that matches the one set on BCD rotary switches of the FTE Bridge module that this block represents. Press the TAB key.

   Moves cursor to **Module Slot Number** box.

6. Click the arrow and select the number of the chassis slot where the physical FTE Bridge module is installed. Press the TAB key. (Remember that chassis slot numbering is zero based, so the first slot on the left is number "0".)

   Moves cursor to **This module is redundant** check box.

> **TIP**
>
> After you select the **Module Slot Number**, the **IP Address** is updated to match the **IP address** previously configured through the **System Preferences** dialog plus the **Device Index** number you just entered in Step 3. For example, if the **IP Address** is 10.10.0.0 and you configured a **Device Index** of 85, the assigned **IP Address** would be 10.10.0.85.

7. Perform any of the following:
   - If the FTE Bridge module is installed in a non-redundant C200 Controller or Fieldbus Interface Module (FIM) chassis, leave the **This module is redundant** check box blank.

     Opens **Server History** tab. Go to Step 8.

   - If the FTE Bridge module is one of a pair of modules installed in a redundant C200 Controller or FIM chassis, click the **This module is redundant** check box to select it. Press the TAB key

     Moves cursor to **Secondary Name** box. Go to Step 6.

8. Type the desired secondary block name in the **Secondary Name** box or accept the default, which is the name entered in Step 2 with a suffix of "SEC". Click the **Server History** tab.

   Opens the **Server History** tab.

9. Use the online help to fill in the applicable data on the **Server History** tab. Click the **Server Displays** tab.

   Opens the **Server Displays** tab.

> **ATTENTION**
>
> If you are using a distributed Server architecture and/or Areas is enabled in Station, you must enter an assigned area name in the **Control Area** box.

10. Use the online help to fill in the applicable data on the **Server Displays** tab. Click the **Control Confirmation** tab.

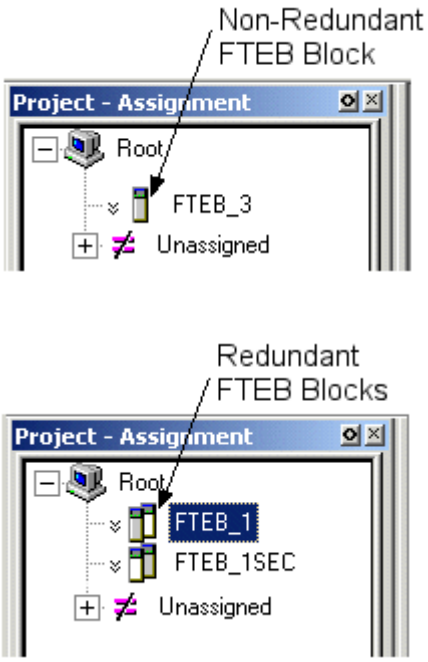
    Opens the **Control Confirmation** tab.

11. Use the online help to fill in the applicable data on the **Control Confirmation** tab. You must have a license for the Electronic Signature option to use this tab. Click the **Identification** tab.

    Opens the **Identification** tab.

12. Use the online help to fill in the applicable data on the **Identification** tab. Click the **OK** button.

    Closes the **SYSTEM:FTEB Block, FTEB_XX- Parameters [Project]** configuration form and creates FTE Bridge block icon in Project tab.



> **TIP**
>
> You can only view FTE Bridge Blocks in **Project** tab set for the **Assignment view**. The **Assignment view** shows the relationship among all blocks while the **Containment view** only shows templates that contain other templates or Control Modules (CM), Sequential Control Modules, (SCM) and basic blocks. To toggle the view, right-click in an open area of the tab window and select **Assignment View** or **Containment View** from the shortcut menu, as applicable.

13. Is this a redundant FTE Bridge module configuration?
    - If the answer is **Yes**, go to the next Step.
    - If the answer is **No**, go to Step 18.
14. In the **Project** tab, double-click the Secondary FTE Bridge block icon.

    Opens the **SYSTEM:FTEB Block, FTEB_XXSEC- Parameters [Project]** configuration form.

> **TIP**
>
> The configuration information on the **Main** tab for the secondary FTE Bridge block reflects the data entered on the **Main** tab for the primary FTE Bridge block. Check that the **IP address** is the same except for the device index component that is incremented by 1, and the module slot location is the same. This information is view only. You can change the name of the block, if desired.

15. Type the desired block name in the **Name** box or accept the assigned name. The Unique name identifies the component within Control Builder views and Station displays. Click the **Server History** tab.

    Opens the **Server History** tab.

16. Use the online help to fill in the applicable data on the **Server History** tab. Click the **Server Displays** tab.

    Opens the **Server Displays** tab.

> ATTENTION
>
> If you are using a distributed Server architecture and/or Areas is enabled in Station, you must enter an assigned area name in the **Control Area** box.

17. Use the online help to fill in the applicable data on the **Server Displays** tab. Click the **Control Confirmation** tab.

    Opens the **Control Confirmation** tab.

18. Use the online help to fill in the applicable data on the **Control Confirmation** tab. You must have a license for the Electronic Signature option to use this tab. Click the **Identification** tab.

    Opens the **Identification** tab.

19. Use the online help to fill in the applicable data on the **Identification** tab. Click the **OK** button.

    Closes the **SYSTEM:FTEB Block, FTEB_XXSEC- Parameters [Project]** configuration form.

20. This completes the configuration procedure.

    You can now load the FTE Bridge Block to the FTE Bridge module.

4.2.4 Loading FTE bridge block

With the FTE network installed, you load the FTE Bridge block through Control Builder as you would any other block. Use the following procedure as a guide.

> TIP
>
> - The FTE Bridge module must be installed and powered before you can load data to it. See the Operation section for details on Applying power to FTE Bridge Module.
> - If you have a **Qualification and Version Control System (QVCS)** license, you can use the relaxed loading function to load a block without checking it in to QVCS. Once you check a block into QVCS, it is subject to the QVCS load requirements.

To load FTE bridge block

1. In the **Project** tab, click the FTE Bridge block icon.

   Selects the block you want to load.

2. In the **Controller** menu, click **Load**.

   Opens **Load Dialog**.

> **TIP**
>
> You can right-click the FTE Bridge block icon and select Load from the shortcut menu or just click the Load  button in the toolbar with the block selected, as alternate methods to open the **Load Dialog**.

3. Ensure the **Load** check box is selected. Click the **OK** button.

   Initiates the load operation and opens the **Load** dialog to show the progress of the load as well as display any load detected errors.

4. When load completes, click the **Monitoring** tab.

   Opens **Monitoring** tab.

5. Confirm that FTE Bridge block icon now appears. See the following table *Viewing FTE Bridge icon in Monitoring tab* to determine the status of the module from the color coded icon.

   Confirm block is loaded and status of associated module.

6. Repeat this procedure to load another FTE Bridge block, if required.

   Load all FTE Bridge blocks including secondary FTE Bridge block for redundant pair.

7. This completes the procedure.

   Go to the next section.

   See the *Control Building Guide* for more information about loading control strategy components.

Viewing FTE Bridge icon in Monitoring tab

If Icon for Non-Redundant FTE Bridge block Is . . .	Then, Module Status Is . . .
Green 	Control Data Access (CDA) server can communicate with the module.
Red ! 	CDA server cannot communicate with the module.

If Icon for Redundant Primary FTE Bridge Block Is . . .	Then, Module Status Is . . .
Green and Secondary is White 	Module pairs are synchronized and CDA server can communicate with the primary module.
Green and Secondary is Yellow 	Module pairs are not synchronized but secondary partner is visible and synchronization is in progress. CDA server can communicate with primary module.
Green and Secondary is transparent 	Module pairs are not synchronized and secondary partner is not visible. CDA server can communicate with primary module.
Red and Secondary is White 	CDA server cannot communicate with the primary module.

If Icon for Redundant Secondary FTE Bridge Block Is . . .	Then, Module Status Is . . .
Green and Primary is White 	Module pairs are synchronized and CDA server can communicate with the secondary module.
Green and Primary is Yellow 	Module pairs are not synchronized but primary partner is visible and synchronization is in progress. CDA server can communicate with secondary module.
Green and Primary is Transparent 	Module pairs are not synchronized and primary partner is not visible. CDA server can communicate with secondary module.
Red and Primary is White 	CDA server cannot communicate with the secondary module.

CHAPTER

5

OPERATION

5.1 Starting and Monitoring FTE Bridge Module

5.1.1 Applying power to FTE Bridge Module

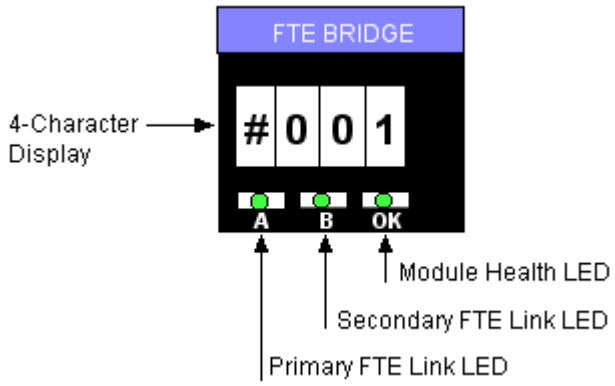
The chassis-mounted FTE Bridge Module receives its power from the chassis power supply. You cycle power to the module by turning the power supply switch On and Off. The following table lists some common power application scenarios that you must consider before powering up the FTE Bridge Module for the first time.

If you are applying power	Then, Consider this
For the first time.	The FTE Bridge module requests an IP address from the BOOTP Server. The BOOTP Server responds with an IP address that is based upon the **base IP address** configured in Control Builder and the **Device Index** setting for the FTE Bridge module. See *Setting up addresses* and *Setting unique Device Index* for details. This is considered a cold start.
Subsequent to the initial power up as part of normal chassis power cycling.	The FTE Bridge module does not request an IP address from the BOOTP Server. This is considered a **warm** start.
After changing the **Device Index** on the FTE Bridge module or	You must make corresponding configuration changes for the FTE Bridge block in Control Builder. See *Creating FTE Bridge module block* for more details.

If you are applying power	Then, Consider this
moving the FTE Bridge module to a different slot in the chassis.	This is like applying power for the first time or a **cold** start. See the first row above.

5.1.2 Monitoring front-panel display

The FTE Bridge module front panel includes a 4-character, alpha-numeric display to show the status of the module. During normal operation, the display alternates between showing its Device Index and current state. The following table lists possible state indications and gives a brief explanation of their meaning.



Possible Display Indications

If Display Indication Is . . .	Then, It Means . . .
OK	The FTE Bridge module is running application code and is functioning properly.
FAIL	Application has crashed. Alternates with crash code display.
ALIV	Executing boot code, no application image is loaded. See *Loading Personality image*.
RDY	Module is ready for firmware download. See *Loading Boot code*.
BP	Requesting IP address through BOOTP Server.
BOOT	Boot is in progress and self-test is being run.
WDTd	Watchdog timer diagnostics.
TXXX	Performing startup test number XXX (see *FTEB test codes*).

