General Description

The DS34S132 evaluation kit (EV kit) is an easy-to-use EV kit for evaluating the DS34S132 32-port TDM-over-packet (TDMoP) IC. The EV kit is a stand-alone system with a TDMoP chip, local oscillator, local control processor, memory, external E1/T1 LIUs and framers, power supply, and user interface software included in a 2.5 RU enclosure. The EV kit is controlled over an RS-232 serial link from an external ASCII terminal (typically using terminal emulation software running on a PC) or through a telnet session. The ASCII user interface is menu driven and hierarchical for easy use. The behavior and performance of the TDMoP IC can be evaluated with a single EV kit where the Ethernet signal is looped back to the kit, or with two EV kits configured as separate end points.

EV Kit Contents

DS34S132 EV Kit System
    TDMoP IC Daughter Card (Factory Installed)
    MPC8313 CPU Daughter Card (Factory Installed)
    User Interface Software (Factory Installed)

Ordering Information

PART	TYPE
DS34S132DK	EV Kit

Features

♦ **Complete System: Motherboard and Daughter Cards in a Convenient 2.5 RU Enclosure**

♦ **Menu-Driven ASCII Text User Interface Software**

♦ **System Processor on a Separate Daughter Card**

♦ **Ethernet PHYs, I/O Jacks, E1/T1 Transceivers, and Clock Sources on Motherboard**

♦ **Built-In AC Power-Supply Module**

♦ **Several Popular TCXO and OCXO Oscillators from Which to Select and BNC Connectors for Lab References**

♦ **9-Pin Serial Jack to Connect an ASCII Terminal for Configuration and Status**

♦ **System TCP/IP Stack for Configuration and Status Over IP/Ethernet**

♦ **One RJ45 Ethernet Jack for Connection to the Ethernet Network**

♦ **One RJ45 Jack for Each E1/T1 Port**

♦ **RJ45 External Clock Input Jack**

♦ **BNC Common Clock Input Jack**

♦ **BNC Reference Clock Input Jack**

♦ **16-Bit CPU Interface to TDMoP IC**

TDMoIP® Evaluation System with No Lid

TDMoIP is a registered trademark of RAD Data Communications, Ltd.

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at www.maximintegrated.com.

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1. Introduction

1.1 Overview

The DS34S132 evaluation kit (EV kit) is a complete evaluation platform. The system consists of the following:

- Four octal E1/T1 transceivers (a transceiver is a framer plus an LIU)
- TDMoP IC daughter card
- Motorola MPC8313 CPU daughter card
- Clock subsystem based on the DS3100 clock sync chip
- Uplink port for the 100/1000Mbps Ethernet (supports autonegotiation)
- 10/100/1000Mbps Ethernet management port connected to the MPC8313 Ethernet controller for debugging
- Peripheral memory and glue logic
- RS-232 interface for control and configuration using an ASCII terminal

1.2 Features

Three operating modes for E1/T1 are supported: unframed, framed, and framed-with-CAS. Bundles consisting of carrying entire TDM data streams or selected TDM time slots are transported over the network based on IP/MPLS/MEF addressing.

VLAN tagging and priority labeling are supported, according to 802.1p and Q. The type of service (ToS) of outgoing IP packets is user-configurable.

Synchronization between TDM interfaces is maintained by deploying advanced clock distribution mechanisms. The clocking options include internal, loopback, recovered clock (either adaptive or common clock), or an externally provided E1/T1 station clock.

The TDMoP IC is connected to 32 E1/T1 transceivers (four DS26518s) on the motherboard to complete the TDM-to-packet path.

Figure 1-1. TDMoP Evaluation System

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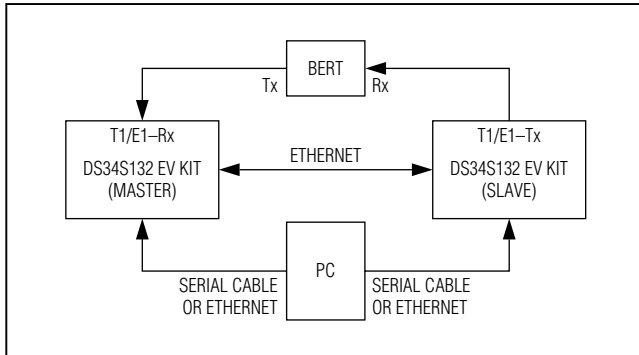
Figure 1-2. Quick Start Connections

1.3 Physical Description

1.3.1 Front Panel

The front panel contains the following:

- Ethernet uplink port with indicator LEDs for ETH LINK and ETH ACT
- TDM ports—32 E1/T1 ports with indicator LEDs for LOS and LOF
- Control port (CONSOLE) (RS-232 for connection of an ASCII terminal)
- T1/E1 external station clock (BITS)
- Ethernet management port with indicator LEDs for ETH LINK and ETH ACT
- Common clock reference port (used for differential clock recovery)
- Reference clock port (optional use for TDM clock recovery)

See *2. Installation* for additional information.

1.4 Quick Start

1.4.1 Recommended Equipment

- Two Maxim DS34S132 EV kit evaluation boards
- Two serial cables or Ethernet connection from PC to both DS34S132 EV kits
- PC to run terminal emulation (e.g., Windows® HyperTerminal or PuTTY)
- Ethernet cable for connection between the DS34S132 EV kits
- T1/E1 cable(s)
- Test set (ANT20 or other BERT for E1)

Windows is a registered trademark of Microsoft Corp.

1.4.2 Procedure

Note: In the following sections, software-related items are identified by bolding. Text in **bold** refers to items within the terminal emulator menu system. Text that is **bold and underlined** indicates user input.

1) Connect cables as shown in Figure 1-2.
2) Connect the EV kit to a PC equipped with ASCII terminal emulation software (e.g., Windows HyperTerminal or PuTTY).
3) Configure the BERT to send a pseudorandom pattern over E1 framed.
4) Power-up both DS34S132 EV kits.
5) Follow the initialization sequence as noted in *3.2 User Interface Software* (this is copied below for convenience).
   a. Set the port parameters of the control terminal PC to 115.2kbps, 8 bits/character, 1 stop bit, no parity. If available, set the terminal emulator to ANSI VT100 emulation (for optimal view of system menus).
   b. At the end of the initialization and self-test, system software detects the part number of the TDMoP IC on the internal daughter card and displays it on the terminal screen as:

   ```
   login:
   ```

   The login ID is **target** and the password is **password**. After giving the password, the screen appears as:

   ```
   ~ $
   ```

   Write the following commands in sequence as shown:

   ```
   ~ $ su
   ~ $ password: root
   ~ $ ./ins132
   ~ $ ./top32App
   ```

   The **Main Configuration (S132)** menu is displayed in the terminal.

6) Master DS34S132 EV kit configuration (at the **Main Configuration (S132)** menu) (this configures the device for E1 operation, which is the default):
   a. Select **2. General Configuration**.
   b. Select **3. Source IP 1**.

c. Set to **10.10.10.4**.

d. Type **s** to save.

e. Press **ESC** to return to **Main Configuration (S132)** menu.

f. Select **3. Interface Configuration**.

g. Select **1. Frame Type**, set to **Unframed**.

h. Select **7. Clock Source**, set to **Loopback**.

i. Select **11. IF Type**, set to **Unbalanced**.

j. Type **s** to save.

k. Press **ESC** to return to the **Main Configuration (S132)** menu.

l. Select **4. Bundle Configuration**.

m. Select **1. Bundle Type**, set to **SAToP**.

n. Select **2. Assign this Bundle to PCM port**, set to **1**.

o. Select **6. TX Bundle Number**, set to **1**.

p. Select **7. RX Bundle Number**, set to **1**.

q. Select **10. Destination IP Address**, set to **10.10.10.5**.

r. Select **22. Clock Recovery**, set to **No**.

s. Select **36. Size in Bytes**, set to **1280** (E1 payload size) .

t. Type **s** to save.

u. Press **ESC** to return to the **Main Configuration (S132)** menu.

7) Slave DS34S132 EV kit configuration (at the **Main Configuration (S132)** menu):

a. Select **2. General Configuration**.

b. Select **3. Source IP 1**.

c. Set to **10.10.10.5**.

d. Type **s** to save.

e. Press **ESC** to return to the **Main Configuration (S132)** menu.

f. Select **3. Interface Configuration**.

g. Select **1. Frame Type**, set to **Unframed**.

h. Select **7. Clock Source**, set to **Recovery**.

i. Select **11. IF Type**, set to **Unbalanced**.

j. Type **s** to save.

k. Press **ESC** to return to the **Main Configuration (S132)** menu.

l. Select **4. Bundle Configuration**.

m. Select **1. Bundle Type**, set to **SAToP**.

n. Select **2. Assign this Bundle to PCM port**, set to **1**.

o. Select **6. TX Bundle Number**, set to **1**.

p. Select **7. RX Bundle Number**, set to **1**.

q. Select **10. Destination IP Address**, set to **10.10.10.4**.

r. Select **22. Clock Recovery**, set to **Yes**.

s. Select **36. Size in Bytes**, set to **1280** (E1 payload size).

t. Type **s** to save.

u. Press **ESC** to return to the **Main Configuration (S132)** menu.

8) This completes the configuration of both boxes, and packets should be flowing in both direction over the Ethernet link.

Verify setup is operational without errors.

1) Check the BERT for errors.

2) Check the DS34S132 EV kit performance monitors (on either the master or the slave).

a. From the **Main Configuration (S132)** menu, select **8. Performance (PM)**.

b. Select **1. Ethernet Performance**.

c. Line 1. displays **Correct Bytes (RX)** and **Correct Bytes (TX)**. These two numbers should match.

d. Press **ESC** to return to the **Performance (PM)** menu.

e. Select **3. Bundle Performance**.

f. It prompts **Please enter the Bundle ID:**, enter **1**.

g. Lines **1.** and **2.** report **Correct Frames Tx to LAN** and **Correct Frames Rx from LAN**. These two values should match.

1.5 Functional Description

1.5.1 Interfaces

E1. The E1 interface complies with the following standards: ITU-T Rec. G.703, G.704, G.706, G.732, and G.823. The E1 framers support unframed (pass-through), framed, and framed-with-CAS. Long-haul/short-haul options can be selected by configuration.

T1. The T1 interface complies with the following standards: AT&T TR-62411, ITU-T Rec. G.703, G.704, ANSI T1.403, and G.824. The T1 framers support unframed (pass-through), SF, and ESF.

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Ethernet Uplink. The Ethernet uplink interface complies with the following standards: IEEE 802.3, 802.3u, and 802.1p and Q. This interface is a standard 100/1000BASE-T full-duplex Ethernet port with auto-negotiation support. The EV kit supports VLAN tagging and priority. A different VLAN can be configured for each bundle. The data stream coming from the E1/T1 interfaces is encapsulated into IP/MPLS/MEF packets and transferred over the Ethernet port, and vice versa. When using IP, a destination IP address should be configured for each bundle. When using MPLS, a bundle should be configured with an MPLS label.

Ethernet Management. The local Ethernet management interface enables the connection of a software debugger to the DS34S132 EV kit CPU. The interface is a standard

10/100/1000BASE-T Ethernet port with autonegotiation support that complies with the IEEE 802.3 standard.

E1/T1 External Clock. The E1/T1 external clock port enables connection of an external clock source to support the station clock mode.

Common Clock. The common clock port enables connection of a common clock source through LVTTL input. It supports frequencies of up to 25MHz. The common clock is used for differential mode clock recovery.

Reference Clock. The reference clock port allows for an external source to be used for TDM clock recovery from the Ethernet link.

RS-232 Control. The RS-232 control interface enables connection an ASCII terminal for configuring the EV kit.
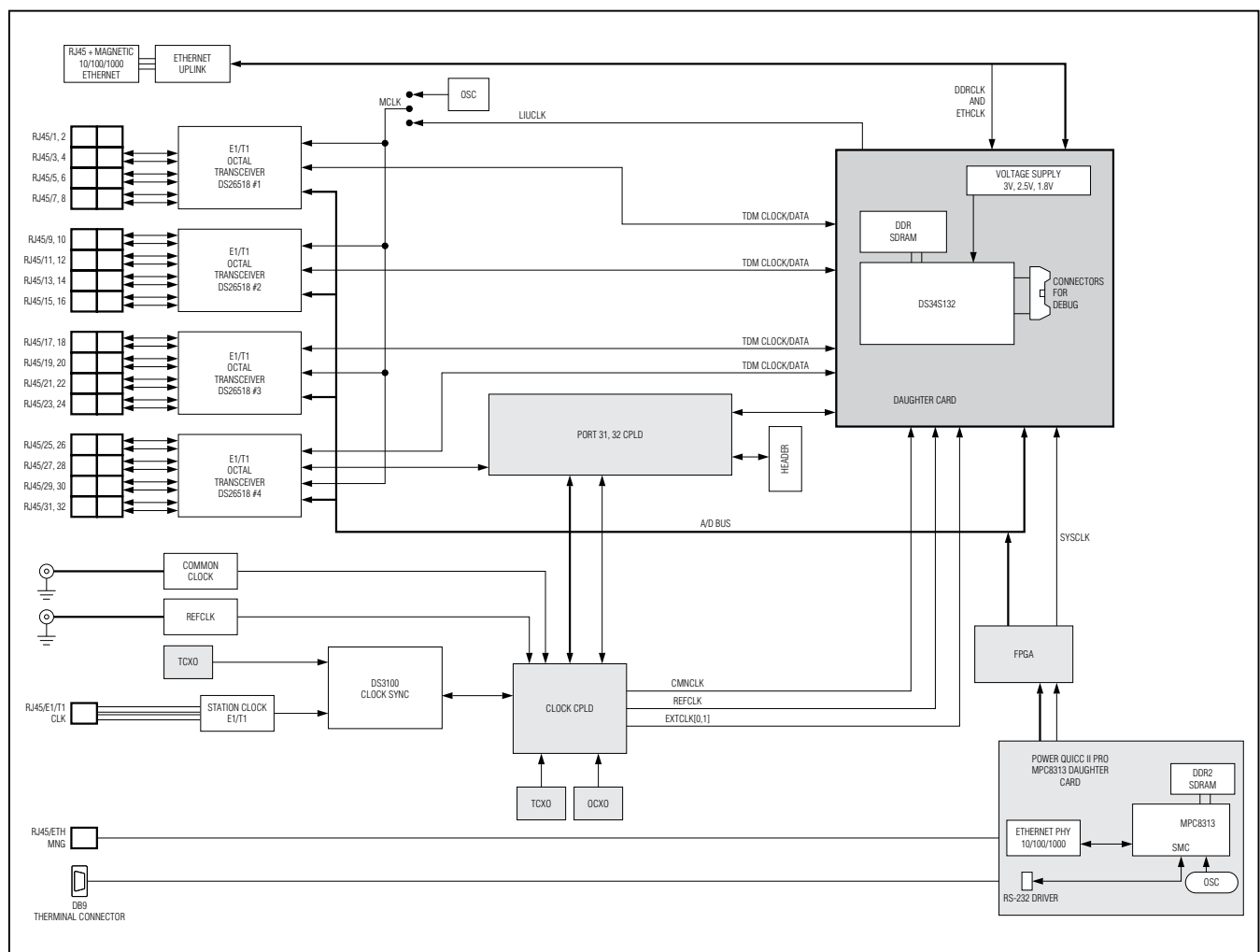
Figure 1-3. DS34S132 EV Kit Block Diagram
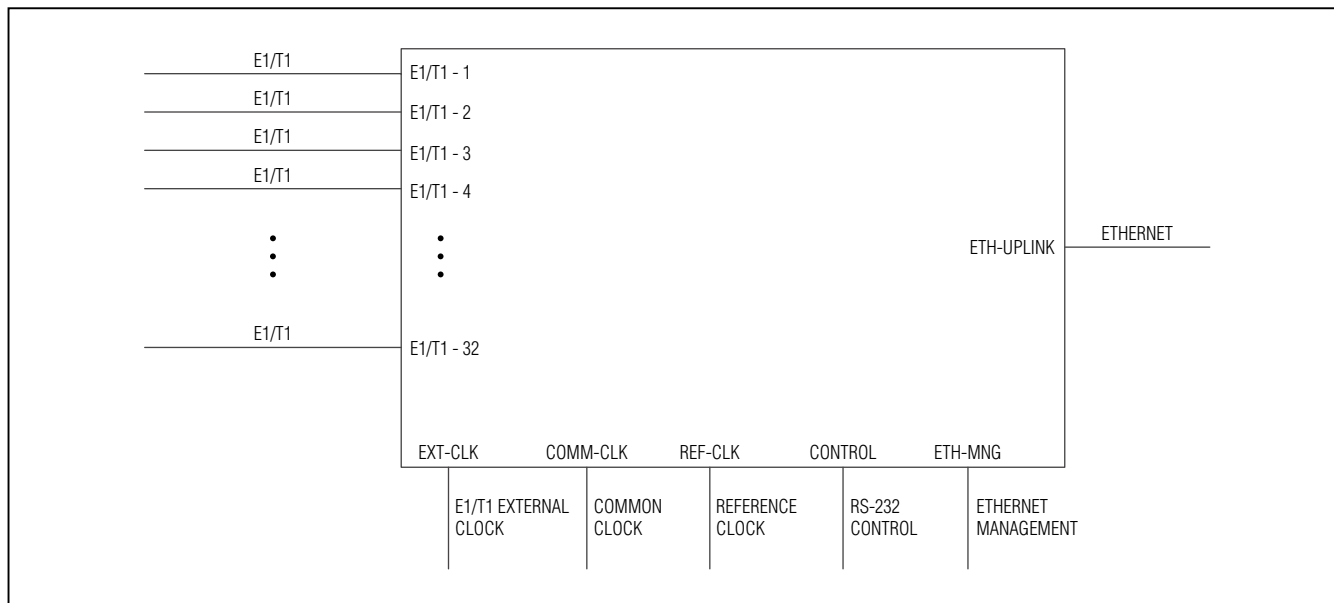
Figure 1-4. Representation of DS34S132 EV Kit Interfaces
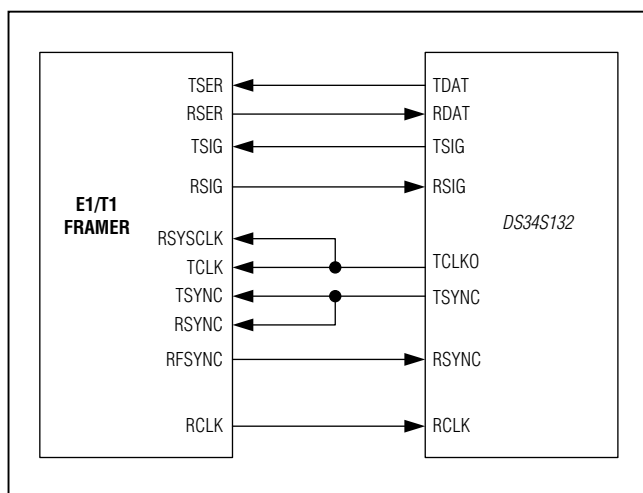
Figure 1-5. E1/T1 Per Port Clock Distribution

1.5.2 Modes of Operation

The EV kit modes of operation for E1/T1 are the following:

- Unframed
- Framed
- Framed-with-CAS

In unframed mode, the entire incoming bit stream from each interface is encapsulated into IP/MPLS/MEF-over-Ethernet packets without regard for frame alignment. This option provides clear channel end-to-end service.

In framed and framed-with-CAS modes, the incoming bit stream is regarded as a sequence of n x 64kbps channel groups. This mode allows fractional or full E1/T1 transmission.

1.5.3 Timing Modes

The E1/T1 transmit (Tx) clock operates in several timing modes to provide maximum flexibility for the EV kit TDM interface. The available timing modes are the following:

- **Loopback Timing:** The clock is derived from the received TDM clock.

- **Recovered Clock Timing:** The clock is regenerated from the ETH network using the clock recovery mechanism.

- **Internal Clock Timing:** The clock is provided by an internal oscillator.

- **E1/T1 Station Clock Timing:** The clock is provided by the external E1/T1 clock source.

