Gigabit TAP Probe User Guide

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Chapter 1
Introducing CodeWarrior Gigabit TAP probe

The CodeWarrior is a tool that helps you develop and debug software on Freescale PowerPC processors.

This chapter contains the following sections:

CAUTION

The Gigabit TAP probe contains components that are subject to damage from electrostatic discharge. Whenever you are using, handling, or transporting the Gigabit TAP probe, or connecting to or disconnecting from a target system, always use proper anti-static protection measures, including static-free bench pads and grounded wrist straps.

1.1 What is Gigabit TAP probe?

The Gigabit TAP probe uses advanced emulation technology to provide control of and visibility into your target system. Combined with a host debugger, the Gigabit TAP probe speeds the debugging process by letting you interactively control and examine the state of your target system. The Gigabit TAP is available in two configurations: the basic Gigabit TAP, and the.

The basic Gigabit TAP probe system is composed of two parts:

- The Gigabit TAP probe as shown in figure Figure 1-1, which provides visibility into and control of your target system using a and connects to your host computer through a , or .
- A target system JTAG/COP probe tip, which is designed to provide a physical and electrical interface to the target system processor that you want to gain visibility into.

Figure 1-1. Gigabit TAP probe

The Gigabit TAP + Trace probe includes two additional components to enable high speed trace collection and downloads as shown in figure Figure 1-2 :

- An (internal) provides logic, buffers, and connectors for high speed trace collection and downloads.
- A target system Aurora Nexus cable, which is used to connect the probe to the high speed Aurora Nexus port of the target.

Figure 1-2. Gigabit TAP + Trace

1.1.1 Product highlights

The Gigabit TAP probe has these features:

- Supports PowerPC™ processors
- Supports all CPU core speeds
- Lets you control and debug software running in-target, with minimal intrusion into target system operation
- Lets you debug code in cache, ROM, RAM, and flash memory
- Provides high performance:
  - Split-second single-step execution
  - Gigabit TAP probe is capable of JTAG download speeds greater than 1 MB per second from host to the target system
  - Gigabit TAP probe + Trace is capable of Aurora download speeds of 6 MB per second

NOTE

The actual download speed depends on the target system processor, the debug port's clock frequency, the network speed, and the debugger.

- Supports 10/100/1000BaseT Ethernet network connection
- Supports telnet access to your target system's serial port, allowing you to interact with your target system's serial port over the network
- Supports both big and little endian byte-order

- Automatically supports target system signal levels from 1.2V to 3.3V
- Software debug capabilities including:
  - Control instruction execution
  - Display and modify target system memory
  - Examine and modify any processor registers
  - Run to breakpoints in ROM, RAM, or flash memory
  - Single-step through source and assembly language code views
  - Step into, over, or out of functions
  - Collect and analyze real-time data and execution trace

1.1.2 Gigabit TAP probe benefits

The Gigabit TAP probe provides these key benefits:

- *Visibility*: The Gigabit TAP probe makes it possible for you to observe registers and the current state of target system memory. You can halt program execution at predefined states and examine the data for a particular program state.
- *Control*: You can conveniently control the state of the target system by downloading code, manually modifying processor registers and memory, single-stepping through the code, or setting breakpoints.
- Trace: Gigabit TAP probes equipped with a trace module (Gigabit TAP + Trace) enable collection of 4 GB of real-time target execution and data trace.

1.2 Identifying components

Before you begin, check that these components are present:

- External power supply with four interchangeable plugs
- The Gigabit TAP probe should include the following and :
  - One standard debug port (JTAG/COP) probe tip cable assembly
  - One flexible probe tip extension cable
  - One RJ-45 cable
  - One RJ-25 cables
  - One 9-pin and one 25-pin cable adapters
  - One type A/B USB cable
- The Gigabit TAP + Trace probe should also include:
  - Aurora Nexus connector on the probe
  - Trigger OUT/IN connectors on the probe
  - One 70-pin Aurora Nexus cable
- Gigabit TAP Probe User Guide (this manual)

1.3 Operating requirements

Before setting up the system, you should make sure that the operating environment is prepared.

1.3.1 Target power requirements

Several configurations are possible for providing power to the system. The preferred configuration is for all target DC power supplies to use a 3-wire AC input with an earth (safety) ground and with the earth ground isolated from the DC return. Table 1-1 shows various and the results of using each.

Table 1-1. Target system device power supply configurations

	AC Input	Isolation	Result
Preferred configuration	3-wire system with earth (safety) wire	AC earth is isolated from DC return.Target system DC is fully isolated and is floating.	Normal operation
Acceptable configuration	2-wire system with no earth (safety) wire	AC return is isolated from DC return. Target system DC is fully isolated and is floating.	Normal operation
Acceptable configuration	3-wire system with earth (safety) wire	AC earth is tied to DC return. Target system DC is not isolated and is floating.	Configuration may result in unstable operation of DC signals.
Prohibited configuration 	2-wire system with no earth (safety) wire	AC return is tied to DC return. Target system DC is not isolated and is not floating.	Configuration may result in unstable operation of DC signals and AC hum.A safety hazard may result from power supply or target system failure where DC voltage is connected to AC return.

CAUTION

Do not use 2-wire AC input with the AC neutral tied to the DC return (Figure 1-3) on any power supply in the system. A failure in a power supply or target system where DC voltage becomes connected to AC neutral may result in personal injury and damage to the equipment.

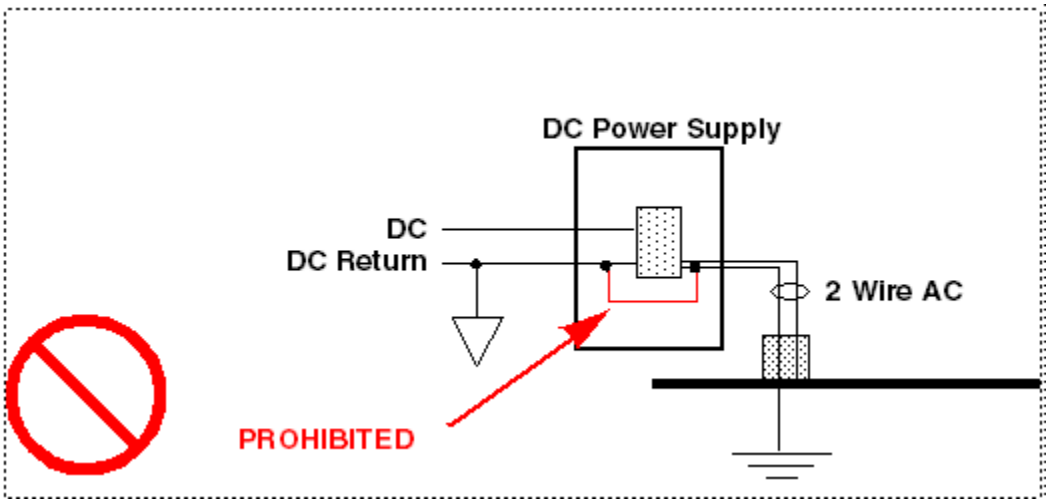

Figure 1-3. Prohibited target power supply connection

CAUTION

Good grounding practices should be observed when connecting digital grounds to earth ground, since ground loops may induce sufficient currents to cause irregular operation of the combined system. Under no circumstances, the third wire prong on any power cord be removed or disconnected.

1.3.2 Standard electrostatic precautions

This instrument contains static-sensitive components that are subject to damage from . Use standard ESD precautions when transporting, handling, or using the Gigabit TAP probe and the target system, when connecting/disconnecting the probe and the target system, and when removing the cover of the instrument.

We recommend the use of the following precautions:

- Use wrist straps or heel bands with a 1 Mohm resistor connected to ground.
- On the work surface and floor, use static conductive mats with a 1 Mohm resistor connected to ground.
- Keep high static-producing items, such as non-ESD-approved plastics, tape and packaging foam away from the probe and the target system.

The above precautions should be considered as minimum requirements for a static-controlled environment.

1.3.3 Electrical requirements

The Gigabit TAP probe is powered from the external power supply provided with your unit. It can use line voltages of 100-240 VAC (50/60 Hz). The Gigabit TAP probe tip draws less than 50 mA from the target system.

We recommend that you use a surge protector between the power supply and AC power.

1.3.3.1 Connecting power supply cable

Connect the power supply connector to the POWER connector on the Gigabit TAP probe as shown in figure below.

CAUTION

Connect only the provided power supply to the Gigabit TAP probe. Other power supplies may look similar, but can damage the probe if the supply specifications differ from the required specifications.

Figure 1-4. Gigabit TAP probe with power cable attached

1.3.3.2 Cycling power to system

When you need to apply or cycle power to the Gigabit TAP probe, connect or disconnect the power cable from the power source or from the probe. After you have connected the probe to your target system, use the following sequence for applying or removing the power:

1.3.4 Operating temperature

The Gigabit TAP probe can operate in a temperature range of 0 to 40 °C (32 to 104 ºF).

NOTE

C is for celsius and F is for Fahrenheit

1.3.5 Target system requirements

The Gigabit TAP probe automatically supports target system signal levels from 1.2V to 3.3V.

NOTE

In the case of PowerPC targets with a $\overline{\text{Qack}}$ signal, for the Gigabit TAP probe to properly stop and restart the target, the$\overline{\text{Qack}}$ signal must be pulled low. The Gigabit TAP probe pulls this signal low through the probe tip.

1.4 Related documentation

This manual describes the procedures for unpacking the Gigabit TAP probe, connecting the external power supply, setting up Ethernet communication, and connecting the Gigabit TAP probe to your target system.

The CodeWarrior documentation explains how to install and configure the CodeWarrior IDE and debugger.

Chapter 2
Connecting to network

This chapter explains how to connect the Gigabit TAP probe to an existing .

The Gigabit TAP probe is an Ethernet host device that may be configured for TCP/IP using to acquire its IP configuration (the default method) or through a static IP configuration.

This chapter contains the following sections:

- Connecting Gigabit TAP probe to network
- Customizing Gigabit TAP probe
- Testing network communication

CAUTION

The probe contains electronic components that are sensitive to electrostatic discharge. Always use anti-static procedures while handling the probe components.

2.1 Connecting Gigabit TAP probe to network

The Gigabit TAP probe's default operation is to acquire its network configuration automatically using DHCP, and optionally, attempt to register its hostname with a name server.

The factory assigned host name is FSLXXYYZZ where XXYYZZ is the last three octets of the MAC address, provided on a label on the bottom side of the probe. For example, if the probe's MAC address is 00:04:9f:00:77:31, the host name will be FSL007731. The Gigabit TAP probe can connect directly to a network using twisted pair cables.

2.1.1 Connecting to twisted pair interface

1. Plug one end of the supplied (p/n 600-75499) into the RJ-45 connector of the Gigabit TAP probe as shown in Figure 2-1.
2. Connect the other end of the RJ-45 cable into the RJ-45 connector of your twisted pair network or host computer.

NOTE

To connect to a thinwire or thickwire network, use a converter hub that accepts the twisted pair (10/100/1000BaseT) cable from the Gigabit TAP probe and converts to the thinwire (10Base2) or thickwire (10Base5) cable from your network.

Figure 2-1. Gigabit TAP probe with an RJ-45 cable attached

NOTE

When you configure the debugger for the hardware connection, you will need to specify the Gigabit TAP probe IP address or hostname. The CCS `findcc` utility is used to search any probe on the local subnet. See Using CCS to search for Gigabit TAP probes section for more information.

NOTE

Depending on the type and complexity of your network, your network administrator may need to update network

server tables so that the network accesses the Gigabit TAP probe correctly. Updating network server tables requires both a detailed knowledge of Ethernet address resolution and network routing with write access permission to the server tables. See Network administration section for more information on network administration.

2.2 Customizing Gigabit TAP probe

If you cannot use DHCP, you must configure the probe for your network using static IP address resolution.

As shipped, the Gigabit TAP probe acquires its network configuration automatically using DHCP. To manually configure the network settings of the Gigabit TAP probe for your network, connect a terminal to the probe configuration port and use the probe on-board setup utility `netparam` to change the probe network settings. The probe `netparam` utility lets you select and modify network parameters that are saved in probe memory. Use `netparam` to configure the probe to match your and .

If the probe is able to communicate with hosts on other subnets, you will need to configure the probe for one of the following routing options:

- Default gateways
- tables

2.2.1 Establishing serial communication with Gigabit TAP probe

1. Connect one end of the USB cable (P/N 600-76787) to a on your host computer.
2. Connect the other end of the USB cable to the USB connector of the Gigabit TAP probe, labeled as shown in figure Figure 2-2.

Figure 2-2. Gigabit TAP Probe with USB Cable Attached

3. Identify the serial port device assigned to the Gigabit TAP. On Windows, click **Start > Control Panel >Adminstrative Tools > Computer Management > Device Manager > Ports** and then select **USB serial port** from the ports list. On Linux, the device file is located at: `/dev/ttyUSB0`.

NOTE

On Windows, you may need a driver before you can access the CONFIG port. The CodeWarrior installer will install this driver.

4. Set your terminal or terminal communication software (for example, Windows HyperTerminal) as follows:
   - 115200 baud
   - 8 data bits
   - 1 stop bit
   - no parity
   - hardware handshaking disabled
   - disabled
   - Turn on power to the Gigabit TAP probe. If the power is already on, then cycle power to the probe.
   - When prompted, press **Enter** . The login banner should be displayed and the `core>` command-line prompt appears.