If Display Indication Is . . .	Then, It Means . . .
PASS	Passed all startup tests.
BKUP	Module is functioning as secondary in redundant pair.
#0XX	XX is the Device Index number setting for the module.

5.1.3 Monitoring front-panel LEDs

Possible LED Indications

The FTE Bridge module front panel includes three red/green Light Emitting Diodes (LED). The A and B LEDs monitor port A and port B FTE link integrity and the OK LED monitors general module health. The following table summarizes possible LED indications.

If OK LED Is . . .	Then, It Means . . .
Off	No power, watchdog timer expiration, or LED has failed.
Red (Solid)	Fatal module failure.
Red (Blinking)	Non-fatal module failure. Also used to indicate firmware update in progress.
Green (Blinking)	Module is Okay - there are no active connections open to the module. If module is part of a redundant pair, the modules are not synchronized.
Green (Solid)	Module is Okay - one or more active connections are open to the module. If module is part of a redundant pair, the modules are synchronized.
If A or B LED Is . . .	**Then, It Means . . .**
Red (Solid)	Link integrity check failed - no Ethernet signal detected or cable is not present.
Off	Link integrity is OK - no transmit activity.
Green (Blinking)	Link integrity is OK - there is transmit activity. Typically, the A or B LED blinks green/off to indicate reception of incoming Ethernet frames over the given FTE link.

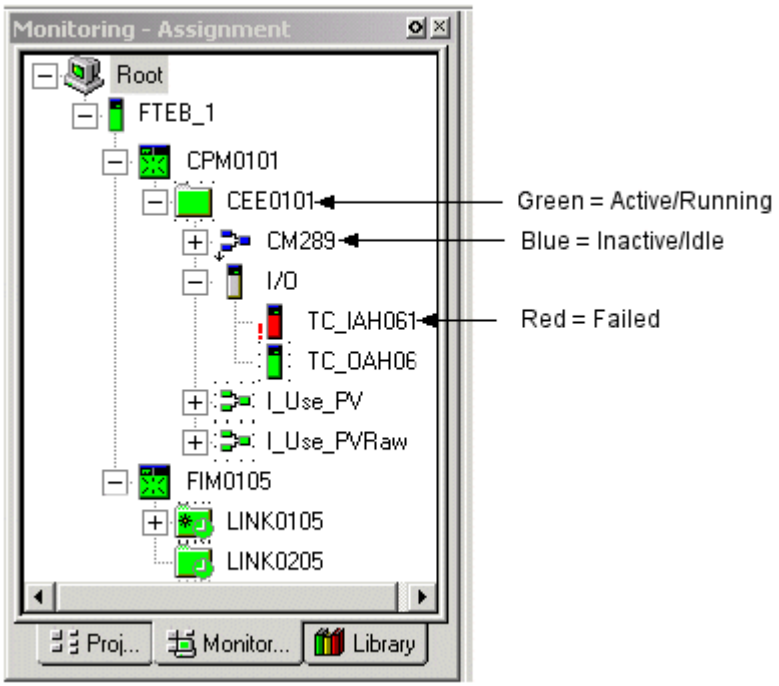
TIP

The A and B Green LEDs blink faster for high Ethernet traffic conditions and may stay on solid in extreme traffic conditions.

5.2 Using Control Builder Interface

5.2.1 About Monitoring mode

Once a control strategy is loaded to a controller assigned to a FTE Bridge module, you can interact with online data through the **Monitoring** tab in Control Builder. You simply click the **Monitoring** tab to open it as shown below.



As shown in the figure above, Control Builder uses color-coding to visually represent the current status of a given component. The tasks you can perform in the Monitoring mode depend on the access level you used to sign-on to this session of Control Builder.

Refer to the *Control Building Guide* for more information about using Control Builder for online monitoring and other functions.

- Monitoring status through block configuration form
- Viewing Main tab
- Viewing UDP/TCP tab
- Viewing IP/ICMP
- Viewing FTE tab
- Viewing ICP Bridging tab
- Viewing ICP Statistics tab
- Viewing Version tab
- Viewing IOMGR Statistics tab
- Viewing Server History tab
- Viewing Server Displays tab
- Viewing Control Confirmation tab
- Viewing Identification tab

5.2.2 Monitoring status through block configuration form

The configuration form for the FTE Bridge block includes various tabs that provide access to parameters for configuration through the Project tab and for monitoring through the Monitoring tab. Use the following procedure to access the configuration form for a FTE Bridge block in the Monitoring tab. This procedure assumes that you have logged on to Control Builder and have loaded your control strategy to the controller.

To access the configuration form for a FTE Bridge block in the Monitoring tab

1. In Control Builder, click the **Monitoring** tab.
   Opens the Monitoring tab.

> **TIP**
> You can only view FTE Bridge Blocks in **Monitoring** tab set for the Assignment view. The Assignment view shows the relationship among all blocks while the Containment view only shows templates that contain other templates or Control Modules (CM), Sequential Control Modules, (SCM) and basic blocks. To toggle the view, right-click in an open area of the tab window and select **Assignment View** or **Containment View** from the shortcut menu, as applicable.

2. Double-click FTE Bridge block icon.
   Opens **System: FTEB Block, Name - Parameters [Monitoring]** configuration form. Where Name represents the name configured by the user or assigned by the system.
3. Click tab you want to open. The **Main** tab opens by default.
   Opens selected tab.
4. Repeat Step 3 to view other tabs, as desired.
   Select tab you want to view.
5. When finished viewing, click the **OK** button.
   Closes the **System: FTEB Block, Name - Parameters [Monitoring]** configuration form.
6. This completes the procedure.
   Go to the next section.
   Refer to the *Control Builder Parameter Reference* for more details on a given parameter.

5.2.3 Viewing Main tab

The following table summarizes the parameter data you can monitor on the Main tab of the configuration form for the selected FTE Bridge block. See Monitoring status through block configuration form for details on accessing the FTE Bridge block configuration form Main tab in the Monitoring tab.

Plain Text	Parameter Name	User Configurable	Notes
Name	NAME	Project Only	System assigned or user configured unique name. Consisting of up to 16 characters and at least one character must be a letter (A-Z).

Plain Text	Parameter Name	User Configurable	Notes
Image Version	IMAGEVER	No	Identifies current version of firmware installed in module.
Device Index	DEVICEIDX	Project Only - Matches Hardware Setting	Set on FTE Bridge module switches.
Module Slot Number	SLOTNUMBER	Project Only	Chassis slot number where FTE Bridge module is installed.
IP Address	IPADDRESS	No	Base IP Address plus configured Device Index.
This module is redundant	MODISREDUN	Project Only	Module is part of redundant pair.
Secondary Name	SECNAMESTRG	Project Only	System assigned or user configured unique name for secondary block.
Redundant Chassis ID	RDNCHASSISID	No	Identifies physical chassis in a redundant chassis pair without regard to chassis redundancy state.
Synchronization State	RDNSYNCSTATE	No	Shows current synchronization state of module.
Redundancy Compatibility	RDNCMPT	No	Indicates whether or not modules residing in same slot of a redundant chassis pair are compatible.
Redundancy Loss of Sync	RDNLOS	No	Provides enumeration for loss of synchronization.
CPU Free Average	CPUFREEAVG	No	Gives rolling time average of free CPU not currently used for processing by CPM. Units are percent.
CPU Free Min	CPUFREEMIN	No	Gives historic minimum of unused CPU available to CPM. Units are percent.
Reset Statistics	STATRESET	No	Click button to reset all statistical parameters for block.

5.2.4 Viewing UDP/TCP tab

The following table summarizes the parameter data you can monitor on the **UDP/TCP** tab of the configuration form for the selected FTE Bridge block. See *Monitoring status through block configuration form* for details on accessing the FTE Bridge block configuration form **UDP/TCP** tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
UDP Statistics (Provides unreliable connectionless packet delivery service between clients.)			
Datagrams Delivered	UDPINDGRAMS	No	Total number of User Datagram Protocol (UDP) datagrams delivered to destination protocol ports.
Datagrams for Unknown Ports	UDPNOPORTS	No	Total number of received UDP datagrams for which there was no application at the destination port.
Datagrams Dropped for errors	UDPINERRORS	No	Number of received UDP datagrams that could not be delivered.
Datagrams Sent to Applications	UDPOUTDGRAMS	No	Total number of UDP datagrams sent from this entity.
TCP Statistics (Provides reliable stream delivery service between clients.)			
Active Opens	TCPACTIVEOPEN	No	Number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.
Passive Opens	TCPPASSIVEOPENS	No	Number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.
Failed Connection Attempts	TCPATTEMPTFAILS	No	Number of times TCP connections have made a direct transition to CLOSED state from either SYN-SENT state or SYN-RCVD state, plus number of times TCP connections have made a direct transition to LISTEN state from SYN-RCVD state.

Plain Text	Parameter Name	User Configurable	Notes
Connections Resets	TCPESTABRESETS	No	Number of times TCP connections have made a direct transition to CLOSED state from either ESTABLISHED state or CLOSE-WAIT state.
Current Connections	TCPCURRESTAB	No	Number of TCP connections for which current state is either ESTABLISHED or CLOSE-WAIT.
Segments Received	TCPINSEGS	No	Total number of segments received, including those received in error.
Segments Sent	TCPOUTSEGS	No	Total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.
Segments Retransmitted	TCPRETRANSSEGS	No	Total number of segments retransmitted - that is, number of TCP segments transmitted containing one or more previously transmitted octets.
Segments Discarded For Errors	TCPINERRS	No	Total number of segments received in error (for example; bad TCP checksums).
Reset Segments Sent	TCPOUTRESETS	No	Number of TCP segments sent containing the RST flag.
Local UDP Listeners	UDPLISTENERS	No	Shows path information for all open ports on the FTE Bridge module.
Current TCP Connections	TCPCONNTABLE	No	Shows path information for all currently connected clients of the FTE Bridge module.

