USER MANUAL

IPM-1SE

TDM Over IP

G.703 E1, T1(DS1)

CTC union CTC Union Technologies Co., Ltd.

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause harmful interference in which case the user will be required to correct the interference at his own expense. NOTICE: (1) The changes or modifications not expressively approved by the party responsible for compliance could void the user's authority to operate the equipment. (2) Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

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IPM-1SE
TDM over IP
E1/DS1(T1)
User Manual
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This manual supports the following models:

IPM-1SE

Throughout this manual the IPM-1SE will be referred to as the Redux RS-160. This is the chip solution used in the IPM.

This document is the first official release manual. Please check CTC Union's website for any updated manual or contact us by E-mail at info@ctcu.com. Please address any comments for improving this manual or to point out omissions or errors to marketing@ctcu.com. Thank you.

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Appendix A Default Database

1 Configuring the RS-160

The Redux RS-160 performs point-to-point emulation of an E1 or T1 circuit by converting unframed bitstream data into packets and transmitting them over a packet network. A paired RS-160 receives the packets and converts the payload back into a bitstream. The result is a low-cost connection that is not dependent on a leased line. The circuit emulation uses a dynamic jitter buffer and accurate clock recovery to deliver measurable performance even over the variability of the packet network. Figure 1-1 and Figure 1-2 show the process of bitstream-to-packet and packet-to-bitstream conversion in the RS-160.

Figure 1-1. Converting from Bitstream to Packets

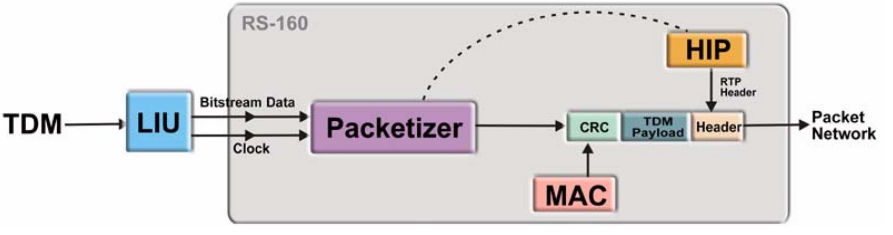
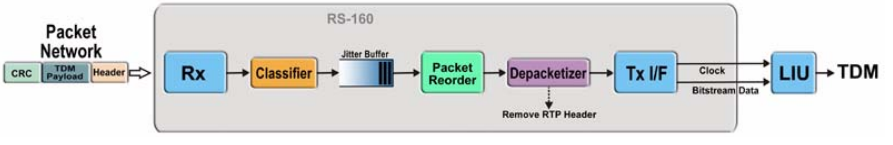


Figure 1-2. Converting from Packets to Bitstream



The RS-160 can control jitter and dynamically vary the delay as network conditions improve or worsen. An RS-160 configured as a "slave" recovers the clock in received data and uses it as a transmit clock to the receiving E1/T1 destination.

While this chapter provides an overview of configuring the RS-160, there are three different ways to perform configurations, which are described in detail in later chapters:

1. The **Management Console** is a PC-based tool that can be used to create new configuration databases, and to upload a database from an RS-160, modify it, and download it to the device via its serial interface or via a network connection. Certain key configuration parameters that define the physical components of the application, such as the line interface unit (LIU) used, presence of a PHY, etc. are set *only* by the Management Console. See Chapter 2, The Management Console for a description of the PC-based configuration tool.
2. Using the **Command Line Interface (CLI)**, a user can change RS-160 configuration parameters directly from a serial ("dumb") terminal, a terminal emulator (such as HyperTerminal), or a Telnet connection, while the RS-160 is

operating. See Chapter 3, CLI Commands for a description of the Command Line Interface.

3. The **Redux Control Protocol (RCP)** was created to enable CPU-to-CPU control of the RS-160. These binary messages perform most of the same functions as the CLI, including querying device status and performance statistics. See Chapter 4, Redux Control Protocol for a description of the CPU-to-CPU message format.