2.2.2 Customizing Gigabit TAP probe network settings

You need to have write permissions to the network database or the assistance of your network system administrator.

1. Change the Gigabit TAP probe network settings.
   a. At the `core>` prompt, enter the `netparam` command to view the current settings.
   b. For network setup, see netparam section for syntax and options. For more information on installing the Gigabit TAP probe on a network, see Network Administration section.
   c. At the `core>` prompt, enter the `netparam` commands and required parameters.
2. At the `core>` prompt, enter `reset` to reboot the Gigabit TAP probe to activate the new network settings.

Example: Assign a Static IP Address and Hostname to the Gigabit TAP Probe

If the Gigabit TAP probe has a static IP address of `195.121.1.2` and a hostname of lab01, enter the following commands:

```
core> netparam bootconfig static:lab01
core> netparam static_ip_address 195.121.1.2
core> reset
```

The `netparam` utility copies its settings into non-volatile memory on the probe. Follow these rules while using `netparam` utility:

- Each time you enter a `netparam` command, wait for the `core>` prompt to re-appear before entering the next command. The prompt indicates that the parameter change has been logged.
- When you have finished entering all settings, type `reset` at the `core>` prompt. When the probe restarts, it will use the new `netparam` parameters.

2.3 Testing network communication

You can use the `ping` command to ensure that the Gigabit TAP probe can communicate with the host.

2.3.1 Verifying communication

At a host command prompt, type the following:

```
ping hostname | ip_address
```

where `hostname` is the name and `ip_address` is the IP address assigned to the Gigabit TAP probe.

If no output is displayed on the screen, check the following:

- The physical connections are tight.
- The Gigabit TAP probe address and netmask in the `hosts` file match those in Gigabit TAP probe flash.
- The netmask used for the Gigabit TAP probe and for the are appropriate to the class of the IP address.

Chapter 3
Connecting to target system

To run your software using the Gigabit TAP probe, you must have working target system hardware, prototype hardware, or an evaluation board.

This chapter explains how to connect a Gigabit TAP probe to the target system.

This chapter contains the following sections:

CAUTION

The Gigabit TAP probe contains components that are subject to damage from electrostatic discharge. Whenever you are using, handling, or transporting the Gigabit TAP probe, or connecting to or disconnecting from a target system, always use proper anti-static protection measures, including static-free bench pads and grounded wrist straps.

3.1 Debug port connector information

The Gigabit TAP probe offers debugging capabilities without modifying any target system code or any special I/O port in the target system for communication with a monitor.

Target system connections can be made using any one of the debug ports (JTAG/COP or). The basic Gigabit TAP probe connects to the target system in any of the following ways:

- Connect to the JTAG header on the target system directly with the probe tip.

- Connect to the JTAG header on the target system using a flexible extension cable. Use it when more clearance is required.
- Connect to the Aurora Nexus socket on the target system directly with the Aurora Nexus cable.

The extension cable is provided with your Gigabit TAP probe. A 70-pin Aurora Nexus cable is provided with the Gigabit TAP + Trace probe. A 22-pin Aurora Nexus cable is also available and can be ordered separately.

JTAG/COP connector information chapter describes the debug port connector specifications.

3.2 Connecting to target JTAG/COP connector

You can connect the Gigabit TAP probe to the target system in one of three ways. The three methods are explained in the following sections:

- Connecting probe tip directly to debug port connector
- Connecting probe tip to target system JTAG connector
- Connecting JTAG header using extension cable

CAUTION

Failure to connect the Gigabit TAP probe tip connector to the target system may damage the Gigabit TAP probe or target system. Verify all connections before applying power.

3.2.1 Connecting probe tip directly to debug port connector

If your target system has debug port connectors, you can directly connect the probe tip and/or trace cables on the Gigabit TAP probe to one of the target system debug port connectors.

3.2.2 Connecting probe tip to target system JTAG connector

1. Turn off the power to the target system and the Gigabit TAP probe.
2. Make sure all the pins of the probe tip or trace cable are properly aligned with the debug port connector on the target system. Use mechanical keying and the label on the probe tip as a guide. The Gigabit TAP probe JTAG/COP connector is shown in figure Figure 3-1.

Figure 3-1. Gigabit TAP probe PPC JTAG/COP probe tip

3. Connect the probe tip 50-pin ribbon cable to the RUN CONTROL connector on the Gigabit TAP probe as shown in the figure Figure 3-2.
4. Gently (but firmly) press the probe tip onto the target system debug port header. Make sure that you properly align the Gigabit TAP multi-pin socket connector with the multi-pin header on your target system.

NOTE

Ensure that pin 1 of the probe tip is connected to the pin 1 of the header.

Figure 3-2. Gigabit TAP probe with PPC-JTAG probe tip

3.2.3 Connecting JTAG header using extension cable

Use the supplied cable to connect the Gigabit TAP probe to your target system if there is not enough clearance for the standard probe tip to fit onto the target system .

3.2.3.1 Connecting flexible probe tip extension cable with JTAG header

1. Turn off the power to the target system and the Gigabit TAP probe.
2. Attach the multi-pin header end of the flexible probe tip extension cable to the JTAG socket of the Gigabit TAP probe tip as shown in Figure 3-3.

Figure 3-3. Flexible probe tip extension cable attached to JTAG/COP header

The red stripe on the cable identifies pin 1. The pin assignment of the cable is identical to that of the probe tip socket.

3. Connect the other end of the flexible probe tip extension cable to the debug port header on your target system.

3.3 Connecting to target aurora nexus connector

You can connect the Gigabit TAP + Trace probe to the target system with the Aurora Nexus cable.

3.3.1 Connecting aurora nexus cable

1. Turn off the power to the target system and the Gigabit TAP + Trace probe.
2. Connect the Aurora Nexus cable to the AURORA NEXUS connector on the Gigabit TAP + Trace probe as shown in figure Figure 3-4.

Figure 3-4. Gigabit TAP + Trace probe with aurora nexus cable

3.4 Connecting to target system serial port

Many target system boards have a built-in serial port. A console interface connection to the serial port of the target system lets you query and configure the state of your target system.

The Gigabit TAP probe provides a serial port which can be configured to access the serial port of the target system. This is useful if you need to access the serial port of a remotely located target system over Ethernet from the host system.

The following sections explain how to access the serial port of the target system:

- Connecting Gigabit TAP probe to target system
- Configuring target serial port
- Accessing target serial port

3.4.1 Connecting Gigabit TAP probe to target system

An RJ-25 cable (P/N 600-76822) is provided with the Gigabit TAP probe to connect to the serial port of your target system.

3.4.1.1 Connecting serial cable between Gigabit TAP probe and serial port of target system

1. Connect one end of the RJ-25 cable, and the appropriate adapter, to the serial port on your target system board.
2. Connect the other end of the RJ-25 cable to the Gigabit TAP probe RJ-25 serial connector, labeled TARGET SERIAL.

3.4.2 Configuring target serial port

Table 3-1 table shows the default settings of the Gigabit TAP Target Serial port.

Table 3-1. Gigabit TAP probe target serial port default settings

For this option...	Select...
Baud rate	9600
Data bits	data8
Stop bits	stop1
Parity	noparity
Hardware flow control	nortscts
XON/XOFF flow control	noxon
Target echo feature	echo

If the Gigabit TAP probe Target Serial port settings do not match the serial port settings of your target system, use the following steps:

3.4.2.1 Configuring Gigabit TAP probe serial port

1. Make sure network communications have already been configured correctly. For more information, see Connecting to network topic or Setting up standalone PC ethernet topic.
2. Connect to the Gigabit TAP probe internal setup utility. For more information, see Connecting to Gigabit TAP probe setup utility topic.
3. When the `core>` prompt appears on the terminal, enter the `tgtty` command to configure the Gigabit TAP probe Target Serial port. The syntax is:

```
tgtty [9600|19200|38400|57600|115200] [data8|data5|data6|data7] [stop1|
stop2] [noparity|oddparity|evenparity|lowparity|highparity] [rtscts|nortscts] [xon|
noxon] [echo|noecho]
```

For example:

```
tgtty 19200 data8 stop2 noparity nortscts noxon echo
```

4. Verify the Target Serial port configuration at the `core>` prompt by entering the `tgtty` command by itself:

   ```
   tgtty
   ```

3.4.2.2 Restoring target serial port to default settings

1. Make sure network communications has already been configured correctly. For more information, see Connecting to network chapter or Setting up standalone PC ethernet appendix.
2. Connect to the CodeWarrior TAP probe internal setup utility. For more information, see Connecting to Gigabit TAP probe setup utility section.
3. When the `core>` prompt appears on the terminal, use the `tgtty` command to reset the Target Serial port to the default settings: `tgtty default`

3.4.3 Accessing target serial port

You can use telnet to connect to the Gigabit TAP probe Target Serial port and access the serial port of your target system remotely over Ethernet.

3.4.3.1 Telnet to target serial port

1. Make sure that you have physically connected the Gigabit TAP probe RJ-25 cable to your target system (for more information, see Connecting the Gigabit TAP Probe to the Target System topic).
2. Verify the serial port settings (see Configuring target serial port topic).
3. Start a telnet session and connect to the Gigabit TAP probe Target Serial port:

   ```
   telnet {hostname | ip_address}1082
   ```

   Use the host name or IP address of the probe. For static IP, the host name must be the same one you entered into the `hosts` database file; see Connecting to network topic or Setting up standalone PC ethernet topic. To identify the IP address of any probe on the subnet, see Using CCS to search for Gigabit TAP probes topic. The Target Serial port number of the Gigabit TAP probe is 1082.

4. You should now have access to the serial port of your target system. You can use this connection in the same manner as if your host computer were connected directly to the serial port of your target system.

NOTE

If you have not already installed it, you can now install the CodeWarrior software. Refer to the Targeting manual for information on how to configure the debugger and run a confidence test.

Chapter 4
Using Gigabit TAP probe

This chapter provides system startup procedures and explains how the Gigabit TAP probe is accessed remotely.

This chapter contains the following sections:

4.1 Debugging with Gigabit TAP system

This section explains how to start debugging with the Gigabit TAP probe.

Before starting debug with the Gigabit TAP probe, make sure you have:

- Connected the Gigabit TAP probe to your network .
- Connected the Gigabit TAP probe to the target system.
- Installed the debugger software and properly configure it to communicate with the Gigabit TAP probe.

4.1.1 Starting Gigabit TAP probe

1. Apply power to the Gigabit TAP probe.
2. Apply power to the target system.

NOTE

The Gigabit TAP probe draws power from the external power supply. The Gigabit TAP probe tip draws less than 50 mA from the target in order to detect target power.

3. Start the debugger.
4. Configure the debugger for the Gigabit TAP connection.

LEDs are provided to indicate the status of the Gigabit TAP probe. For information on the , see Ethernet TAP probe specifications topic.

You are now ready to begin your debug session. For information on using the debugger, see Targeting Users Guide .

4.2 Accessing Gigabit TAP probe remotely

You can remotely access the internal setup utility and the Target Serial port of the Gigabit TAP probe after you connect the probe to your network.

If the host computer is not physically located near the Gigabit TAP probe, remote access is useful when you need to:

- reconfigure communications
- use the serial port of your target system
- reset the Gigabit TAP probe through your Ethernet connection

4.2.1 Remotely accessing setup utility

Open a telnet session and connect to the Gigabit TAP probe by entering the command:

```
telnet hostname | ip_address
```

Use the host name or IP address of the probe. For static IP, the host name must be the same one you entered into the `hosts` database file; see Connecting to network topic or Setting up standalone PC Ethernet topic. To identify the IP address of any probe on the subnet, see Using CCS to search for Gigabit TAP probes topic.

The login banner is displayed, followed by the `core>` command-line prompt.

4.2.2 Connecting to your target's serial port remotely

Make sure the Gigabit TAP probe Target Serial port is physically connected to your target's serial port, and it has been configured correctly. For more information, see Accessing target serial port topic.

Chapter 5
Hardware specifications

This chapter provides hardware specifications for the Gigabit TAP probe.

This chapter contains the following sections:

5.1 LEDs on Gigabit TAP probe

Figure 5-1 and Figure 5-2 show the various LEDs of the Gigabit TAP and Gigabit TAP + Trace probes.

Figure 5-1. Gigabit TAP Probe - top view

Figure 5-2. Gigabit TAP + Trace Probe - top view

5.1.1 Heartbeat indicator

The (labeled HEARTBEAT) indicates the status of communication between the Gigabit TAP probe and the network as follows:

- The LED is red until the Gigabit TAP probe boot code starts running.
- The LED flashes orange (1 Hz) during configuration of the network interface.
- The LED flashes green (1 Hz) after network interface has been successfully configured. During firmware updates, the LED flashes green at a higher frequency (5Hz).

NOTE

Do not remove power, unplug the network, or press the reset button during firmware updates.

- The LED is unlit if the Gigabit TAP probe is not powered on.
- The LED flashes red if the Gigabit TAP probe is overheating.

5.1.2 Run/Pause indicator

The status LED (labeled) indicates the state of the target as follows:

- The LED is green when the target is in run mode.
- The LED is red when the target is in pause mode.
- The LED is orange when the target is in mixed mode.
- The LED is initially unlit and remains so until the debugger is connected to the Gigabit TAP probe.