These selections are accessed through the user interface software. See *4.3 Configuring TDM Interfaces* for more information. Figure 1-5 shows the TDM backplane wiring for one E1/T1 port of the system (there are 32 total E1/T1 TDM ports).

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1.5.4 Ethernet Clock Recovery

The DS34S132 uses either CMNCLK or REFCLK pins as its reference clock input to recover the TDM timing from the Ethernet source using either "Adaptive Clock Recovery" or "Differential Clock Recovery." These clock inputs are sourced from the on-board CPLD and are user-selectable from TCXOs, an OCXO, an E1/T1 station clock, or an external reference on one of the BNC jacks (CMNCLK or REFCLK BNC jacks).

1.5.5 Motherboard

The motherboard consists of four octal T1/E1 transceivers, a timing synthesizer (DS3100 clock sync), various TCXOs, an OCXO, two CPLDs, and an FPGA.

The DS3100 clock sync provides clock sources to the CPLD, which acts as a mux to allow software selection of the various clock sources to the DS34S132.

The FPGA provides CPU timing signals to the devices on the address/data bus. One CPLD provides user-selectable clock sources and the other CPLD breaks out ports 31 and 32 of the TDM backplane for connection to an alternative LIU (e.g., the T3/E3 LIU, DS3150).

1.5.6 CPU Board

Figure 1-6 shows the CPU and peripherals block diagram. The CPU clock is obtained from an on-board local crystal oscillator.

The flash device has a 64Mb memory capacity. The flash is used for storage of software and configuration data that should not be lost when system power is off. The RAM memory consists of a DDR2 SDRAM device with a capacity of 512Mb. The CPU provides 16-bit data bus synchronous with the address bus. The CPU can accept and prioritize multiple external interrupts. One interrupt is connected to the TDMoP IC daughter card. MPC8313's SMC communication port, used as a UART, is connected through an RS-232 transceiver to the DB9 control port on the front panel of the system. An ASCII terminal connected to the control port can be used to configure the system. The MPC8313's Ethernet communication controller is connected through an Ethernet PHY to the Ethernet management port (MNG) on the front panel of the system.
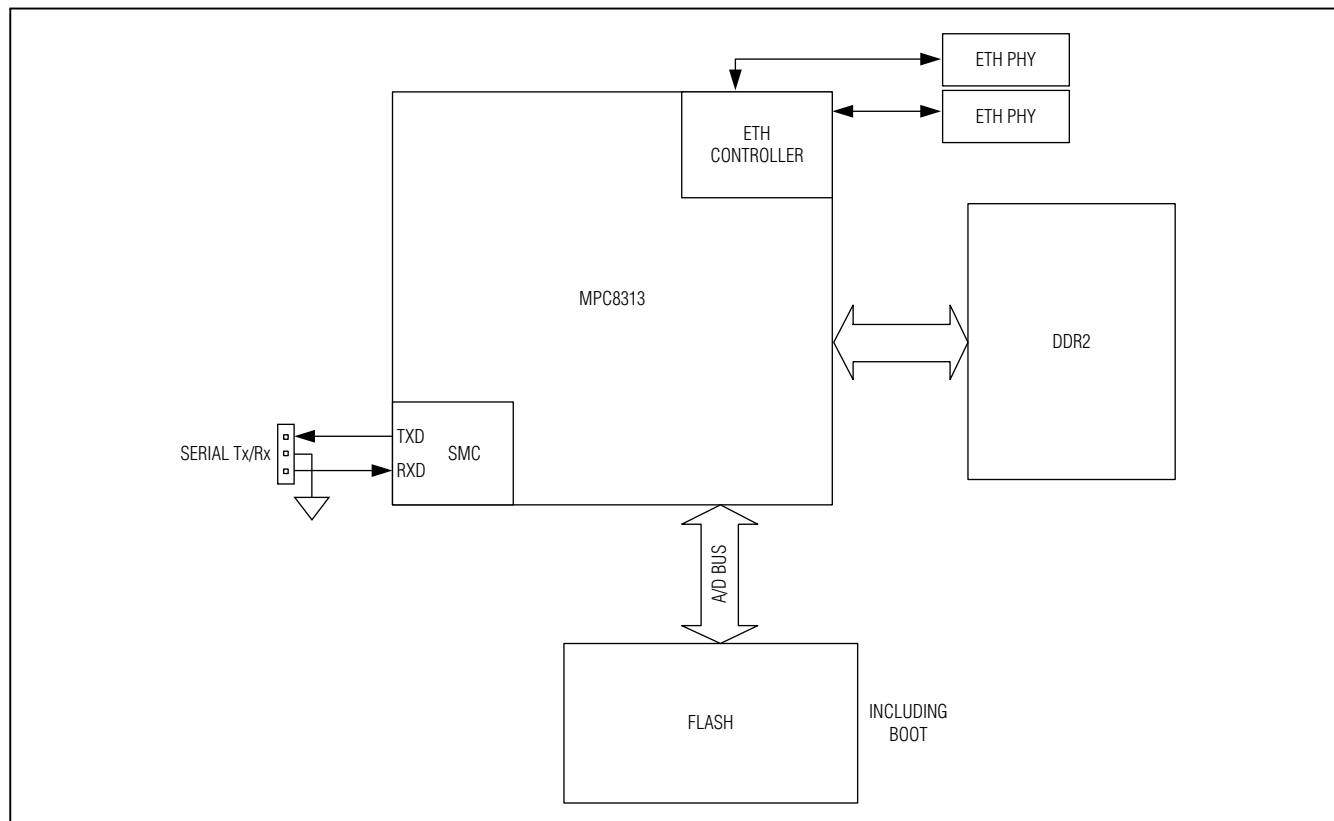
Figure 1-6. CPU and Peripherals Block Diagram

1.5.7 TDMoP IC Daughter Card

The TDMoP IC daughter card is populated with a Maxim TDMoP IC (DS34S132) and a 512Mb DDR SDRAM. The core voltage is 1.8V for the TDMoP IC. I/Os are supplied with 3.3V. In addition, 2.5V is made from the 3.3V power supply through an on-board linear regulator.

1.5.8 Bundles

A bundle is defined as a stream of bits originating from one TDM interface that are transmitted from a TDMoP source device to a TDMoP destination device. For example, a bundle can comprise any number of 64kbps time slots originating from a single E1 or T1 interface. Bundles are single-direction streams, frequently coupled with bundles in the opposite direction to enable full-duplex communications. More than one bundle can be transmitted between two TDMoP edge devices. Each bundle transmitted or received by the EV kit uses one of the following payload type methods:

- TDMoIP using CESoPSN or SAToP payload type method
- TDMoMPLS using CESoPSN or SAToP payload type method
- TDMoMEF using CESoPSN or SAToP payload type method
- HDLCoIP
- HDLCoMPLS

Up to 256 bundles are supported. Each TDMoP bundle/connection can be assigned to one of the payload type machines or to the CPU.

1.5.9 Packet Formats

DA MAC_addr/ BROADCAST/ MULTICAST	SA	VLAN TAG UP TO 2 TAGS	ETH TYPE IP	IP HEADER DEST. IP = IP_Add1/ IP_Add2	UDP* OR L2TPv3 HEADER Bundle no. = Bundle_Identifier/ OAM_bundle_num	CONTROL WORD	PAYLOAD TYPE HDLC/OAM/SAToP/ CESoPSN	CRC32

*THE UDP SOURCE PORT NUMBER IS USED AS THE BUNDLE NUMBER DESIGNATOR, WHILE UDP DESTINATION PORT NUMBER IS SET TO 0x085E (2142), THE USER PORT NUMBER ASSIGNED BY IANA TO TDMoIP.

Figure 1-7. TDMoIP Packet with VLAN Tag

DA MAC_addr/ BROADCAST/ MULTICAST	SA	VLAN TAG UP TO 2 TAGS	ETH TYPE MPLS	UP TO 2 MPLS LABELS OPTIONAL	MPLS LABEL* Bundle no. = Bundle_Identifier/ OAM_bundle_num	CONTROL WORD	PAYLOAD TYPE HDLC/OAM/SAToP/ CESoPSN	CRC32

*A STACK OF UP TO THREE MPLS LABELS IS SUPPORTED, WHERE THE INNER LABEL IS USED AS THE BUNDLE NUMBER DESIGNATOR.
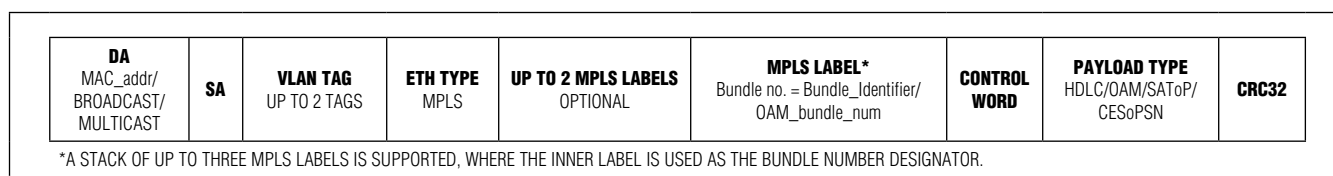
Figure 1-8. TDMoMPLS Packet with VLAN Tag

DA MAC_addr/ BROADCAST/ MULTICAST	SA	VLAN TAG UP TO 2 TAGS	ETH TYPE MEF	ECID = Bundle_Identifier	CONTROL WORD	PAYLOAD TYPE HDLC/OAM/SAToP/ CESoPSN	CRC32
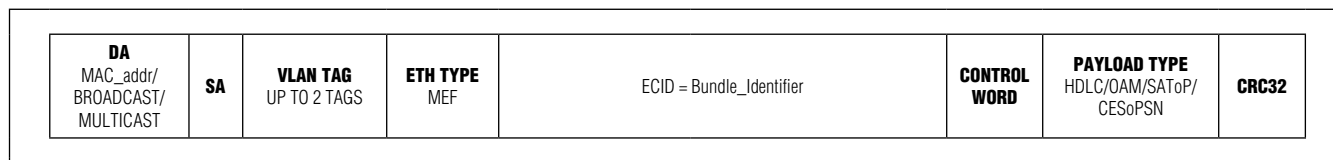
Figure 1-9. TDMoMEF Packet with VLAN Tag

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1.5.10 TDMoP Mappings

To transport TDM data through packet switched networks, the EV kit encapsulates it into Ethernet packets, as shown in Figure 1-10. The UDP/IP, L2TPv3/IP, MEF, and MPLS headers, as well as the TDMoIP control word, are detailed in the packets formats section of Maxim's TDMoP IC data sheets.

1.5.11 Payload Type Machines

SAToP. The SAToP payload type machine converts unframed E1/T1 or serial data flows into IP, MPLS, or Ethernet packets and vice versa according to ITU-T Y.1413, MEF 8, MFA 8.0.0, and IETF RFC 4553.

CESoPSN. The CESoPSN payload type machine converts structured E1/T1 data flows into IP, MPLS, or Ethernet packets and vice versa with static assignment of time slots inside a bundle according to ITU-T Y.1413, MEF 8, MFA 8.0.0, and IETF RFC 5086.

HDLC. The HDLC payload type machine, for efficient transfer or termination of frame-based traffic, provides an HDLC controller for each bundle assigned to it. It supports 2, 7, and 8-bit time-slot resolution (i.e., 16, 56, and 64kbps, respectively), as well as N x 64kbps bundles (N = 1 to 32). This is useful in applications where HDLC-based signaling interpretation is required (such as ISDN D-channel signaling termination, V.51/2, or GR-303), or for trunking packet-based applications (such as frame relay), according to IETF RFC 4618.

1.5.12 OAM

OAM is used to detect a valid connection. It can be set to enable or disable. When a bundle in the EV kit is
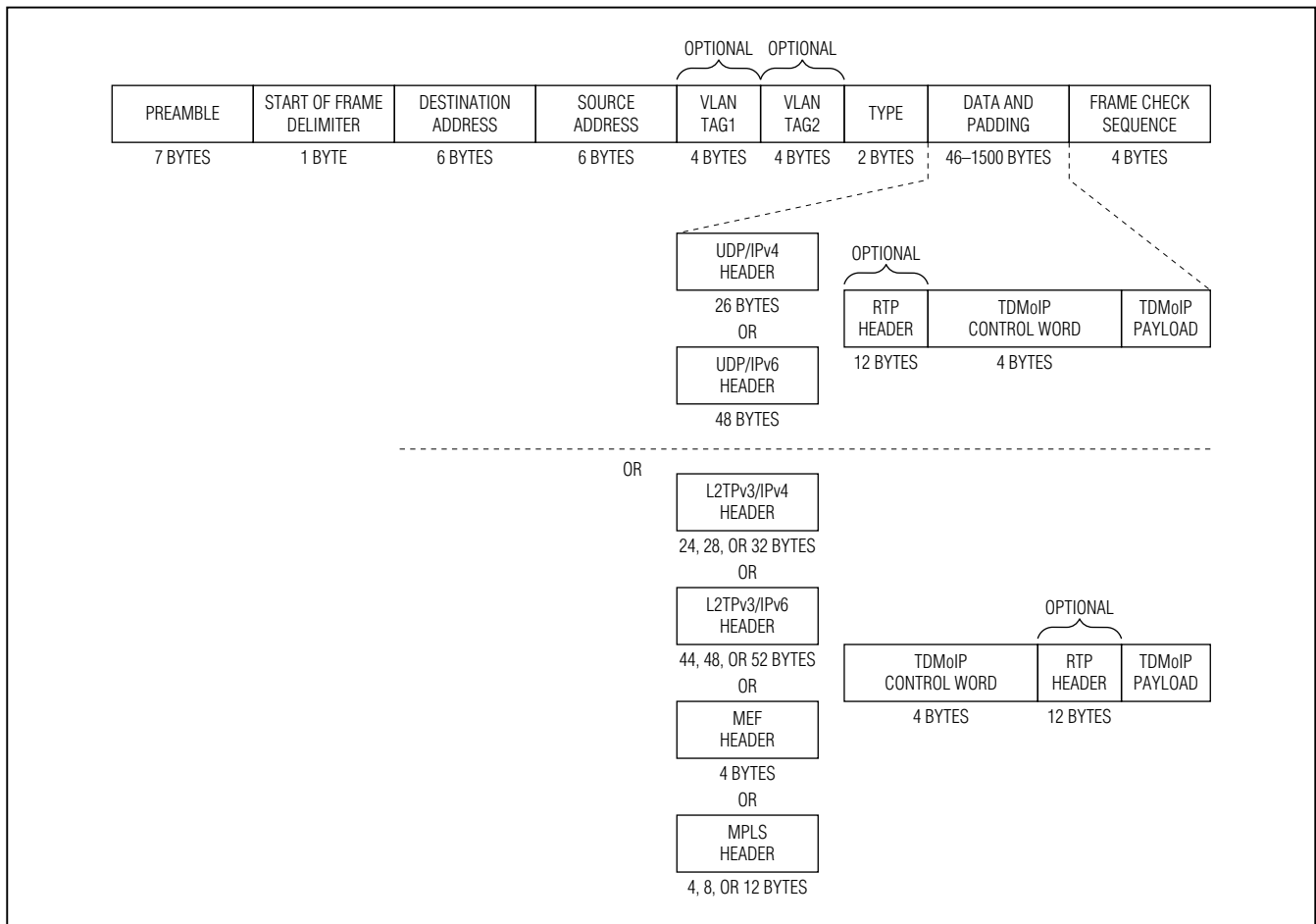
Figure 1-10. TDMoIP Encapsulation in an Ethernet Frame

assigned with OAM, TDMoIP traffic is not sent immediately. First, a TDMoIP echo request packet is sent once every five seconds. This continues until a valid echo reply arrives. The remote TDMoP system receives the echo request packet and sends a valid echo reply only if all parameters in the echo request match its local configuration. When a valid echo reply arrives, the transmitting echo request message stops, and TDMoP traffic flow begins at full rate for that bundle. If there is a break in the connection, the initialization process begins again.

Refer to the VCCV OAM and UDP/IP-specific OAM sections of the DS34S132 IC data sheet for details of the OAM payload types.

1.5.13 Packet Delay Variation

Packets are transmitted at set intervals. Packet delay variation (PDV) is the maximum deviation from the nominal time the packets are expected to arrive at the receiving device. The TDMoP IC controls a buffer that compensates for the deviation from the expected packet arrival time to prevent buffer overflow or underflow.

Packet delay variation is an important network parameter. Large PDV (exceeding the jitter buffer configuration) causes receive buffer overflow or underflow and errors in the recovered E1/T1 signal. To compensate for large PDV, the packet delay variation tolerance (PDVT) (jitter) buffer should be configured to a higher value.

1.5.13.1 Differential Time

The TDMoP IC is equipped with a PDVT buffer. The PDVT buffer is filled by the payload of incoming packets and emptied to fill the outgoing E1/T1 or serial data stream.

The jitter buffer depth is defined by the Rx_max_buff_size parameter. When the jitter buffer level reaches the value of Rx_max_buff_size, an overrun situation is declared.

The differential time parameter defines the amount of data to be stored in the jitter buffer to compensate for network delay variation. This parameter has two implications:

- Differential time defines the IC's immunity to network packet delay variation.

- The data arriving from the network is delayed by differential time before it is sent to the TDM interface.

Differential time should be smaller than Rx_max_buff_size. Also, the difference between Rx_max_buff_size and differential time should be larger than the time required to reconstruct a packet (otherwise an overrun can occur). Configuring the jitter buffer parameters correctly avoids underrun and overrun situations. Underrun occurs when the jitter buffer becomes empty (data is being written to the buffer more slowly than data is being read out of the buffer). Overrun occurs when the jitter buffer is full and there is no room for new data (data is being read out of the buffer more slowly than data is being written to the buffer). See Figure 1-12.

Table 1-1 shows the maximum configurable value for differential time.

Table 1-1. Maximum PDVT for E1/T1

TDM FRAME TYPE	E1 (ms)	T1 (ms)
Unframed	256	340
Framed-without-CAS	256	256
Framed-with-CAS	256	192
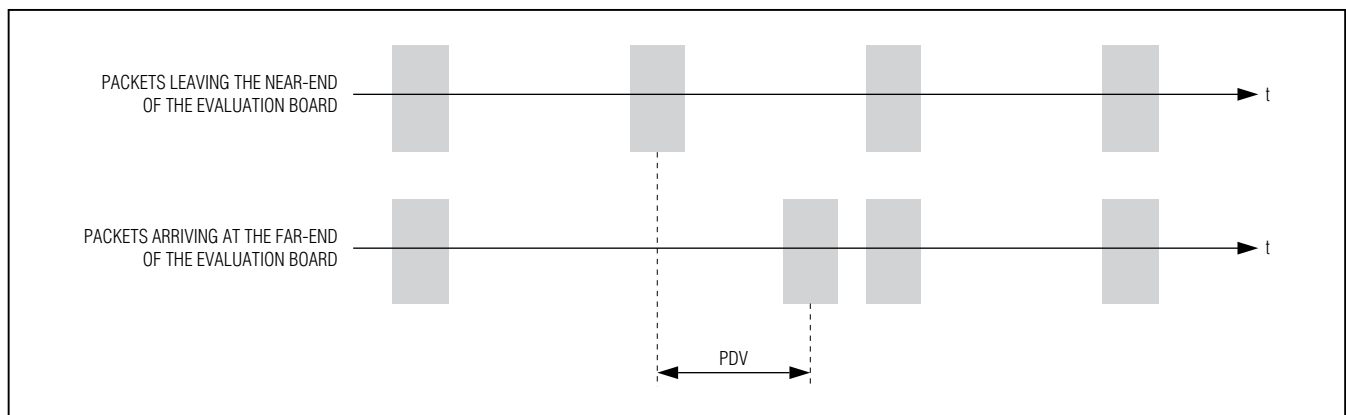
Figure 1-11. Packet Delay Variation
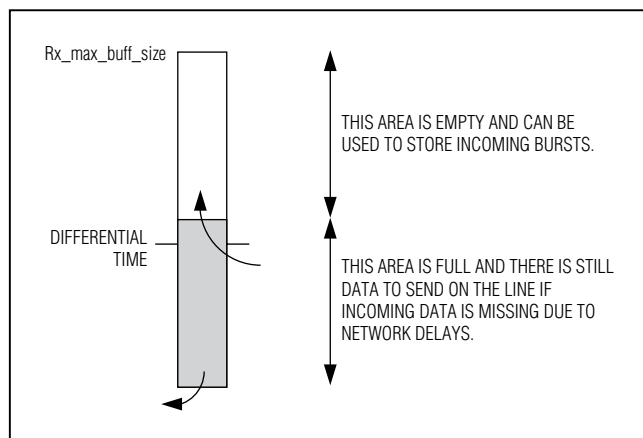
Figure 1-12. Jitter Buffer Parameters

1.5.13.2 End-to-End Delay

The data path end-to-end delay, which is a function of all connections and network parameters, is calculated as follows:

End-to-End Delay = PDVT + Packet Creation Time + Fixed Network Delay

where PDVT is measured in seconds, Packet Creation Time is measured in seconds, and time of one time slot = 1/8kHz.