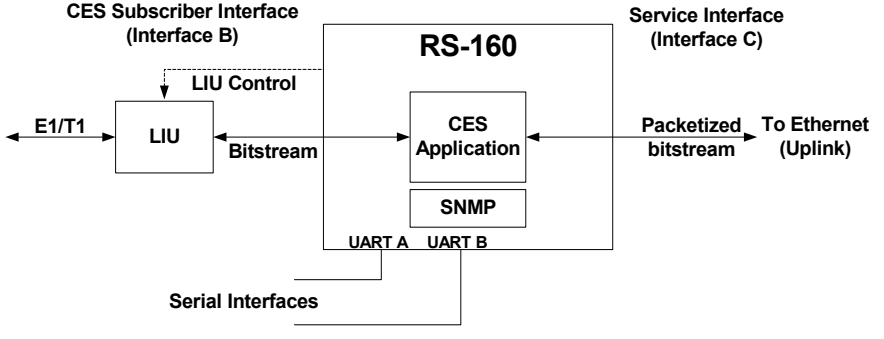
The RS-160 Database

At startup, the RS-160 is configured from a database that contains all the device parameters. Normally, a database is written to Flash memory that defines the configuration of the application board containing the RS-160. If no database was defined, the firmware assumes a default set of parameters. See Appendix A, Default Database for a list of the default parameters when a database was not written to Flash. Redux provides four standard databases - T1 Slave and Master and E1 Slave and Master - and the application designer can create a database according to the needs of a specific application using the supplied databases as a starting point. Once the RS-160 is running, many of the parameters in the database can be modified using either the CLI or the RCP, although most of the changed values will not take effect until the next restart of the device.

Configuration Parameters

Figure 1-3 shows the configurable elements of the RS-160. Parameters from each element are described briefly here and in more detail in subsequent chapters.

Figure 1-3. Configurable Elements of the RS-160



Bitstream Tunneling

A bitstream by definition is a sequence of bits that is continuous as long as there is a clock available to sample an Rx interface or to send on a Tx interface. The RS-160 has to receive the bitstream continuously and to send bits out continuously even if there is no data to receive or send. The E1/T1 source will send filler symbols if it has no data. The RS-160 sends the user-defined underflow pattern when it has no data to send.

Tunneling hides the bitstream character of an E1/T1 signal by breaking the bitstream into packets. The packets are numbered so the receiving RS-160 can reassemble the bitstream in order.

- **Bitstream to packet**

  A fixed number of bits (an integral number of bytes, definable by the user) are taken from the Rx bitstream and packed into the payload of an Ethernet packet.

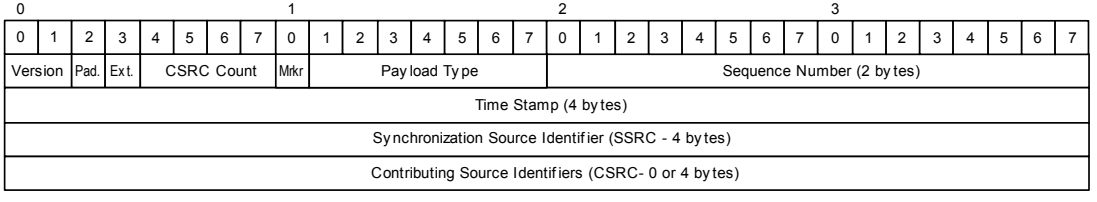
- **Packet headers**

  The packet is transmitted to the Uplink (Ethernet service connection) with one of two header formats. The destination is a paired RS-160 that is defined via a database parameter, the Target IP address. The two header formats are:

  •Real Time Protocol (RTP) header

  The protocol complies with the draft standard for unstructured TDM over packet switched networks prepared for the PWE3 IETF Working Group (See Figure 1-4). The protocol is routable and can be configured to use a VLAN to improve priority of the tunnelled traffic. The figure shows only the RTP portion of the header. The header requires 58 bytes per packet, including Ethernet, IP and UDP headers.