5.1.3 Target power indicator

The target power LED (labeled TARGET POWER) indicates whether the Gigabit TAP probe detects target power.

- The LED is green when target power is detected.
- The LED is unlit when no target power is detected.

NOTE

In Gigabit TAP + Trace systems, this LED is shared by the run control and Aurora Nexus cables and will light up if target power is detected on either cable.

5.1.4 Active indicator

The active (labeled ACTIVE) indicates the status of the Aurora Nexus interface.

- The LED is unlit if the Aurora Nexus link is down.
- The LED is red if the Aurora Nexus lanes are up but the channel is not up.
- The LED is green if the Aurora Nexus lanes are up and the channel is also up.
- The LED is orange if the Aurora Nexus lanes are up and the channel is also up but errors are occurring.

5.1.5 Measure indicator

The measure LED (labeled MEASURE) indicates the flow of data across the Aurora Nexus channel and in and out of the trace buffer.

- The LED is unlit if the the unit is idle.
- The LED flashes red if there is data flow on the Aurora Nexus channel, sending or receiving.
- The LED flashes green if the trace buffer is being read.
- The LED flashes orange if there is data flow on the Aurora Nexus channel and also the trace buffer is being read.

5.1.6 RJ-45 Ethernet connector with Link and Activity indicators

The Gigabit TAP probe interface consists of an RJ-45 connector and a built-in twisted pair MAU that connects directly to 10/100/1000BaseT twisted pair networks. See Connecting to network topic or Setting up standalone PC Ethernet topic for more information on connecting to an network.

The Gigabit TAP probe link and activity indicators are integrated into the RJ-45 Gigabit TAP probe connector. The yellow indicator is turned on when the Gigabit TAP probe is connected to any network, and flickers when data is being transferred across the network. The green indicator is turned on when the Gigabit TAP probe is connected to a 1000BaseT network, and flickers when data is being transferred across the network.

5.1.7 Gigabit TAP probe status indicators

The Gigabit TAP probe uses LEDs to indicate its status.

Table 5-1. Gigabit TAP probe status indicators

LED	Location	Activity	Description
HEARTBEAT	Top	Off	Gigabit TAP probe is not powered on.
		Solid red	Gigabit TAP probe is executing the BootLoader or has failed to boot.
		Orange heartbeat	Gigabit TAP probe Operating System running and network interface is initializing.
		Green heartbeat	Gigabit TAP probe Operating System running and network interface successfully configured.
		Red heartbeat	Gigabit TAP is overheating. Remove airflow obstructions, and contact Customer Support if the problem persists.
RUN/PAUSE	Top	Off	Debugger is not connected to Gigabit TAP probe.
		Solid red	Gigabit TAP probe is in pause mode.
		Solid green	Gigabit TAP probe is in run mode.
		Solid orange	Gigabit TAP probe in mixed mode.

Table continues on the next page...

Table 5-1. Gigabit TAP probe status indicators (continued)

LED	Location	Activity	Description
TARGET POWER	Top	Off	Target system power is not detected.
		Solid green	Target system power is detected.
ACTIVE	Top	Off	Aurora Nexus link is down.
		Solid red	Aurora Nexus lanes are up but the channel is not up.
		Solid green	Aurora Nexus lanes are up and the channel is also up.
		Solid orange	Aurora Nexus lanes are up and the channel is also up but errors are occurring.
MEASURE	Top	Off	Gigabit TAP is idle.
		red	Data flow on the Aurora Nexus channel.
		green	Trace buffer is being read.
		orange	Data flow on the Aurora Nexus channel and also the trace buffer is being read.
ACTIVITY	Ethernet Connector	Off	Ethernet is not transmitting or receiving data.
		Green heartbeat	Ethernet is transmitting or receiving.
LINK	Ethernet Connector	Off	Ethernet is not linked.
		Solid Orange	Ethernet is linked.

5.2 Host connectors on Gigabit TAP probe

This figure shows the host connectors of the Gigabit TAP and Gigabit TAP + Trace probes.

Figure 5-3. Gigabit TAP and Gigabit TAP + Trace probes - host end view

5.2.1 Reset button

The reset button is used to reboot the Gigabit TAP probe.

5.2.2 Power connector

The Power connector on the Gigabit TAP probe is used to connect the DC power supply cable.

5.2.3 RJ-45 Ethernet connector

The Ethernet connector on the Gigabit TAP probe is used to connect to an 10/100/1000BaseT Ethernet.

5.2.4 Config USB connector

The Config USB port on the Gigabit TAP probe acts as a virtual serial device which supports at 115200 baud. The Config USB port is used for configuring network communication, entering routing tables, and for diagnostics.

5.3 Target connectors on Gigabit TAP probe

Figure 5-4 and Figure 5-5 shows the target connectors of the Gigabit TAP and Gigabit TAP + Trace probes.

Figure 5-4. Gigabit TAP probe - target end view

Figure 5-5. Gigabit TAP + Trace probe - target end view

5.3.1 Trigger in connector

The TRIGGER IN port on the Gigabit TAP + Trace probe is a 3.5mm stereo socket, with a trigger input channel on pin 3 (right), and an trigger output channel on pin 2 (left).

5.3.2 Trigger out connector

The TRIGGER OUT port on the Gigabit TAP + Trace probe is a 3.5mm stereo socket, with a trigger output channel on pin 3 (right), and an trigger input channel on pin 2 (left).

5.3.3 Aurora Nexus connector

The Aurora Nexus cable is connected to the AURORA Nexus socket on the Gigabit TAP + Trace probes.

5.3.4 RJ-25 target serial connector

The Gigabit TAP probe provides a target serial port which can be configured to access your target's serial port. This is particularly useful if your host computer is not near your target and you need to access your target's serial port remotely over your network.

Figure below shows the pinout definition of the Target serial port.

Table 5-2. Pinout definition of the Target Serial port

Pin	Signal
1	Ready To Send (RTS)
2	Ground
3	Receive Data (RxD)
4	Transmit Data (TxD)
5	Ground
6	Clear To Send (CTS)

Pin 1 is on the right side as you look at the RJ-11 socket (locking tab on the bottom).

5.3.5 Run control probe tip cable connector

The probe tip ribbon cable is connected to the 50-pin connector on the Gigabit TAP probe.

5.3.6 Debug port connector

The debug port socket is on the end of the tip and is used to connect the Gigabit TAP probe to a debug port header on your target system.

NOTE

Ensure that Pin 1 of the probe tip is connected to the Pin 1 of the header.

5.4 Gigabit TAP probe specifications

The dimensions of both Gigabit TAP and Gigabit TAP + Trace probes are same. The figure Figure 5-6 shows the dimensions of the Gigabit TAP + Trace probe.

Figure 5-6. Gigabit TAP + Trace probe dimensions

5.4.1 Electrical characteristics

The Gigabit TAP probe affects the load on only those signals that are connected to the debug port connector. Loading depends on the method used to connect the Gigabit TAP probe to the target system. See Connecting to target system topic for a description of each connection method.

The Gigabit TAP probe affects the target processor and target electrical characteristics. Caution should be taken in designing the target to accommodate the small signal delays associated with in-circuit emulator or other test equipment.

The Gigabit TAP probe automatically supports target signal levels from 1.2V to 3.3V.

5.4.2 Physical characteristics

The Gigabit TAP probe is designed to accommodate a trace expansion card, so the overall system may be too large to physically fit in all target systems.

If you are unable to connect to the debug port on your target system, or if your target system does not have a debug port connector, see Connecting JTAG header using extension cable topic.

The Table 5-3 table shows the physical characteristics of the Gigabit TAP probe.

Table 5-3. Gigabit TAP probe - physical characteristics

Physical Characteristics	
Power Consumption	
Gigabit TAP probe power consumption from external power supply	5A @ 12V maximum
Gigabit TAP probe power consumption from target	Less than 50 mA to detect target power
Environmental Requirements	
Operating temperature	0 to 40 ×C (32 to 104 ×F)
Storage temperature	-40 to 70 ×C (-40 to 158 ×F)
Humidity	5% to 95% relative humidity, non-condensing
Physical	
Gigabit TAP probe dimensions	8.473" x 6.2" x 2.661" (21.52 cm x 15.74 cm x 6.75 cm)
Aurora Nexus cable dimensions	See Aurora high speed trace daughtercard information topic
Run Control probe tip enclosure dimensions (excluding connector)	approx. 2.25" x 1.75" x 0.625" (5.72 cm x 4.44 cm x 1.59 cm)
Run Control target socket dimensions	
Height (out of probe tip enclosure; above board)	0.28" (0.71 cm)
Thickness	0.20" (0.51 cm)
Pin-to-pin spacing	0.1" (0.25 cm)
JTAG/COP width	0.8" (2.0 cm)
Black and gray cable	approximately 16.0" x 1.25" x 0.126" (40.64 cm x 3.18 cm x 0.32 cm)

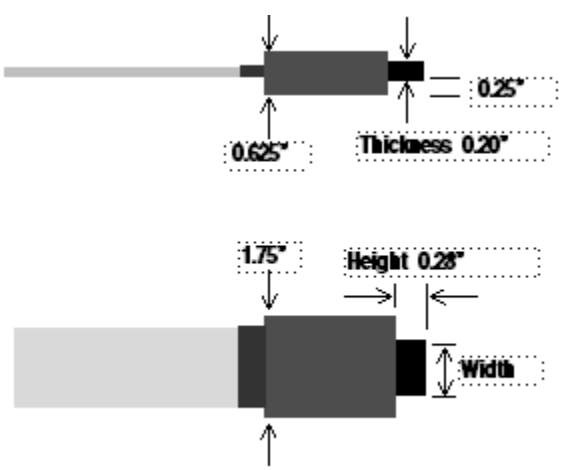

Figure 5-7. Target connector dimensions

Chapter 6
JTAG/COP connector information

The CodeWarrior Gigabit TAP JTAG/COP probe has a 16-pin connector which automatically supports target system signal levels from 1.2V to 3.3V.

Figure 6-1 shows the pin assignments of the probe JTAG/COP connector.

Table 6-1 lists JTAG/COP signal names, direction, pin numbers, descriptions, and drive capabilities for the probe JTAG/COP connector.

Table 6-2 provides a general description of each JTAG/COP signal and the operational requirements.

NOTE

All JTAG/COP signals must meet accepted standards for JTAG/COP signal design. To ensure proper and stable operation between the Gigabit TAP probe and the target system, the JTAG/COP signals must meet the requirements listed in Table 6-2.

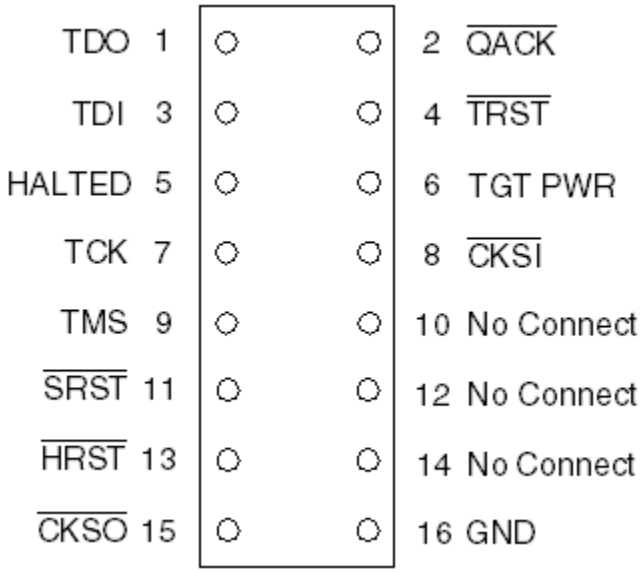

Figure 6-1. Gigabit TAP probe for JTAG/COP connector pin assignments

Table 6-1. Gigabit TAP probe for JTAG/COP signal directions

JTAG/COP pin	Signal mnemonic	Signal direction	Description
1	TDO	From target system	17pF load
2	$\overline{\text{QACK}}$	From Gigabit TAP probe connector	100Ohm pull-down
3	TDI	From Gigabit TAP probe connector	50mA driver
4	$\overline{\text{TRST}}$	From Gigabit TAP probe connector	50mA driver**1**
5	HALTED	From target system	17pF load
6	TGT PWR	From target system	2MOhm pull-down, plus 0.01µF load
7	TCK	From Gigabit TAP probe connector	50mA driver
8	CKSI	From Gigabit TAP probe connector	50mA driver
9	TMS	From Gigabit TAP probe connector	50mA driver
10	No Connect	- n/a -	
11	$\overline{\text{SRST}}$	Bi-directional	Open-drain. 100Ohm to ground when asserted by Gigabit TAP probe, 22pF load when not asserted**1**
12	No Connect	- n/a -	
13	$\overline{\text{HRST}}$	Bi-directional	Open-drain. 100Ohm to ground when asserted by Gigabit TAP probe, 22pF load when not asserted**1**
14	No Connect	- n/a -	

Table continues on the next page...

Table 6-1. Gigabit TAP probe for JTAG/COP signal directions (continued)

JTAG/COP pin	Signal mnemonic	Signal direction	Description
15	$\overline{\text{CKSO}}$	From target system	17pF load **1**
16	GND	- n/a -	

1. 14.7KOhm pull-up to buffered TGT PWR.