SAToP (Unstructured) Packets:

$$\text{Packet Creation Time} = \left(\frac{1}{(NTS \times 64K)/8bit}\right) \times SB$$

where SB = size of packet in bytes.

CESoPSN Packets (Structured or Structured with CAS):

Packet Creation Time = 0.125ms x NF

where NF = number of TDM frames per packet.

1.5.14 End-to-End Alarm Generation

An end-to-end alarm generation mechanism exists in the EV kit to facilitate the following alarms:

- Unframed: OOS is transmitted towards the near-end TDM interface in the event of:

    far-end LOS, AIS

    PDVT underflow/overflow

- Fractional: Time slot/CAS configurable alarm pattern is transmitted towards the near-end TDM interface in the event of:

    far-end LOS, LOF, AIS

    PDVT underflow/overflow

1.5.15 Default Gateway Configuration

The EV kit supports a default gateway configuration. In addition, a different Next Hop can be configured for each bundle.

Table 1-2. Technical Specifications

E1	Standards	ITU-T Rec. G.703, G.704, G.706, G.732, G.823
	Framing	Unframed, structured
	Data Rate	2.048Mbps
	Line Code	HDB3
	Receive Level	0 to -28dB with LTU, 0 to -9dB without LTU
	Transmit Level	±3V ±10%, balanced
	Line Impedance	120Ω
	Jitter Performance	Per ITU-T G.823
	Connector	8-pin RJ45
T1	Standards	AT&T TR-62411, ITU-T Rec. G.703, G.704, ANSI T1.403, G.824
	Data Rate	1.544Mbps
	Line Code	B8ZS, B7ZS
	Framing	Unframed, SF, ESF
	Receive Level	0 to -30dB
	Transmit Level	±2.75V ±10% at 0 to 655ft with DSU 0dB, -7.5dB, -15dB, -22.5dB with CSU
	Line Impedance	100Ω
	Jitter Performance	Per AT&T TR-62411, ITU-T G.824
	Connector	8-pin RJ45
Ethernet Uplink	Standards	IEEE 802.3, 802.3u, 802.1p and Q
	Data Rate	10/100/1000 half/full duplex
	Range	Up to 100m on UTP Cat. 5
	Type	10/100/1000 half/full-duplex port with autonegotiation support
	Connector	8-pin RJ45

Table 1-2. Technical Specifications (continued)

Ethernet Management	Standards	IEEE 802.3, Ethernet, 802.1p and Q
	Data Rate	10/100/1000 half/full duplex
	Range	Up to 100m on UTP Cat. 5
	Type	10/100/1000BASE-TX half/full-duplex port with autonegotiation support
	Connector	8-pin RJ45
Control	Type	Standard DB9 connector
	Interface	RS-232/V.24 (DCE) interface
	Data Rate	115.2kbps
	Data Bits	8
	Stop Bit	1
	Flow Control	None
Station Clock	Clock Rate	2.048Mbps or 1.544Mbps
	Connector	8-pin RJ45
	Line Impedance	120Ω or 100Ω
Common Clock	Standard	LVTTL input (square wave 0/3.3V)
	Connector	BNC
Diagnostics	Loopbacks	LLB and RLB
Ethernet Port Indicators	LINK	Off when line is not connected; On when line is connected
	ACT	Off when no activity; On when a frame is being transmitted or received on the line
E1/T1 Port Indicators	LOS	On when there is no data in Rx
	LOF	On when loss of frame is detected
Power	—	100 to 240V AC, 50Hz to 60Hz
Physical	Height	11.1cm (4.375in)
	Width	48.3cm (19in)
	Depth	34.3cm (13.5in)

2. Installation

2.1 Introduction

The EV kit is delivered completely assembled and ready to use. Configure the EV kit using an ASCII terminal connected to the EV kit control port as described in *3. Operation*. If problems are encountered, see *5. Troubleshooting and Diagnostics* for test and diagnostics instructions.

2.2 Making Internal Settings

The EV kit contains jumpers and switches that provide preliminary configuration of the device. It should not be necessary to change these settings from the factory default. If it becomes necessary to change them, follow these instructions:

1) Open the EV kit enclosure.

2) Set jumpers or switches located on the motherboard or on the daughter card.

3) Close the EV kit enclosure.

2.2.1 Opening the DS34S132 EV Kit Case

Open the EV kit case to gain access. **Caution: The EV kit contains components sensitive to electrostatic discharge (ESD). To prevent ESD damage, avoid touching the internal components. Before moving the jumpers, touch the EV kit frame.**

To open the unit's case:

1) Disconnect all cables from the EV kit.

2) Unscrew all the cover screws on the top and side panels of the unit.

3) Remove the top cover by pulling it straight up.

2.2.2 Setting the Internal Jumpers

Internal jumpers are located on the motherboard and the CPU daughter card. To set the motherboard jumpers:

1) See Figure 2-1 to locate internal jumpers on the motherboard PCB.

2) Set the motherboard jumpers while referring to Table 2-1.

To set the CPU daughter card jumpers:

1) See Figure 2-2 to locate internal jumpers on the daughter card.

2) Set the daughter card jumpers referring to Table 2-2.

DS34S132 Evaluation Kit

Evaluates: DS34S132
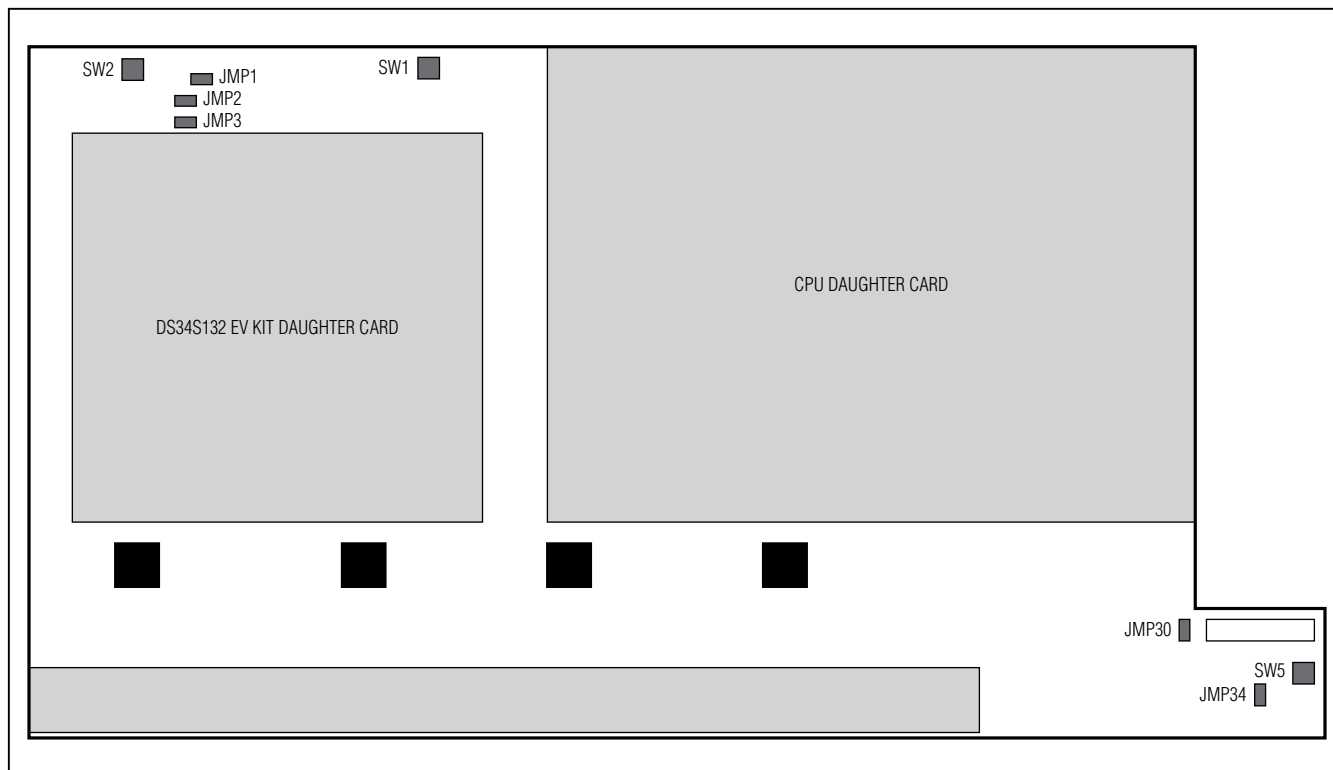
Figure 2-1. Motherboard Jumper Locations

Table 2-1. Motherboard Jumper and Switch Settings

JUMPER	FUNCTION	POSSIBLE SETTINGS	FACTORY SETTING
JMP1	Controls DDRCLK	PHY clock or BNC for DDR	PHY clock
JMP2	Selects clock for MAC	PHY clock or BNC for MAC	Unconnected
JMP3	Selects clock for MAC	PHY clock or not for MAC	PHY clock
JMP30	PWR ON	Bypasses SW5	Connected
JMP34	DS26518s' MCLK selector	Selects between LIUCLK output of DS34S132 and 2.048MHz oscillator	Oscillator
SW1	Resets DS34S132 EV kit	Resets DS34S132 daughter card	N/A
SW2	Board reset	Resets motherboard	N/A
SW5	Powers down board	This powers down the board if JMP30 is not connected	N/A

Note: *The motherboard includes additional factory-set jumpers and switches that must not be changed by the user.*

Figure 2-2. CPU Daughter Card Jumper Locations

Table 2-2. CPU Daughter Card Jumper Settings

JUMPER	FUNCTION	POSSIBLE SETTINGS	FACTORY SETTING
J26	SYS_CLK_IN selection	BNC or oscillator	Oscillator
S1	Reset CPU card	N/A	N/A
S2	Unused	N/A	N/A
S3	CPU control switches	Do not change	All on
S4	CPU control switches	Do not change	All off

Note: *The CPU board includes additional factory-set jumpers and switches that must not be changed by the user.*

DS34S132 Evaluation Kit

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2.3 Connecting to the Ethernet Network Equipment

The EV kit is connected to Ethernet network equipment through the 8-pin RJ45 port designated **UPLINK**. See *Appendix A. Connector Wiring* for the connector pin arrangement. Connect the EV kit to the Ethernet network equipment using a standard straight UTP cable. See Figure 2-3.

2.4 Connecting to the TDM Equipment

The EV kit is connected to the TDM equipment through **T1/E1** balanced RJ45 ports. See *Appendix A. Connector Wiring* for the connector pin arrangement. Connect the EV kit to the TDM equipment using standard straight E1/T1 cables. See Figure 2-4.
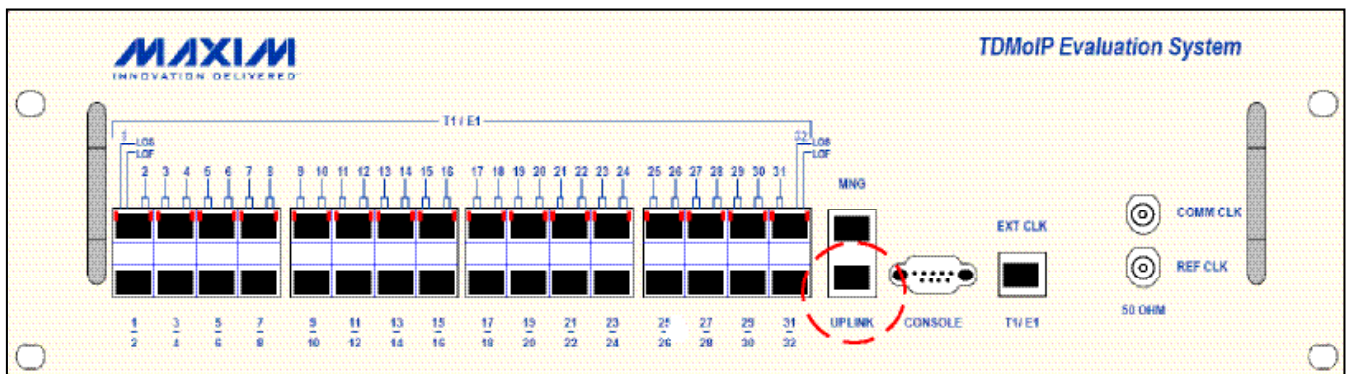
Figure 2-3. UPLINK Connector
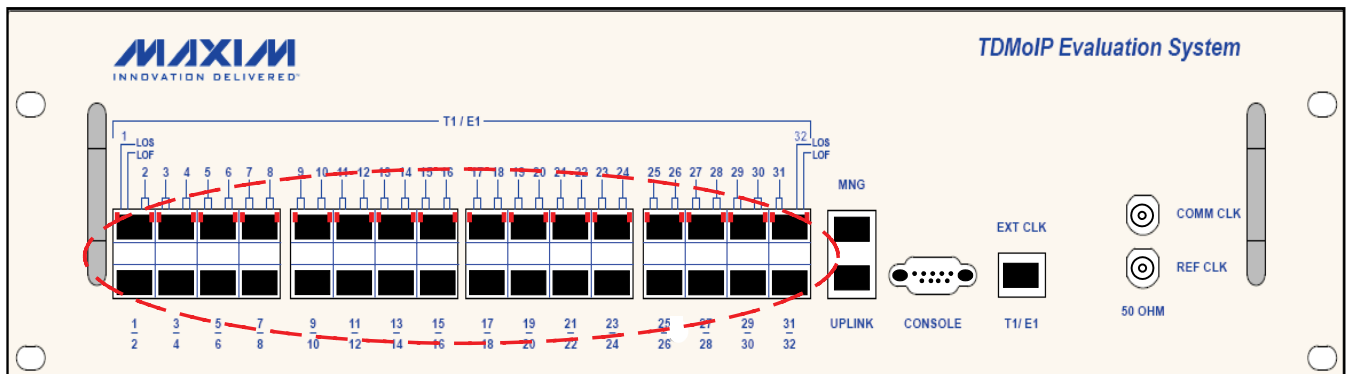
Figure 2-4. T1/E1 Connectors

2.5 Connecting to the Clock Sources

2.5.1 Connecting to the External Clock Source

The EV kit is connected to an external BITS clock source through a balanced RJ45 connector designated **EXT CLK**. See *Appendix A. Connector Wiring* for the connector pin arrangement. See Figure 2-5.

2.5.2 Connecting to the Common Clock Source

The EV kit is connected to a common clock source through an unbalanced BNC connector designated **COMM CLK**. Connect the EV kit to the common clock source using a using a 50Ω coaxial cable. The input signal must be LVTTL (square wave with 0V/3.3V levels). See Figure 2-6.
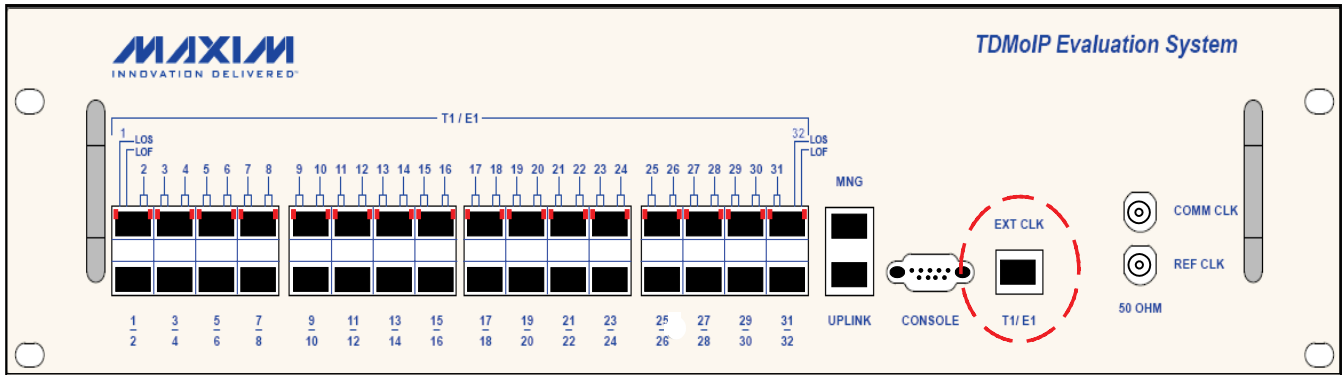
Figure 2-5. EXT CLK Connector
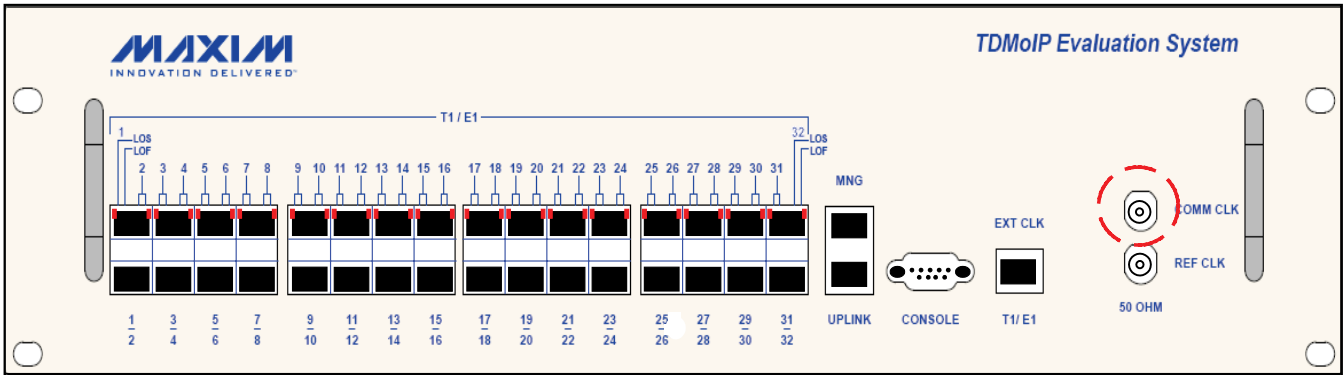
Figure 2-6. COMM CLK Connector
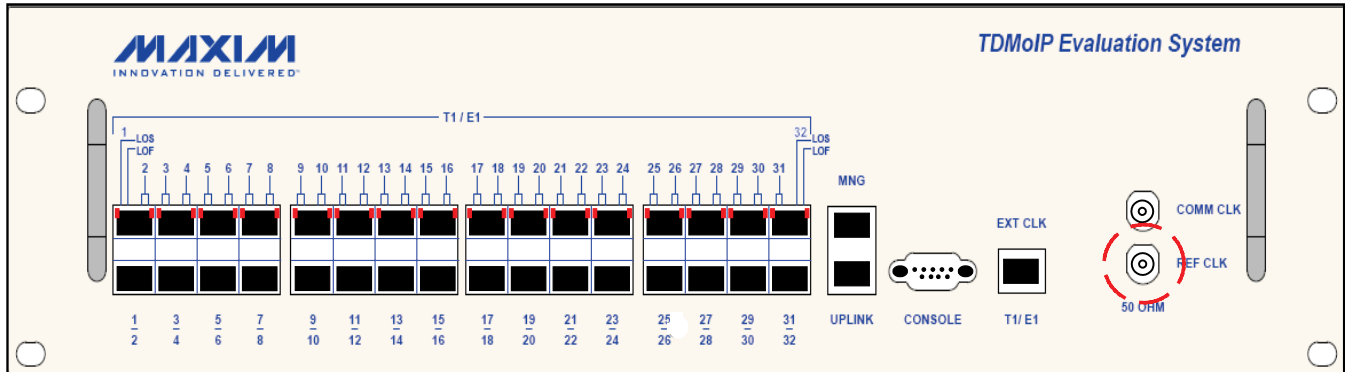
Figure 2-7. REF CLK Connector
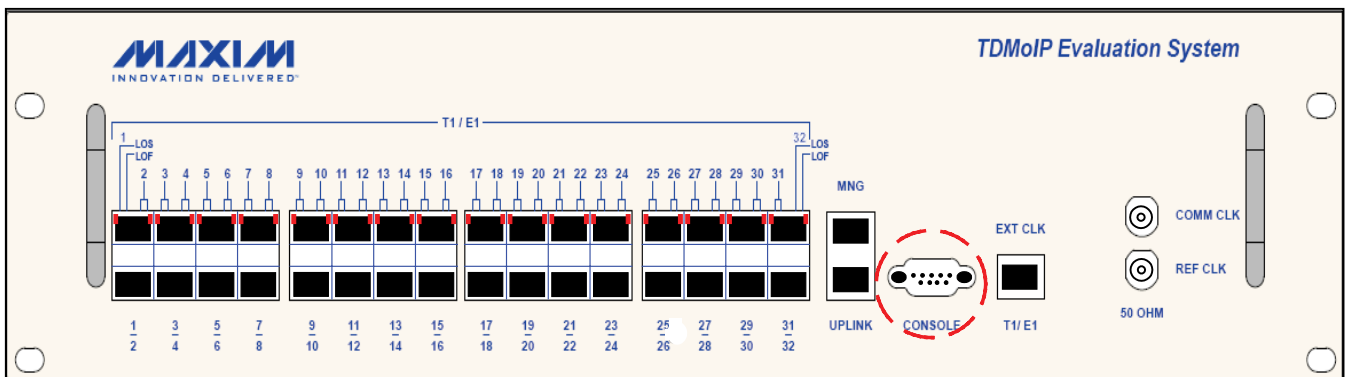
Figure 2-8. CONSOLE Connector

2.5.3 Connecting to the Reference Clock Source

The EV kit is connected to a reference clock source through an unbalanced BNC connector designated **REF CLK**. Connect the EV kit to the reference clock source using a using a 50Ω coaxial cable. The input signal must be LVTTL (square wave with 0V/3.3V levels). See Figure 2-7.