5.2.5 Viewing IP/ICMP

The following table summarizes the parameter data you can monitor on the **IP/ICMP** tab of the configuration form for the selected FTE Bridge block. See *Monitoring status through block configuration form* for details on accessing the FTE Bridge block configuration form IP/ICMP tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
IP Statistics (Provides packet delivery services between nodes.)			
Datagrams Received from Below.	IPINRECEIVES	No	Total number of input datagrams received from connected nodes, including those received in error.
Datagrams Format Errors Drops	IPINHDRERRORS	No	Number of input datagrams discarded due to errors in their Internet Protocol (IP) headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, etc.
Datagrams Misdelivery Drops	IPINADDRERRORS	No	Number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity.
Unknown Protocol Datagrams	IPINUNKNOWNPORTS	No	Number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
Datagrams Discarded for Resrc	IPINDISCARDS	No	Number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded; for example, for lack of buffer space.
Datagrams	IPINDELIVERS	No	Total number of input

Plain Text	Parameter Name	User Configurable	Notes
Delivered Above			datagrams successfully delivered to IP user-protocols, including Internet Control Message Protocol (ICMP).
Datagram Sent Out	IPOUTREQUESTS	No	Total number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission.
Out Datagrams Discarded	IPOUTDISCARDS	No	Number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded; for example, for lack of buffer space.
Datagrams Drops for No Routes	IPOUTNOROUTES	No	Number of IP datagrams discarded because no route could be found to transmit them to their destination.
Fragments Needing Reassembly	IPREASSEMREQS	No	Number of IP fragments received which needed to be reassembled at this entity.
Fragments Reassembled	IPREASSEMOKS	No	Number of IP datagrams successfully reassembled.
Fragment Reassembly Fails	IPREASSMFAILS	No	Number of failures detected by the IP reassembly algorithm, for whatever reason: timed out, errors, etc.
Datagrams Fragmented	IPFRAGOKS	No	Number of IP datagrams that have

Plain Text	Parameter Name	User Configurable	Notes
			been successfully fragmented at this entity.
Datagrams Fragmentation Fails	IPFRAGFAILS	No	Number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be. For example, because their do not Fragment flag was set.
Fragments Created	IPFRAGCREATES	No	Number of IP datagram fragments that have been generated as a result of fragmentation at this entity.
Routing Entries Discarded	IPROUTINGDISCARDS	No	Number of routing entries which were chosen to be discarded even though they are valid.
ICMP Statistics (Controls transmission of error and control messages between hosts and gateways.)			
Messages Received	ICMPINMSGS	No	Total number of ICMP messages which the entity received.
Messages with Format Errors	ICMPINERRORS	No	Number of ICMP messages which entity received but determined as having ICMP-specific errors such as bad ICMP checksums and bad length.
Dest. Unreachable Msgs Recvd	ICMPINDESTUNREACHS	No	Number of ICMP Destination Unreachable messages received.
Echo Messages Recvd	ICMPINECHOS	No	Number of ICMP Echo (request) messages received.

Plain Text	Parameter Name	User Configurable	Notes
Echo Reply Messages Recvd	ICMPINECHOREPS	No	Number of ICMP Echo Reply messages received.
Messages Sent	ICMPOUTMSGS	No	Total number of ICMP messages which this entity attempted to send.
Out Error Messages	ICMPOUTERRORS	No	Number of ICMP messages which this entity did not send due to problems discovered within ICMP such as a lack of buffers.
Dest. Unreachable Msgs Sent	ICMPOUTDESTUNREACHS	No	Number of ICMP Destination Unreachable messages sent.
Echo Messages Sent	ICMPOUTECHOS	No	Number of ICMP Echo (request) messages sent.
Echo Reply Messages Sent	ICMPOUTECHOREPS	No	Number of ICMP Echo Reply messages sent.

5.2.6 Viewing FTE tab

The following table summarizes the parameter data you can monitor on the **FTE** tab of the configuration form for the selected FTE Bridge block. See *Monitoring status through block configuration form* for details on accessing the FTE Bridge block configuration form **FTE** tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
FTE Mart Statistics (Provides statistics related to the MAC Address Resolution Table (MART). This deals with on-line media access control (MAC) address mapping. Two separate tables are maintained - One for FTE nodes and one for non-FTE nodes. The media access control address entry information is obtained by extracting the source media access control address from received diagnostic messages.)			
Address Count	FTEMARTADDRCOUNT	No	Number of IP addresses contained in FTE MART.
Max Depth	FTEMARTMAXDEPTH	No	Maximum depth that

Plain Text	Parameter Name	User Configurable	Notes
			the FTE MART has reached (largest number of entries in table).
Average Depth	FTEMARTAVGDEPTH	No	Average depth of FTE MART (average number of entries in table).
Address Collisions	FTEMARTCOLLCOUNT	No	Number of collisions that have occurred when hashing the FTE MART.
Current FTE Traffic			
LAN_A Tx Rate (kBit/sec)	LANATXRATE	No	Indicates communication transmission rate in kilobits per second (kbps) for port A (Yellow Tree Port) on the FTE Bridge.
LAN_B Tx Rate (kBit/sec)	LANBTXRATE	No	Indicates communication transmission rate in kilobits per second (kbps) for port B (Green Tree Port) on the FTE Bridge.
LAN_A Rx Rate (kBit/sec)	LANARXRATE	No	Indicates communication receive rate in kilobits per second (kbps) for port A (Yellow Tree Port) on the FTE Bridge.
LAN_B Rx Rate (kBit/sec)	LANBRXRATE	No	Indicates communication receive rate in kilobits per second (kbps) for port B (Green Tree Port) on the FTE Bridge.

Plain Text	Parameter Name	User Configurable	Notes
FTM Statistics			
Number of FTE nodes	NUMFTENODES	No	Current number of FTE nodes within FTE community.
Max number of FTE nodes	MAXFTENODES	No	Maximum number of FTE nodes that have been detected within FTE community.
Max node ID	MAXNODEID	No	Highest Device Index supported within FTE community.
IP checksum errors	BADIPCSUM	No	Number of FTE IP messages which were received but determined as having bad IP checksums.
UDP checksum errors	BADUDPCSUM	No	Number of FTE UDP messages which were received but determined as having bad UDP checksums.
Non-FTE Mart Statistics			
Address Count	NONFTEMARTADDRCOUNT	No	Number of IP addresses contained in non-FTE MART.
Max Depth	NONFTEMARTMAXDEPTH	No	Maximum depth that non-FTE MART has reached (largest number of entries in table.
Average Depth	NONFTEMARTAVGDEPTH	No	Average depth of non-FTE MART (average number of entries in table).
Address Collisions	NONFTEMARTCOLLCOUNT	No	Number of collisions that have occurred

Plain Text	Parameter Name	User Configurable	Notes
			when hashing non-FTE MART.
Peak FTE Traffic			
LAN_A Tx Rate Max (kBit/sec)	LANATXRATEMAX	No	Indicates maximum communication transmission rate in kilobits per second (kbps) for port A (Yellow Tree Port) on the FTE Bridge.
LAN_B Tx Rate Max (kBit/sec)	LANBTXRATEMAX	No	Indicates maximum communication transmission rate in kilobits per second (kbps) for port B (Green Tree Port) on the FTE Bridge.
LAN_A Rx Rate Max (kBit/sec)	LANARXRATEMAX	No	Indicates maximum communication receive rate in kilobits per second (kbps) for port A (Yellow Tree Port) on the FTE Bridge.
LAN_B Rx Rate Max (kBit/sec)	LANBRXRATEMAX	No	Indicates maximum communication receive rate in kilobits per second (kbps) for port B (Green Tree Port) on the FTE Bridge.
LAN_A (Yellow) failed	LANAFAILED	No	Status indicator for port A (Yellow Tree Port) on the FTE Bridge. If this LED is lit, it is an indication that communications have failed on Port A.
LAN_B (Green) failed	LANBFAILED	No	Status indicator for

Plain Text	Parameter Name	User Configurable	Notes
			port B (Green Tree Port) on the FTE Bridge. If this LED is illuminated it is an indication that communications have failed on Port B.
InterLAN comm. failed	INTERLANFAILED	No	Status indicator for Inter-LAN communications - indicates that inter-LAN communications have failed.
Crossover cable failed	XOVERFAILED	No	Status indicator for Crossover cable - indicates that the Crossover cable has failed.

5.2.7 Viewing ICP Bridging tab

The following table summarizes the parameter data you can monitor on the **ICP Bridging** tab of the configuration form for the selected FTE Bridge block. See *Monitoring status through block configuration form* for details on accessing the FTE Bridge block configuration form **ICP Bridging** tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
Originators			
Application Connection Id	ORIAPPCONNID [1..48]	No	Initiator's Application Connection ID
Connection State	ORICONNSTATE [1..48]	No	Initiator's Connection State
Number Of Initiators Using	ORIMUXED[1..48]	No	Number of initiators using multiplexed connections.
Path	ORIPATH[1..48]	No	Initiator's Connection Path
Transport Class	ORITCLASS[1..48]	No	Initiator's Transport Class

Plain Text	Parameter Name	User Configurable	Notes
Targets			
Application Connection Id	TGTAPPCONNID [1..24	No	Target's Application Connection ID
Connection State	TGTCONNSTATE [1..24	No	Target's Connection State
Transport Class	TGTTCLASS [1..24]	No	Target's Transport Class

5.2.8 Viewing ICP Statistics tab

The following table summarizes the parameter data you can monitor on the **ICP Statistics** tab of the configuration form for the selected FTE Bridge block. See *Monitoring status through block configuration form* for details on accessing the FTE Bridge block configuration form **ICP Statistics** tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
Reset ICP Statistics (Button)	ICPSTATRESET	N/A	Click to reset ICP statistics, when available.
ICP General Statistics			
Open Requests Received	RECVOPENREQ	No	Number of open requests received.
Open Responses Sent	SENDOPENRSP	No	Number of open responses sent.
Open Requests Sent	SENDOPENREQ	No	Number of open requests sent.
Open Responses Received	RECVOPENRSP	No	Number of open responses received.
Close Requests Received	RECVCLOSEREQ	No	Number of close requests received.
Close Requests Sent	SENDCLOSEREQ	No	Number of close requests sent.
Close Responses Received	RECVCLOSERSP	No	Number of close responses received.

Plain Text	Parameter Name	User Configurable	Notes
Close Responses Sent	SENDCLOSERSP	No	Number of close responses sent.
ICP Error Statistics			
Connected Send Errors	CONNSENDERR	No	Number of connected send errors.
Un-Connected Send Errors	UNCONNSENDERR	No	Number of unconnected send errors.
Connection Open Failures	CONNOPENFAIL	No	Number of connection open failures.
Connection Close Failures	CONNCLOSEFAIL	No	Number of connection close failures.
Connection Open Rejects	CONNOPENREJECT	No	Number of connection open rejects.
NAKS Received	RECVNAKS	No	Number of negative acknowledgements (NAKS) received.

5.2.9 Viewing Version tab

The **Version** tab is common to all configuration forms for tagged blocks in Control Builder. If you have a Qualification and Version Control System (QVCS) license, this tab shows current QVCS information for the selected FTE Bridge block. Refer to the online help and the Qualification and Version Control System User's Guide for more information about the data on this tab. See *Monitoring status through block configuration form* for details on accessing the FTE Bridge block configuration form **Version** tab in the **Monitoring** tab.

5.2.10 Viewing IOMGR Statistics tab

The following table summarizes the parameter data you can monitor on the **IOMGR Statistics** tab of the configuration form for the selected FTE Bridge block. See **Monitoring status through block configuration form** for details on accessing the FTE Bridge block configuration form **IOMGR Statistics** tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
C300 IOMGR Client IP	IOMGRCLI	No	Shows the C300 IP address to which this FTEB IO manager is connected.
Number of IOM's	NUMIOM	No	Specifies the number of Series A IOM's configured to this FTEB block. Note that only

Plain Text	Parameter Name	User Configurable	Notes
configured			16 IOM's can be configured per FTEB block.
Connection status table			
IO Module Name	IOMNAME	No	Name of the configured IOM
ASA path of the IO Module	IOMASAPH	No	ASA path of the configured module
IOM Connection Status	CONNSTAT	No	Current connection status
Last Open Conn Error	CONNERR	No	Last open connection error status

5.2.11 Viewing Server History tab

ATTENTION

The configuration settings you make for Server Load Options on the System Preferences dialog determines whether or not the data entered on the Server History tab is loaded to the Experion Server. See the Control Building Guide for information about setting system preferences.