Table 6-2. Gigabit TAP probe for JTAG/COP signal recommendations and requirements

JTAG/COP pin	Signal mnemonic	Requirement
1	TDO	Must be wired to the target system processor. TDO is an output from the target system processor and an input to the Gigabit TAP probe. The TDO trace run should be kept short and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace. TDO should have a series termination resistor located near the target system processor.
2	$\overline{\text{QACK}}$	May be wired to the target system processor. $\overline{\text{QACK}}$ is an input to most PowerPC processors and must remain low while the Gigabit TAP probe is connected to the target system. The Gigabit TAP probe connects this signal internally to the JTAG/COP GND pin (16) through a 100Ohm resistor.
3	TDI	Must be wired to the target system processor. The Gigabit TAP probe drives the TDI output with up to 50mA. The TDI trace should be kept short and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace. TDI should have an RC termination option at the processor.
4	$\overline{\text{TRST}}$	Must be wired to the target system processor. The Gigabit TAP probe drives the $\overline{\text{TRST}}$ output with up to 50mA. To gain control of the processor, the Gigabit TAP probe negates $\overline{\text{TRST}}$ approximately 250 milliseconds before negation of $\overline{\text{HRST}}$. This allows the Gigabit TAP probe to issue COP commands through the JTAG/COP interface and gain control of the processor upon negation of $\overline{\text{HRST}}$. The $\overline{\text{TRST}}$ trace run should be kept short and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace.
5	HALTED	Need not be wired to the target system. The Gigabit TAP probe does not currently use this signal.

Table continues on the next page...

Table 6-2. Gigabit TAP probe for JTAG/COP signal recommendations and requirements (continued)

JTAG/COP pin	Signal mnemonic	Requirement
6	TGT PWR	Must be wired to the target system. The Gigabit TAP probe uses this signal to determine if power is applied to the target system. This signal is also used as a voltage reference for the signals driven by the Gigabit TAP probe ($\overline{\text{CKSI}}$, $\overline{\text{TRST}}$, TCK, TMS, TDI). TGT PWR (pin 6) should be connected to the target system Vcc through a pull-up resistor. The Gigabit TAP will draw less than 50 µA from this signal, so a weak pull-up is sufficient (1KOhm).
7	TCK	Must be wired to the target system processor. The Gigabit TAP probe drives the TCK output with up to 50mA. The TCK trace run should be kept as short as possible and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace.
8	CKSI	Need not be wired to the target system. The Gigabit TAP probe does not currently use this signal.
9	TMS	Must be wired to the target system processor. The Gigabit TAP probe drives the TMS output with up to 50mA. TMS should be kept as short as possible and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace. TMS should have a termination option at the processor.
10	No Connect	Not required for emulation
11	$\overline{\text{SRST}}$	May be wired to the target system processor. During reset, the Gigabit TAP probe drives $\overline{\text{SRST}}$ to ground through a 100Ohm resistor.
12	No Connect	Not required for emulation
13	$\overline{\text{HRST}}$	Must be wired to the target system processor. During reset, the Gigabit TAP probe drives $\overline{\text{HRST}}$ to ground through a 100Ohm resistor.
14	No Connect	Not required for emulation
15	$\overline{\text{CKSO}}$	Should be wired to the target system processor. The Gigabit TAP probe senses $\overline{\text{CKSO}}$ to determine if the processor halted execution in a checkstop state.
16	GND	Must be wired to the target system. GND is connected directly to the ground inside the Gigabit TAP probe.

Chapter 7
OnCE connector information

The CodeWarrior Gigabit TAP OnCE probe has a 14-pin connector which automatically supports target system signal levels from 1.2V to 3.3V.

Figure 7-1 shows the pin assignments of the probe OnCE connector.

Table 7-1 lists OnCE signal names, direction, pin numbers, descriptions, and drive capabilities for the probe OnCE connector.

Table 7-2 provides a general description of each OnCE signal and the operational requirements.

NOTE

All OnCE signals must meet accepted standards for OnCE signal design. To ensure proper and stable operation between the Gigabit TAP probe and the target system, the OnCE signals must meet the requirements listed in Table 7-2.

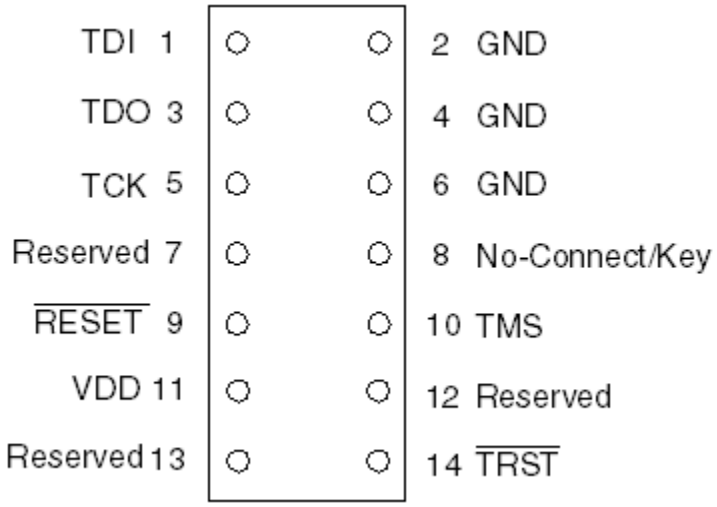

Figure 7-1. Gigabit TAP probe OnCE connector pin assignments

Table 7-1. Gigabit TAP probe OnCE signal directions

OnCE pin	Signal mnemonic	Signal direction	Description
1	TDI	From Gigabit TAP probe connector	24mA driver
2	GND	- n/a -	
3	TDO	From target system	100KOhm pull-down, plus 7pF load
4	GND	- n/a -	
5	TCK	From Gigabit TAP probe connector	24mA driver
6	GND	- n/a -	
7	Reserved	From Gigabit TAP probe connector	24mA driver
8	No-Connect/Key	- n/a -	
9	$\overline{\text{RESET}}$	Bi-directional	Open-drain. 100Ohm to ground when asserted by Ethernet TAP probe, 11pF load when not asserted **1**
10	TMS	From Gigabit TAP probe connector	24mA driver
11	VDD	From target system	2MOhm pull-down, plus 0.01uF load
12	Reserved	Bi-directional	Open-drain, 100Ohm to ground when asserted by Gigabit TAP probe, 11pF load when not asserted **1**
13	Reserved	Bi-directional	Open-drain, 100Ohm to ground when asserted by Ethernet TAP probe, 11pF load when not asserted **1**
14	$\overline{\text{TRST}}$	From Gigabit TAP probe connector	24mA driver

1 14.7KOhm pull-up to buffered VDD.

Table 7-2. Gigabit TAP probe OnCE signal recommendations and requirements

OnCE pin	Signal mnemonic	Requirement
1	TDI	Must be wired to the target system processor. The Gigabit TAP probe drives the TDI output with up to 24 mA. The TDI trace should be kept short and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace. TDI should have an RC termination option at the processor.
2	GND	Must be wired to the target system. GND is connected directly to the ground inside the Gigabit TAP probe.
3	TDO	Must be wired to the target system processor. TDO is an output from the target system processor and input to the Gigabit TAP probe. The TDO trace run should be kept short and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace. TDO should have a series termination resistor located near the target system processor.
4	GND	Must be wired to the target system. GND is connected directly to the ground inside the Gigabit TAP probe.
5	TCK	Must be wired to the target system processor. The Gigabit TAP probe drives the TCK output with up to 24 mA. The TCK trace run should be kept as short as possible and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace.
6	GND	Must be wired to the target system. GND is connected directly to the ground inside the Gigabit TAP probe.
7	Reserved	Not required for emulation.
8	No-Connect/Key	Not required for emulation. Pin 8 should be clipped on the target system OnCE header.
9	$\overline{\text{RESET}}$	Must be wired to the target system processor. During reset, the Gigabit TAP probe drives RESET to ground through a 100Ohm resistor.
10	TMS	Must be wired to the target system processor. The Gigabit TAP probe drives the TCK output with up to 24mA. The TCK trace run should be kept as short

Table continues on the next page...

Table 7-2. Gigabit TAP probe OnCE signal recommendations and requirements (continued)

OnCE pin	Signal mnemonic	Requirement
		as possible and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace.
11	VDD	Must be wired to the target system. The Gigabit TAP probe uses this signal to determine if power is applied to the target system. This signal is also used as a voltage reference for the signals driven by the Gigabit TAP probe (TDI, TCK, TMS, $\overline{\text{RESET}}$, and $\overline{\text{TRST}}$).
12	Reserved	Not required for emulation.
13	Reserved	Not required for emulation.
14	$\overline{\text{TRST}}$	Must be wired to the target system processor. The Gigabit TAP probe drives the $\overline{\text{TRST}}$ output with up to 24 mA. The $\overline{\text{TRST}}$ trace run should be kept short and maintain a "two-signal-width" spacing from any other parallel dynamic signal trace.

Chapter 8
Aurora high speed trace daughtercard information

This chapter provides information on the CodeWarrior Gigabit TAP Aurora/JTAG probe. It supports high speed serial trace and JTAG interfaces as specified by the Power.org™ Standard for Physical Connection. The connection provides two lanes of high speed serial trace, two lanes of high speed serial download capability, a standard JTAG connection, and from four to six vendor specific I/O signals troubleshooting information.

This chapter contains the following sections:

8.1 General specifications

This section describes the general sepcifications.

8.1.1 Simplex operation

The probe can receive two lanes of high speed trace data from the SoC. Any combination of lanes and speeds may be configured to support the bandwidth requirement of the SoC. An optional back channel may be used to support UFC (User Flow Control) between the probe and the SoC as specified by the appropriate Power.Org and Nexus specifications.

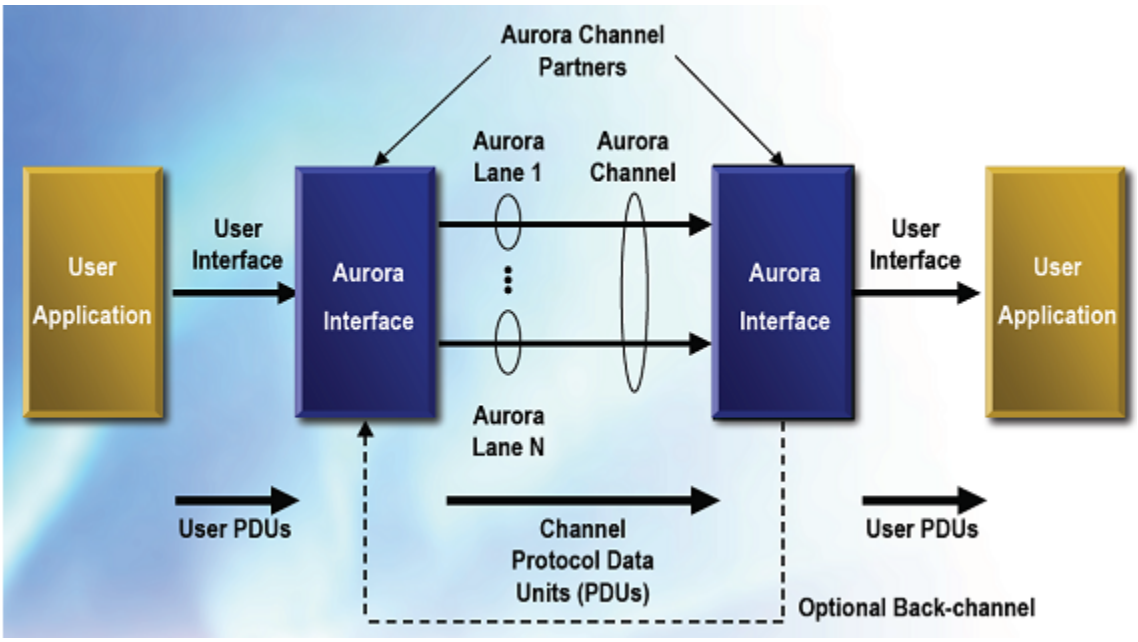

Figure 8-1. Simplex operation

8.1.2 Duplex operation

The DCU receives up to eight lanes of high speed trace data from the SoC. An additional two lanes may be configured to transmit data to the SoC from the probe. This configuration is useful in supporting UFC (User Flow Control) between the probe and the SoC.