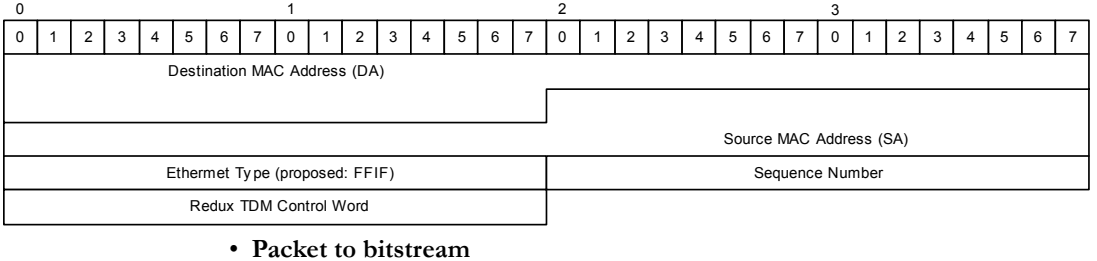
Figure 1-4. RTP Header Format (RFC 1889)



•Redux proprietary protocol (Minimal header)

The minimal header only adds four bytes over Ethernet header, therefore making good use of bandwidth.

Figure 1-5. Minimal Header Format0



- **Packet to bitstream**

  Received packets have their headers removed and are transmitted in the order they were sent, which is not necessarily the order they were received. Both header types include a sequence number so that data order can be maintained.

- **Jitter buffer/underrun/overrun**

  The transmitted bitstream must be maintained at a constant rate. Jitter can come from two sources: the variability of a packet network, where a packet may not be available for transmission, and from small variations in timing between the source and destination E1/T1 circuit. The RS-160 maintains a jitter buffer which contains a backlog of packets. The configurable maximum jitter assumes a level of end-to-end network delay. Based on this value, a number of packets received over the network are buffered before the bitstream transmission begins. The number of packets in the jitter buffer is calculated based on the maximum jitter in milliseconds, the packet payload length, and the nominal operating frequency of the line format (1.544 MHz for T1 and 2.048 MHz for E1). For example, with a packet payload of 96 bytes on an E1 circuit, one packet is transmitted in 375 microseconds. If the maximum jitter is ±10 milliseconds, then the RS-160 will create an initial 27-packet backlog.

  This jitter buffer is monitored continuously. If the incoming data is stable (the number of packets in the buffer does not increase or decrease over time), then the delay is gradually reduced to a minimum level (the latter capability will be supported in a future release).

  If the buffer empties, this is an **underrun** condition: the transmitted synchronous bitstream needs to be maintained but there is no data to send. In this case, a filler pattern is sent until data arrives. The jitter buffer is allowed to build back up to the initial level to reduce the possibility of future underruns.

  If the buffer overflows, which is defined as having twice the number of packets waiting for transmission as the initial backlog, then an **overrun** condition has occurred. Additional received packets are discarded until the jitter buffer drops back to the initial condition.

  In normal conditions, the jitter buffer will vary in length by only one or two packets. Underrun and overrun occurrences indicate that the RS-160 parameters should be adjusted.

  To support the clock recovery calculation described below, the application buffers a minimum of five frames. With the 96-byte packet example above, this represents less than 2 milliseconds of delay.

- **Replacement frames**

  Another cause for "underrun" is due to a packet getting delayed or lost in the packet network. This condition is detected based on the sequence numbers in the packet headers. If a packet with the right sequence number is not available at the right time, the filler pattern will be sent in its place. If the packet eventually arrives late, it will be discarded. "Late" in this context means later than twice the maximum jitter setting. This feature is called "packet reordering" and is enabled optionally.

- **Clock recovery**

  The RS-160 can recover the transmit clock of data received over the network. The clock rate is recreated by adaptive clock recovery, and is used to clock out the

bitstream to the receiving end of the circuit. One RS-160 is configured as a Master that is driven by the clock detected in the locally received bitstream. The paired RS-160 is configured as a Slave, which performs the described clock recovery. If a common stable clock is available at both ends of the link, then both RS-160s can be configured as Master. The user can select a clock locking range that trades off the speed of convergence of the derived clock versus the variability of the clock from nominal values.

- **Jitter buffer length limitations**

  The jitter buffer must be at least five packets long. It can be no longer than 64 packets when reordering is enabled. Otherwise it can be no longer than 800 packets.

  The jitter buffer length is equal to the maximum jitter setting divided by the packet payload transmission time:

$$JitterBufLength = \frac{MaxJitter}{TransmitTime}$$

$$TransmitTime = \frac{PayloadLength}{DataRate}$$

  For example, an E1 payload of 256 bytes will have a transmit time of 1 msec. Similarly, a T1 payload of 192 bytes will have a transmit time of 1 msec. If reordering is enabled, then the maximum jitter in both cases is constrained to a range of 5 to 64 msec.