2.5.4 Connecting to an ASCII Terminal

The EV kit is connected to an ASCII terminal through a 9-pin, D-type, female connector designated **CONSOLE**. See *Appendix A. Connector Wiring* for the connector pin arrangement. See Figure 2-8.

To connect to an ASCII terminal:

1) Connect a serial cable with a male 9-pin, D-type connector to the **CONSOLE** connector.

2) Connect the other end of the serial cable to an ASCII terminal.

3. Operation

This section provides a detailed description of the front panel indicators and their functions, and explains the EV kit configuration using an ASCII terminal. See *4. Configuration* for detailed explanations of parameters on the menus.

3.1 Front Panel Indicators

The unit's LEDs are located on the front panel (see Figure 3-1). Table 3-1 lists the functions of the EV kit LED indicators.

3.2 User Interface Software

3.2.1 Using the Control Port and an ASCII Terminal

The EV kit can be configured and monitored using an ASCII terminal connected to the control port on the EV kit front panel. The control port is a V.24/RS-232 asynchronous DCE port terminated in a 9-pin, D-type female connector. The EV kit continuously monitors control port signals from the ASCII terminal and immediately responds to any input string received through this port.

To access the user interface software using an ASCII terminal:

1) Ensure all DS34S132 EV kit cables and connectors are properly connected.

2) Connect the DS34S132 EV kit to a PC equipped with ASCII terminal emulation software (for example, Windows Hyper Terminal or PuTTY).

3) Set the port parameters of the control terminal PC to 115.2kbps, 8 bits/character, 1 stop bit, no parity. If available, set the terminal emulator to ANSI VT100 emulation (for optimal view of system menus).

4) At the end of the initialization and self-test, system software detects the part number of the TDMoP IC on the internal daughter card and displays it on the terminal screen as:

```
login:
```

The login ID is **target** and the password is **password**. After giving the password, the screen shows:

```
~ $
```

Write the following commands in sequence as shown:

```
~ $ su
~ $ password: root
~ $ ./ins132
~ $ ./top32App
```

The **Main Configuration (S132)** menu is displayed in the terminal.

top32App can be executed again after exiting the **Main Configuration (S132)** menu.
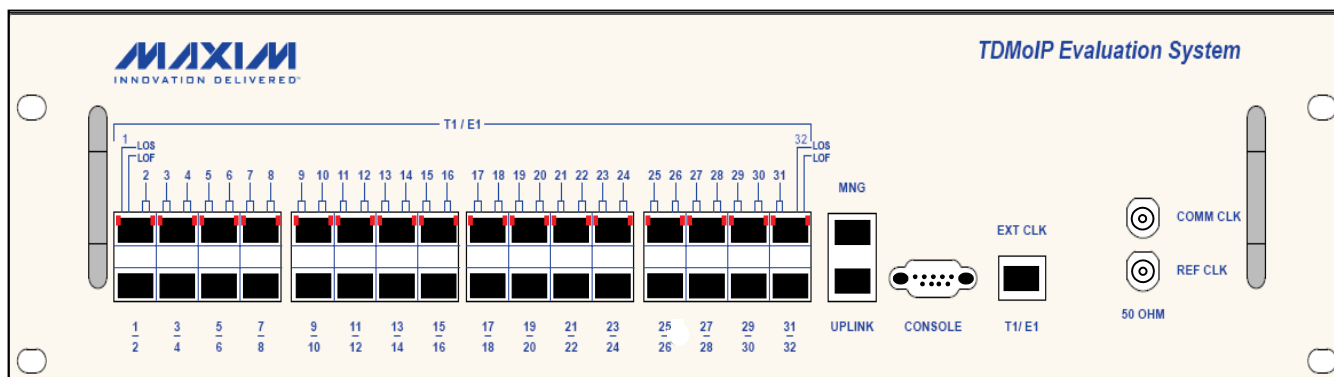
Figure 3-1. DS34S132 EV Kit Front Panel

Table 3-1. DS34S132 EV Kit LEDs and Controls

NAME	TYPE	FUNCTION
LOS	Red LED	On: Loss of signal (LEDs on the left refer to the top port, LEDs on the right refer to the bottom port).
LOF	Red LED	On: Loss of E1/T1 synchronization has been detected.
LINK	Green LED	On: Ethernet link is connected. Off: Ethernet link is disconnected.
ACT	Yellow LED	On: Data is being transmitted/received at the Ethernet interface. Off: No data is being transmitted/received at the Ethernet interface.

Note: LINK and ACT are not shown in Figure 3-1.

3.2.2 Using Telnet Through the Ethernet Management Port

The EV kit can be configured and monitored remotely over an IP/Ethernet network. Currently, the DS34S132 only supports static IP (factory default is 10.16.34.18) so the user needs to program the correct IP address. Use the following steps to do this. Remember that the user only needs to do this once.

To configure the static IP address of the DS34S132 EV board:

1) Power the DS34S132 EV kit.

2) Connect the **MNG** port of the EV kit to the local IP/Ethernet network.

3) Use an ASCII terminal connected as previously described.

```
login:
```

The login ID is **root** and the password is also **root**. After giving the password, the screen shows:

```
~ #
```

Write the following commands in sequence as shown below:

```
~ # cd /etc/rc.d
/etc/rc.d # vi rc.conf
```

The user then needs to change the necessary parameters for 'eth0' (lines between 'net interface 0' and 'net interface 1'). Once complete, save and exit.

```
/etc/rc.d # reboot
```

To access the user interface software using a telnet session:

1) Power the DS32S132 EV kit.

2) Connect the **MNG** port of the DS34S132 EV kit to the local IP/Ethernet network.

3) IP address was decided above.

4) On a PC is connected to the IP/Ethernet network, run "cmd" to get a DOS-like text interface window.

5) At the command prompt, type **telnet** followed by the IP address determined in step 3.

6) At the **login** prompt, type **target**. At the **password** prompt, type **password**.

Write the following commands in sequence as shown below:

```
~ $ su
~ $ password: root
~ $ ./ins132
~ $ ./top32App
```

The **Main Configuration (S132)** menu is displayed in the terminal.

top32App can be executed again after exiting the **Main Configuration (S132)** menu.

3.2.3 Choosing Options

To select a menu item, type the corresponding item number and then press **Enter**. If the selected item leads to another menu, the EV kit software displays the menu. If the selected item is a configurable parameter, the software displays descriptive text about the parameter and then, for parameters with only a few possible settings, displays a numbered list of possible values (e.g., **1: Enable, 2: Disable**) and a prompt such as **Please enter your choice:**. For parameters with many possible values, the software displays descriptive text followed by

```
SW Version             1.0.0

              Main Configuration (S132)

1.    Preconfig Configuration
2.    General Configuration
3.    Interface Configuration
4.    Bundle Configuration
5.    Bundle Management
6.    Restore Default Configurations
7.    Alarms
8.    Performance (PM)
9.    Utilities


Please select item <1 to 9>
q: exit, s: save, ESC: previous menu, r or Enter: reprint screen
```

Figure 3-2. Main Configuration Menu

a prompt at which a value can be entered (e.g., **Please enter your clock rate:**).

The selection or value entered for each parameter is checked after pressing **Enter**, and only valid entries are accepted. If an entry is invalid, the software displays a prompt such as **Please enter a valid choice:** and gives another opportunity to enter a valid selection number or value. To navigate upward in the menu hierarchy toward the main menu, press **Esc**.

3.2.4 Redisplaying the Current Menu

To redisplay the current menu, type **r** and press **Enter** or simply press **Enter**.

3.2.5 Saving Changes

After changing the values of one or more parameters in a configuration menu, type **s** then **Enter** to save the changes and write them to the TDMoP IC. **If changes are not saved in each menu, attempts to change parameters in other menus may not behave as expected.** For example, changes in the **Interface Configuration** menu must be saved before activities in the **Bundle Configuration** menu behave correctly, especially when saving a bundle configuration.

4. Configuration

This section discusses the EV kit configuration menus and explains their parameters:

- Preliminary Configuration
- Configuring General Parameters
- Configuring TDM Interfaces
    - Configuring E1 Interface
    - Configuring T1 Interfaces
- Configuring Bundles
    - Configuring SAToP Bundles
    - Configuring CESoPSN Bundles
- Deleting Bundles
- Displaying Active Bundles
- Restoring Default Configurations

4.1 Preliminary Configuration

For the convenience of the user, parameters that must be configured, such as link type, TDMoIP and IP versions, and clock recovery statistics, are given in the **PreConfig Configuration** menu. See Figure 4-1.

```
                    PreConfig Configuration

1.    Device Num (1 - 1)                        1
2.    Max. Bundles (1 - 256)                    64
3.    Link Type                                 T1
4.    Bundle Number ID Location                 Bundle Configuration Decides
5.    UDP Port Check                            Yes
6.    VCCV OAM Mask [0 - 4]                      1
7.    VCCV OAM Value                            1000
8.    MEF Ethernet Type                         88D8
9.    MEF OAM Type                              889C
10.   TDMoIP Port Number 1                      85E
11.   TDMoIP Port Number 2                      85E
12.   VLAN Inner Label                          8100
13.   VLAN Outer Label                          9100
14.   Oscillator Type                           OCXO (Stratum 3E)
15.   Common clock Freq                         19440000
16.   Reference Clock Frequency                 38880000
17.   Reference Clock Frequency PPM Offset      0
18.   Clock Recovery DSP File Name              rom_code.asm.patch.txt
19.   Driver Type                               Kernel Mode


Please select item <1 to 19>
q: exit, s: save, ESC: previous menu, r or Enter: reprint screen


Please enter your choice:
```

Figure 4-1. Preliminary Configuration Menu

Table 4-1. Preliminary Configuration Parameter Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Device Num (1 - 1)	Device number	Default: 1
Max. Bundles (1 - 256)	Maximum bundles	Any number **from 1–256** Default: 64
Link Type	Specifies the type of TDM interface (link); all TDM interfaces on a TDMoP IC must be the same type	**E1, T1** Default: T1
Bundle Number ID Location	Defines location of the bundle identification number	**1: Bundle configuration decides (BCDR4)** **2: Either UDP SRC or DST. port** **3: Bundle in DST UDP PORT** **4: Bundle in SRC UDP PORT** **5: Combined SRC and DST UDP ports** Default: Bundle Configuration Decides
UDP Port Check	Checks the UDP port number	**Yes, No** Default: Yes
VCCV OAM Mask [0 - 4]	Indicates which of the 16 MSBs of the control word are used to identify VCCV OAM packets; the mask is active when one of the bits is set to 0	**0–4** Default: 1
VCCV OAM Value	Indicates the value of the 16 MSBs of the control word that identifies VCCV OAM packets	**0–0xFFFF** Default: 1000
MEF Ethernet Type	Ethertype for MEF packets; must be set to a value greater than 0x5DC	**0–0xFFFF** Default: 88D8
MEF OAM Type	Ethertype for MEF OAM packets; must be set to a value greater than 0x5DC	**0–0xFFFF** Default: 889C
TDMoIP Port Number 1	Used to identify UDP/IP TDMoIP packets; its value is compared to either UDP_SRC_PORT_NUM or UDP_DST_PORT_NUM, according to Bundle Number ID Location (above)	**0–0xFFFF** Default: 85E
TDMoIP Port Number 2	Used to identify UDP/IP TDMoIP packets; its value is compared to either UDP_SRC_PORT_NUM or UDP_DST_PORT_NUM, according to Bundle Number ID Location (above)	**0–0xFFFF** Default: 85E
VLAN Inner Label	Defines the tag protocol identifier (TPID) to use when using VLAN tags	**Standard (0x8100)** **Proprietary** Default: Standard (8100)
VLAN Outer Label	Defines the tag protocol identifier (TPID) to use when using VLAN tags	**Standard (0x9100)** **Proprietary** Default: Standard (9100)
Oscillator Type	The oscillator used as the clock recovery reference clock	**TCXO** (Stratum 3) **OCXO** (Stratum 3E) Default: OCXO (Stratum 3E)
Common clock Freq	The common clock frequency supplied in the differential mode clock recovery	**Multiple of 8kHz** Default: 19440000

Table 4-1. Preliminary Configuration Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Reference Clock Frequency	Selects one of the 13 options for REFCLK frequency	**1: 38.88MHz** **2: 19.44MHz** **3: 10MHz** **4: 77.76MHz** **5: 5MHz** **6: 5.12MHz** **7: 10.24MHz** **8: 12.8MHz** **9: 13MHz** **10: 20MHz** **11: 20.48MHz** **12: 25MHz** **13: 155.52MHz** Default: 38880000
Reference Clock Frequency PPM Offset	Selects one of the 13 options for PPM offset of the reference clock frequency	**Any number from 0–50** Default: 0
Clock Recovery DSP File Name	DSP file that was used for recovering the clock	Default: rom_code.asm.patch.txt
Driver Type	Type of the driver used	**1. Kernel mode** **2. User mode** Default: Kernel Mode

4.2 Configuring General Parameters

```
                              General Configuration

                1.    Source Mac Address 1                      08002E289D53
                2.    Source Mac Address 2                      08002E286C0D
                3.    Source IP 1                               10.10.10.5
                4.    Source IP 2                               10.10.10.5
                5.    Default Gateway                           0.0.0.0
                6.    Not Eth Type                              CPU
                7.    ARP Wrong IP                              CPU
   MAIN MENU    8.    Wrong IP                                  Discard
                9.    ARP My IP                                 CPU
   GENERAL      10.   Not TDMoIP Type                           CPU
 CONFIGURATION  11.   Not UDP Type                              CPU
                12.   OAM Packet                                CPU
                13.   Bundle Not Exist                          Discard
                14.   Max HDLC Frame Size[1 - 1800]             1468
                15.   Ethernet Rate & Duplex                    100M_FDX, ANEG
                16.   OAM Configuration                              >

                Please select item <1 to 14>
                q: exit, s: save, ESC: previous menu, r or Enter: reprint screen


                Please enter your choice:
```

Figure 4-2. General Configuration (Main Menu→General Configuration)

Table 4-2. General Configuration Parameter Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Source Mac Address 1	Port local MAC address	Up to 12 alphanumeric characters Default: 08002E289D53
Source Mac Address 2	Second host MAC address.	Up to 12 alphanumeric characters Default: 08002E2896C0D
Source IP 1	Host IP address (see note).	**0.0.0.0** to **255.255.255.255** Default: 10.10.10.5
Source IP 2	Second host IP address (see note).	**0.0.0.0** to **255.255.255.255** Default: 10.10.10.5
Default Gateway	IP address of default gateway.	**0.0.0.0** to **255.255.255.255** Default: 0.0.0.0
Not Eth Type	Specifies what to do with packets received from UPLINK port, where Ethertype does not match one of the following: IP, MPLS, ARP, MEF, MEF OAM, or CPU.	**Discard:** Drops these packets **CPU:** Passes these packets to the CPU Default: CPU
ARP Wrong IP	Specifies what to do with ARP packets received from UPLINK port, where IP is different from source IP.	**Discard:** Drops these packets **CPU:** Passes these packets to the CPU Default: CPU
Wrong IP	Specifies what to do with packets received from UPLINK port with IP different from all source IPs.	**Discard:** Drops these packets **CPU:** Passes these packets to the CPU Default: CPU
ARP My IP	Specifies what to do with ARP packets received from UPLINK port, where IP is identical to source IP.	**Discard:** Drops these packets **CPU:** Passes these packets to the CPU Default: CPU
Not TDMoIP Type	Specifies what to do with packets received from UPLINK port, where UDP destination/source port is not TDMoIP.	**Discard:** Drops these packets **CPU:** Passes these packets to the CPU Default: CPU
Not UDP Type	Specifies what to do with packets received from UPLINK port, where protocol is not UDP.	**Discard:** Drops these packets **CPU:** Passes these packets to the CPU Default: CPU
OAM Packet	Specifies what to do with TDMoIP OAM packets.	**Discard:** Drops these packets **CPU:** Passes these packets to the CPU Default: CPU
Bundle Not Exist	Specifies what to do with packets received from UPLINK port, where bundle identifier is not one of the identifiers assigned in the TDMoP IC.	**Discard:** Drops these packets **CPU:** Passes these packets to the CPU Default: Discard
Max HDLC Frame Size [1 - 1800]	Maximum size of HDLC packet in bytes (header and FCS are not included).	**1–1800** for IP **1–1800** for MPLS Default: 1468
Ethernet Rate & Duplex	If autonegotiation is enabled, rate and duplex must be configured to a value equal or greater than the rate and duplex mode of the network. If autonegotiation is disabled, the rate and duplex must be configured equal to the rate and duplex of the network.	**1: 100 FDX ANEG** **2: 1000 FDX ANEG** **3: 100 FDX** **4: 1000 FDX** Default: 100M_FDX, ANEG
OAM Configuration	Selecting this options causes the **OAM Configuration** submenu to be displayed.	—

Note: *Source IP 1 and Source IP 2 can reside in different subnets. However, the IP mask is used for both source IPs. Either Source IP 1 or Source IP 2 can be selected in the* **Bundle Configuration** *menu (see section* 4.4 Configuring Bundles*).*

```
                                    OAM Config Menu

                1.   OAM Valid 2                                     Enable
                2.   OAM ID 2 [0 - 0xFFFF]                           24
                3.   OAM Valid 3                                     Enable
  MAIN MENU     4.   OAM ID 3 [0 - 0xFFFF]                           0
                5.   OAM Valid 4                                     Disable
  GENERAL       7.   OAM Valid 5                                     Disable
CONFIGURATION   9.   OAM Valid 6                                     Disable
                11.  OAM Valid 7                                     Disable
OAM CONFIGURATION 13. OAM Valid 8                                    Disable


                Please select item <1 to 14>
                q: exit, s: save, ESC: previous menu, r or Enter: reprint screen


                Please enter your choice:
```

Figure 4-3. OAM Configuration (Main Menu→General Configuration→OAM Configuration)

```
  MAIN MENU
                Please enter your Choice: 3

  INTERFACE
CONFIGURATION   Please enter TDM Link Number [1 - 32]:
```

Figure 4-4. TDM Interface Selection (Main Menu→Interface Configuration)

Table 4-3. OAM Configuration Parameter Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
OAM Valid n	Enables/disables OAM ID n ($2 \leq n \leq 8$).	**Enable** **Disable** Default: Disable
OAM ID n [0 - 0xFFFF]	Specifies OAM ID n ($2 \leq n \leq 8$). These IDs are bundle IDs for UDP/IP-specific OAM. If the bundle ID of an incoming packet matches an enabled OAM ID, the packet classifier in the TDMoP IC considers the packet to be an OAM packet and discards or forwards it to the CPU as specified by the OAM packet field described above.	**0–0xFFFF** Default: 0

4.3 Configuring TDM Interfaces

The number of TDM interfaces available depends on the TDMoP IC on the daughter card. A DS34S132 has 32 TDM interfaces. The user interface software only allows configuration of the number of TDM interfaces actually supported by the installed IC.