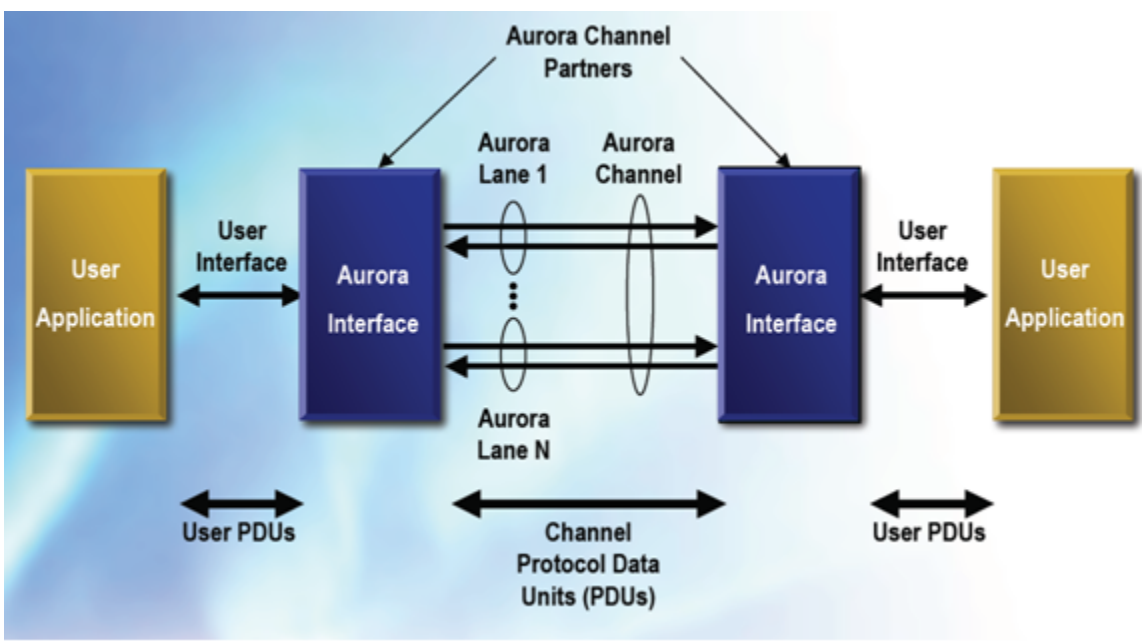

Figure 8-2. Duplex operation

8.1.3 Electrical specifications

This section describes the electrical requirements for the implementation of protocol. The line rate of the recovered clock should match the line rate of the receiver within 350ppm. Due to the tight tolerances of the clocks between the target SoC and the Data Collection Unit, some DCU implementations might support only a subset of the permissible bit rates. These signals should not be routed to multiple connectors to maintain signal integrity.

Figure below details the electrical characteristics required for simplex and duplex operation.

Table 8-1. Aurora electrical characteristics

Parameter	HSSTP Phy
Serial protocol	CML Interface that complies with XAUI
Supported bit rates	2.5, 3.0, 3.125 Gb/s
Topologies supported	Point-to-Point (multiple lanes)
Physical bit error rate	<10E-13
Line code	NRZ
Data encoding	8B/10B, 64B/66B
Number of lanes	two Transmit two Receive
Channel Configuration	Simplex or Duplex
Clock tolerance	50ppm
Signal	
Characteristic impedance	100 ohm differential
Coupling	AC coupled on Rx side
Total jitter @3.125 Gb/s	0.35 UI
Deterministic jitter @3.125 Gb/s	0.19 UI
Transmit signal level	1600mVp-p max 400mVp-p min

8.1.4 AC coupling

The Aurora lanes should be AC coupled. AC coupling isolates the common modes of the two devices and is the preferred configuration in hot-plug applications. The capacitor prevents DC current from flowing between the connected devices. The unit receiving these signals should have the responsibility to couple these signals. A 0.01mF XR7 capacitor in a 0402 package or smaller is recommended. When a signal meets the pads of

capacitor, a discontinuity in impedance and capacitance to the plane occurs. The PCB designer should take this discontinuity into consideration and make the adjustments as needed.

8.1.5 JTAG and optional signaling

The connector contains standard JTAG signals and signals that are specific to the SOC implementation. Any signal with an OUT direction is an output from the target to the development tool.

Figure below displays the list of signals that can be placed on the connector with the serial lanes.

Signal Name	Voltage Levels	Drive Stregnth (Min)	Frequency (Max)	Optional/ Required	Direction
VIO (Vsense)	3.3V-1.0V	N/A	N/A	R	OUT
TCK	3.3V-1.0V	5mA	100MHz	R	IN
TMS	3.3V-1.0V	5mA	100MHz	R	IN
TRST	3.3V-1.0V	5mA	100MHz	R	IN
TDI	3.3V-1.0V	5mA	100MHz	R	IN
TDO	3.3V-1.0V	5mA	100MHz	R	OUT
Reset	3.3V-1.0V	5mA	100MHz	O	IN/OUT
Vendor I/O 0-5	3.3V-1.0V	5mA	100MHz	O	IN/OUT

Figure 8-3. JTAG and optional signals

8.1.5.1 TCK, TMS, TRST, TDI, and TDO signals

The following signal definitions are defined in IEEE STD 1149.1™-1990. Refer to this document for signal definitions and their usage.

8.1.5.2 VIO (Vsense) signal

The VIO (Vsense) signal is used to establish the signaling levels of the debug interface of the target system. The current drawn from this pin is limited to a few nano amps and does not supply logic functions or power.

8.1.5.3 Reset signal

The Reset signal causes the target to enter into a defined reset state or signals the occurrence of a reset on the target. The full intent of the Reset signal may be defined differently for each device so the device documentation should be referred to determine the behavior of this signal. The tool and target should use an open-drain output driver for this pin.

8.1.5.4 Vendor IO 0-5 signals

These signals are input and output SoC specific signals. The Gigabit TAP automatically configure these signals as input or output based on the type of SoC it is connecting to. These signals are not required by the standard for operation, but improve the control between the test tool and SoC. For the definition of these signals, refer to the hardware reference manual for specific SoC.

8.1.5.5 Recommended termination

It is recommended that the signals having Target value in the Location field as shown in figure are connected to pull-ups on the target to prevent floating signals when the tool is not connected or powered on. The voltage to which the signals are pulled up is the I/O voltage of the target signals.

Table 8-2. JTAG and optional signals

Signal name	Pull-up	Series termination	Location
VIO (sense)		1 KOhms	Target
TCK	10 KOhms		Target
TMS	10 KOhms		Target
TRST	10 KOhms		Target
TDI	10 KOhms		Target
TDO	10 KOhms		Test Tool
Reset	10 KOhms		Target

8.2 Mechanical specification

The Power.Org and Nexus specifications provide a wide range of connector and pinout options. The sections below describe the connectors and pinouts currently supported by the Gigabit TAP, but additional options may become available later. Contact your Freescale FAE or Sales person to determine those that are currently supported with the Gigabit TAP and recommended for your application.

8.2.1 Cables

Freescale currently supports two cables listed in the Table 8-3, but note that the 22-pin cable must be purchased separately from Samtec.

Table 8-3. 70-pin and 22-pin duplex cables

	70-pin duplex cable	22-pin duplex cable
Freescale Part Number	CWH-GTT-ACBL-YE	N/A
Samtec Part Number	HDR-141762-02	HDR-141490-02
Pin Count	70	22
Target Transmit Lanes	8	2
Target Receive Lanes	4	2
Aurora Reference Clock Pins	Yes	No
Vendor I/O Pins	6	4
Cable Length	18"	18"
PCB Keepout Dimensions	1.786"x0.326"	1.030"x0.326"
Included with Gigabit TAP	Yes	No

All Aurora cables use a common 62-pin connector to attach to the Gigabit TAP's Aurora Trace socket. This socket is keyed so that the cable cannot be plugged in upside-down.

8.2.2 Connectors

The Power.org and Nexus specifications define both simplex and duplex variations of the 70-pin connector, but the Gigabit TAP + Trace currently only has cables available for the duplex configuration. This pinout is shown in figure below.

Table 8-4. 70-pin Duplex Aurora Pinout - Samtec Part Number: ASP-135029-01

Latch	GND	GND	Latch
1	TX0+	VIO (V sense)	2
3	TX0-	TCK	4

Table continues on the next page...

Table 8-4. 70-pin Duplex Aurora Pinout - Samtec Part Number: ASP-135029-01 (continued)

5	GND	TMS	6
7	TX1+	TDI	8
9	TX1-	TDO	1
11	GND	TRST	12
13	RX0+	Vendor I/O 0	14
15	RX0-	Vendor I/O 1	16
17	GND	Vendor I/O 2	18
19	RX1+	Vendor I/O 3	20
21	RX1-	/RESET	22
23	GND	GND	24
25	TX2+	CLK+	26
27	TX2-	CLK-	28
29	GND	GND	30
31	TX3+	Vendor I/O 4	32
33	TX3-	Vendor I/O 5	34
35	GND	GND	36
37	RX2+	N/C	38
39	RX2-	N/C	40
41	GND	GND	42
43	RX3+	N/C	44
45	RX3-	N/C	46
47	GND	GND	48
49	TX4+	N/C	50
51	TX4-	N/C	52
53	GND	GND	54
55	TX5+	N/C	56
57	TX5-	N/C	58
59	GND	GND	60
61	TX6+	N/C	62
63	TX6-	N/C	64
65	GND	GND	66
67	TX7+	N/C	68
69	TX7-	N/C	70
Latch	GND	GND	Latch

The Power.org and Nexus specifications define both simplex and duplex variations of the 22-pin connector, but the Gigabit TAP + Trace currently only has cables available for the Duplex configuration. This pinout is shown in figure below.

Table 8-5. 22-pin Duplex Aurora Pinout - Samtec Part Number: ASP-137969-01

Latch	GND	GND	Latch
1	TX0+	VIO (V sense)	2
3	TX0-	TCK	4
5	GND	TMS	6
7	TX1+	TDI	8
9	TX1-	TDo	10
11	GND	TRST	12
13	RX0+	Vendor I/O 0	14
15	RX0-	Vendor I/O 1	16
17	GND	Vendor I/O 2	18
19	RX1+	Vendor I/O 3	20
21	RX1-	/RESET	22
Latch	GND	GND	Latch

8.2.3 PCB design and routing consideration

Routing of the Aurora lane traces are extremely critical. Sharp corners and vias can make narrow eye patterns that affect the performance of the Aurora lanes. To achieve maximum performance, it is critical that care be taken in routing the lanes and the JTAG single-ended signals. To achieve optimal JTAG interface, good performance layout and routing practices should be observed. When routing the JTAG signals on a target board, it is recommended that they should be routed directly to the SoC using minimal vias and have a minimum of twice the distance to the plane spacing. These signals should have an impedance of 50ohm ±10%. If multiple components are attached to the JTAG scan chain, the performance of the bus must be considered. Additional loading may require a reduced JTAG bus speed for reliable operation or buffering of the TMS, TCK, and TDI signals to all the devices on the chain.

NOTE

Consult the appropriate Xilinx documentation for Aurora specific layout and routing.

8.2.4 Trigger signals

When driven by a match in the hardware event system, the trigger-out signal will pulse.

Table below explains the trigger signal characteristics.

Table 8-6. Trigger signal characteristics

	Trigger inputs	Trigger outputs
VIH	2.3V minimum	
VIL	0.9V maximum	
VOH		2.3V minimum
VOL		0.6V maximum
Polarity		Programmable for both inputs and outputs
Pulse Duration		10ns minimum for both inputs and outputs
Time between signals		TBD for both inputs and outputs
Time from detection of event trigger		TBD for both inputs and outputs

Chapter 9
Setting up standalone PC Ethernet

This chapter covers installation of a direct TCP/IP Ethernet standalone connection between a and the Gigabit TAP probe. Use it only if you do not want to connect your probe to an existing multi-user network.

You may decide to have a standalone network for:

- Target system access security
- Immunity from network outages
- Faster communication if main network has high-traffic
- Simpler connection with fewer variables to cause problems

This chapter contains the following sections:

CAUTION

The Gigabit TAP probe contains components that are subject to damage from electrostatic discharge. Whenever you are using, handling, or transporting the Gigabit TAP probe, or connecting to or disconnecting from a target system, always use proper anti-static protection measures, including static-free bench pads and grounded wrist straps.

9.1 System requirements

A typical standalone network configuration requires:

- A two-node network between a non-networked PC and the Gigabit TAP probe.

- A networked PC with a second Ethernet Network Interface Card (NIC) connected to the Gigabit TAP probe; Standalone TCP/IP network configuration shows the standalone configuration.

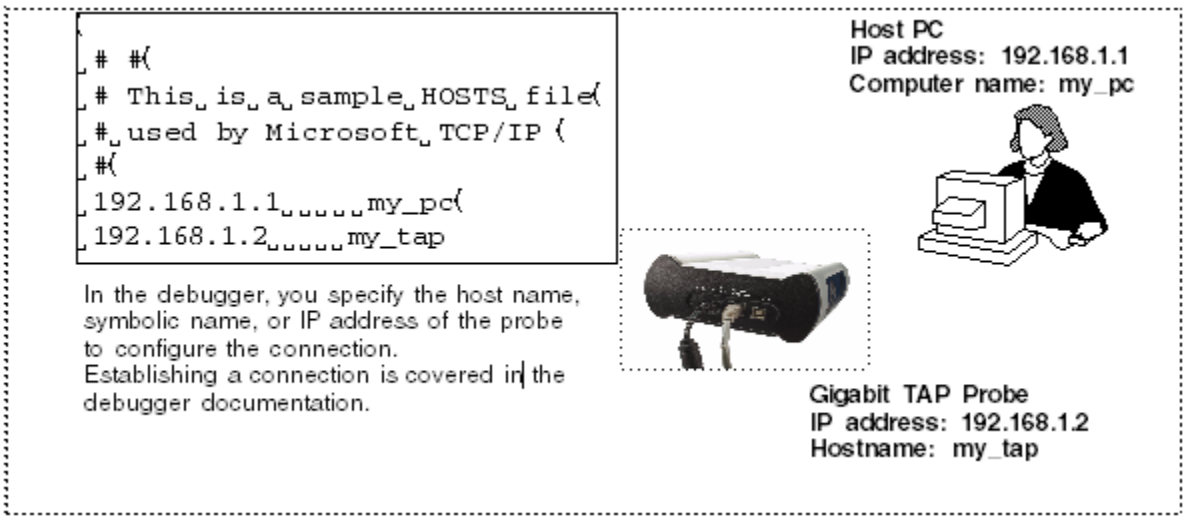

Figure 9-1. Standalone TCP/IP network configuration

- A PC with Microsoft® Windows operating system installed on it.