Plain Text	Parameter Name	User Configurable	Notes
Access Levels			
Control Level	SCANCTRLLVL	Yes	Indicates Server control level to be associated with this function.
Control Area	SCANAREA	Yes	Indicates the Server control area to be associated with this function.
History Configuration			
Number of History Parameters	HIST.NUMPARAMS	Yes	Defines number of history parameters to be included in History Configuration table.
Parameter		Yes	Valid parameter name for a parameter associated with the given point that is to be collected and stored as historical data at

Plain Text	Parameter Name	User Configurable	Notes
			predetermined intervals.
Description		No	Provides a brief description of the entered parameter.
FAST		Yes	Select the Fast type of history collection.
STD		Yes	Select the Standard type of history collection.
EXTD		Yes	Select the Extended type of history collection.
Gating Parameter		Yes	Optional gating parameter to define conditions under which data for this parameter must be collected.
Gate State		Yes	Defines gate state for configured gating parameter.
Create New or Edit Existing Server Scripts (Button)		N/A	Launch the Server scripting configuration utility.

5.2.12 Viewing Server Displays tab

The **Server Displays** tab is common to all configuration forms for tagged blocks in Control Builder. The following table summarizes the parameter data you can monitor on this tab of the configuration form for the selected FTE Bridge block. See *Monitoring status through block configuration form* for details on accessing the FTE Bridge block configuration form **Server Displays** tab in the **Monitoring** tab.

> **ATTENTION**
>
> The configuration settings you make for Server Load Options on the System Preferences dialog determines whether or not the data entered on the Server Displays tab is loaded to the Experion Server. See the Control Building Guide for information about setting system preferences.

Plain Text	Parameter Name	User Configurable	Notes
Point Detail Display	SCANPNTDTL	Yes	By default, a Display template is already entered into Point Detail Display box (for example, sysDtlFTEB.dsp). This template

Plain Text	Parameter Name	User Configurable	Notes
			can be used for creating your own display or it can be used as is, provided that your function block name matches name built into detail display that is supplied as a template.
Group Detail Display	SCANGRPDTL	Yes	By default, a Display template is already entered into the Group Detail Display box (for example, sysGrpFTEB.dsp). This template can be used for creating your own display or it can be used as is, provided that your function block name matches name built into detail display that is supplied as a template.
Associated Display	SCANASSOCDSP	Yes	Name of the Server display to be associated with this function block.
Trends			
Number of Trends	TREND.NUMPARAMS	Yes	Defines the number of trend parameters to be included in the Trends Configuration table.
Trend #		Yes	Defines Trend number to be associated with this trend parameter.
Pen		Yes	Defines color of pen that will be used to trace assigned parameter on Station Trend display.
Trend Parameter		Yes	Valid parameter name for a parameter associated with given point that is configured for history collection.
Description		No	Provides a brief description of the entered parameter.
Groups			
Number of Groups	GROUP.NUMPARAMS	Yes	Defines the number of group parameters to be included in Groups Configuration table.

Plain Text	Parameter Name	User Configurable	Notes
Group #		Yes	Defines Group number to be associated with this group parameter.
Pos #		Yes	Defines number of position configured parameter will occupy in the Station Group display.
Group Parameter		Yes	Valid parameter name for a parameter associated with the given point that is configured in the system.
Description		No	Provides a brief description of the entered parameter.

5.2.13 Viewing Control Confirmation tab

The **Control Confirmation** tab is common to all configuration forms for tagged blocks in Control Builder. If you have an optional Electronic Signature license, you can configure electronic signature information for the tagged block through this tab on the block's configuration form in Control Builder. Refer to the online help and the *Server and Client Configuration Guide* for information about the data on this tab.

The Electronic Signature function aligns with the identical Electronic Signatures function that is initiated through Quick Builder and Station for Server points. When this block is loaded to a controller, its control confirmation configuration (electronic signatures) is also loaded to the Server. This means you can view the control confirmation configuration for this tagged object in Station and make changes to it. If you make changes through Station, you must initiate an **Upload** or **Upload with Contents** function through the Controller menu in Control Builder for the object in the **Monitoring** tab to synchronize changes in the Engineering Repository Database (ERDB).

5.2.14 Viewing Identification tab

The **Identification** tab is common to all configuration forms for tagged blocks in Control Builder. The following table summarizes the parameter data you can monitor on this tab of the configuration form for the selected FTE Bridge block. See **Monitoring status through block configuration form** for details on accessing the FTE Bridge block configuration form **Identification** tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
Name	NAME	Yes	Unique block name consisting of up to 16 characters to identify the block. At least one character in the name must be a letter (A-Z).
Description	DESC	Yes	Descriptive text appears on detail and group displays to uniquely describe this

Plain Text	Parameter Name	User Configurable	Notes
			particular function block.
Block Comment 1	BLCKCOMMENT1	Yes	Comment to be associated with this block consisting of up to 40 characters.
Block Comment 2	BLCKCOMMENT2	Yes	Comment to be associated with this block consisting of up to 40 characters.
Block Comment 3	BLCKCOMMENT3	Yes	Comment to be associated with this block consisting of up to 40 characters.
Block Comment 4	BLCKCOMMENT4	Yes	Comment to be associated with this block consisting of up to 40 characters.
Library		No	Identifies Control Builder Library that is source of template.
System Template		No	Identifies System Template that is source for this block.
Base Template		No	Identifies Base Template that is used for this block.
Created By	CREATEDBY	No	Identifies user who created block, if operator security is implemented. Otherwise, may just show Default login.
Date Created	DATECREATED	No	Shows date and time template was created. If this block is in Version Control System, shows date and time initial version of template was created.
Last Modified By	MODIFIEDBY	No	Identifies user who made last modifications to block, if operator security is implemented. Otherwise, may just show default login. If this block is in Version Control System, modifications apply to last version of block.
Date Last Modified	VERSIONDATE	No	Shows date and time last modification was made to block's configuration. If this block is in Version Control System, modification date and time applies to last version of block.

5.3 Using Network Tools (NTools) Utility

5.3.1 About NTools

The NTools utility lets you view the online status of the chassis mounted hardware. It lets you quickly confirm the firmware revision levels and slot locations of all modules. It supports both ControlNet and Ethernet communications media.

Refer to the *Control Hardware Troubleshooting and Maintenance Guide* for more information about the NTools utility.

- Launching NTools in Ethernet mode

5.3.2 Launching NTools in Ethernet mode

Prerequisites

- If you are running R210 or greater software, you launch NTools through Configuration Studio.
- On the Configuration Explorer tab, click the Control Strategy icon and click Maintain control system firmware selection in the I/O and Network Maintenance box.
- In this case, skip Steps 1 and 2 in the following procedure.

To launch NTools in the Ethernet mode

1. On the taskbar, click the **Start** button, and then click **Run**.
   Opens the **Run** dialog.
2. In **Open** box, type ntools -e -u. click the **OK** button
   - Launches Network Tools utility in Ethernet mode (-e) with ability to update firmware versions (-u).
   - Opens Network Tools dialog with warning message.
3. Click the **OK** button.
   Acknowledge the warning about monitoring through Control Builder.
4. On the toolbar, click the Resume  button.
   Starts the network scan.
5. If this is the initial launch of NTools, click the Settings  button.
   Opens the **Settings** dialog.
6. Select the desired scanning options. The defaults are:
   - Delay between scans (seconds) - 2
   - Periodic (automatic) - selected
   - Enable mode version/revision checking - checked
   - Enable ControlNet Parameter checking - checked
   - Click the **OK** button.

   Adjust scanning to your requirements.

> **ATTENTION**
> You must create a FTE Bridge block in Control Builder before you can view it in the Network Tools (NTools) utility.

7. Click the first **FTEB** icon under the Desktop tree.
   - If this is the initial NTools launch, the **Settings** dialog opens. Go to the Next step.
   - If this is not the initial NTools launch, go to Step 9.
8. Fill in the appropriate data for the Local and Remote chassis configurations in your network associated with the given FTE Bridge module. Click the **OK** button.

   Closes **Settings** dialog and defines your system configuration for viewing.
9. Once the graphic representation of the chassis appears in the Detail pane, individual modules can be selected, which results in the applicable menu commands becoming available.

   Lets you view hardware details and confirm firmware revision levels for modules installed in the chassis. Refer to the *Network Tools Help* for more information about menu commands.
10. Click **NetworkTools** menu and then click **Exit**.

    Closes the **NTools** utility.
11. This completes the procedure.

    Go to the Next section.

5.4 Using Station Displays

5.4.1 Viewing Detail or Group displays

The Experion Server Station application includes pre-configured Detail and Group displays for FTE Bridge blocks. These displays are default entries for the Point Detail Display (sysDtlFTEB.dsp) and Group Detail Display (sysGrpFTEB.dsp) parameters on the Server Displays tab of the FTE Bridge block configuration form. Once you load a FTE Bridge block, you can begin monitoring the Detail displays through Station. The Detail displays provide convenient access to the same information found on the FTE Bridge block configuration form tabs in Monitoring mode.

Refer to the *Operator's Guide* for detailed information about calling up, navigating, and viewing station displays.

- Viewing Event Summary display

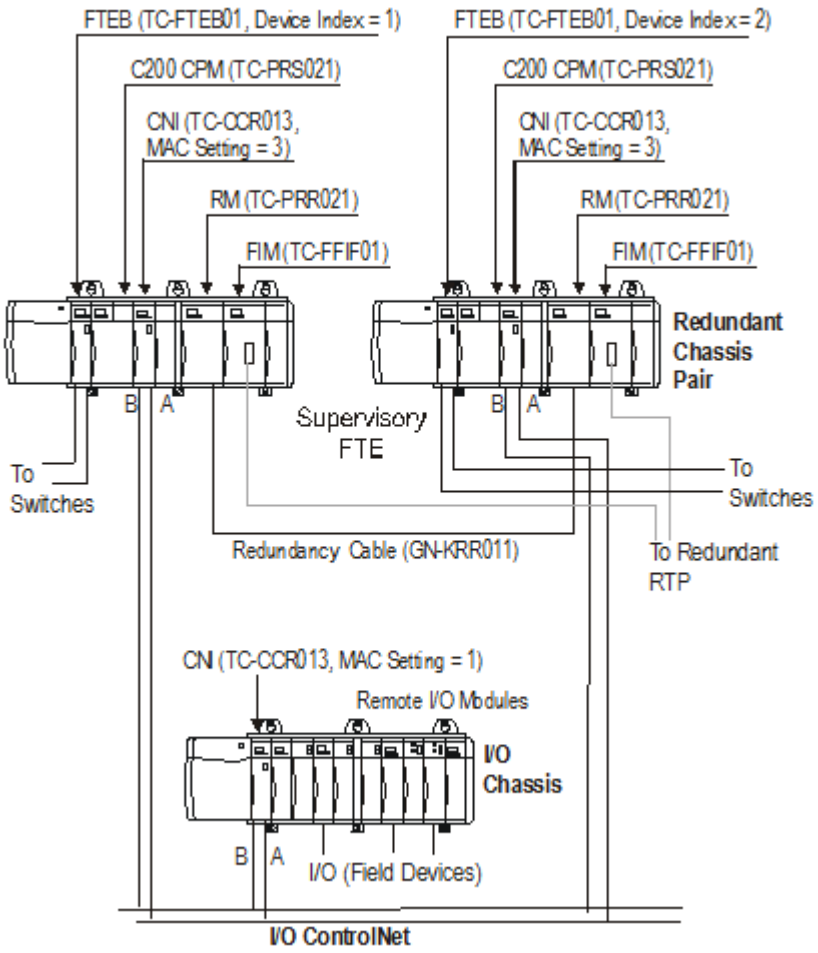
5.4.2 Viewing Event Summary display

Like the Details displays, the Station Alarm and Event Summary displays support integration of FTE Bridge module generated alarms and events through the Network Diagnostic Manager (NDM). The configured FTE Bridge block tags will be used to identify the FTE Bridge module generating the event.