To configure a TDM interface, select **Interface Configuration** from the **Main Configuration (S132)** menu and enter the interface number at the prompt (Figure 4-4). The **Interface Configuration** menu is then displayed, either Figure 4-5 (E1) or Figure 4-6 (T1), depending on the setting of the **Link Type** parameter in the **PreConfig Configuration** menu.

DS34S132 Evaluation Kit

Evaluates: DS34S132

4.3.1 Configuring E1 Interfaces

```
                E1 Interface Configuration for link 1

        1.    Frame Type                              UnFramed
        2.    Rx Config Gain Limit                    Short Haul
        3.    OOS Code Type                           OOS Code
        4.    Data TX/RX OOS[0 - 0xFF]                7F
        6.    TX/RX OOS Signal Mask                   Space
        7.    Clock Source                            Internal
        8.    Link Sync                               CCITT
MAIN MENU       9.    Connect/Disconnect              Connect
        10.   CRC4                                    No
INTERFACE       11.   IF Type                         Balanced
CONFIGURATION   26.   Master's Side Clock Source      Stratum 1
        32.   Network Type                            Router based
E1 INTERFACE    33.   Clock Recovery Debug Tool       Extended Statistics
CONFIGURATION   38.   ADCL PPM                        0.000000
        39.   One or Two Clock Mode                   One Clock
        40.   Adaptive or Differential Mode           Adaptive
        41.   RTP Timestamp Generation Mode           Bit


        Please select item <1 to 41>
        q: exit, s: save, ESC: previous menu, r or Enter: reprint screen


        Please enter your choice:
```

NOTE: THE SETTINGS FOR SOME PARAMETERS IN THIS CONFIGURATION MENU DETERMINE WHETHER OR NOT OTHER PARAMETERS IN THE MENU ARE DISPLAYED. FOR EXAMPLE, IF **RECOVERY CLK MODE** IS SET TO **AUTO**, THEN ITEMS 13–25 AND 27–31 ARE NOT DISPLAYED BECAUSE THEIR VALUES ARE IGNORED IN THAT MODE. THE PARAMETER DESCRIPTIONS IN TABLE 4-4 HAVE NOTES INDICATING THE NECESSARY CONDITIONS FOR A PARAMETER TO BE DISPLAYED. SEE THE **ACQUISITION SWITCH** PARAMETER.

Figure 4-5. E1 Interface Configuration (Main Menu→Interface Configuration→E1 Interface Configuration)

Table 4-4. E1 Interface Configuration Parameter Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Frame Type	Framing mode and operation mode for each configuration. *Note: Before changing the E1 frame type, you must close all bundles assigned to the link.*	**Unframed:** Framer is configured to pass-through mode and the operation mode is set to unframed. **Framed:** The E1 framer is set for simple FAS/NFAS framing and the TDMoP block is set to fractional. **Multiframe:** The E1 framer is set to MF mode and the TDMoP block is set to fractional with CAS. Default: UnFramed
Rx Config Gain Limit	Determines the maximum attenuation of the receive signal that can be compensated for by the E1 link receive path, to obtain the BER performance required by the standards.	**Long Haul:** Maximum attenuation of 36dB. **Short Haul:** Maximum attenuation of 10dB. This configuration can actually improve the performance when operating over relatively short line sections, especially when operating over multipair cables. In such cables, significant interference is generated by the signals carried by other pairs, and therefore a weak desired signal can be masked by the interference. Default: Short Haul
OOS Code Type	Defines what to send if an OOS state occurred.	**OOS Code:** OOS code is sent Default: OOS code

Table 4-4. E1 Interface Configuration Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Data TX/RX OOS [0 - 0xFF]	Can be applied to time slots transmitted towards the ETH network when loss of signal, loss of frame or AIS is detected at the E1 line. Can also be applied to time slots transmitted toward the E1 line when packet receive buffer overrun or underrun occurs. In unframed mode, OOS state results in AIS transmission. This is applied when an LOS is detected at the E1 line, or when packet receive buffer overrun or under-run occurs.	**0–FF** Default: 7F
TX/RX OOS Signal Mask	Out-of-service signaling method. OOS signal is sent in the Ethernet direction when loss of signal, loss of frame, or AIS is detected at the E1 line. The OOS signal is also sent toward the E1 line when packet receive buffer overrun or underrun occur.	**Space:** Transmit CAS all 0s, when the Ethernet or TDM link is down **Mark:** Transmit CAS all 1s, when the Ethernet or TDM link is down **Space + Mark:** Transmit all 0s in CAS for the first 2.5s, then switch to all 1s **Mark + Space:** Transmit all 1s in CAS for the first 2.5s, then switch to all 0s Default: Space
Clock Source	Defines transmit clock source used by the interface.	**Adaptive Recovery:** Clock recovery regeneration from UPLINK **LIU Loopback:** T1 recovered receive clock is used as the transmit clock **Global Adaptive Recovery:** Selecting recovered clock from port 1 (future version will select one of the 32 ports) **EXTCLK0:** Not supported (future version will select one of the 32 ports) **EXTCLK1:** Not supported (future version will select one of the 32 ports) Default: Loopback
Link Sync	Selects the E1 local sync loss alarm recovery time.	**CCITT:** Complies with ITU-Rec.G.732 **62411:** 10s **Sync Fast:** 1s Default: CCITT
Connect/ Disconnect	Defines if link is connected.	**Connect:** Link is connected **Disconnect:** Link is disconnected Default: Connect
CRC4	Enables the generation of CRC bits (in accordance with the CRC-4 polynomial specified by ITU-T Rec. G.704) for the frames transmitted on the E1 link, and the checking of the CRC bits carried by the received E1 link frames.	**No:** CRC-4 option is disabled **Yes:** CRC-4 option is enabled Default: No
IF Type	Defines E1 interface type.	**Balanced, Unbalanced** Default: Balanced

Table 4-4. E1 Interface Configuration Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Network Type	Model used for simulating distribution of the packet delay variation in the network.	**Router-based** **Switch-based** **GenDSL based** Default: Router based
Clock Recovery Debug Tool	Enables or disables clock recovery statistics collection tools.	**1: Extended Statistics** **2: Auto Debug Tool** **3: Manual Debug Tool** **4: Disable** Default: Extended statistics
ADCL PPM	Adding PPM with ADCL clock.	Default: 0.000000
One or Two Clock Mode	Using one-clock or two-clock mode.	**1: One Clock (TCLKO pin RCLK)** **2: Two Clock (RCLK pin RCLK)** Default: One Clock
Adaptive or Differential Mode	Enabling adaptive or differential mode of operation per port.	**1: Adaptive mode** **2:Differential mode** Default: Adaptive
RTP Timestamp Generation Mode	Putting timestamp when the RTP is enabled based on bit, byte, or frame byte mode.	**1: Bit** **2: Byte** **3: Frame** Default: Bit

4.3.2 Configuring T1 Interfaces

```
                    T1 Interface Configuration for link 1

1.    Frame Type                                    UnFramed
2.    Rx Config Gain Limit                          Short Haul
3.    OOS Code Type                                 OOS Code
4.    Data TX/RX OOS[0 - 0xFF]                      7F
5.    TX/RX OOS Signal Mask                         Space
7.    Clock Source                                  Loopback
8.    Link Sync                                     Sync Fast
9.    Connect/Disconnect                            Connect
10.   DSU / CSU                                     DSU
11.   DSU / CSU Mask                                Mask 0
12.   Config Code                                   B8ZS
26.   Master's Side Clock Source                    Stratum 1
32.   Network Type                                  Router based
33.   Clock Recovery Debug Tool                     Extended Statistics
38.   ADCL PPM                                      0.000000
39.   One or Two Clock Mode                         One Clock
40.   Adaptive or Differential Mode                 Adaptive
41.   RTP Timestamp Generation Mode                 Bit


Please select item <1 to 40>
q: exit, s: save, ESC: previous menu, r or Enter: reprint screen


Please enter your choice:
```

MAIN MENU

INTERFACE CONFIGURATION

T1 INTERFACE CONFIGURATION

NOTE: THE SETTINGS FOR SOME PARAMETERS IN THIS CONFIGURATION MENU DETERMINE WHETHER OR NOT OTHER PARAMETERS IN THE MENU ARE DISPLAYED. FOR EXAMPLE, IF **RECOVERY CLOCK MODE** IS SET TO **AUTO**, THEN ITEMS 13–25 AND 27–31 ARE NOT DISPLAYED BECAUSE THEIR VALUES ARE IGNORED IN THAT MODE. THE PARAMETER DESCRIPTIONS IN TABLE 4-5 HAVE NOTES INDICATING THE NECESSARY CONDITIONS FOR A PARAMETER TO BE DISPLAYED. SEE THE **ACQUISITION SWITCH** PARAMETER.

Figure 4-6. T1 Interface Configuration (Main Menu→Interface Configuration→T1 Interface Configuration)

Table 4-5. T1 Interface Configuration Parameter Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Frame Type	Framing mode and operation mode for each configuration. *Note: Before changing the T1 frame type, you must close all bundles assigned to the link.*	**Unframed:** Framer is configured to passthrough mode and the operation mode is set to unframed. **ESF:** Framer is configured to T1-ESF mode. Operation mode is set by the robbed bit field to either fractional or fractional with CAS. **SF:** Framer is configured to T1-SF mode. Operation mode is set by the robbed bit field to either fractional or fractional with CAS. Default: UnFramed
Rx Config Gain Limit	Determines the maximum attenuation of the receive signal that can be compensated for by the T1 link receive path, to obtain the BER performance required by the standards.	**Long Haul:** Maximum attenuation of 36dB. **Short Haul:** Maximum attenuation of 10dB. This configuration can actually improve the performance when operating over relatively short line sections, especially when operating over multipair cables. In such cables, significant interference is generated by the signals carried by other pairs, and therefore a weak desired signal can be masked by the interference. Default: Short Haul
OOS Code Type	Inserted into unassigned time slots by the system at the transmit path towards the T1 equipment. This parameter is not displayed when the frame type is set to unframed.	**OOS Code**: OOS code is sent. Default: OOS Code
Data TX/RX OOS [0 - 0xFF]	Can be applied to time slots transmitted towards the ETH network when loss of signal, loss of frame, or AIS is detected at the T1 line. Can also be applied to time slots transmitted towards the T1 line when a packet receive buffer overrun or underrun occurs. In unframed mode, voice/data OOS state results in AIS transmission. This is applied when an LOS is detected at the T1 line, or when a packet receive buffer overrun or underrun occurs.	00–FF Default: 7F
TX/RX OOS Signal Mask	Out-of-service signaling method. OOS signal is sent in the Ethernet direction when loss of signal, loss of frame, or AIS is detected at the T1 line. The OOS signal is also sent toward the T1 line when packet receive buffer overrun or underrun occur.	**Space:** Transmitting CAS all 0s, when the Ethernet or TDM link is down. **Mark:** Transmitting CAS all 1s, when the Ethernet or TDM link is down. **Space + Mark:** Transmitting all 0s in CAS for the first 2.5s, then switching to all 1s. **Mark + Space:** Transmitting all 1s in CAS for the first 2.5s, then switching to all 0s. Default: Space

Table 4-5. T1 Interface Configuration Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Clock Source	Defines transmit clock source used by the interface.	**Adaptive Recovery:** Clock recovery regeneration from UPLINK. **LIU Loopback:** T1 recovered receive clock is used as the transmit clock **Global Adaptive Recovery:** Selecting reovered clock from port 1 (future version will select one of the 32 ports). **EXTCLK0:** Not supported (future version will select one of the 32 ports). **EXTCLK1**: Not supported (future version will select one of the 32 ports). Default: Loopback
Link Sync	Selects the T1 red alarm recovery time.	**Sync Fast:** 1s **62411:** 10s Default: Sync Fast
Connect/ Disconnect	Defines if link is connected.	**Connect:** Link is connected. **Disconnect:** Link is disconnected. Default: Connect
DSU / CSU	—	**CSU:** If the port interface operates as a CSU, it is necessary to adjust the T1 output transmit level for reliable operation of the network and for compliance with FCC Rules Part 68A. This adjustment is used to minimize the interference caused by a local transmit signal to other users that transmit their signals on other pairs of the same cable. The required setting depends mainly on the length of the cable that connects between the T1 port and the first repeater down the link. Repeaters are usually located every mile, and, therefore, they are designed to optimally handle signals attenuated by one-mile length of cable. If the T1 port is closer, the repeater receives a T1 signal at a higher level. This does not significantly improve handling of the T1 signal, but certainly increases the interference coupled from the T1 pair to repeaters that serve other pairs in the cable. To prevent this, an attenuation value can be selected that brings the T1 signal level closer to the expected repeater signal level. This is achieved by enabling circuitry in the T1 transmitter that preattenuates the signal by 7.5dB, 15dB, or 22.5dB, effectively emulating 1000ft, 2000ft, or 3000ft of cable. **DSU:** In this case, the transmit signal mask can be selected in accordance with the transmit line length, to meet DSX-1 requirements, as specified by AT&T CB-119, or operation in accordance with FCC Rules Part 68. For compliance with DSX-1 specifications per AT&T CB-119 and ANSI T1.102-1987, select the value corresponding to the length of the cable (in feet) connected between the T1 port connector and network entry point. Default: DSU

Table 4-5. T1 Interface Configuration Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
DSU / CSU Mask	—	**CSU:** **Mask 0:** No attenuation. **Mask 1:** Attenuation of 7.5dB relative to nominal. **Mask 2:** Attenuation of 15dB relative to nominal. **Mask 3:** Attenuation of 22.5dB relative to nominal. **DSU:** **Mask 0:** 000–133ft **Mask 1:** 133–266ft **Mask 2:** 266–399ft **Mask 3:** 399–533ft **Mask 4:** 533–655ft Default: Mask 0
Config Code	Specifies the line coding.	**B8ZS** **AMI** Default: B8ZS
Master's Side Clock Source	The type of the master's side source clock.	**Stratum 1** **Stratum 2** **Stratum 3** **Stratum 3E** **Stratum 4** Default: Stratum 1
Network Type	Model used for simulating distribution of the packet delay variation in the network.	**Router based** **Switch based** **GenDSL based** Default: Router based
Clock Recovery Debug Tool	Enables or disables clock recovery statistics collection tools.	**1: Extended Statistics** **2: Auto Debug Tool** **3: Manual Debug Tool** **4: Disable** Default: Extended Statistics
ADCL PPM	Adding PPM with ADCL clock.	Default: 0.000000
One or Two Clock Mode	Using one-clock or two-clock mode.	**1: One Clock (TCLKO pin RCLK)** **2: Two Clock (RCLK pin RCLK)** Default: One Clock
Adaptive or Differential Mode	Enabling adaptive or differential mode of operation per port.	**1: Adaptive mode** **2: Differential mode** Default: Adaptive
RTP Timestamp Generation Mode	Putting timestamp when the RTP is enabled based on bit, byte, or frame byte mode	**1: Bit** **2: Byte** **3: Frame** Default: Bit

4.4 Configuring Bundles

To configure a bundle:

1) Configure general parameters (see *4.2 Configuring General Parameters*).

2) Configure TDM interface (see *4.3 Configuring TDM Interfaces*).

3) From the **Main Configuration (S132)** menu (Figure 3-2) select **4. Bundle Configuration**.

4) Enter a bundle number at the prompt. Bundle number can be any number from 0–4095.

5) In the **Bundle Configuration** menu, select **1. Bundle Type** to specify the bundle type: HDLC, SAToP, or CES.

6) Proceed with bundle configuration according to the bundle type (see *4.4.1 Configuring SAToP Bundles* and *4.4.2 Configuring CESoPSN Bundles*).

Up to 256 bundles can be assigned in the TDMoP IC in E1 or T1 mode.

4.4.1 Configuring SAToP Bundles

See Figure 4-7 and Table 4-6 for SAToP bundle options.

4.4.2 Configuring CESoPSN Bundles

```
                        Bundle Configuration for ID 2

              1.   Bundle Type                              SAToP
              2.   Assign this Bundle to PCM port           1
              4.   TX Bundle Destination                    Ethernet
              5.   RX Bundle Destination                    PCM
              6.   TX Bundle Number[0 - 65535]              1
              7.   RX Bundle Number[0 - 65535]              1
              8.   Source IP Address                        IP 1
              9.   Destination Main MAC Address             0020D224A346
              10.  Destination IP Address                   10.10.10.5
              11.  Next Hop IP                              0.0.0.0
              12.  IP ToS[0 - 255]                          0
              13.  IP TTL[0 - 255]                          128
MAIN MENU     14.  Number of VLAN Tags[0 - 2]               0
              20.  PSN Type                                 IP
BUNDLE        21.  Switches Sanity Check                    Discard
CONFIGURATION 22.  Clock Recovery                           Yes
              23.  Differential Time (usec)[1 - 512000]     5000
SAToP BUNDLE  24.  Max Buffer Size (usec)[0 - 512000]       15000
CONFIGURATION 25.  L Bit & OOS                              OOS Mode Conditioning
              26.  Redundant                                Disable
              27.  RTP Mode                                 Disable
              28.  Next Hop Type                            IP
              29.  Enable JB Reset                          On N Times
              30.  Window Size[2 - 127]                     83
              35.  Reordering                               Yes
              36.  Size in Bytes[24 - 1600]                 965
              37.  Eth Cond Octet Type                      Octet A
              38.  TDM Cond Octet Type                      Octet A
              44.  TX Bundle Number Location at UDP port    Source
              45.  RX Bundle Number Location at UDP port    Source


              Please select item <1 to 43>
              q: exit, s: save, ESC: previous menu, r or Enter: reprint screen
```

NOTE: THE SETTINGS FOR SOME PARAMETERS IN THIS CONFIGURATION MENU (FOR EXAMPLE, **BUNDLE TYPE** AND **PSN TYPE**) DETERMINE WHETHER OR NOT OTHER PARAMETERS IN THE MENU ARE DISPLAYED. THEREFORE, IT IS NORMAL TO HAVE GAPS IN THE ITEM NUMBERING, SUCH AS HAVING NOTHING LISTED BETWEEN ITEMS 14 AND 20. THE PARAMETER DESCRIPTIONS IN TABLE 4-6 HAVE NOTES INDICATING THE NECESSARY CONDITIONS FOR A PARAMETER TO BE DISPLAYED. SEE THE **IP TOS** PARAMETER.