9.2 Tutorial: Standalone Network for Ethernet setup

If your PC is already configured for networking, skip the tutorial section and see Configuring Gigabit TAP probe section.

The steps required to set up a standalone network are covered in the following sections:

- Installing and configuring TCP/IP software
- Creating Windows hosts file
- Connecting Gigabit TAP probe to host computer

9.2.1 Installing and configuring TCP/IP software

Microsoft provides support for TCP/IP protocol with Windows. If your host PC does not already have TCP/IP protocol installed, you need to add it.

If you are installing a second Ethernet adapter to dedicate to the Gigabit TAP probe, you need to install a second instance of TCP/IP. In both instances, you bind the adapter to the TCP/IP protocol stack.

To install and configure TCP/IP, you need to have the following:

- The Windows CD
- A name for the Gigabit TAP probe and for the Ethernet Network Interface Card (NIC). If you want other users to have access to the Gigabit TAP probe over the network, refer to the Connecting to network chapter.

To add TCP/IP protocol to the host PC:

1. Add TCP/IP to the host PC.
   a. Select **Start > Settings > Control Panel**

      The **Control Panel** window appears.

   b. In the **Control Panel** window, double-click the **Network Connections** icon.

      The **Network Connections** window appears.

   c. Right-click the connection name for which you want to install the TCP/IP protocol.

      A context menu appears.

   d. From the context menu, select **Properties**.

      The properties dialog appears.

   e. Click the **General** tab.

      The **General** page appears.

   f. Select the Internet Protocol (TCP/IP) checkbox.
   g. Click **Install**.

      The **Select Network Component Type** dialog appears.

   h. In the **Select Network Component Type** dialog, select **Protocol**.
   i. Click **Add**.

      The **Select Network Protocol** dialog appears.

   j. In the **Network Protocol** box, select Internet Protocol (TCP/IP).
   k. Click **OK**.

      The **Select Network Protocol** dialog closes.

   l. In the properties dialog, click **OK**.

      The TCP/IP protocol is added to the host PC.

2. Configure TCP/IP to recognize the Ethernet Network Interface Card (NIC) used to connect to the Gigabit TAP probe.
   a. Select **Start > Settings > Control Panel**.

The **Control Panel** window appears.

b. In the **Control Panel** window, double-click the **Network Connections** icon.

The **Network Connections** window appears.

c. Right-click the connection name for which you want to install the TCP/IP protocol.

The context menu appears.

d. From the context menu, select **Properties**.

The network connection properties dialog appears.

e. Click the **General** tab.

The **General** page of the properties dialog appears.

f. From the **General** page, select the Internet Protocol (TCP/IP) protocol item.

g. Click **Properties**.

The **Internet Protocol (TCP/IP) Properties** dialog appears.

h. Select **Use the following IP address option** button.

The IP address text boxes associated with this selected option appear.

3. Specify an IP address and .

If the PC is already on an existing network, assign the second adapter an IP and netmask inconsistent with your network topology (for example, use if LAN is Class B). This allows the PC to easily resolve communication with the LAN versus the Gigabit TAP probe. Valid possible internal- use IP addresses for each class are:

Table 9-1. IP Addresses for each Class

Class	IP Address	Subnet Mask
A	10.0.0.0 - 10.255.255.255	255.0.0.0
B	172.16.0.0 - 172.31.255.255	255.255.0.0
C	192.168.0.0 - 192.168.255.255	255.255.255.0

If the PC is to remain standalone, use the address and listed below. These addresses simplify the configuration.

Address: `192.168.1.1`

Subnet mask: `255.255.255.0`

4. Confirm your settings, and close the **Internet Protocol (TCP/IP) Properties** window.
5. When prompted, restart Windows.

   If not prompted, restart Windows manually.

NOTE

Unless you want to password protect access, click **Cancel** when asked for a network password.

9.2.2 Creating Windows hosts file

In the following procedure, you create a hosts database that identifies your PC host and the Gigabit TAP probe. The `hosts` file associates IP addresses and host names of both devices.

A sample `hosts` file is installed in your Windows directory when you add the Microsoft TCP/IP protocol. If your PC has previously been set up with network communication, a hosts database may already exist. Before creating a new hosts database, it is a good idea to make backup copies of any `hosts` file or sample `hosts` file.

To create a hosts database:

1. Go to the directory where the `hosts` file is located. Windows `hosts` files are located in the *%system root%*`\system32\drivers\etc` directory.

NOTE

If you have trouble locating this file, use Windows Find to search for "hosts." If you have a dual-boot system, be sure to edit the `hosts` file appropriate to the operating system under which you are installing Gigabit TAP probe.

2. Make a backup copy of any existing `hosts` file.

   Name the backup files something other than `hosts`, such as `hosts.bak`.

3. Use any text editor, open a new text file and name it `hosts` (without an extension) or open the existing `hosts` file.
4. In the `hosts` file, add an entry for the Ethernet Network Interface Card (NIC) used by the Gigabit TAP probe.

   Use the IP address you assigned during TCP/IP configuration and assign the unique name.

List the IP address first, followed by the name you assigned to the adapter. For reference, you can click the **Network** icon in the **Control panel** and view the properties for the appropriate TCP/IP connection.

The following example illustrates a `hosts` file for a PC in which two adapters are installed:

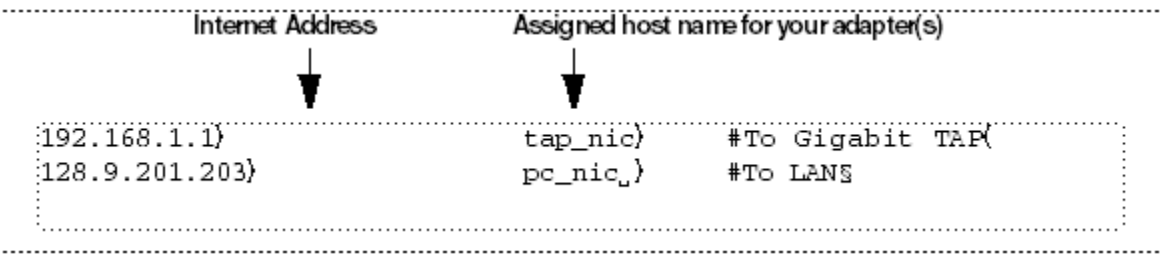

Figure 9-2. Host Name

5. Add an entry for your Gigabit TAP probe.

   In a standalone configuration, use the suggested IP address (`192.168.1.2`) to simplify configuration. Otherwise, use an address class-consistent with the IP assigned to the NIC that will be connected to the Gigabit TAP probe.

   You can assign any unique host name to the Gigabit TAP probe.

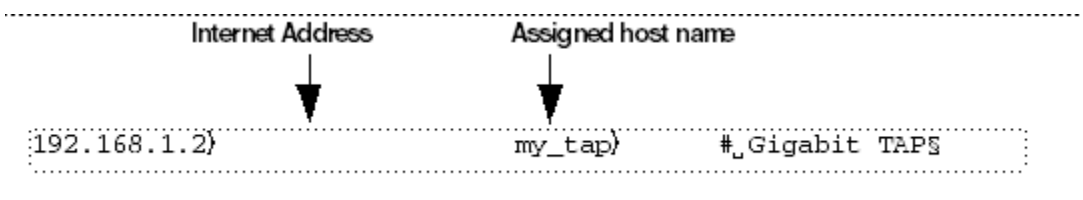

Figure 9-3. Unique host name

6. Save the `hosts` file as text in the correct directory, and exit the editor. Its name should not include a file extension.

```
# # Copyright (c) 1994 Microsoft Corp.
#
# This is a sample HOSTS file used by
# Microsoft TCP/IP for Chicago
#
#
192.168.1.1       tap_nic   #To Gigabit TAP
192.168.1.2       my_tap    #Gigabit TAP
128.9.201.203     pc_nic    #To LAN
```

Figure 9-4. Host file

9.2.3 Connecting Gigabit TAP probe to host computer

The Gigabit TAP probe has a built-in twisted pair interface that connects directly to networks that use the twisted pair (10/100/1000BaseT) cables. A twisted pair crossover cable has been provided to connect the RJ-45 connector of the Gigabit TAP probe to the installed in your PC.

9.3 Configuring the Gigabit TAP probe

Before you can use the to communicate with the Gigabit TAP probe, you must store the IP address and netmask in the Gigabit TAP probe's flash using the probe's internal setup utility.

NOTE

For more information on all the commands available from the Gigabit TAP probe's internal setup utility, see Gigabit TAP probe setup utility commands and variables section.

9.3.1 Starting setup utility

To access the internal of the Gigabit TAP probe, connect a terminal emulator (such as Windows® HyperTerminal) and configure it. For more information, see Customizing Gigabit TAP probe section.

9.3.2 Storing IP address and netmask in flash EPROM

When the `core>` prompt appears on the terminal, you can use the `netparam` command to configure the Gigabit TAP probe's network parameters.

To store the IP address and in flash EPROM:

1. Set the Gigabit TAP probe for static IP address mode using the following command at the `core>` prompt:

   ```
   netparam bootconfig static
   ```
2. Enter the Gigabit TAP probe's IP address and netmask at the `core>` prompt. For example:

   ```
   netparam static_ip_address 192.168.1.2:255.255.0.0
   ```

NOTE

The IP address you enter must match the IP address you specified for the Gigabit TAP probe in the `hosts` file (`192.168.1.2` is the suggested IP address). The netmask must match the netmask you specified when you configured your PC (`255.255.0.0` is the suggested netmask).

3. Remove the USB cable from the port. It is not required for normal Ethernet TAP probe operation.

Chapter 10
Gigabit TAP probe setup utility commands

This chapter explains how to access the Gigabit TAP probe internal setup utility. It describes all available setup utility commands and arguments.

This chapter contains the following sections:

- Connecting to Gigabit TAP probe setup utility
- Gigabit TAP probe setup utility commands and variables

NOTE

The commands described in this chapter are for reference only. For detailed procedures on using these commands, see applicable chapter that covers the topic of interest.

10.1 Connecting to Gigabit TAP probe setup utility

There are two methods for accessing the Gigabit TAP probe internal setup utility:

- Connect to the Gigabit TAP probe USB port. Use this method if the Gigabit TAP probe is not connected to your network. For more information, see Customizing Gigabit TAP probe section.
- Telnet to the Gigabit TAP probe through an existing Ethernet connection.

  Use this method if the Gigabit TAP probe is currently connected to your network.

  is the Internet standard protocol for remote logins. Most TCP/IP networks provide a telnet program that you can use to login across the network to another machine. Note that if you lose your Ethernet connection by improperly configuring the Gigabit TAP probe from a telnet session, then you will have to connect to the serial port to re-establish network communications.

  To connect to the setup utility using the telnet port:

1. Open a telnet session and connect to the Gigabit TAP probe.

`telnet` *`hostname`*

Use the hostname that you entered into the hosts database file, as described in Connecting to network chapter or Setting up standalone PC Ethernet chapter.

2. After the login banner is displayed, the `core>` command-line prompt appears.

NOTE

Use the `help` command at the `core>` prompt for a list of all the internal Gigabit TAP probe commands available. Or use `help` and the command name for a brief description of the command and a list of the command's arguments.

10.2 Gigabit TAP probe setup utility commands and variables

The Gigabit TAP probe internal setup utility commands are configuration and troubleshooting commands.

10.2.1 Commands to configure communications

The following internal setup utility commands are used to configure the Gigabit TAP probe for network communication (`netparam`), and to communicate with your target system's serial port (`tgtty`).

10.2.1.1 netparam

The `netparam` command displays or sets non-volatile networking parameters stored in the flash EPROM of Gigabit TAP probe. Entered without options, it displays all current settings. To change parameters, specify one or more options. To activate new settings, the unit must be rebooted. For more information on netparam command, refer to the Configuring the Gigabit TAP Probe Using netparam section.