5.5 FTE Bridge Redundancy Operation Considerations

5.5.1 About redundancy

If you have redundancy compliant hardware, you can implement redundant CPM/IOLIM/FIM operation through a Redundant Chassis Pair (RCP). A RCP consists of two chassis which include identical redundancy compliant modules in matching slot positions within their given chassis. The following figure shows a typical hardware configuration for a RCP that includes a Control Processor Module (CPM) and a Fieldbus Interface Module (FIM). The RCP does not need CPMs to support FIM redundancy. It does need one pair of Redundancy Modules (RMs) though.



- RM based redundancy
- Switchover and Secondary readiness
- Failure conditions and switchover
- FTE Bridge switchover considerations

5.5.2 RM based redundancy

Redundancy Modules in a Redundant Chassis Pair (RCP) configuration provide redundant functionality. The RCP does this by providing a pair of chassis, so a component failure in one chassis switches the handling of the assigned functions to the other chassis. This is considered a dual redundant system, which is characterized by the following two main redundancy states.

- **Primary** - Refers to the chassis executing the assigned control functions.
- **Secondary** - Refers to the chassis in some state of readiness to assume the responsibilities of the Primary.

Refer to the Controller Redundancy Functionality section in the *Control Builder Components Theory* for more information about Controller redundancy.

5.5.3 Switchover and Secondary readiness

A switchover describes the process where a Secondary chassis assumes the Primary state, and the Primary chassis assumes the appropriate Secondary state of readiness, depending upon what triggered the switchover. A switchover can be triggered immediately upon the detection of a fault in the Primary or upon the receipt of an operator command.

The ability of a Secondary chassis to take over the assigned control functions of the Primary depends upon which one of the following readiness states reflects its current state.

If Secondary Chassis State is . . .	Then, the Secondary Chassis . . .
Disqualified	Cannot assume the Primary state. This is a state of non-readiness.
Synchronizing	Cannot assume the Primary State. In this state, the Secondary chassis is copying database information from the Primary.
Synchronized	Can assume the Primary state upon switchover. In this state, the database in the Secondary is aligned with the database in the Primary. The Secondary closely tracks database changes to maintain its synchronization with the database of the Primary. Otherwise, the Secondary will revert to a Disqualified state.

5.5.4 Failure conditions and switchover

The following table identifies failure conditions that result in a switchover and those that do not.

ATTENTION

When any failure that results in a switchover occurs in a Secondary, the Secondary chassis loses synchronization.

In addition to the failure conditions, these events are reported as diagnostic notifications:

- Loss of view of redundant partner on H1 network (applies to FIM link).
- Loss of private path connection from Primary to Secondary (lonely event).

Failure Conditions That Result in a Switchover	Failure Conditions That Do Not Result in a Switchover
Power to Primary chassis fails.	One or both fieldbus H1 cables fail.
Integrated Control Protocol (ICP) backplane in primary chassis fails.	One or both fieldbus H1 network conditioners fail.

Failure Conditions That Result in a Switchover	Failure Conditions That Do Not Result in a Switchover
Any module in Primary chassis fails.	The 24-Volt power supply fails.
Both FTE links to Primary FTE Bridge module are lost, and the secondary module has at least one healthy link.	One FTE link to Primary FTE Bridge module is lost. The secondary has both links healthy.
Primary FIM's connection to Redundant Remote Terminal Panel fails.	

5.5.5 FTE Bridge switchover considerations

For FTE Bridge modules in a redundant chassis pair, the primary FTE Bridge module does not fail, if it loses communication with both FTE links. In this case, the primary FTE Bridge module initiates a switchover request to the Redundancy Module to switch control to the secondary chassis, assuming it is in a qualified state. The following are some considerations associated with a FTE Bridge module initiated switchover.

For this Switchover Consideration . . .	FTE Bridge Redundancy Operation . . .
Device Index number	Does not transition the **Device Index** for the primary FTE Bridge module to the secondary FTE Bridge module. The **Device Index** stays with the physical FTE Bridge module.
MAC Addresses	Does not transition the **MAC addresses** for the FTE links on the primary FTE Bridge module to the secondary FTE Bridge module. The **MAC addresses** stay with the physical FTE Bridge module.
IP Address	Does swap IP addresses for primary and secondary FTE Bridge modules during switchover as follows: • During initial synchronization, primary and secondary FTE Bridge modules exchange their **IP addresses** over the private redundancy link. This is for verification purpose only, since the odd-even convention allows both modules to determine their partner's address based on their own address. • During switchover or swap, both primary and secondary FTE Bridge modules replace their current **IP address** with their partner's **IP address**. This puts redundant pair into transient state in which peer modules are temporarily unable to communicate with either one of them, since their address tables are no longer valid due to the **IP address** swap. • After **IP address** swap, both primary and secondary FTE Bridge modules construct Address Resolution Protocol (ARP) request packets with updated IP-to-Ethernet address mapping and

For this Switchover Consideration . . .	FTE Bridge Redundancy Operation . . .
	broadcast them on the network. Upon reception of ARP packets, peer nodes update their address tables.

ATTENTION

The swapping of IP addresses is transparent to the higher-level protocols such as Transmission Control Protocol (TCP) or User Datagram Protocol (UDP).

- TCP packets sent to either primary or secondary FTE Bridge module during switchover will be re-tried. Once retry limit is exceeded, connection breaks and gets re-established by application based on updated address information.
- UDP packets sent to either primary or secondary FTE Bridge module during switchover and before client address table is updated will be lost.

CHAPTER

6

SERVICE

6.1 Maintenance considerations

6.1.1 Periodic checks

Check the front-panel indicators periodically to ensure all segments of the 4-character display and the light emitting diodes (LED) are working. If segment or LED is not lit or has dimmed, you must replace the FTE Bridge module, since front-panel indicators are not field replaceable.

Refer to the Removal and Insertion Under Power (RIUP) Function Guidelines in the *Control Hardware Installation Guide* before you RIUP any module.

- Remove and replace FTE Bridge module TC/TK-FTEB01
- Spare parts

6.1.2 Remove and replace FTE Bridge module TC/TK-FTEB01

> ATTENTION
>
> We recommend that you proceed with **extreme caution** whenever replacing any component in a control system. Ensure the system is offline or in a safe operating mode.
>
> Component replacements may also require corresponding changes in the control strategy configuration through Control Builder, as well as downloading appropriate data to the replaced component.

To remove and replace a FTE Bridge module

1. On the **Project** tab in Control Builder, double click the icon for the FTE Bridge block that represents the FTE Bridge module to be replaced.

   Opens **SYSTEM:FTEB Block**, **XXXXX- Parameters [Project]** configuration form. Where XXXXXX equals the assigned name.

2. On the **Main** tab, record the **Image Version** and **Device Index** number listed for reference. Click the **Cancel** button.

   Records data for future reference and closes the form.

3. Is the FTE Bridge Module to be replaced installed in a **non-redundant** chassis configuration or in a **redundant chassis pair** configuration?
   - If answer is **non-redundant** chassis, go to Step 5.
   - If answer is **redundant chassis pair**, go to Step 4.

4. If FTE Bridge module to be replaced is currently running as the Primary, initiate a switchover to make it the secondary.

   Ensure the FTE Bridge module to be replaced is functioning as the secondary, so power to the chassis can be turned off. Skip Step 5 and go to Step 6.

5. Put the Controller in its idle state and ensure the backup battery is functioning.

   Prepare the non-redundant Controller chassis for shutdown.

6. Flip the switch on the chassis power supply to the **Off** position.

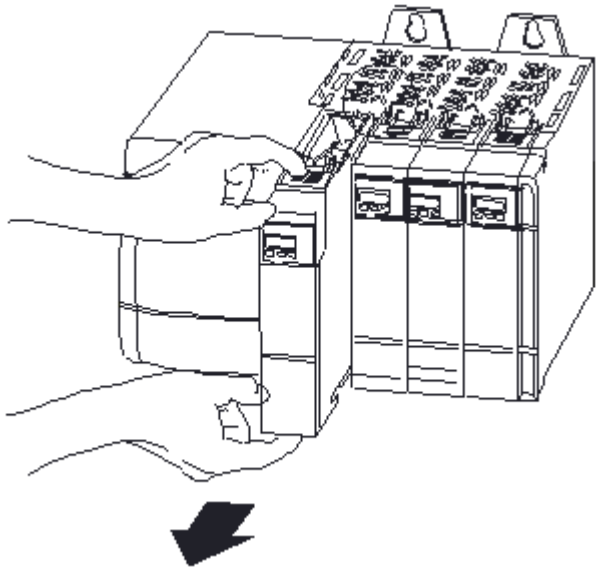
   Remove power from the chassis.

7. Open the front-panel door and unplug the primary and secondary cable connectors from the sockets on the module.

   Prepare module for removal.

8. Push in the top and bottom locking tabs and pull the FTE Bridge module from its chassis slot.

   Remove the module from the chassis.



9.
   - Note if cable shield ground jumpers are installed or not. See *Checking cable shield ground jumper* for more information.
   - Confirm that **Device Index** number set on BCD rotary switches on the module agrees with the one recorded in Step 2. See **Setting unique Device Index** for more information.

   Confirm settings on the removed module.

10. On the new FTE Bridge module, ensure the cable shield ground jumpers and BCD rotary switches (**Device Index**) settings match those on the removed module.

    Make sure settings on the new module match those on the removed module.

11. Align the module's circuit board with the top and bottom chassis guides for the slot just vacated by the removed module.
12. Slide the module into the chassis, until the module's locking tabs "click" into position. The module is fully installed when it is flush with the power supply or other installed modules.
13. Open the front-panel door, connect yellow and green FTE cable connectors to applicable sockets on the module. See *Attaching FTE cables* for more information. Close the front-panel door.

    Connect FTE link cables.

14. Ensure the BOOTP Server service is started. See *Checking status of BOOTP server service* for more information.

    Confirm that BOOTP Server is running.