Configuring a Pair of RS-160s

RS-160s travel in pairs. They perform point-to-point communications. At startup, each RS-160 "pings" the other and waits for a response. Pings are retransmitted until each receives a response from the other. An RS-160 will start forwarding encapsulated bitstream data when it has received a response from its pair.

Master versus Slave

Clocking is a critical element in a bitstream over packet application. The way that the RS-160 maintains consistent timing is to define one RS-160 as a Master and one as a Slave. Operationally, the Slave uses the clock of the Master as its clock source. As shown in Figure 1-6, the Master uses the clock derived by the Line Interface Unit (LIU) from the Rx stream as its Tx clock. The Slave recovers the Master clock from the data received over the packet network and uses this value to drive a Baud Rate Generator (BRG). The BRG output is used as the Tx clock of the Slave.

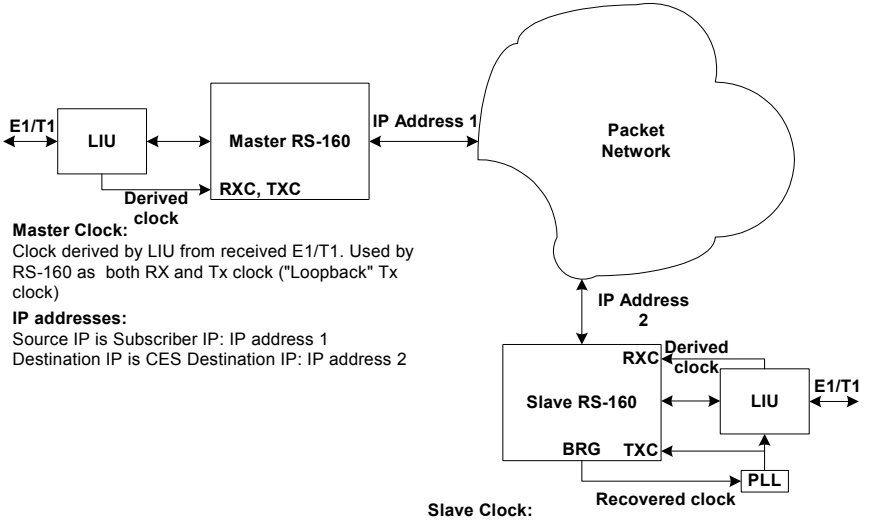
Both RS-160s can be configured as Master if a common stable clock is available to both devices.

The user configures the clocking with the bitstream subscriber clocking parameter. This parameter is configurable with the Management Console: See "Transmit clock source select (Recovery (Slave)/Loopback (Master))" on page 2-7.

It is also configurable with the CLI: See "SetConfigBitStream" on page 3-12.

The RPC also supports this function. See "SetConfigBitStream" on page 4-16.

Figure 1-6. An RS-160 Pair



IP Addresses

Each RS-160 must be aware of the IP address of the Service (Uplink) port of the other RS-160. This value is required for maintaining communications between the two devices.

Enter the local IP address when the Service Interface (Interface C) is defined.

Enter the target IP - the address of the remote RS-160 - when the Circuit Emulation Service (CES) is defined.

Other Parameters That Must be Consistent Between a Pair of RS-160s

The Circuit Emulation Service must be configured consistently on the two RS-160s.

This includes the following parameters:

- Payload length - same value for both RS-160s
- Header format - both units set either to RTP or to Minimal
- Port numbers - local port for one RS-160 is the target port for the other, and vice versa
- Maximum jitter setting - same value for both RS-160s
- Reordering option - both units have reordering enabled or both have it disabled
- Ethertype, if applicable - same value for both RS-160s
- IP TOS, if applicable - same value for both RS-160s
- VLAN parameters, if applicable - same values for both RS-160s

Summary of Configurable Parameters

- Bitstream/LIU (Subscriber) interface

  Set up the Line Interface Unit (LIU) to match the connection to the PBX E1/T1 source. The primary parameters are the line code (encoding used by/expected by the E1/T1 source/destination) and the Line Build Out (impedance adjustment based on the PBX impedance or the distance to the PBX or next repeater.)

- Uplink (Ethernet Service) interface

  If the uplink connection is to a self-configuring Ethernet switch, then the default auto-negotiation setting will suffice. Otherwise, the user can change to the desired duplex and speed setting.