Syntax

```
 netparam [add_host host ip_address]
[add_route host gateway hop_# ]
 [bootconfig {static | dhcp }[:host]]
 [delete_host host]
[delete_route host]
```

```
[static_ip_address address[:mask]]
[static_dns_server address]
```

Table 10-1. Netparam Parameters

Field	Description
<null>	Reports the current configuration
add_host host ip_address	Adds a hostname-address pair to the static host table. Table entries are automatically entered into the system on reset. host - Name to associate with the address ip_addressip_address - IP address to use for host, specified in dotted-decimal notation
add_route host gateway hop_#	Adds a route to Gigabit TAP probe static route table. Table entries are automatically entered into the system on reset. If the specified parameters are invalid for the operating network, they are not stored. host - Destination IP address of host or host network, specified in dotted-decimal notation. Default is a valid entry for host, and equivalent to 0.0.0.0. gateway - Gateway IP address for probe, specified in dotted-decimal notation hop_# - Decimal number of gateway hops between Gigabit TAP probe and destination host or network
bootconfig {static | dhcp }[:host]	Sets the IP address resolution protocol. It determines the boot method of Gigabit TAP probe. Use bootconfig to connect to the network either by DHCP or by storing the IP address in the flash EPROM of Gigabit TAP probe. When using DHCP, you can specify the host name that you would like the probe to try to register with a name server when it acquires its network configuration. The factory assigned host name is FSLXXYYZZ, where XXYYZZ is the last three octets of the Gigabit MAC address, provided on a label on the bottom side of the probe. For example, if the probe's Gigabit MAC address is 00:00:f6:00:77:31, the default host name will be FSL007731. static - Use IP address stored in Gigabit TAP probe dhcp - Use the network DHCP protocol to resolve IP address, netmask, and default gateway (default) :host - Host name for the Gigabit TAP probe. If dhcp is specified, the probe will attempt to register this host name with the DHCP server. There should be no white space before :host. The ccs findcc search utility will report the host name of the probe for both the dhcp and static options
delete_host host	Deletes a hostname-address pair from the static host table. host - Destination IP address of host or host network
delete_route host	Deletes a route from the static route table host - Destination IP address of host or host network
static_ip_address address[:mask]	Sets the Gigabit TAP probe IP address and optional netmask address - IP address in dotted-decimal format (for example, 128.8.1.1). When entering the IP address by itself (without also entering the netmask), the Gigabit TAP probe uses the standard netmask assigned to that IP address. mask - Netmask in dotted-decimal format (for example.,

Table continues on the next page...

Table 10-1. Netparam Parameters (continued)

Field	Description
	255.255.0.0). If subnetting is required, you must store the netmask by entering it on the same command line, immediately following the IP address.
`static_dns_server address`	Sets the DNS server to use static bootconfig `address` - IP address in dotted-decimal format (e.g. 128.1.1). The DNS server at this address will be used for domain name resolution when bootconfig is set to static.

10.2.1.2 tgtty

The `tgtty` command configures the target system serial port settings.

Syntax

```
tgtty
  [default]
  [9600 | 19200 | 38400 | 57600 | 115200]
  [data8 | data5 | data6 | data7]
  [stop1 | stop2]
  [noparity|oddparity|evenparity|lowparity|highparity]
  [<rtscts | nortscts>]
  [noxon | xon]
  [echo | noecho]
```

Options

Options can be combined in one statement. Without options, the `tgtty` command displays the current settings.

The target system serial port's default settings are:

```
9600 data8 stop1 noparity nortscts echo
```

Table 10-2. Default Target Settings

Default	Set the default target system serial settings
`[9600 | 19200 | 38400 | 57600 | 115200]`	Choose a baud rate
`[data8 | data5 | data6 | data7]`	Specify data bits
`[stop1 | stop2]`	Specify stop bits
`[noparity | oddparity | evenparity |lowparity | highparity]`	Define parity
`[<rtscts | nortscts>]`	Enable or disable hardware flow control
`[noxon | xon]`	Enable or disable XON/XOFF flow control

Table continues on the next page...

Table 10-2. Default Target Settings (continued)

Default	Set the default target system serial settings
[echo | noecho]	Enable or disable target system echo feature

10.2.2 Commands to troubleshoot communication

The following commands are used to troubleshoot problems connecting to your network. The procedures for troubleshooting communication are covered in Troubleshooting chapter.

NOTE

In this manual, commonly used options for these commands are described.

10.2.2.1 arp

Use the `arp` command to edit the table by assigning *hostnames* to specific Ethernet addresses. Without options, it displays the current arp table.

Syntax

```
arp [-s hostname ethernet_address | -d hostname]
```

Table 10-3. ARP - Options

Field	Description
-s hostname ethernet_address	Assign a `hostname` alias to an Ethernet address in the arp table
-d hostname	Delete a `hostname` alias from the arp table

10.2.2.2 host

Use the `host` command to edit the host table by assigning `hostnames` to specific IP addresses without permanently storing the routing tables in the flash EPROM of the Gigabit TAP probe. Without options, it displays the current host table.

Syntax

```
host [add hostname ip_address | delete hostname ip_address]
```

Table 10-4. Host - Options

Field	Description
`add hostname ip_address`	Assign a `hostname` alias to an IP address in the host table.
`delete hostname ip_address`	Delete a `hostname` alias from the host table.

10.2.2.3 netstat

Displays network information and statistics.

Syntax

```
netstat -a --inet | -i | -s | -r
```

Table 10-5. Netsat - Options

Field	Description
`-a --inet`	Display network connections
`-i`	Display device status
`-s`	Display protocol statistics
`-r`	Display route table

10.2.2.4 ping

Use the `ping` command to verify that the Gigabit TAP probe is connected to your network.

Syntax

```
ping [-s size] [-c cnt][hostname | ip_address]
```

Table 10-6. Ping - Options

Field	Description
`hostname`	Use the `hostname` stored in Gigabit TAP probe host table (see the host command).
`ip_address`	Use the IP address of the host you are trying to reach.

Table continues on the next page...

Table 10-6. Ping - Options (continued)

Field	Description
`size`	The size, in bytes, to use for request packets.
`cnt`	The number of packets to send.

10.2.2.5 route

Use the `route` command to test network routing without permanently storing the routing tables in the Gigabit TAP probe flash EPROM. Without options, it displays the current route table or default gateway.

Syntax

```
route [add destination gateway | delete destination]
```

Table 10-7. Route - Options

Field	Description
`add destination gateway`	Add a dynamic route to the route table.
`delete destination`	Delete a dynamic route from the route table.

Chapter 11
Network administration

This chapter guides the network administrators in installing a Gigabit TAP probe. The Gigabit TAP probe is a Gigabit host device that may be configured for TCP/IP using DHCP to acquire its IP configuration (the default method) or through a static IP configuration.

This chapter explains the following:

11.1 Gigabit TAP probe network ports

Software uses several network ports to communicate with a Gigabit TAP. In case, the Gigabit TAP and host software are on the same network, you do not need to be aware of these ports. However, in case where a Gigabit TAP is located in a protected network, an administrator will need to provide access to these ports if you want to connect to the Gigabit TAP from another network. Figure below lists the ports used by the Gigabit TAP and a brief description of each port and describes various network ports of the Gigabit TAP probe.

Table 11-1. Gigabit TAP network ports

Port Number	Description
23	Telnet access to configuration console
1082	Telnet access to target serial port
1085	Used by CodeWarrior for trace collection
1086	Used by CodeWarrior for trace collection
1087	Used for firmware updates and by CodeWarrior to initialize the Gigabit TAP
41474	Used by CodeWarrior to control the Gigabit TAP
53099	Used by CodeWarrior to check Gigabit TAP status

11.2 Configuring Gigabit TAP probe using netparam

Use the `netparam` command to select the network parameters:

- Address resolution protocol
- Static address resolution data
- Static routing tables

CAUTION

`netparam` writes its settings into non-volatile flash memory on the Gigabit TAP probe. Each time you enter a `netparam` command, wait for the `core>` prompt to re-appear before entering the next command.

11.2.1 Configuring dynamic IP Address

To configure a dynamic IP address:

1. Connect to the Gigabit TAP probe internal setup utility, as explained in Connecting to the Gigabit TAP Probe Setup Utility section.
2. At the `core>` prompt, use `netparam` to specify the protocol appropriate to your network:

```
netparam bootconfig dhcp[:hostname]
```

DHCP is the default setting. If you specify a `hostname` for the Gigabit TAP probe, the probe will attempt to register the host name with the DHCP server, which may then update any name servers on the network.

11.2.2 Configuring static IP Address

If you do not have a DHCP server on your network or you prefer to manually configure your network settings, the Gigabit TAP probe is capable of storing its IP address and netmask in flash memory. When `bootconfig` is set to `static`, the Gigabit TAP probe uses this stored information to resolve its own IP and netmask requests.

NOTE

Because this is a simple proven way to add a Gigabit TAP probe to any TCP/IP network, we strongly recommend using it if you have any network communication problems.

To enter the IP and optional netmask in flash:

1. Have your network administrator assign an unused IP (Internet Protocol) address and host name to the probe.
2. Enter the name/address pair into the `hosts` database file. Windows `hosts` files are typically located in the `%system_root%\system32\drivers\etc\` directory.

   The following is an example of probe entries in a `hosts` file:

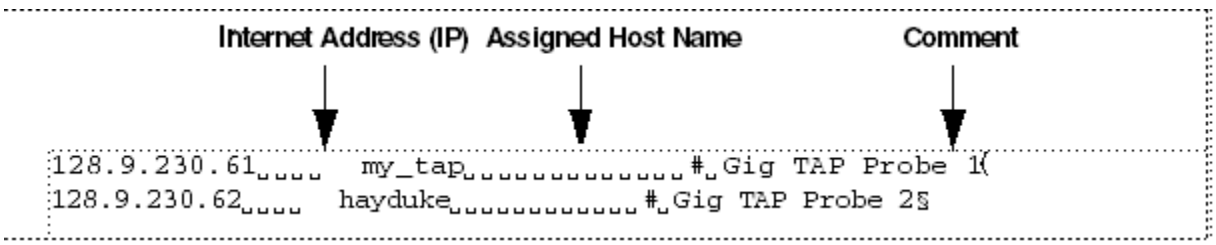

Figure 11-1. Host File

NOTE

You should create or update the `hosts` file on the network server or on each local workstation that needs access to the probe.

3. At the `core>` prompt, use `netparam` to set and store the IP address and netmask (subnetting only) in the Gigabit TAP probe flash EPROM.

   ```
   netparam static_ip_address nnn.nnn.nnn.nnn [:mmm.mmm.mmm.mmm]
   ```

   where `nnn.nnn.nnn.nnn` represents the IP address and `mmm.mmm.mmm.mmm` represents the subnetting mask.

11.2.3 Static routing

The simplest networks consist of one or more subnets. Routers forward network traffic from one point on the network to another across these subnets.

If the Gigabit TAP probe uses DHCP to automatically acquire its network settings, it is most likely that a default gateway setting was acquired and the probe will be accessible on other subnets.

However, when using a static IP configuration or where the DHCP configuration is incomplete, you may have to provide additional routing information, including:

- Store a default gateway in flash memory
- Load static routing tables into flash memory

11.2.3.1 Specify default gateway or static route table (optional)

If you are using a static IP configuration or your DHCP configuration does not specify a default gateway, you can manually enter the IP address of the default gateway to use. This gateway must be accessible on your local subnet.

To specify a default gateway:

A default gateway entry must specify the IP address of the first gateway that the network traffic from probe crosses. This gateway must be aware of the network's complete route table. Use the following `netparam` syntax:

```
netparam add_route 0.0.0.0 gateway_ip 1
```

For `gateway_ip`, provide the IP address of the router or gateway in dot notation. The default value is `0.0.0.0`.

11.2.4 Changing existing route entry

NOTE

When entered in the Gigabit TAP probe, static routes are not updated automatically. You must update these routes if changes in network topology affect the static routes.

Before entering static routes, make a map of all gateway paths between the Gigabit TAP probe, as starting point, and each workstation that must have access to it.

To change an existing routing entry:

1. At the `core>` prompt, delete the existing routing entry:

   ```
   netparam delete_route host_ip
   ```
2. Enter the new route as described above:

   ```
   netparam add_route host_ipgateway_iphop_#
   ```

NOTE

`host_ip` can identify an individual workstation or a network serving multiple hosts. The `gateway_ip` is the first gateway the probe traffic crosses when communicating with the destination workstation. The `hop_#` is the decimal number of gateways between the probe and the destination workstation.

11.2.5 Entering static routes

NOTE

When entered in the Gigabit TAP probe, static routes are not updated automatically. You must update these routes if changes in network topology affect the static routes.

Before entering static routes, make a map of all gateway paths between the Gigabit TAP probe, as starting point, and each workstation must have access to it.

To enter a static route or default gateway:

1. At the `core>` prompt, use the `netparam` command to enter the first host/gateway pair:

   ```
   netparam add_route host_ipgateway_iphop_#
   ```

   Wait for the `core>` prompt between each `netparam` entry.

   NOTE

   `host_ip` can identify an individual host or a network serving multiple hosts. The `gateway_ip` is the first gateway the Gigabit TAP probe crosses when communicating with the destination host. The `hop_#` is the decimal number of gateways between the Gigabit TAP probe and the destination host. The `netparam` command is described in Gigabit TAP probe setup utility commands section.

2. Add routes until all destination hosts or networks are defined.
3. When the `core>` prompt returns, reset the Gigabit TAP probe by cycling power, or by entering the `reset` command.

11.2.5.1 Static route example

Figure 11-2 shows three class "C" networks joined together by a single IP router, making each Gigabit TAP probe accessible from three workstations (elmer, tweety, and brutus).

No static routing information is required to make a Gigabit TAP probe accessible from a workstation local to it on a network. For example, the Gigabit TAP probe goofy on network `198.9.230.0` communicates directly with workstation elmer.