Figure 4-7. SAToP Bundle Configuration (Main Menu→Bundle Configuration→SAToP Bundle Configuration)

Table 4-6. SAToP Bundle Parameter Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Bundle Type	Select the bundle type.	**HDLC** **SAToP** **CES**
Assign this Bundle to PCM port	Number of the TDM port to which the bundle is assigned.	**1–32**
TX Bundle Destination	Destination of the Tx data flow toward the ETH port. **Note:** *The Tx bundle destination cannot be changed after the bundle configuration has been saved.*	**Ethernet:** TDM to Ethernet **CPU:** TDM to CPU **Cross Connect:** Don't support yet Default: Ethernet
RX Bundle Destination	Destination of the Rx data flow from the ETH port. **Note:** *The Rx bundle destination cannot be changed after the bundle configuration has been saved.*	**CPU:** CPU **PCM:** TDM (PCM bus) **Discard:** Discarded Default: PCM
TX Bundle Number [0 - 65535]	Number of the desired Tx bundle.	Default: 2
Rx Bundle Number [0 - 65535]	Number of the desired Rx bundle. **Note:** *Must be unique for each bundle ID.*	Default: 2
Source IP Address	Assign the bundle one of the source IP addresses configured in the **General Configuration** menu.	**IP 1, IP 2** Default: IP 1
Destination Main MAC address	MAC address of destination device. **Note:** *If the destination Main MAC address is different from the default value, the MAC is not learned in the ARP process.*	Default: 000000000000
Destination IP Address	IP address of the destination device.	**0.0.0.0 – 255.255.255.255**
Next Hop IP	The Next Hop parameter should be used when the Destination IP Address is not in the device subnet. In such cases the Ethernet packet is sent to the Next Hop IP. The default value of the Next Hop field is the default gateway. **Note:** *The Next Hop must be in the same subset as the Source IP address of the bundle ID.*	**0.0.0.0 – 255.255.255.255**
IP ToS [0 - 255]	Sets the IP ToS field in the IP ETH packets leaving the EV kit. The ToS setting defines the whole byte, since different vendors could use different bits to tag packets for traffic prioritization. ToS assignment applies to all ETH packets leaving the EV kit for this bundle. **Note:** *This parameter is displayed only if PSN Type is set to IP.*	**0–255** Default: 0
IP TTL [0 - 255]	Sets the IP TTL field in the IP packets transmitted by the device. TTL assignment applies to all ETH packets leaving the EV kit for this bundle. **Note:** *This parameter is displayed only if PSN Type is set to IP.*	**0–255** Default: 128

Table 4-6. SAToP Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
MPLS TTL	Sets the MPLS TTL field in the packets transmitted by the device. TTL assignment applies to all MPLS packets leaving the EV kit for this bundle. **Note:** *This parameter is displayed only if PSN Type is set to MPLS.*	**0–255** Default: 128
Number of VLAN Tags [0 - 2]	Defines if VLAN tagging is enabled, and how many VLAN tags are used.	**0:** No VLAN Tag **1:** One VLAN tag **2:** Two VLAN tags (stacked) Default: 0
VLAN Protocol	Defines the tag protocol identifier (TPID) to use when using VLAN tags. **Note:** *This parameter is displayed only if Number of VLAN tags is set to 1 or 2.*	**Standard (0x8100)** **Proprietary** Default: Standard (0x8100)
VLAN ID 1	VLAN identifier, uniquely identifying the VLAN to which the Ethernet packet belongs. **Note:** *This parameter is displayed only if Number of VLAN tags is set to 1 or 2.*	**1–4095** Default: 1
VLAN ID 2	VLAN identifier, uniquely identifying the VLAN to which the Ethernet packet belongs. **Note:** *This parameter is displayed only if the Number of VLAN tags is set to 2.*	**1–4095** Default: 1
VLAN 1 Priority	Sets the priority of the packet in the virtual LAN. **Note:** *This parameter is displayed only if the Number of VLAN tags is set to 1 or 2.*	**0–7** Default: 0
VLAN 2 Priority	Sets the priority of the packet in the virtual LAN. **Note:** *This parameter is displayed only if the Number of VLAN tags is set to 2.*	**0–7** Default: 0
PSN Type	Defines the header encapsulated in the packets leaving the DS34S132 EV kit	**IP:** UDP/IP header **MPLS:** MPLS header **L2TPV3:** L2TPV3/IP header **Ethernet:** MEF header Default: IP
Switches Sanity Check	Sanity check between the received packet length and the length according to bundle configuration (length mismatch).	**CPU:** Sends the packets that fail the sanity check to the CPU **Discard:** Drops the packets that fail the sanity check Default: Discard
Clock Recovery	Determines whether this bundle is used by the clock recovery mechanism.	**Yes:** Bundle is used by clock recovery mechanism **No:** Bundle is not used by clock recovery mechanism Default: No

Table 4-6. SAToP Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Differential Time (usec) [1 - 51200]	Desired depth of the jitter buffer.	**1–512000µs** Default: 5000
Max Buffer Size (usec) [1 - 51200]	Defines the maximum size of the jitter buffer. When this parameter is set to zero, the maximum jitter buffer size equals (2 x PDVT) + (2 x packet fill).	**0–512000µs** Default: 0
L Bit & OOS	Defines how the OOS condition at the TDM interface is transmitted towards the Ethernet side.	**1. OOS Mode Conditioning:** OOS condition is reported by the OOS (ETH cond data) code and L-bit of the TDMoIP frame. **2. OOS Disable:** OOS condition is not reported, but user data with L-bit keeps on being sent towards the Ethernet interface. **3. OOS Mode Tx Off:** OOS condition is not reported and faulty user data is not transmitted towards the Ethernet interface. **4. OOS Mode Conditioning with JB reset:** OOS condition is reported by the OOS (ETH cond data) code and L-bit of the TDMoIP frame. Reset jitter buffer when L-bit cleared. **5. OOS Disable with JB reset:** OOS condition is not reported, but user data with L-bit keeps on being sent towards the Ethernet interface. Reset jitter buffer when L-bit cleared. **6. OOS Mode Tx Off with JB reset:** OOS condition is not reported and faulty user data is not transmitted towards the Ethernet interface. Reset jitter buffer when L-bit cleared.
Redundant	Defines whether this bundle is a redundant bundle. ***Note:** The bundle redundancy cannot be changed after the bundle configuration has been saved. Redundant mode not supported*	**Enable:** Current bundle is redundant **Disable:** Current bundle is not redundant Default: Disable
RTP Mode	Determines if an RTP header is used for the bundle. Must be used for common clock mode.	**Enable:** RTP header is used **Disable:** RTP header is not used Default: Disable
Next Hop Type	Must be set to MAC for next hops that do not reply to ARP requests.	**IP** **MAC** Default: IP

Table 4-6. SAToP Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Enable JB Reset	A mechanism that enables setting an optimum level for the jitter buffer working level. It enables the reset of a bundle, until a satis-factory jitter buffer level is reached, to minimize the delay.	**Off:** Bundle reset is disabled and the working level of the jitter buffer is determined by the timing the bundle was first opened **On N Times:** Up to N times of bundle reset is allowed **Endless:** Bundle reset is allowed with unlimited number of resets Default: On N Times
Window Size [2 - 127]	The maximum number of conditioning Ethernet packets that can be inserted upon a loss of received Ethernet packets. If the differ-ence in packet SN is greater than the configured window, there is no insertion of conditioning packets.	**2–127** Default: 83
Number Of Outer Cookies	Determines if L2TPV3 cookies are used and how many. ***Note:*** *This parameter is displayed only when PSN Type = L2TPV3.*	**0:** L2TPV3 cookies are not used **1:** One L2TPV3 cookie is used **2:** Two L2TPV3 cookies are used Default: 0
Cookie 1	Optional field that contains a randomly selected value used to val-idate association of the packet with the expected bundle identifier. ***Note:*** *This parameter is displayed only when PSN Type = L2TPV3 and Number of Outer Cookies is 1 or 2.*	**0–4294967295** Default: 0
Cookie 2	Optional field that contains a randomly selected value used to val-idate association of the packet with the expected bundle identifier. ***Note:*** *This parameter is displayed only when PSN Type = L2TPV3 and Number of Outer Cookies is 2.*	**0–4294967295** Default: 0
Number Of Outer Labels	Determines if MPLS outer labels are used and how many. ***Note:*** *This parameter is displayed only when PSN Type = MPLS.*	**0:** MPLS outer labels not used **1:** One MPLS outer label is used **2:** Two MPLS outer labels are used Default: 0
MPLS Outer Label 1	MPLS Outer Label (only when not equal to 0) identifies the MPLS LSP, which is used to tunnel the TDM packets through the MPLS network. ***Note:*** *When equal to 0, only the Inner Label exists. This parameter is displayed only when PSN Type = MPLS and Number of Outer Labels is 1 or 2.*	**0–1048575** Default: 0
MPLS Outer Label 2	MPLS Outer Label (only when not equal to 0) identifies the MPLS LSP, which is used to tunnel the TDM packets through the MPLS network. ***Note:*** *When equal to 0, only the Inner Label exists. This parameter is displayed only when PSN Type = MPLS and Number of Outer Labels is 2.*	**0–1048575** Default: 0

Table 4-6. SAToP Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Experimental Bits	Sets the value of the MPLS experimental bits. **Note:** This parameter is displayed only when PSN Type = MPLS.	**0–7** Default: 0
Reordering	Determines whether to reorder received misordered packets.	**Yes:** Received misordered packets are reordered **No:** Received misordered packets are not reordered Default: Yes
Size in Bytes [24 - 1600]	SAToP payload size in bytes.	**24–1600** Default: 965
Eth Cond Octet Type	Conditioning octet used in the Ethernet direction when no data is available.	**Octet A** **Octet B** **Octet C** **Octet D** Default: Octet A
TDM Cond Octet Type	Conditioning octet used in the TDM direction when no data is available.	**Octet A** **Octet B** **Octet C** **Octet D** Default: Octet A
RTP Source Identifier	The RTP header Source Identifier value for transmitted packet. **Note:** This parameter is displayed only when RTP Mode is Enabled.	**0–4294967295** Default: 111111111
RTP Payload	The RTP header Payload value for transmitted packet. **Note:** This parameter is displayed only when RTP Mode is Enabled.	**0–255** Default: 96
TX Bundle Number Location at UDP port	Indicating the location of the Transmitting Bundles UDP port.	**Source:** UDP port number is at Source Port side **Destination:** UDP port number is at Destination Port side
RX Bundle Number Location at UDP port	Indicating the location of the Receiving Bundles UDP port.	**Source:** UDP port number is at Source Port side **Destination:** UDP port number is at Destination Port side

DS34S132 Evaluation Kit

Evaluates: DS34S132

See Figure 4-8 and Table 4-7 for CESoPSN bundle options.

4.5 Deleting Bundles

```
                        Bundle Configuration for ID 2

     1.    Bundle Type                                CES
     2.    Assign this Bundle to PCM port             2
     3.    Timeslot Assignment [1-24]                 1-24
     4.    TX Bundle Destination                      Ethernet
     5.    RX Bundle Destination                      PCM
     6.    TX Bundle Number[0 - 65535]                2
     7.    RX Bundle Number[0 - 65535]                2
     8.    Source IP Address                          IP 1
     9.    Destination Main MAC Address               0020D224A346
     10.   Destination IP Address                     10.10.10.5
     11.   Next Hop IP                                0.0.0.0
     12.   IP ToS[0 - 255]                            0
     13.   IP TTL[0 - 255]                            128
MAIN MENU  14.   Number of VLAN Tags[0 - 2]           0
     20.   PSN Type                                   IP
BUNDLE     21.   Switches Sanity Check                Discard
CONFIGURATION  22.  Clock Recovery                    No
     23.   Differential Time (usec)[1 - 512000]       5000
     24.   Max Buffer Size (usec)[0 - 512000]         15000
CES BUNDLE  25.  L Bit & OOS                          OOS Mode Conditioning
CONFIGURATION  26.  Redundant                         Disable
     27.   RTP Mode                                   Disable
     28.   Next Hop Type                              IP
     29.   Enable JB Reset                            On N Times
     30.   Window Size[2 - 127]                       83
     35.   Payload Type                               Data
     36.   Reordering                                 Yes
     37.   Number of Frames[1 - 1500]                 40
     38.   Eth Cond Octet Type                        Octet A
     39.   TDM Cond Octet Type                        Octet A
     45.   Far End Interface Type                     ESF
     46.   TX Bundle Number Location at UDP port      Source
     47.   RX Bundle Number Location at UDP port      Source


     Please select item <1 to 44>
     q: exit, s: save, ESC: previous menu, r or Enter: reprint screen
```

NOTE: THE SETTINGS FOR SOME PARAMETERS IN THIS CONFIGURATION MENU (FOR EXAMPLE, **BUNDLE TYPE** AND **PSN TYPE**) DETERMINE WHETHER OR NOT OTHER PARAMETERS IN THE MENU ARE DISPLAYED. THEREFORE, IT IS NORMAL TO HAVE GAPS IN THE ITEM NUMBERING, SUCH AS HAVING NOTHING LISTED BETWEEN ITEMS 14 AND 20. THE PARAMETER DESCRIPTIONS IN TABLE 4-7 HAVE NOTES INDICATING THE NECESSARY CONDITIONS FOR A PARAMETER TO BE DISPLAYED. SEE THE **IP TOS** PARAMETER.

Figure 4-8. CESoPSN Bundle Configuration (Main Menu→Bundle Configuration→CES Bundle Configuration)

Table 4-7. CESoPSN Bundle Parameter Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Bundle Type	Select the bundle type.	**HDLC** **SAToP** **CES**
Assign this Bundle to PCM port	Number of the TDM port to which the bundle is assigned.	**1–32**
Timeslot Assignment [1 - 24]	Assigns time slots to the previously selected bundle, for example, 1–5, 7, 8, 9, 12–15.	T1: **1–24** E1: **1–31**
TX Bundle Destination	Destination of the Tx data flow toward the ETH port. *Note: The Tx bundle destination cannot be changed after the bundle configuration has been saved.*	**Ethernet:** TDM to Ethernet **CPU:** TDM to CPU **Cross connect:** TDM to TDM (not supported yet) Default: Ethernet
RX Bundle Destination	Destination of the Rx data flow from the ETH port *Note: The Rx bundle destination cannot be changed after the bundle configuration has been saved.*	**CPU:** CPU **PCM:** TDM (PCM bus) **Discard:** Discarded Default: PCM
TX Bundle Number [0 - 65535]	Number of the desired Tx bundle.	Default: 2
RX Bundle Number [0 - 65535]	Number of the desired Rx bundle. *Note: Must be unique for each bundle ID.*	Default: 2
Source IP Address	Assign the bundle one of the source IP addresses configured in the **General Configuration** menu.	**IP 1, IP 2** Default: IP 1
Destination Main MAC Address	MAC address of destination device. *Note: If the destination Main MAC address is different from the default value, the MAC is not learned in the ARP process.*	Default: 0020D224A346
Destination IP Address	IP address of the destination device	10.10.10.5
Next Hop IP	The Next Hop parameter should be used when the Destination IP Address is not in the device subnet. In such cases the Ethernet packet is sent to the Next Hop IP. The default value of the Next Hop field is the default gateway. *Note: The Next Hop must be in the same subset as the Source IP address of the bundle ID.*	0.0.0.0
IP ToS [0 - 255]	Sets the IP ToS field in the IP ETH packets leaving the EV kit. ToS setting defines the whole byte, since different vendors could use different bits to tag packets for traffic prioritization. The ToS assignment applies to all ETH packets leaving the EV kit for this bundle. *Note: This parameter is displayed only if PSN Type is set to IP.*	**0–255** Default: 0

Table 4-7. CESoPSN Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
IP TTL [0 - 255]	Sets the IP TTL field in the IP packets transmitted by the device. TTL assignment applies to all ETH packets leaving the EV kit for this bundle. **Note:** *This parameter is displayed only if PSN Type is set to IP.*	**0–255** Default: 128
MPLS TTL	Sets the MPLS TTL field in the packets transmitted by the device. TTL assignment applies to all MPLS packets leaving the EV kit for this bundle. **Note:** *This parameter is displayed only if PSN Type is set to MPLS.*	**0–255** Default: 128
Number of VLAN Tags [0 - 2]	Defines if VLAN tagging is enabled and how many VLAN tags are used.	**0:** No VLAN Tag **1:** One VLAN tag **2:** Two VLAN tags (stacked) Default: 0
VLAN Protocol	Defines the tag protocol identifier (TPID) to use when using VLAN tags. **Note:** *This parameter is displayed only if Number of VLAN tags is set to 1 or 2.*	**Standard (0x8100)** **Proprietary** Default: Standard (0x8100)
VLAN ID 1	VLAN identifier, uniquely identifying the VLAN to which the Ethernet packet belongs. **Note:** *This parameter is displayed only if Number of VLAN tags is set to 1 or 2.*	**1–4095** Default: 1
VLAN ID 2	VLAN identifier, uniquely identifying the VLAN to which the Ethernet packet belongs. **Note:** *This parameter is displayed only if the Number of VLAN tags is set to 2.*	**1–4095** Default: 1
VLAN 1 Priority	Sets the priority of the packet in the virtual LAN. **Note:** *This parameter is displayed only if the Number of VLAN tags is set to 1 or 2.*	**0–7** Default: 0
VLAN 2 Priority	Sets the priority of the packet in the virtual LAN. **Note:** *This parameter is displayed only if the Number of VLAN tags is set to 2.*	**0–7** Default: 0
PSN Type	Defines the header encapsulated in the packets leaving the EV kit.	**IP:** UDP/IP header **MPLS:** MPLS header **L2TPV3:** L2TPV3/IP header **Ethernet:** MEF header Default: IP
Switches Sanity Check	Sanity check between the received packet length and the length according to bundle configuration (length mismatch).	**CPU:** Sends the packets that fail the sanity check to the CPU **Discard:** Drops the packets that fail the sanity check Default: Discard

Table 4-7. CESoPSN Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Clock Recovery	Determines whether this bundle is used by the clock recovery mechanism.	**Yes:** Bundle is used by clock recovery mechanism **No:** Bundle is not used by clock recovery mechanism Default: No
Differential Time (usec) [1 - 512000]	Desired depth of the jitter buffer.	**1–512000µs** Default: 5000
Max Buffer Size (usec) [1 - 512000]	Defines the maximum size of the jitter buffer. When this parameter is set to zero, the maximum jitter buffer size equals (2 x PDVT) + (2 x packet fill time).	**0–512000µs** Default: 0
L Bit & OOS	Defines how the OOS condition at the TDM interface is transmitted towards the Ethernet side.	**1. OOS Mode Conditioning:** OOS condition is reported by the OOS (ETH cond data) code and L-bit of the TDMoIP frame. **2. OOS Disable:** OOS condition is not reported, but user data with L-bit keeps on being sent towards the Ethernet interface. **3. OOS Mode Tx Off:** OOS condition is not reported and faulty user data is not transmitted towards the Ethernet interface. **4. OOS Mode Conditioning with JB reset:** OOS condition is reported by the OOS (ETH cond data) code and L-bit of the TDMoIP frame. Reset jitter buffer when L-bit cleared. **5. OOS Disable with JB reset:** OOS condition is not reported, but user data with L-bit keeps on being sent towards the Ethernet interface. Reset jitter buffer when L-bit cleared. **6. OOS Mode Tx Off with JB reset:** OOS condition is not reported and faulty user data is not transmitted towards the Ethernet interface. Reset jitter buffer when L-bit cleared.
Redundant	Defines whether this bundle is a redundant bundle. ***Note:** The bundle redundancy cannot be changed after the bundle configuration has been saved.* *Note: Redundant mode not supported*	**Enable:** Current bundle is redundant **Disable:** Current bundle is not redundant Default: Disable
RTP Mode	Determines if an RTP header is used for the bundle. Must be used for common clock mode.	**Enable:** RTP header is used **Disable:** RTP header is not used Default: Disable
Next Hop Type	Must be set to MAC for next hops that do not reply to ARP requests.	**IP** **MAC** Default: IP