15. Flip the switch on the chassis power supply to the **On** position.

    Restore power to the chassis.

16. Monitor the front-panel 4-character display to confirm that the module receives its IP address. See *Applying power to FTE Bridge Module* for more information.

    Confirm that module is operating.

17. Use the Network Tools utility to check that firmware revision of the new module matches the one recorded in Step 2. See *Launching NTools in Ethernet mode* for more information.
    - If firmware revision is correct, go to Step 18.
    - If firmware revision is not correct, go to the *Updating FTE Bridge module firmware* section and then return to Step 17.
18. If you need to replace the other FTE Bridge module in a redundant chassis pair, wait for the primary and secondary chassis to synchronize and then repeat this procedure following the steps for a redundant chassis pair.

    Replace both modules in a redundant chassis pair.

19. This completes the procedure.

    Return to normal operation.

6.1.3 Spare parts

The FTE Bridge module is not field repairable and the only replacement part is the module itself. The following table lists the recommended spares based on the number of modules installed.

Model Number	Recommended Spares	
	Per 10	Per 100
TC-FTEB01 (uncoated)	1	5
TK-FTEBO1 (coated)	1	5

6.2 Updating FTE Bridge module firmware

> **ATTENTION**
>
> If the FTE Bridge module is not installed and pre-configured by the factory, users must load the FTE Bridge module's firmware to make it fully operational. This is also true for any replacement FTE Bridge module ordered separately from the factory.

6.2.1 Checking firmware status

To check firmware status

1. If chassis is not powered, flip the switch on the chassis power supply to the **On** position.

   Applies power to the chassis and installed modules initiate their "boot" routines.
2. Wait a few minutes for the modules to reach their normal operating states. Check the 4-Character LED display on the FTE Bridge module.
   - If the Device Index number and OK or BKUP are sequencing in the FTE Bridge module display, the module is operating and contains some version of firmware. In this case, go to the next procedure *Checking firmware version*. If RDY appears in the FTE Bridge module display, go to the procedure *Loading Boot code*.
   - If **ALIV** appears in the FTE Bridge module display, go to the procedure *Loading Personality image*.
3. This completes the FTE Bridge module firmware status check.

   Go to the next appropriate procedure.

6.2.2 Checking firmware version

To check firmware version

1. Launch Network Tools. See *Launching NTools* in Ethernet mode for more information.
2. Opens Network Tools utility.
   - Click the **OK** button to acknowledge the message prompt.
   - Click the **Resume** button  in the toolbar.

   NTools begins scanning the network for installed components. Detected nodes will appear under the Desktop directory.

> **ATTENTION**
>
> You must load a FTE Bridge block or have a ControlNet Interface (CNI) module installed in a chassis before you can view other installed but not loaded FTE Bridge modules in the Network Tools (**NTools**) utility.

3. Click the node icon.

   Graphic representation of the chassis for the selected node appears in the Detail pane.

4. Check the boot version (BV) and application (personality) version (AV) listed on the face of the FTE Bridge module (FTEB01) graphic.

   If the version numbers shown are colored green, they are the correct ones for your current system software version. If they are colored red, they need to be updated.

5.
   - If firmware versions are correct (green), click **NetworkTools** > **Exit**.
   - If firmware versions are wrong (red), go to the next sub-procedure Loading Boot code to continue.

   - Closes the utility and you can quit this procedure.
   - Continue with the next sub-procedure.

6.2.3 Loading Boot code

This procedure assumes that you have launched NTools and determined that the FTE Bridge module firmware needs to be updated or the FTE Bridge has started up in the RDY mode.

To load boot code

1. Click the FTE Bridge module (FTEB01) graphic in the chassis representation in the Detail pane.

   A red box appears around the graphic to show that it is selected.

2. Click the **Flash** button  in the toolbar.

   Opens **Warning! Use Extreme Care** dialog.

3. Click the **Yes** button to acknowledge that the system is Offline.

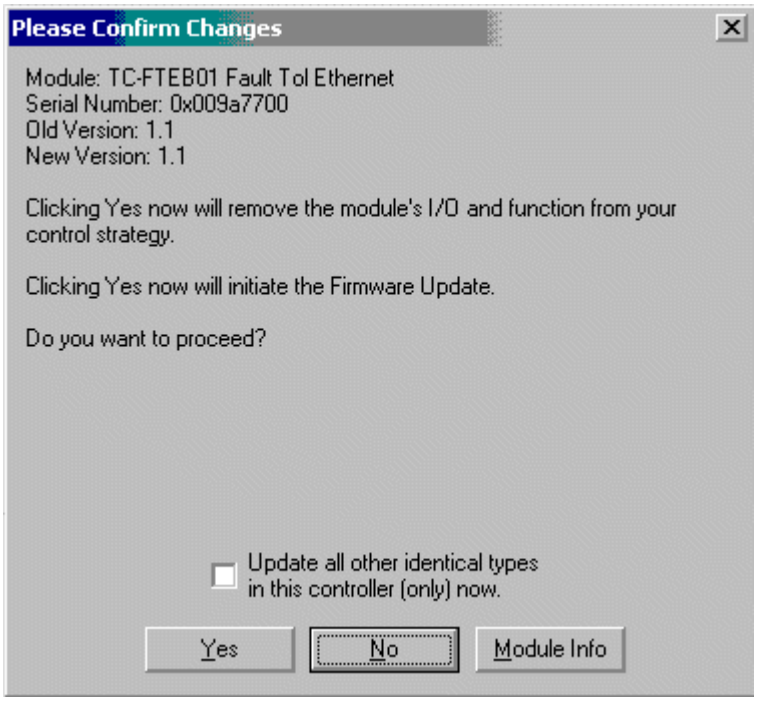
   Opens **Confirm Changes** dialog.

4. Click the **Yes** button to acknowledge that it is okay to shutdown the FTE Bridge module.

5. Initiates shutdown and reboot of the FTE Bridge module and calls up the **Open dialog**.

   - In the **Look in** box, click the  arrow button to navigate to this directory location **c:\Program Files\Honeywell\Experion\Engineering Tools\system\firmware\FTEB**, if required.

   Opens **Confirm Changes** dialog. This illustration is for example purposes only.



6. Click the **Yes** button to acknowledge that you want to proceed with the update. (Note that RDY must appear in the FTE Bridge module display)
   - Initiates firmware load. LOAD appears in the FTEB display.
   - Progress of the load is tracked in the status bar.
7. Wait for the load to complete and the FTE Bridge module to reboot to its ALIV state.

   NetworkTools message appears.
8. Click the **OK** button to acknowledge that the update completed with no errors.

   Wait for the **NTools** to complete its next scan.
9. Check that the updated boot version (BV) now appears on the FTE Bridge module graphic in green.

   Confirm that load completed successfully.
10. This completes the procedure.

    Go to the next procedure **Loading Personality** image to continue the firmware update.

6.2.4 Loading Personality image

This procedure assumes that you have just completed the previous procedure or the FTE Bridge has started up in the ALIV mode.

To load personality image

1. With FIM graphic still selected, click the **Flash**  button.
   Opens **Warning! Use Extreme Care** dialog.

   > ATTENTION
   > Depending on when this function is initiated, you may be asked to confirm the changes and the FTE Bridge module will be rebooted before you can access the **Open** dialog.

2. Click the **Yes** button to acknowledge that system is still Offline.
3. Opens the **Open** dialog.

   - In the **Look in** box, click the **Arrow**  button to navigate to this directory location **c:\Program Files\Honeywell\Experion\Engineering Tools\system\firmware\FTEB**, if required.
   - Click **ftebrex.nvs** file so it appears in the **File name** box. Click the **Open** button.

   Opens the **Confirm Changes** dialog.
4. Click the **Yes** button to acknowledge that you want to proceed with the update.
   - Initiates the firmware load. LOAD appears in the FTE Bridge module display.
   - Progress of the load is tracked in the status bar.
5. Wait for load to complete and the FTE Bridge module to reboot to its normal run state.
   NetworkTools message appears.
6. Click the **OK** button to acknowledge that the update completed with no errors.
   Wait for **NTools** to complete its next scan.
7. Check that the updated application (Personality) version (AV) now appears on the FTE Bridge module graphic in green.
   Confirm that load completed successfully.
8. This completes the FTEB Bridge module firmware update.
   Go to the next appropriate section.

6.3 Configuration changes and migration scenarios

- Changing base IP address
- Changing the Device Index or slot number for a configured FTE Bridge module
- Upgrading non-redundant chassis to redundant chassis pair

6.3.1 Changing base IP address

If you must change your base IP address, use the following procedure as a guide. The following procedure assumes that you are logged onto Control Builder with the necessary security level to implement control strategy changes and you are familiar with using Control Builder to create and edit control strategies.

To change base IP address

1. On the **Monitoring** tab, inactivate and delete any and all devices.
2. On the **Tools** menu, click **System Preferences** to call up the dialog.
3. On the **System Preferences** dialog, click the **Embedded FTE** tab.
4. Click the **Edit network parameters** check box to select it.
5. Key in the new base IP address in the **Base IP Address** field.
6. If applicable, change **Subnet Mask** and **Default Gateway** as well as **SNTP Primary Server** and **Secondary Server** addresses.
7. Click the **OK** button to close the dialog and save the changes. If applicable, follow on-screen prompts to correct any errors. Otherwise, click the **OK** button to acknowledge the Control Builder warning message.
8. Restart any remote Control Builder applications.
9. Reboot any embedded device **that already received its IP address from the previous network configuration**.
10. Reload your control strategy and continue normal operation.

6.3.2 Changing the Device Index or slot number for a configured FTE Bridge module

If you want to change the Device Index number or slot location of an existing, configured FTE Bridge module, use the following procedure as a guide. The following procedure assumes that you are logged onto Control Builder with the necessary security level to implement control strategy changes and you are familiar with using Control Builder to create and edit control strategies.

To change Device Index or Slot number for a configured FTE Bridge module

1. Is your control strategy loaded and running?
   - If the answer is **Yes**, go to the next Step.
   - If the answer is **No**, go to Step 4.
2. On **Monitoring** tab, inactivate Control Execution Environment (CEE) and associated Control Modules, Sequential Control Modules, and I/O Modules for all Controllers assigned to the FTE Bridge module targeted for change. Do the same for any assigned Fieldbus Interface Modules (FIMs) and links, and I/O Link Interface Modules (IOLIM) and links.

   You must inactivate control strategy components before you can delete them.
3. On **Monitoring** tab, delete all control strategy components associated with FTE Bridge block and then delete the FTE Bridge block.

   You must delete control strategy components from **Monitoring** tab before you can unassign components in the **Project** tab.

> TIP
>
> - It may be helpful to initiate a **Project Tree Charts** printout through the **Print** command on the **File** menu before you unassign and delete components in the **Project** tab.
> - If you have a **Qualification and Version Control System** license, there will be

additional steps required to check out a component before you can modify it in Control Builder.

4. On **Project** tab, unassign all container type blocks, I/O modules, and devices from their respective Control Processor Module (CPM), FIM, and/or IOLIM.

   You must unassign components before you can delete a CPM, FIM, or IOLIM block.