When static routing is used, a routing entry is required on a Gigabit TAP probe for each workstation on a non-local network that accesses it. The Gigabit TAP probe goofy requires two entries, for workstation tweety on network `198.9.231.0` and workstation brutus on network `198.9.232.0`.

Each static route entry is made using a `netparam` command and consists of a network address and a host address. The `netparam` commands for the static route entries for Gigabit TAP probe goofy are:

```
netparam add_route 198.9.231.0 198.9.230.1 1


netparam add_route 198.9.232.0 198.9.230.1 1
```

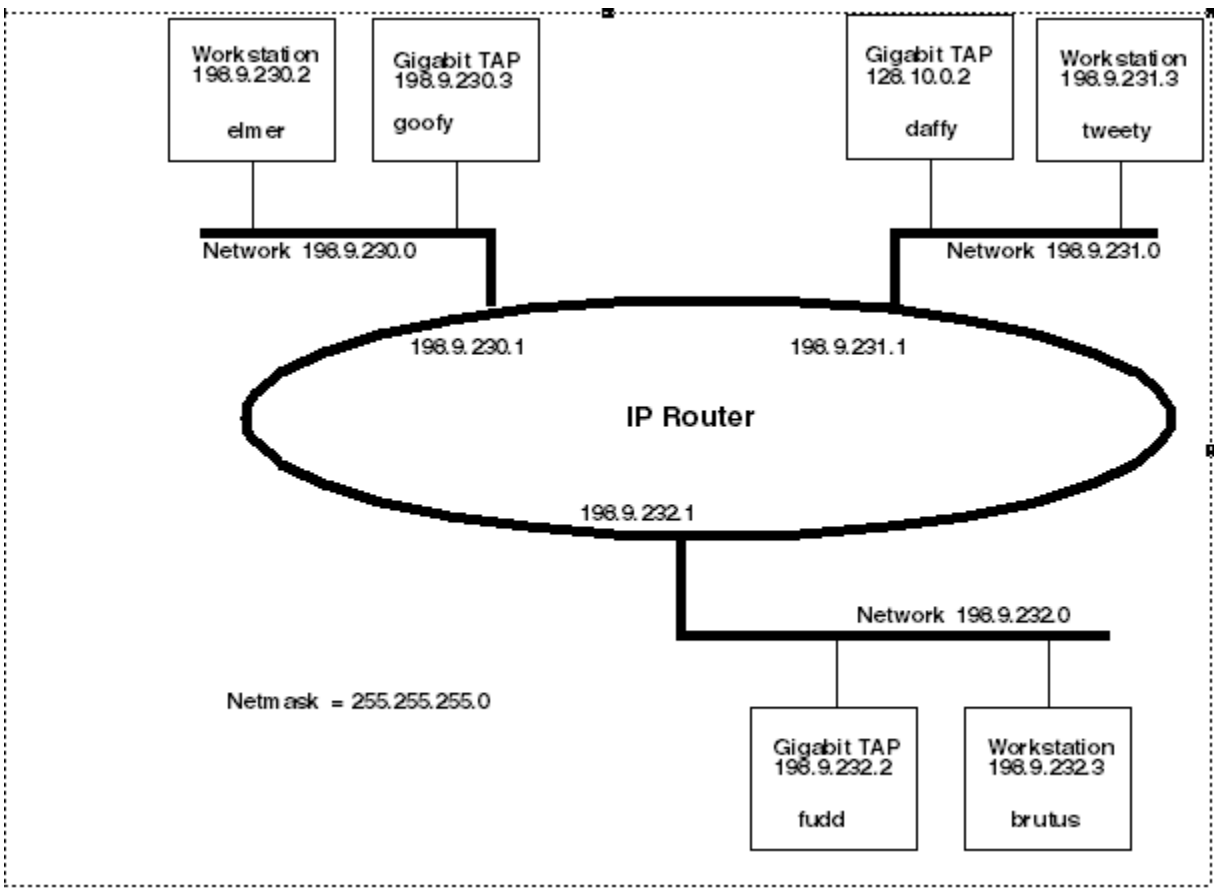

Figure 11-2. Three Class C Networks Connected by a Single Router

Each of the three Gigabit TAP probe hosts must have a static route entry for each remote workstation that accesses it.

11.3 Using CCS to search for Gigabit TAP probes

The console provides a `findcc` command line utility which searches for all the CodeWarrior probes on the local subnet of each network interface of the host and lists the probes' IP addresses, as well as other information. It uses mDNS multicast packets to discover Gigabit TAP devices. Multicast packets are typically limited to the local subnet and typically are not routed or passed through VPNs.

If your Gigabit TAP probe acquires its IP address using DHCP, but is not able to register its host name on the network, you will need the probe's IP address. To find the probe's address, perform the following steps:

1. Launch CCS and open the CCS Command window. The procedure is slightly different on Windows and Linux/Solaris host machines.
   - For Windows, run the command:

```
CodeWarrior_Installation\ccs\bin\ccs.exe
```

This will launch CCS and add a CCS icon (see Figure 11-3) to your taskbar. Double-click that icon in the taskbar to open the Command window.

- For Linux/Solaris, run the command:

```
CodeWarrior_Installation/ccs/bin/ccs
```

This will launch CCS and open the Command window automatically.

Figure 11-3. CCS icon

2. The command takes the following arguments when searching for Gigabit TAP probes:

```
findcc gtaps [-quiet|-verbose]
```

11.3.1 Sample output

% findcc gtaps

gtap1 (192.168.0.3): Gigabit TAP

Aurora Nexus Daughter Card

LVDS PowerPC JTAG/COP Probe Tip

Boot Loader v1.0.0

Operating System v1.0.0

%

Chapter 12
Gigabit TAP probe firmware (Core)

This chapter explains the methods for reprogramming the core image stored in the flash EPROM of the Gigabit TAP probe. Before reprogramming the flash EPROM, make sure you have already configured the Gigabit TAP probe network communication.

This chapter contains the following sections:

12.1 Gigabit TAP probe internal software overview

The Gigabit TAP Boot Loader image performs hardware initialization and starts up the Operating System.

12.1.1 Boot loader

When the Gigabit TAP first powers up, it executes the Boot Loader. This occurs while the heartbeat LED is solid red. The Boot Loader is not generally visible to the user and should rarely require reprogramming or updating. If an update is required, follow the instructions in Reprogramming firmware through Gigabit port section.

12.1.2 Fallback boot loader

The Gigabit TAP Fallback Boot Loader image can be used to recover a probe if the primary Boot Loader becomes corrupted. The procedure for enabling the Fallback Boot Loader requires opening the case to access switches, and should only be performed after consulting with Freescale Technical Support.

12.1.3 Operating System

The Gigabit TAP probe Operating System image provides tools for configuring and testing network communication, for re-loading the probe software, and the underlying software framework required to work with the debugger.

When the Gigabit TAP probe finishes executing the Boot Loader, it loads the Operating System. This is indicated by the `core>` prompt in the Gigabit TAP probe's setup utility, and by flashing a Orange or Green heartbeat LED. To reprogram the operating system image stored in the Gigabit TAP probe flash EPROM, see Reprogramming Gigabit TAP probe firmware images section.

12.1.4 Shell software

The Gigabit TAP probe shell software is transparent to the user, and the application that tells the probe how to control the target system. It recognizes the specific target system processor and debug port interface, and carries out the instructions of the debugger. The shell software is not stored in flash, and therefore does not require reprogramming.

12.2 Reprogramming Gigabit TAP probe firmware images

At some point you may be required to reprogram the Gigabit TAP probe firmware images stored in its flash EPROM. Typically this occurs when you are installing an update to existing software, and the release letter specifies a later version of probe Boot Loader or Operating System software. The firmware is distributed in two images:

- `gtap_bl.gp` contains the Boot Loader
- `gtap_os.gp` contains the Operating System

A flash file loader (`UPDATEGTAP`) utility is included with the debugger software. `UPDATEGTAP` provides the ability to reprogram the Gigabit TAP probe firmware images stored in its flash EPROM.

12.2.1 Reprogramming firmware through Gigabit port

In order to use the following instructions, the Gigabit TAP probe communications must already be configured (see Connecting to network chapter or Setting up standalone PC Ethernet chapter.)

To reprogram the firmware image:

1. Launch CCS and open the CCS command window. For information on launching CCS, refer to the Using CCS to Search For Gigabit TAP Probes section.
2. In the CCS Command window, enter the command:

   ```
   updategtap {hostname | ip_address}
   ```
3. As it executes, UPDATEGTAP reports its progress. When the process is complete, `UPDATEGTAP` reports:

   ```
   All updates completed successfully.
   ```

CAUTION

Do nothing to disrupt operation while running the UPDATEGTAP command. The heartbeat LED will flash at a faster frequency while the update is in progress, and the probe will automatically reboot when the update is complete. Power failures, network disruptions, and Gigabit TAP probe resets during an update and can create a non-working state that may require factory repair.

These procedures must be performed on each Gigabit TAP probe that you plan to use with the current version of debugger.

Chapter 13
Troubleshooting

This chapter provides Gigabit TAP probe troubleshooting information.

This chapter contains the following sections:

13.1 Troubleshooting communications problems

This section explains how to troubleshoot communication problems between the debugger and the Gigabit TAP probe.

If the debugger is unable to communicate with the Gigabit TAP probe:

- Check the cable and connections between the network cable and the Gigabit TAP probe.

  The Gigabit TAP probe connects directly to networks that use twisted pair (10/100/1000BaseT) cables.

- Make sure communication was configured correctly for your network.
- Make sure the Gigabit TAP probe is receiving power.

  See Gigabit TAP probe status indicators section for a description of the status LEDs.

- Make sure the Gigabit TAP probe is running the operating system software.

  For more information on loading the operating system software, see Gigabit TAP probe firmware (Core) chapter.

- Use the communication troubleshooting utilities of Gigabit TAP probe to verify that it is recognized on your network, or to help diagnose problems connecting to your network.

To troubleshoot communication, see Verify network communication section.

To list all the CodeWarrior probes on your local subnets, use the CCS `findcc` host utility. see Using CCS to search for Gigabit TAP probes section.

- Make sure the debugger is set up correctly for Ethernet communication with the Gigabit TAP probe.

  If all the settings are correct and the debugger cannot communicate with the Gigabit TAP probe, contact Customer Support for assistance.

13.1.1 Verify network communication

If you want to verify that Gigabit TAP is up and running on your network, enter the `ping` command at the `core>` prompt of the Gigabit TAP probe.

To verify network communication:

1. Connect to the Gigabit TAP probe internal setup utility, as explained in Connecting to Gigabit TAP probe setup utility section.
2. Verify communication by entering this command at the `core>` prompt:

   ```
   ping ipaddress | hostname
   ```

   For example, to ping a hostname, named `my_tap` at IP address `128.9.230.61`, enter the command as follows:

   ```
   ping 128.9.230.61
   ```

   - or -

   ```
   ping my_tap
   ```

NOTE

When establishing communication, you will have to ping the IP address that was used during the setup process, as the Gigabit TAP probe may not automatically recognize the hostname. To ping a hostname, the Gigabit TAP probe internal host table must first be updated.

13.1.2 View network connections

If you want to check your network configuration and activity, use `netstat command`. This command displays all the network statistics on active connections such as their current status, all hosts that are connected, and which programs are running. You can also see information about the routing table and even get statistics on your network interfaces.

To run the `netstat` command:

1. Connect to the internal setup utility of Gigabit TAP probe.
2. At the `core>` prompt, enter the `netstat` command using this syntax:

```
netstat -s
```

The output of this command will show you whether any data is being sent or received over the network. For description of the netstat options, see netstat section.

13.2 Troubleshooting power problems

If the Gigabit TAP probe behaves erratically, check the connections to the external power supply.

The LED labeled HEARTBEAT indicates whether the Gigabit TAP probe is receiving power. If this LED is not lit, check the connections to the external power supply.

13.3 Troubleshooting overheating problems

The following problems indicate the cause of overheating of Gigabit TAP probe:

- Excessive fan noise: The Gigabit TAP have cooling fans which keep critical components from overheating. These fans generally run quietly, but will run faster and louder if the Gigabit TAP is getting too hot.
- Red heartbeat LED: The Gigabit TAP monitors the temperature of several key components, and will change the color of the heartbeat LED to red if these components get close to overheating.
- Unexpected shutdown or reset: If the Gigabit TAP detects that components are reaching their maximum rated operating temperature, it will automatically go into an overtemperature shutdown. When this occurs, the Gigabit TAP will power off all components (including LEDs, USB, Serial, and network), and run the fans at maximum speed until the system cools off.

If you encounter any of the above problems, follow these steps to resolve your problem:

1. Check for air flow obstructions. The Gigabit TAP has air vents on both sides which should be kept clear of obstructions and dust. If any of these air vents are blocked, the Gigabit TAP will not be able to adequately cool itself.
2. Check the ambient temperature. The Gigabit TAP is designed to operate at ambient temperatures up to 40 degrees Celcius. If the ambient temperature exceeds 40 degrees Celcius, the Gigabit TAP may overheat.

NOTE

Be careful not to position the Gigabit TAP near the heat exhaust of other hardware or equipment. Doing so, it may cause the Gigabit TAP to use air that is warmer than the ambient room temperature.

3. Check that the fans are clean and spinning smoothly. Checking the fans will require opening the Gigabit TAP case, and this should only be done after contacting technical support.

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