Table 4-7. CESoPSN Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Enable JB Reset	A mechanism that enables setting an optimum level for the jitter buffer working level. It enables the reset of a bundle until a satisfactory jitter buffer level is reached to minimize the delay.	**Off:** Bundle reset is disabled and the working level of the jitter buffer is determined by the timing the bundle was first opened **On N Times:** Up to N times of bundle reset is allowed **Endless:** Bundle reset is allowed with unlimited number of resets Default: On N Times
Window Size [2 - 127]	The maximum number of conditioning Ethernet packets that can be inserted upon a loss of received Ethernet packets. If the difference in packet SN is greater than the configured window, there is no insertion of conditioning packets.	**2–127** Default: 83
Number Of Outer Cookies	Determines if L2TPV3 cookies are used and how many. **Note:** This parameter is displayed only when PSN Type = L2TPV3.	**0:** L2TPV3 cookies are not used **1:** One L2TPV3 cookie is used **2:** Two L2TPV3 cookies are used Default: 0
Cookie 1	Optional field that contains a randomly selected value used to validate association of the packet with the expected bundle identifier. **Note:** This parameter is displayed only when PSN Type = L2TPV3 and Number of Outer Cookies is 1 or 2.	**0–4294967295** Default: 0
Cookie 2	Optional field that contains a randomly selected value used to validate association of the packet with the expected bundle identifier. **Note:** This parameter is displayed only when PSN Type = L2TPV3 and Number of Outer Cookies is 2.	**0–4294967295** Default: 0
Number Of Outer Labels	Determines if MPLS outer labels are used and how many. **Note:** This parameter is displayed only when PSN Type = MPLS.	**0:** MPLS outer labels not used **1:** One MPLS outer label is used **2:** Two MPLS outer labels are used Default: 0
MPLS Outer Label 1	MPLS Outer Label (only when not equal to 0) identifies the MPLS LSP which is used to tunnel the TDM packets through the MPLS network. **Note:** When equal to 0, only the Inner Label exists. Note: This parameter is displayed only when PSN Type = MPLS and Number of Outer Labels is 1 or 2.	**0–1048575** Default: 0
MPLS Outer Label 2	MPLS Outer Label (only when not equal to 0) identifies the MPLS LSP which is used to tunnel the TDM packets through the MPLS network. **Note:** When equal to 0, only the Inner Label exists. Note: This parameter is displayed only when PSN Type = MPLS and Number of Outer Labels is 2.	**0–1048575** Default: 0
Experimental Bits	Sets the value of the MPLS experimental bits. **Note:** This parameter is displayed only when PSN Type = MPLS.	**0–7** Default: 0

Table 4-7. CESoPSN Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Payload Type	Determines the bundle structure.	**Data:** The bundle is configured as Structured (without CAS). **Voice CAS:** The bundle is configured as Structured with CAS. For units with T1 interface the payload type can be set to voice with CAS, if the interface type of the far-end unit is set to T1 SF or T1 ESF. *Note: For redundant or cross-connect bundles, both bundles must be the same payload type. The payload type cannot be changed after the bundle configuration has been saved.*
Reordering	Determines whether to reorder received misordered packets.	**Yes:** Received misordered packets are reordered **No:** Received misordered packets are not reordered Default: Yes
Number of Frames [1 - 1500]	The number of TDM frames included in the CESoPSN payload.	**1–1500** Default: 24
Eth Cond Octet Type	Condition octet used in the Ethernet direction when no data is available.	**Octet A** **Octet B** **Octet C** **Octet D** Default: Octet A
TDM Cond Octet Type	Condition octet used in the TDM direction when no data is available.	**Octet A** **Octet B** **Octet C** **Octet D** Default: Octet A
RTP Source Identifier	The RTP header Source Identifier value for transmitted packet. *Note: This parameter is displayed only when RTP Mode is Enabled.*	**0–4294967295** Default: 111111111
RTP Payload	The RTP header Payload value for transmitted packet. *Note: This parameter is displayed only when RTP Mode is Enabled.*	**0–255** Default: 96
Redundant Type	*Note: This parameter is displayed only when Redundant is Enabled.*	**None:** Redundancy disabled (no bundles are transmitted) **1 and 1** **1 plus 1** **1 and 1 HW:** Only one of the redundant bundles (primary or secondary) is transmitted **1 plus 1 HW:** Both redundant bundles (primary and secondary) are transmitted Default: 1 plus 1 HW

Table 4-7. CESoPSN Bundle Parameter Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Far End Interface Type	Type of the interface at the far end.	**T1: ESF or SF** **E1: Not applicable** Default: ESF
TX Bundle Number Location at UDP Port	Indicating the location of the Transmitting Bundles UDP port.	**Source:** UDP port number is at Source Port side **Destination:** UDP port number is at Destination Port side
RX Bundle Number Location at UDP Port	Indicating the location of the Receiving Bundles UDP port.	**Source:** UDP port number is at Source Port side **Destination:** UDP port number is at Destination Port side

To delete a bundle:

1) From the **Main Configuration (S132)** menu, select **Bundle Management**.

2) In the **Bundle Management** menu select **Delete Existing Bundle(s)**.

3) Type in the bundle ID to be deleted and press **Enter**.

Once a bundle is deleted, the bundle ID in **Bundle Configuration** is deleted. Any assignments made to that bundle are deleted.

4.6 Displaying Active Bundles

To display a table of active bundles:

1) From the **Main Configuration (S132)** menu, select **Bundle Management**.

2) In the **Bundle Management** menu select **Display Existing Bundle(s)**.

4.7 Restoring Default Configurations

To erase all configurations and restore factory-default configurations, select **Restore Default Configurations** from the **Main Configuration (S132)** menu.

5. Troubleshooting and Diagnostics

Users can troubleshoot the DS34S132 EV kit by viewing alarms, performance monitoring counters, or the troubleshooting chart.

5.1 Displaying Alarms

The **TopAlarms Menu** displays the following types of alarms:

- **General Alarms**
- **Interface Alarms**
- **Bundle Alarms**

To view alarms select **Alarms** from the **Main Configuration (S132)** menu. The **TopAlarms Menu** appears as shown in Figure 5-1.

5.1.1 Displaying General Alarms

To display general alarms, from the **TopAlarms Menu** (Figure 5-1) select **General Alarms**. The **General Alarms** menu appears (Figure 5-2).

```
                TopAlarms Menu

1.    General Alarms
2.    Interface Alarms
3.    Bundle Alarms

Please select item <1 to 3>
q: exit, s: save, ESC: previous menu, r or Enter: reprint screen

Please enter your choice:
```

Figure 5-1. TopAlarms Menu

```
                 General Alarms

1.    SW Tx TDM packet loss             OFF
2.    SW Rx LAN Packet Loss             OFF
3.    Rx FIFO Size                      28
4.    Rx Ip Ver Err Status              OFF
5.    Rx Fifo Sof Err                   OFF
6.    Rx MPLS Err                       OFF
7.    MAC Receive Fifo Overrun          OFF

n: next screen, p: previous screen, ESC: previous menu
q: exit, r: manually update, c: reset
d: disable automatically update, e: enable automatically update

Please enter your choice:
```

Figure 5-2. General Alarms Menu

Table 5-1. General Alarms Parameter Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
SW Tx TDM packet loss	Packets received from TDM to CPU were discarded due to lack of buffers in the TDMoP IC.	ON, OFF
SW Rx LAN packet loss	Packets received from LAN to CPU were discarded due to lack of buffers in the TDMoP IC.	ON, OFF
Rx FIFO Size	Indicates the current Rx FIFO level given in dwords (32 bits)	0–3FF
Rx Ip Ver Err Status	Received packet IP version does not match the configured IP version.	ON, OFF
Rx Fifo Sof Err	Start of packet indication mismatch in Rx FIFO (indicates a bundle configuration error). Results in flushing the Rx FIFO's contents.	ON, OFF
Rx MPLS Err	MPLS packet received with more than three labels (packet is discarded).	ON, OFF
MAC Receive Fifo Overrun	MAC receive FIFO has overflowed.	ON, OFF

DS34S132 Evaluation Kit

Evaluates: DS34S132

5.1.2 Displaying Interface Alarms

To display E1/T1 interface alarms:

1) From the **TopAlarms Menu** (Figure 5-1) select **Interface Alarms**.

2) Enter the TDM link (port) number.

3) From the **Interface Alarm** menu, select **TDM Alarms**. The **TDM Alarms** menu is displayed (Figure 5-3).

```
        E1 TDM Alarms for Port 1

1.   Loss of Signal                ON
2.   Loss of Frame                 ON
3.   AIS                           OFF
4.   RAI                           OFF
5.   RX FRAME SLIP                 OFF
6.   TX FRAME SLIP                 OFF
7.   BPV/CV ERRORs                 0

n: next screen, p: previous screen, ESC: previous menu
q: exit, r: manually update, c: reset
d: disable automatically update, e: enable automatically update

Please enter your choice:
```

Figure 5-3. TDM Alarms Menu

Table 5-2. TDM Alarms Descriptions

MESSAGE	DESCRIPTION	POSSIBLE VALUES	CORRECTIVE ACTIONS
Loss of Signal	Loss of receive signal. Also indicated by the front panel SYNC LOS LED being lit.	ON, OFF	Check cable connection to the E1 link connector. Check line and/or other communication equipment connected to the link of the remote unit.
Loss of Frame	Loss of frame synchronization.	ON, OFF	Check the remote equipment. Perform the following: Check cable connection to the E1 connector of the remote device. Check line and/or other communication equipment providing the E1 link to the remote equipment. Replace the remote equipment.
AIS	AIS is detected on the link.	ON, OFF	Check equipment connected to the remote end of the E1 link.
RAI	RAI is detected on the link.	ON, OFF	Check equipment connected to the remote end of the E1 link.
RX FRAME SLIP, TX FRAME SLIP	E1 frame slips are detected (not displayed during local loss of frame synchronization). Updated once per second.	ON, OFF	Verify the clock settings. Check the far end (unstable clock source). Replace the EV kit only if previous steps do not correct the problem.
BPV/CV ERRORs	Bipolar violations or code violations on the link receive signal. Updated once per second.	0, 1, . . .	Check the TDM equipment and cable connecting it to the E1 port. Replace the EV kit.

To display adaptive alarms:

1) From the **TopAlarms Menu** (Figure 5-1), select **Interface Alarms**.

2) Enter the TDM link (port) number.

3) From the **Interface Alarms** menu, select **Adaptive Alarms**. The **Adaptive Alarms** menu is displayed (Figure 5-4).

If a problem cannot be corrected by carrying out the actions listed in Table 5-2 or Table 5-3, perform the actions corresponding to the problem symptoms in accordance with Table 5-4.

5.1.3 Displaying Bundle Alarms

The EV kit displays various per-bundle alarms. To display bundle alarms:

1) From the **TopAlarms Menu** (Figure 5-1), select **Bundle Alarms**.

2) Enter the bundle ID.

Depending on the bundle type, one of the alarm menus shown in Figure 5-5 is displayed.

```
            Adaptive Alarms for Port 1

1.   Current State                 Tracking 2
2.   System Freeze                 OFF
3.   DSP state (Debug use only)    Locked

n: next screen, p: previous screen, ESC: previous menu
q: exit, r: manually update, c: reset
d: disable automatically update, e: enable automatically update

Please enter your choice:
```

Figure 5-4. Adaptive Alarms Menu

Table 5-3. Adaptive Alarms Descriptions

MESSAGE	DESCRIPTION	POSSIBLE VALUES	CORRECTIVE ACTIONS
Current State	Current state of the clock recovery mechanism.	**No recovery:** Clock recovery mechanism is disabled. **Idle:** Clock recovery mechanism is in its idle state **Acquisition:** Frequency acquisition state. **Tracking 1, Tracking 2:** In these phases, the clock recovery mechanism performs slow and precise phase tracking.	Verify that the bundle is configured as clock recovery enabled, and that the link clock is configured to be recovered.
System Freeze	The DPLL input level was frozen.	ON, OFF	—
DSP state (Debug use only)	Debugging tool for designers.	**Free Running with Calibration Locked Unlocked**	—

5.1.3.1 SAToP/CES Bundle Alarms

See Figure 5-5 and Table 5-4 for the SAToP/CES bundle alarm options.

```
                CES Alarms Screen for Bundle 5

   1.   Tx Frame with R bit (No Rx Packets)      OFF
   2.   Tx Frame with L bit (TDM Interface Fail)  OFF
   3.   Tx Frame with M bits                      OFF
   4.   HW lack of Tx buffers                     OFF
   5.   Rx TDMoIP Length Mismatch                 OFF
   6.   Rx Frame with R bit (Remote Fail)         OFF
   7.   Rx Frame with L bit (Remote TDM Fail)     OFF
   8.   Rx Frame with M bits                      OFF
   9.   Overrun Occurred                          OFF
   10.  Underrun Occurred                         OFF
   11.  JB Reset Occurred                         OFF
   12.  RX Fragmentation Bit                      OFF
   13.  Frame Count Err                           OFF
   14.  Jump Overflow Err                       OFF
   15.  Sequence Number Drop Err                  OFF
   16.  Miss Ordered Discard                      OFF

   n: next screen, p: previous screen, ESC: previous menu
   q: exit, r: manually update, c: reset
   d: disable automatically update, e: enable automatically update

   Please enter your choice:
```

Figure 5-5. SAToP/CES Bundle Alarms Menu

Table 5-4. SAToP or CES Bundle Alarm Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Tx Frame with R bit (No Rx Packets)	Transmit packets with Remote Fail indication (R-bit) set.	ON, OFF
Tx Frame with L bit (TDM Interface Fail)	Transmit packets with Local Fail indication (L-bit) set.	ON, OFF
Tx Frame with M bits	Transmit packets with Modifier bits (M-bits) set.	ON, OFF
HW lack of Tx buffers	Packet received from TDM was discarded due to lack of buffers associated with this bundle.	ON, OFF
Rx TDMoIP Length Mismatch	The length of an incoming packet did not match the length expected for the bundle configuration.	ON, OFF
Rx Frame with R bit (Remote Fail)	Received packets with Remote Fail indication (R-bit) set.	ON, OFF
Rx Frame with L bit (Remote TDM Fail)	Received packets with Local Fail indication (L-bit) set.	ON, OFF
Rx Frame with M bits	Received packets with Modifier bits (M-bits) set.	ON, OFF
Overrun Occurred	Overrun has occurred in jitter buffer.	ON, OFF
Underrun Occurred	Underrun has occurred in jitter buffer.	ON, OFF
JB Reset Occurred	The jitter buffer was reset.	ON, OFF
RX Fragmentation Bit	Packet fragmentation status.	**ON:** Packet is fragmented **OFF:** Entire (unfragmented) multiframe structure is carried in a single packet

Table 5-4. SAToP or CES Bundle Alarm Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Start frame or multiframe insertion (CES bundles only)	Start frame or multiframe mismatch.	ON, OFF
Frame Count Err	Packets that belong to structured with CAS bundles were received with incorrect number of frames.	ON, OFF
Jump Overflow Err	Packets received with incorrect sequence number (higher than the expected sequence number and within the window allowed by the configured Rx_max_lost_packets value) and could not be inserted into the jitter buffer due to insufficient space.	ON, OFF
Sequence Number Drop Err	Packets discarded due to incorrect sequence number (SN equal to the former or gap between them exceeds limit determined by 'Rx_max_lost_packets' parameter).	ON, OFF
Miss Ordered Discard	Packets discarded because they were considered duplicated, or because they were received too late to be inserted into the jitter buffer.	ON, OFF

5.2 Displaying Performance Monitoring Counters

The EV kit provides statistics collection for the Ethernet interface and bundles.

5.2.1 Displaying Ethernet Counters

To display the Ethernet counters:

1) From the **Main Configuration (S132)** menu (Figure 3-2), select **Performance (PM)**. The **TopPMs Menu** (performance monitoring) is displayed (Figure 5-6).

2) Select **Ethernet Performance**. The **Ethernet Performance Data** menu is displayed (Figure 5-7). This menu is automatically redisplayed every few seconds. To disable automatic updates, select **d** from the menu. To reset the Ethernet performance monitoring counters, select **c**.

```
                    TopPMs Menu

 1.    Ethernet Performance
 2.    Interface Performance
 3.    Bundle Performance

 Please select item <1 to 3>
 q: exit, s: save, ESC: previous menu, r or Enter: reprint screen

 Please enter your choice:
```

Figure 5-6. Performance Monitoring Menu

```
                        Ethernet Performance Data

 1.    Correct Bytes (RX)      0         Correct Bytes (TX)      0
 2.    Correct Frames (RX)     0         Correct Frames (TX)     0
 3.    Pause Packets (RX)      0         Pause Packets (TX)      0
 4.    FCS Error               0         Single Collision        0
 5.    Alignment Errors        0         Multiple Collision      0
 6.    Symbol Errors           0         Deferred Frames         0
 7.    Excessive Length Ers    0         Underrun                0
 8.    Jabbers Errors          0         Excessive Collision     0
 9.    Under size Packets      0         Late Collision          0
10.    Classified Packets      0       Carrier Sense             0
11.    Checksum Err Packets    0         Sqe Test Errors         0
12.    Stray Packets           0

n: next screen, p: previous screen, ESC: previous menu
q: exit, r: manually update, c: reset
d: disable automatically update, e: enable automatically update
```

Figure 5-7. Ethernet Performance Data Menu

Table 5-5. Ethernet Performance Data Descriptions

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Correct Bytes (RX)	The number of ETH packet octets successfully received (not including CRC). When a valid connection is established the number increases steadily. This counter wraps around to 0 after reaching the maximum value.	32-bit number
Correct Frames (RX)	The number of ETH packets successfully received. When a valid connection is established the number increases steadily. This counter wraps around to 0 after reaching the maximum value.	32-bit number
Pause Packets (RX)	The number of good ETH pause packets received. A good packet has a length of 64 to 1518 (1536 if bit 8 is set in the network configuration register) and has no FCS, alignment, or receive symbol errors.	**0–511**
FCS Error	Counts the number of packets received that do not pass the FCS check (RFC 1643). An FCS check is a mathematical way to ensure that all the frame bits are correct without the system having to examine each bit and compare it against the original. **Recommendation:** Check for physical problem such as hardware problem, or a bad line, or noisy environment.	
Alignment Errors	The number of packets received that are not an integral number of octets in length (RFC 1643). All frames should end on an 8-bit boundary, but physical problems on the network could cause the number of bits to deviate from the multiple of eight. **Recommendation:** Check physical connections, devices and configuration.	**0–255**
Symbol Errors	The number of packets from PHY that had Rx_err during reception.	**0–255**
Excessive Length Ers	The number of received packets where the length exceeds 1518 bytes, and without CRC error, alignment error or symbol error.	**0–255**
Jabbers Error	The number of received packets exceeding 1518 bytes (1536 if bit 8 set in network configuration register) in length and have either a CRC error, an alignment error or a receive symbol error.	**0–255**
Under size Packets	The number of received packets where the length is less than 64 bytes, without CRC error or alignment error.	**0–255**

Table 5-5. Ethernet Performance Data Descriptions (continued)

PARAMETER	DESCRIPTION	POSSIBLE VALUES
Classified Packets	The number of packets that passed packet classifier.	32-bit number
Checksum Err Packets	The number of packets with IP checksum errors.	
Stray Packets	The number of strayed packets.	
Correct Bytes (TX)	The number of octets successfully transmitted (not including CRC). When a valid connection is established the number increases steadily.	
Correct Frames (TX)	The number of packets successfully transmitted. When a valid connection is established the number increases steadily.	
Pause Packets (TX)	The number of pause packets transmitted.	
Single Collision	Counter of successfully transmitted packets for which transmission is inhibited by exactly one collision. **Recommendation:** Use a full-duplex mode if possible.	Valid only in half-duplex mode (RFC 1643)
Multiple Collision	Counter of successfully transmitted packets for which transmission is inhibited by 2 to 15 collisions. **Recommendation:** Use a full-duplex mode if possible.	Valid only in half-duplex mode (RFC 1643)
Deferred Frames	The number of packets experiencing deferral due to carrier sense being active on the first attempt at transmission. Packets involved in any collision are not counted nor are packets that experienced a transmit underrun.	**0–511**
Underrun	The number of packets that were not transmitted due to transmit FIFO underrun.	
Excessive Collision	The number of packets that were not transmitted due to 16 collisions.	**0–255**
Late Collision	To allow collision detection to work properly, the period in which collisions are detected is restricted (512 bit-times). For 10BASE-T Ethernet (10Mbps), it is 51.2µs; for Fast Ethernet (100Mbps) it is 5.12µs. For Ethernet stations, collisions can be detected up to 51.2 µs after the beginning of the transmission, or in other words, up to the 512th bit of the frame. When a station detects a collision after it has sent the 512th bit of its frame, this is counted as a late collision. ***Note:*** *A late collision is counted twice—as a collision and as a late collision.* **Recommendation:** Check if there is incorrect cabling or a non-compliant number of hubs in the network. Bad network interface cards (NICs) can also cause late collisions.	Valid only in half-duplex mode (RFC 1643) **0–255**
Carrier Sense	The number of packets transmitted where carrier sense was not seen during transmission or where it was deasserted after being asserted in the transmit packet without collision. **Recommendation:** Check connection between the UPLINK interface and its Ethernet transceiver.	Valid only in half-duplex mode (RFC 1643) **0–255**
Sqe Tst Errors	The number of packets where COL was not asserted within 96 bit-times (an interpacket gap) of TX_EN being deasserted in half-duplex mode.	**0–255**

DS34S132 Evaluation Kit

Evaluates: DS34S132

5.2.2 Displaying Bundle Counters

The EV kit displays counters for HDLC, SAToP, and CES bundles. To display bundle counters:

1) From the **Main Configuration (S132)** menu (Figure 3-2), select **Performance (PM)**.