5. On **Project** tab, delete CPMs, FIMs, and IOLIMs associated with the FTE Bridge module, and then delete the FTE Bridge block.

   You must delete controllers, so you can configure them for association with the changed FTE Bridge module.

   ATTENTION

   If you are making changes to a FTE Bridge module in a redundant chassis pair, ensure you make corresponding changes in the partner FTE Bridge module to maintain the proper odd/even **Device Index** numbering scheme and the installation of modules in matching slot locations.

6.
   - To change the FTE Bridge module's **Device Index** number, see *Setting unique Device Index* for details.
   - To change the FTE Bridge module's slot position, adapt the steps in the previous procedure Remove and replace *FTE Bridge module TC/TK-FTEB01* to install the module in another slot in the chassis.

   Make desired FTE Bridge module **Device Index** and/or slot position changes.

7. Configure new FTE Bridge block for changed FTE Bridge module. See *Creating FTE Bridge module* block for details.

   Must configure FTE Bridge block before you configure CPM, FIM, and/or IOLIM blocks.

8. Configure new CPM, FIM and/or IOLIM blocks for the ones deleted in Step 5.

   Associate controllers with changed FTE Bridge module.

9. On **Project** tab, assign all container type blocks, I/O modules, and devices that were unassigned in Step 4 to their respective Control Processor Module (CPM), FIM, and/or IOLIM.

   Reestablish control strategy associations.

10. Load the FTE Bridge block. See *Loading FTE Bridge* block for details.

    FTE Bridge block appears in **Monitoring** tab.

11. Load the rest of the blocks that make up the control strategy.

    All blocks for the control strategy appear in the **Monitoring** tab.

12. This completes the procedure.

    Resume normal operation.

6.3.3 Upgrading non-redundant chassis to redundant chassis pair

Use this procedure as a general guide to upgrade an existing non-redundant C200 Controller or Fieldbus Interface Module chassis to be a redundant chassis pair. This procedure assumes that you are aware of the basic requirements for implementing a redundant chassis pair and focuses only on the changes relevant to FTE Bridge modules. See *About redundancy* for basic information about a redundant chassis pair.

To upgrade non-redundant chassis to redundant chassis pair

1. On **Monitoring** tab, inactivate Control Execution Environment (CEE) and associated Control Modules, Sequential Control Modules, and I/O Modules for all Controllers assigned to the FTE Bridge module targeted for upgrade to a redundant chassis pair. Do the same for any assigned Fieldbus Interface Modules (FIMs) and links, and I/O Link Interface Modules (IOLIM) and links.

   You must inactivate control strategy components before you can delete them.

2. On **Monitoring** tab, delete all control strategy components associated with FTE Bridge block and then delete the FTE Bridge block.

   You must delete control strategy components from **Monitoring** tab before you can unassign components in the **Project** tab.

   > TIP
   > - It may be helpful to initiate a **Project Tree Charts** printout through the **Print** command on the **File** menu before you unassign and delete components in the **Project** tab.
   > - If you have a **Qualification and Version Control System** license, there will be additional steps required to check out a component before you can modify it in Control Builder.

3. On **Project** tab, unassign all container type blocks, I/O modules, and devices from their respective Control Processor Module (CPM), FIM, and/or IOLIM.

   You must unassign components before you can delete a CPM, FIM, or IOLIM block.

4. On **Project** tab, delete CPMs, FIMs, and IOLIMs associated with the FTE Bridge module, and then delete the FTE Bridge block.

   You must delete controllers, so you can configure them for association with the redundant FTE Bridge module.

5. Flip the power supply switch to **Off** on the existing non-redundant power supply module located on the left side of the chassis.

   Remove power from the chassis before removing and inserting modules.

6. Remove the FTE Bridge module from the non-redundant chassis and set its **Device Index** to desired odd number. See *Setting unique Device Index* for details.

   The FTE Bridge module in the existing non-redundant chassis becomes the primary FTE Bridge module in the redundant chassis pair.

7. Install the Redundancy Module in the appropriate slots in the non-redundant chassis.

   All modules in redundant chassis pair must be redundancy compliant and installed in matching slot locations.

8. Install the secondary chassis and check that the **Device Index** number on the FTE Bridge module in this chassis is the next even number following the odd number set for the Primary FTE Bridge module. Also, ensure cable shield jumpers are installed or removed, as required.

   Ensure FTE Bridge modules in redundant chassis pair have appropriate odd/even **Device Index** numbers.

9. Connect the dedicated cable between the Redundancy Modules and connect the FTE cables to the secondary FTE Bridge module. Make any other field connections to the secondary chassis, as required.

   Make all network and field connections to modules in the chassis.

10. Configure new redundant FTE Bridge blocks for FTE Bridge modules in redundant chassis pair. See *Creating FTE Bridge module* block for details.

    Must configure FTE Bridge block before you configure CPM, FIM, and/or IOLIM blocks.

11. Configure new redundant CPM, FIM and/or IOLIM blocks for the ones deleted in Step 4.

    Associate controllers with redundant FTE Bridge modules.

12. Configure new Redundancy Module (RM).

    Support redundant chassis pair.

13. On **Project** tab, assign all container type blocks, I/O modules, and devices that were unassigned in Step 3 to their respective Control Processor Module (CPM), FIM, and/or IOLIM.

    Re-establish control strategy associations.

14. Flip the power switch to **On**, on both the primary and secondary power supply modules that are located on the left-hand side of the chassis.

15. Load the FTE Bridge blocks. See *Loading FTE Bridge block* for details.

    FTE Bridge blocks appear in **Monitoring** tab.

16. Load the rest of the blocks that make up the control strategy.

    All blocks for the control strategy appear in the **Monitoring** tab.

17. This completes the procedure.

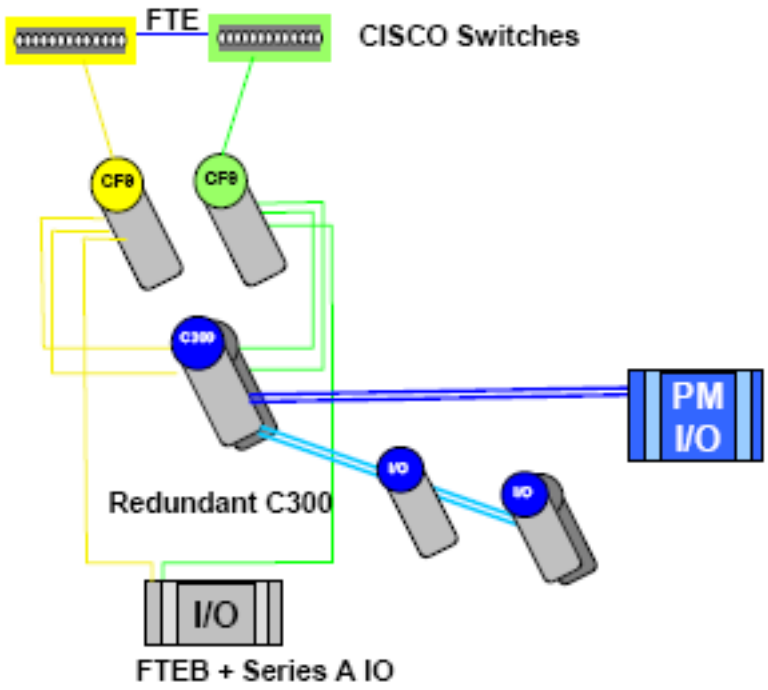
    Resume normal operation.

6.4 Migrating from ControlNet or Ethernet supervisory network

To convert your existing ControlNet or Ethernet supervisory network to a Fault Tolerant Ethernet supervisory network, you must make a network topology change which requires different hardware than was originally installed with your system. This is not a software migration and requires the clean installation of Experion software. For details about installing Experion software, refer to the *Software Installation and Upgrade Guide*.

6.5 Migration from FTE based C200 to C300

You can migrate from FTE-based C200 to C300 and retain the Series A - Chassis I/O associated with the C200 by connecting the C300 to the same FTE segment and installing an FTE Bridge module in the Series A I/O chassis, as show in following figure.



6.5.1 Prerequisites

Prerequisites

- You must take your control system **offline** before starting the supervisory network migration process.
- Your current software and hardware must support at least Experion R300 software. See *Checking software and firmware versions*.
- You have logged onto Control Builder with the security level required to make control strategy changes.

6.5.2 Considerations

It may be helpful to initiate a **Project Tree Charts** printout through the **Print** command on the **File** menu before you begin.

If you have a **Qualification and Version Control System** license, there will be additional steps required to check out a component before you can modify it in Control Builder.

6.5.3 Checking software and firmware versions

To check software and firmware versions

1. On the **Project** tab, double-click the Control Processor Module (CPM) block icon to open the block's configuration form.
2. On the **Main** tab, check the **Image Version (IMAGEVER)** parameter to verify the current CPM firmware personality loaded in the CPM.
3. Repeat Steps 1 and 2 to verify the **Image Version (IMAGEVER)** for any FIMs, IOLIMs, ACEs, or other CPMs included in your control strategy.
4. If software and firmware versions are at the Experion R300 software level or greater, go to the next procedure. If software and firmware versions are not at the minimum Experion R300 software level, see the Software Installation and Upgrade Guide to install the required software and firmware.
5. This completes the procedure.

6.5.4 Exporting current database and restoring clean database

To export current database and restore clean database

1. On **Monitoring** tab, inactivate Control Execution Environment (CEE) and associated Control Modules, Sequential Control Modules, and I/O Modules for all Controllers in your control strategy. Do the same for any assigned Fieldbus Interface Modules (FIMs), links, and devices; and I/O Link Interface Modules (IOLIM), links, and I/O Processors.
2. On **Monitoring** tab, delete the target C200 controllers.
3. Click the **Project** tab.
4. On the **File** menu, click **Export**.
5. On **Export** dialog, select all points and types except those for the target CPM200s.
6. To change storage directory location, click the **Browse** button and navigate to desired **Directory** location.
7. Click the **Export** button. The **Exporting Data** dialog appears to show progress of the action.
8. With database export completed, click the **Start** button on the taskbar.
9. Click **Programs** > **Experion Engineering Tools** > **DB Admin** to open the DB Admin utility. **Or** - If you are running R210 or greater software, you launch the DbAdmin utility through the Configuration Studio. On the **Configuration Explorer** tab, click the **Control Strategy** icon and click the **Administer the control strategy database** selection in the **Process Control Strategies** box. In this case, skip the next Step, since you logon through Configuration Studio.
10. Logon with user name and password, if required. Click plus + sign for **DBadmin** folder to expand it.
11. Click plus + sign for **Experion Node** folder to expand it.
12. Click **ERDB Admin Tasks** folder to open Tasks window.
13. On **Tasks** window, click the **Restore Database** icon. Acknowledge messages.
14. When Completed successfully message appears, the clean ERDB has been restored. On **Console** menu, click **Exit**.
15. This completes the procedure.

6.5.5 Build new C300 controllers

Build new C300 controllers with the same names as the C200 controllers they replace.

6.5.6 Configuring control strategy

To configure control strategy

1. Configure FTE Bridge block.
2. On **Project** tab, configure new C300s that are associated with the FTE Bridge module to replace those that were not exported. See the *Control Building Guide* for details.
3. If applicable, use the **File** menu **New** > **Type** > **Fieldbus Device** command to create any Fieldbus device templates that were deleted when the clean database was restored. See the *Fieldbus Implementation Guide* for details.
4. On the **File** menu, click **Import**.
5. Click the **Browse** button and navigate to directory location where you previously stored the database and click the **OK** button. The database location is listed in the **Directory** box.
6. Ensure the check box for the **Import CEE Assignments** is deselected.
7. Click the **Select All** button.
8. Click the **Import** button. Track the progress of the import on the **Importing Data** dialog.
9. When the import is completed. Move/assign the IOMs to the applicable C300/CEEC300 block.
10. Open the IOMs one by one and assign the correct FTE Bridge to each one. Then load the IOMs.
11. Load the FTE Bridge block and other control strategy components as you normally would.
12. This completes the migration procedures.

6.6 Import/export and on-process migration support

You can use the existing **Import** and **Export** commands provided on the Control Builder **File** menu to import and export a FTE Bridge block as you would any other block. The **Device Index** and slot number configuration for the FTE Bridge block is exported. The base **IP Address** for the FTE Bridge block is not exported, so it can be imported into a different FTE community where it will receive a new **IP Address** based upon that community's base **IP Address**.

The FTE Bridge module supports on-process migration (OPM) in the same way as the IOLIM and FIM modules. The on-process migration utility is a licensed option that was introduced with Experion system R101 software. See the *On-Process Migration Planning Guide* for more information.

> ATTENTION
>
> - We recommend that you use the ERDB Database (or Server) Migration function of the OPM utility to move hardware definitions like the FTE Bridge modules instead of the Export/Import functions.
> - Use the Export/Import functions to move or copy control strategies (Control Modules and Sequential Control Modules) from one system to another.

6.7 Troubleshooting

This section lists some possible problems you may encounter in using the FTE Bridge module. The focus is on the FTE Bridge module itself and not the FTE network which has its own diagnostics and report mechanisms.

- FTEB module indicators are off

6.7.1 FTEB module indicators are off

The 4-character display and all LEDs are off.	
Diagnostic check	The 4-character display and all LEDs are off.
Cause	Module is not receiving power.
Solution	• Ensure module is fully seated in the chassis slot. • Turn On power supply switch. • Ensure power is connected to the power supply.

6.7.2 FTEB OK LED is off

The OK LED is off but 4-character display is working.	
Diagnostic check	The OK LED is off but 4-character display is working.
Cause	Bad LED
Solution	Replace the FTE Bridge module.

6.7.3 FTEB FAIL indication

4-character display is alternately showing FAIL and a code number.	
Diagnostic check	Refer to the failure codes located in *FTEB test codes*.

4-character display is alternately showing FAIL and a code number.	
Cause	Internal diagnostics has detected a failed application.
Solution	Cycle power to the chassis. If error persists, replace the FTE Bridge module.

6.7.4 FTEB ALIV indication

4-character display is showing ALIV	
Diagnostic check	4-character display is showing ALIV
Cause	Personality image has not been loaded to the module.
Solution	Load the personality image to the Module.

6.7.5 FTEB RDY indication

4-character display is showing RDY	
Diagnostic check	4-character display is showing RDY
Cause	Boot code has not been loaded to the module.
Solution	Load the boot code to the module.

6.7.6 FTEB BP indication

4-character display is showing BP.	
Diagnostic check	4-character display is showing BP.
Cause	Module has not received its IP Address.
Solution	• Ensure FTE cables are connected to the module. • Ensure BOOTP Server service is running.

6.7.7 FTEB self-test hang

4-character display is stuck on a test code (TXXX).	
Diagnostic check	See the following *FTE Bridge Module Test Codes* table for list of

4-character display is stuck on a test code (TXXX).	
	self test codes.
Cause	Module has hung on self test routine.
Solution	• Cycle power to the chassis. • If error persists, replace the FTE Bridge module.

6.7.8 Cable error indication

A or B LED is Red.	
Diagnostic check	A or B LED is Red.
Cause	FTE cable is not connected.
Solution	Connect FTE cable to module.

6.7.9 Cannot launch NTools after migration

Cannot launch NTools in Ethernet mode after migrating from ControlNet or Ethernet supervisory network.	
Diagnostic check	Check NetworkType registry key.
Cause	NetworkType registry key value has not been changed from CNet or ENET to FTE.
Solution	Change NetworkType registry key value to FTE and re-install CDA server.

6.7.10 FTEB not visible to NTools

FTE Bridge module is not visible in NTools chassis view	
Diagnostic check	FTE Bridge module is not visible in NTools chassis view.
Cause	Chassis does not contain a configured FTE Bridge module or ControlNet Interface module.
Solution	Load configured FTE Bridge block to module.

6.7.11 Cannot create FTEB

Cannot create FTE Bridge block.	
Diagnostic check	Cannot create FTE Bridge block.
Cause	Invalid base IP address (0.0.0.0).
Solution	Configure valid base IP address through Embedded FTE tab on System Preferences dialog.

6.7.12 Cannot 'ping' FTEB

FTE Bridge module appears on System Management FTE display but cannot be "pinged".	
Diagnostic check	FTE Bridge module appears on System Management FTE display but cannot be "pinged".
Cause	Incorrect address assignment.
Solution	• Ensure DHCP server is not configured to respond to BOOTP requests. DHCP server may assign address in different range. • Ensure only Honeywell BOOTP servers bundled with Experion software are on the network. • Change Device Index or slot number of FTE Bridge module and retry.

6.7.13 FTE receive fault diagnostic

The FTE Bridge has detected an open receive signal line between either of its two Ethernet interface devices and the processor handling incoming communication.	
Diagnostic check	• The Status LED for the faulted port (A or B) on the front panel of the FTEB turns RED. • The 'LAN_A' or 'LAN_B' LED for the faulted port on the FTE Tab of the FTEB Function Block form turns RED, respectively. • An alarm is generated by the FTEB... "FTE Port A Receive Fault" or "FTE Port B Receive Fault".
Cause	One of the following conditions may result in a spurious indication of an FTE Receive Diagnostic fault. All revolve around conditions external to the FTEB that allow a carrier to be detected by the FTEB's Port A or Port B Ethernet interface but eliminate FTE traffic on that port. • Disconnecting the uplink cable of an Ethernet interface when only one FTEB is connected to any of the downlink ports on the Ethernet interface. *In this case, the only source of external FTE Diagnostic messages are nodes that communicate through the uplink port of the Ethernet interface. When the uplink cable is disconnected, there are no incoming FTE Diagnostic messages on the FTEB. Since the downlink cable from the Ethernet interface to the FTEB remains attached, the FTEB has a 'good' Link Status on the port. The combination of a good Link Status and no incoming FTE Diagnostic messages results in the **spurious** indication of an FTE Receive Fault.* • Removal and re-insertion of an Ethernet interface or power cycling an Ethernet interface, when the associated FTEB is **not** power cycled. *In this case, when the Ethernet interface is re-powered, Link Status transitions to the 'good' state long before the Ethernet interface completes its power up and starts passing FTE Diagnostic messages again. This interval is long enough that the FTEB's FTE Receive Fault Diagnostic will indicate a **spurious** fault.* • Throttling of Ethernet traffic in the face of an abnormal amount of communication traffic on one or both of the FTEB's Ethernet ports. *In the face of a 'storm' on the wider FTE network, the FTEB will initiate limiting of incoming Ethernet traffic on its FTE ports. As a result of this limiting, a sufficient number of FTE Diagnostic messages may be lost so that one or both ports see 'good' Link Status signals but no FTE Diagnostic messages over the sample interval of this diagnostic. In this case, the FTEB's FTE Receive Fault Diagnostic will indicate a **spurious** fault. The **spurious** alarm generated by the FTE Receive Fault Diagnostic is a relatively minor side effect, in the case of a network storm. A network storm is signaled by other alarms*

The FTE Bridge has detected an open receive signal line between either of its two Ethernet interface devices and the processor handling incoming communication.	
	in the system.
Solution	Unless you suspect that one of the causes described above exists and is resulting in a spurious indication, you must replace the FTEB module exhibiting this diagnostic at your earliest convenience. When this fault exists, network redundancy for this node no longer is working. See *Installing FTE Bridge module (TC-FTEB01/TK-FTEB01)* for details.

6.7.14 FTEB test codes

Test Code	Function
T000	Self test start test
T001	LED check test
T002	Memc initialization test
T003	CPU mask test
ROM Test	**ROM Test**
T010	Boot image check test
T011	Loader image check test
RAM and Parity Tests	**RAM and Parity Tests**
T020	RAM BR or check test
T021	Lower RAM word access test
T022	Upper RAM word access test
T023	Lower RAM byte access test
T024	Upper RAM byte access test
T025	Lower RAM parity int. test
T026	Lower RAM parity int. test
T030	RAM parity sweep test
T031	RAM sweep time test
T032	RAM retention test

Test Code	Function
T033	RAM address test
T034	RAM pattern test
T040	Flash burst test
T044	RAM860 address test
T045	RAM860 pattern test
T046	CPU type test
D-Cache Tests	**D-Cache Tests**
T050	I Cache function test
T051	I Cache integrity test
T055	D Cache function test
T056	D Cache RAM wrap test
T057	D Cache integrity test
Hardware Status Register and System Control Tests (The following tests look for improper states of hardware status bits.)	**Hardware Status Register and System Control Tests** (The following tests look for improper states of hardware status bits.)
T060	Stuck watch dog timer pend test
T061	Stuck DC fail test
T062	Stuck IRQ0 test
T063	Stuck ICP timer test
T064	Stuck ICP comm test
T065	Stuck System fail test
T066	System fail assert test
ICP ASIC and Shared RAM Tests	**ICP ASIC and Shared RAM Tests**
T100	ICP ASIC initialization test
T101	ICP RAM byte write test

Test Code	Function
T102	ICP RAM byte parity test
T103	ICP RAM word read test
T104	ICP RAM byte read test
T105	ICP RAM half read test
T106	ICP RAM half write test
T107	ICP RAM half align test
T108	ICP RAM word align test
T109	ICP RAM address test
T110	ICP RAM pattern test
T111	ICP register access test
T112	ICP address echo test
T113	ICP bus lock test
T114	ICP clock run test
T115	ICP clock compare test
T116	ICP interrupt test
T117	ICP ASIC RAM parity test
T118	ICP RAM ASIC active test
ICP Tests (The ICP comm interrupt cannot be tested during self test.)	**ICP Tests** (The ICP comm interrupt cannot be tested during self test.)
T120	DB FPGA load test
T121	DB lower RAM byte test
T123	DB lower RAM parity test
T125	DB lower RAM access test
T127	DB RAM address test
T128	DB RAM pattern test

Test Code	Function
FTE Bridge Tests	**FTE Bridge Tests**
T130	DB EEPROM interface test
T131	DB PHY interface test
T150	Application image check test
T255	Self test done test

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