2) The **TopPMs Menu** (performance monitoring) is displayed (Figure 5-6). Select **Bundle Performance**.

3) A list of open bundles is displayed. Enter the ID number of the bundle for which you want to display the

performance monitoring counters. The Bundle PMs menu is displayed (SAToP/CESoPSN: Figure 5-8). This menu is automatically redisplayed every few seconds. To disable automatic updates, select **d** from the menu. To reset the Ethernet performance monitoring counters, select **c**.

5.2.2.1 Displaying SAToP/CES Bundle Counters

See Figure 5-8 and Table 5-6 for SAToP/CES bundle counter options.

```
              SATOP Bundle PMs for Bundle 5

1.    Correct Frames Tx to LAN          0
2.    Correct Frames Rx from LAN        0
3.    Lost Frames in Rx                 0
4.    Minimum JB Level [Usec]           0
5.    Maximum JB Level [Usec]           0
6.    Discarded Packets in Rx           0
7.    Reordered Packets in Rx           0
8.    Underrun Occurred                 0
9.    Jump Packets in Rx                0
10.   MisOrdered Packets in Rx          0
11.   Rx MalFormed Packets              0
12.   Rx R-bit Packets                  0
13.   Tx L-bit Packets                  0
14.   Overrun Occurred                  0
15.   Loss of Frames Occurred           0

n: next screen, p: previous screen, ESC: previous menu
q: exit, r: manually update, c: reset
d: disable automatically update, e: enable automatically update
```

Figure 5-8. SAToP/CES Bundle Counter Menu

Table 5-6. SAToP/CES Bundle Counter Descriptions

PARAMETER	DESCRIPTION
Correct Frames Tx to LAN	The number of packets successfully transmitted for the bundle. When a valid connection is established, the number increases steadily.
Correct Frames Rx from LAN	The number of packets successfully received for a bundle. When a valid connection is established, the number increases steadily.
Lost Frames in Rx	There are two possible reasons for lost frames: Packet or packets are dropped or lost somewhere along the network. Reordering of packets by network. Packet reordering can occur due to queuing mechanisms, rerouting by the network, or when the router updates very large routing tables and is therefore overloaded. **Recommendations:** Ensure the EV kit traffic has sufficient bandwidth. Ensure the Ethernet connection is functioning properly. Ensure the Ethernet/IP network provides priority (quality of service) to the EV kit traffic. Priority can be achieved by two means: VLAN tagging and IP ToS marking. Verify that the IP network devices (switches/routers/modems/etc.) can handle the EV kit PPS (packets per second) rate. Ensure the network devices do not drop/lose/ignore packets by checking their statistics.
Minimum JB Level [Usec]	The minimum jitter buffer level for the current bundle.

Table 5-6. SAToP/CES Bundle Counter Descriptions (continued)

PARAMETER	DESCRIPTION
Maximum JB Level [Usec]	The maximum jitter buffer level for the current bundle.
Discarded Packets in Rx	Number of received packets that were discarded by SAToP/CESoPSN payload type machine.
Reordered Packets in Rx	Number of received misordered packets that were successfully reordered by SAToP/CESoPSN payload type machine.
Underrun Occurred	An underrun situation can be caused by: Buffer starvation: Packets delay variation causes the buffer to empty out gradually until it underflows. Continuous sequence errors: The sequence error means a halt in the valid stream of packet arrival into the jitter buffer. Packets are stopped/lost/dropped. Differential timing (PDVT) configuration that is not large enough to compensate for the network delay variation. In a TDM network, all system elements must be locked to one master clock. If not, it leads to a situation in which data is clocked out of the jitter buffer at a rate different from the one that is clocked in. This gradually results in either an overflow or underflow event, depending on which rate is higher. The event repeats itself periodically as long as the system clock is not locked. **Recommendations:** Try increasing the differential timing (PDVT) in a bundle configuration. Check reasons for sequence errors or lost/dropped packets (if present), system clocking configuration, Ethernet environment (full duplex), and connection, packets drop/loss/ignore by routers/switches or nonuniform packets output by routers/switches due to queuing mechanisms. Ensure the same number of time slots for bundle is configured on each end. Ensure the Ethernet/IP network provides priority (quality of service) to the TDMoP traffic. Priority can be achieved by two means: VLAN tagging and IP TOS marking.
Jump Packets in Rx	Number of jumped packets encountered by SAToP/CESoPSN payload type machine. System software can calculate the number of lost packets using the following equation: Lost Packets = (Jumped Packets - Reordered Packets).
MisOrdered Packets in Rx	Received misordered packets.
Rx MalFormed Packets	Received malformed packets.
Rx R-bit Packets	Received packets with R-bits.
Tx L-bit Packets	Transmitted packets with L-bits.
Overrun Occurred	Number of overrun occurred.
Loss of Frames Occurred	Total loss of frames occurred.

5.2.3 Displaying TDM Interface Counters

This is not yet implemented in the DS34S132 EV kit user interface software.

5.3 Utility Menu

5.3.1 Read Memory/Write Memory

For advanced troubleshooting, the system software has menu options to read and write the registers of the DS34S132 and other peripherals. From the **Main Configuration (S132)** menu, select either **Read Memory** or **Write Memory** and follow the prompts. These selections (options 1 and 2) can access the DS34S132 registers, but not DSP memory or DDR memory. To access DSP or DDR memory, the user must use options 11–14.

5.3.2 Update ToP Application

This option allows the user to upgrade the Linux-based software package to the newest version, if necessary.

Table 5-7. DS32S132 EV Kit Address Map

ADDRESS	DEVICE
0xF0000000	DS34S132
0xF0020000	DS26518 #1
0xF0030000	DS26518 #2
0xF0040000	DS26518 #3
0xF0050000	DS26518 #4
0xF0060000	DS3100
0xF0070000	CPLD
0xF0080000	Motherboard FPGA

5.3.3 Set Debug Flags

This option is for debug purposes only. Maxim Technical Support provides support for this function.

5.4.4 Management Network Information

This option displays the Ethernet management port information. It displays the MAC address, IP address, and other network information.

5.3.5 Loopbacks

The DS34S132 EV kit supports local and remote loopbacks that can be run on the physical interfaces and bundles. The loopbacks can be used to check internal circuitry of the unit and its physical network and bundle connections. Options 1–4 refer to loopbacks on the T1/E1 transceivers. Refer to the DS26518 IC data sheet for more information.

5.3.5.1 Enabling Loopbacks

To run a loopback on a physical port:

1) From the **Main Configuration (S132)** menu, select **Utilities**.

2) The **Utility** menu is displayed.

3) From the **Utility** menu, select **Loopbacks**.

4) Specify the TDM interface number.

5) The **Loopbacks Menu** is displayed (Figure 5-9).

6) Select **Remote Loopback**, **Local Loopback**, or any of several other loopback types.
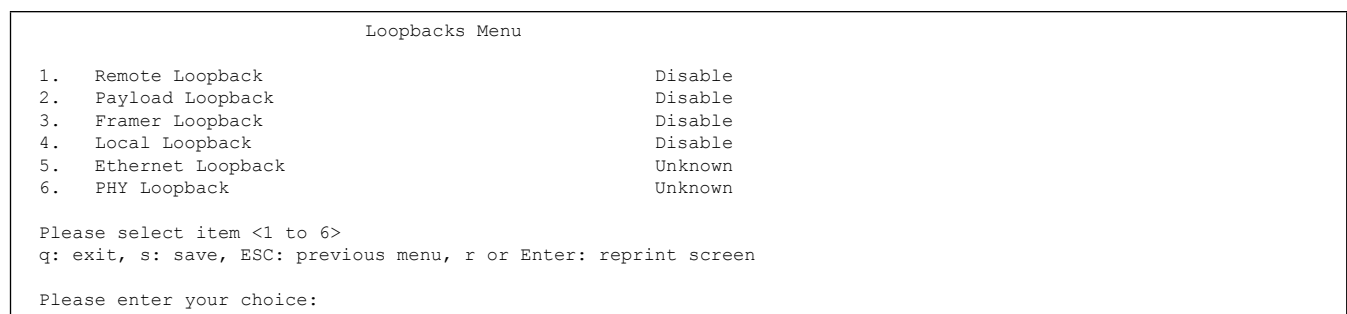
7) Select **Enable**.

```
                    Loopbacks Menu

  1.    Remote Loopback                          Disable
  2.    Payload Loopback                         Disable
  3.    Framer Loopback                          Disable
  4.    Local Loopback                           Disable
  5.    Ethernet Loopback                        Unknown
  6.    PHY Loopback                             Unknown


  Please select item <1 to 6>
  q: exit, s: save, ESC: previous menu, r or Enter: reprint screen


  Please enter your choice:
```

Figure 5-9. Loopbacks Menu

5.3.5.2 Framer Loopback and Payload Loopback

These loopbacks are not necessary for troubleshooting purposes. Remote and local loopbacks are sufficient. Refer to the DS26518 IC data sheet for more information on the use of these loopbacks.

5.3.5.3 Local Loopback

Local loopback returns packets received through the IP interface towards the network. Figure 5-10 shows the signal path for a typical local loopback.

5.3.5.4 Remote Loopback

Remote loopback returns the data received on the TDM receive port to the test equipment connected to the TDM transmit port. See Figure 5-11.

5.3.5.5 Ethernet Loopback

The Ethernet loopback loops data at the transmit MAC interface (internal on the DS34S132) to the receive MAC interface. Data coming from the TDM side is looped back to the TDM interface. See Figure 5-12.
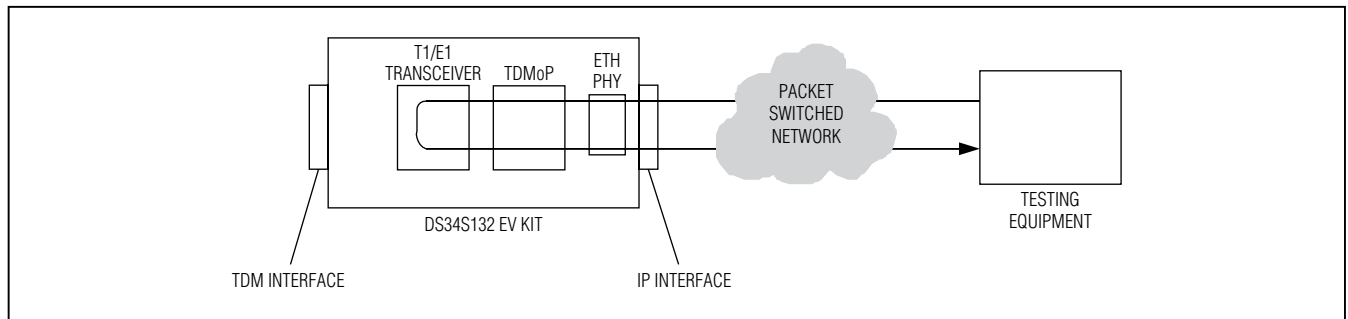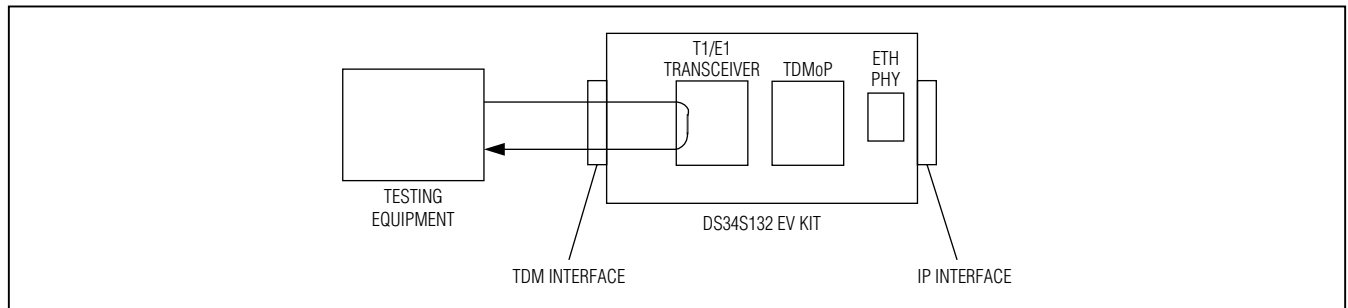

Figure 5-10. Local Loopback Diagram
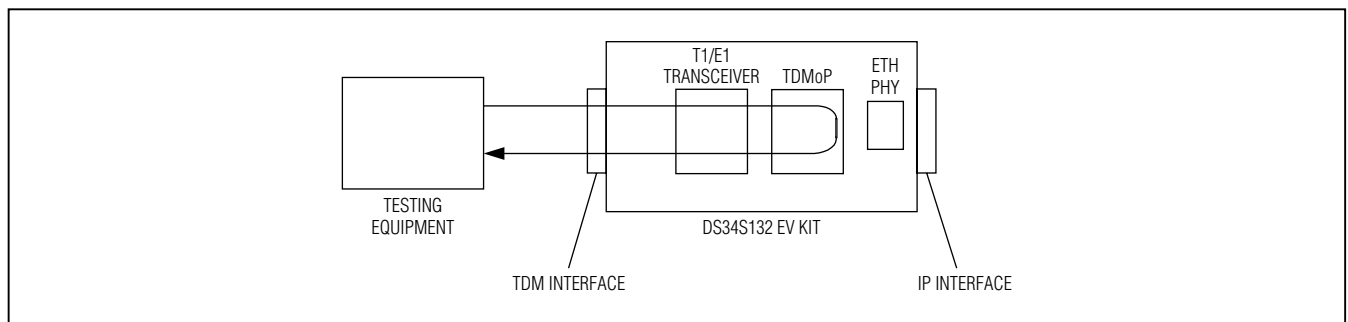

Figure 5-11. Remote Loopback Diagram

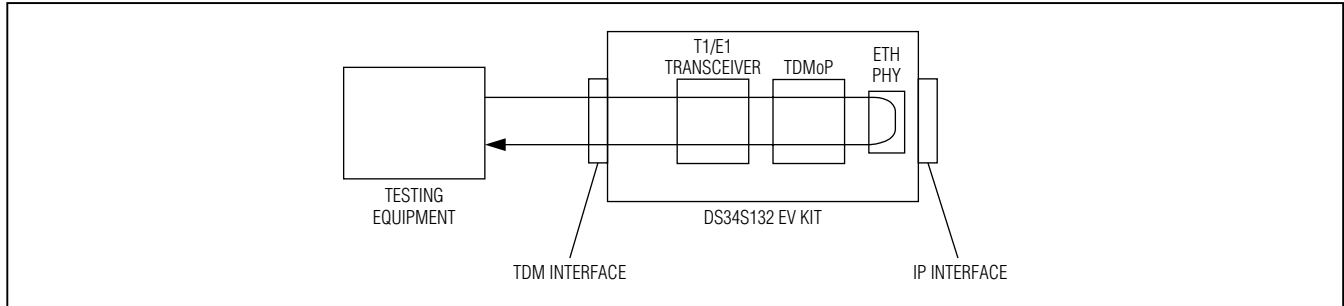*Figure 5-12. Ethernet Loopback Diagram*

Figure 5-13. PHY Loopback Diagram

5.3.5.6 PHY Loopback

The PHY loopback loops data at the Ethernet PHY received from the TDM interface (through the DS34S132) back to the TDM interface. See Figure 5-13.

5.3.6 Reboot System

Reboots the whole EV kit (hardware and software reboot).

5.3.7 UART Baud Rate

Allows the user to change to change the serial-port baud rate (default 115200bps).

5.3.8 Read Script Configuration File from Terminal

This option is not functional at this time.

5.3.9 Send OAM Packet to Other Party

This option is not functional at this time.

5.3.10 Read S132 Memory/Write S132 Memory (DDR Memory)

Access to the DS34S132 memory and DDR SDRAM.

5.3.11 Read DSP Memory/Write DSP Memory

Access to DSP embedded in the DS34S132 for clock recovery. No offset required. Debugging use only.

5.3.12 System Information

Describes SW Version, S132 revision, HAL (driver) revision, and DSP Version (embedded in the DS34S132).

5.3.13 Execute Linux Command

This option allows the user to execute a Linux command without exiting the EV kit software program.

5.4 Troubleshooting Chart

Table 5-8 lists possible faults, probable causes, and the actions necessary to correct the situation.

Table 5-8. Troubleshooting Chart

FAULT	PROBABLE CAUSE	CORRECTIVE ACTIONS
The E1/T1 equipment connected to EV kit is not synchronized (E1/T1 level) with the EV kit.	Configuration problems	Check the EV kit port configuration.
Slips and errors in E1/T1 equipment.	—	Check E1/T1 alarms to indicate the exact cause.
	Ethernet port is set to work in half-duplex mode (can cause extreme PDV because of collisions and back-offs). Ethernet ports of the local and remote devices are not set to the auto negotiation mode or set to different rates.	Check the EV kit port configuration (autonegotiation, rate, duplex mode) and check Ethernet PM.
	Timing configuration is not properly set (periodic buffer under/overflows—bundle connection status menu).	Check the timing settings.
	Network PDV or lost frames	Check PDV introduced by the network, and, if necessary, increase differential time (PDVT) setting.
Echo in voice.	End-to-end delay is too large	Check network delay and try to decrease it. Try to decrease differential time (PDVT). Decrease Ethernet packet size by changing bundle configuration.
Ethernet interface LINK indicator is not lit.	No active station on the LAN	Check that at least one station is active on the LAN.
	Cable problem	Check and replace, if necessary, the cable that connects the EV kit UPLINK connector to the LAN.
	Problem on the LAN	Check LAN media.
	Defective EV kit	Replace the EV kit if a failure is detected.

DS34S132 Evaluation Kit

Evaluates: DS34S132

Appendix A. Connector Wiring

A.1 E1/T1 and External Clock Connectors

The E1/T1 and external clock interfaces of the DS34S132 EV kit terminate in 8-pin RJ45 connectors, wired in accordance with Table A-1.

A.2 Ethernet Connectors

The Ethernet uplink and Ethernet management electrical interfaces terminate in 8-pin RJ45 connectors, wired in accordance with Table A-2.

A.3 ASCII Terminal Connector

The control terminal interface terminates in a V.24/ RS-232, 9-pin, D-type female DCE connector, wired in accordance with Table A-3.

Table A-1. E1/T1 and External Clock Interface Connector Pinout

PIN	DESIGNATION	DIRECTION	FUNCTION
1	RD (R)	Input	Receive data (ring)
2	RD (T)	Input	Receive data (tip)
3, 6	—	—	FGND
4	TD (R)	Output	Transmit data (ring)
5	TD (T)	Output	Transmit data (tip)
7, 8	—	N/A	Not connected

Table A-2. Ethernet Connector Pinout

PIN	FUNCTION
1	Tx+
2	Tx-
3	Rx+
6	Rx-
4, 5, 7, 8	—

Table A-3. Control Interface Pinout

PIN	FUNCTION
1	–
2	Tx
3	Rx
4	—
5	GND
6, 7, 8	—

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/11	Initial release	—

Maxim Integrated 160 Rio Robles, San Jose, CA 95134 USA 1-408-601-1000