  The user must assign an IP address to this interface. It will be the target IP for the paired RS-160.

- Serial interfaces

  UART A is set by default to Terminal to support the CLI commands.

  UART B is set by default to Message to support the RCP interface.

- Circuit Emulation Service

  These are the core settings for the circuit emulation system. The Target IP must be set to the IP of the paired RS-160. The header type (RTP or Minimal) and the maximum jitter must be selected. The selected packet payload size must be compatible with the available bandwidth of the intervening network. Adjust the the clock locking range to larger than the nominal value if greater than normal variability is expected.

  These settings must also be set on the paired RS-160. The target IP on the paired RS-160 will be the local IP on the first RS-160.

- Configure SNMP

The SNMP agent on each RS-160 must be configured with the list of network management stations (NMS) that can query the RS-160 MIB and will receive RS-160 SNMP traps.

Performance Choices/Adjustments

- **Header type** - The choice between the RTP and the Minimal header is primarily one of a savings of network bandwidth: The RTP header requires 44 bytes over the Ethernet protocol, while the Minimal protocol only requires four bytes. The Minimal protocol is not routable. The RTP protocol allows defining a VLAN that can aid in improving network performance.
- **Payload size** - Longer packets are more efficient in the use of packet network bandwidth, but may result in reduced performance if a packet is lost. There will be a longer wait until the loss is detected and replaced by the underrun value. When the RTP header is configured, this value must be a multiple of the line format frame length, i.e., multiple of 24 bytes (T1) or 32 bytes (E1). The payload size in this case ranges from 32 to 1440 bytes (E1) or from 24 to 1440 bytes (T1). When the minimal header is used, the payload size can vary from 42 to 1492 bytes. Note that longer packets can result in more delay due to the requirement of maintaining a minimum jitter buffer length of five packets.
- **Maximum Jitter** - This value can be up to ±6200 milliseconds. The default value is 5 milliseconds. This means that if network delays stay within ±5 milliseconds, then there will be no detectable variation by the station receiving the E1/T1 bitstream. If the jitter drifts higher then data packets may be lost. If the user's network has greater delays, this parameter should be increased.

Performance Statistics

The **get status** command for the CES application returns the latest values of key performance parameters. See page 3-26 for a description of the CLI command and page 4-34 for a description of the corresponding RCP message.

The **get statistics** command also returns performance statistics on a selected interface. The bitstream subscriber is connected to interface B; the Uplink (Ethernet service) is connected to Interface C.

The CES and interface statistics can be cleared with the **reset statistics** command. See page 3-29.

The RS-160 SNMP agent returns the performance parameters included in MIB2 that describe data activity into and out of the RS-160.

2 Quick Configure

This chapter gives a quick configuration method for the IPM-1SE.

The following is broken into 5 steps that need to be configured for each unit. For clocking concerns, the IPM-1SE pair can be considered transparent. However, for proper operation, the configuration must be set to place the "Master" unit towards the E1 clock source (towards the up stream) and place the "Slave" unit towards the CPE side.

Connect the IPM-1SE via serial console cable to a PC or notebook with HyperTerminal program or other VT-100 compatible terminal program and set the communication parameters for 115.2k, 8 bits, no parity, 1 stop bit, and no flow control. Once the terminal is connected to the IPM, power on the IPM and the terminal show display the IPM's prompt. Comments are placed in brackets { }.

```
RS160:\>
```

Configuration Steps for Master unit.
Step 1. dBase initialize

```
RS160:\> a                              {enter the admin menu}
RS160:\Admin> sddb e1 loopback   {call up initial database}
RS160:\Admin> \c\rr                     {Replace & Reload}
```

Step 2. Uplink's TCP/IP setting

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> up                       {enter Uplink menu}
RS160:\Config\UPLINK> ssip 10.128.46.18       {Set Static IP}
RS160:\Config\UPLINK> ssnm 255.255.254.0      {Set SubNet Mask}
RS160:\Config\UPLINK> \c\rr             {Replace & Reload}
```

Step 3. Uplink's default gateway

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> g                        {enter general menu}
RS160:\Config\General> sdg 10.128.46.1        {Set Default Gateway}
RS160:\Config\General> \c\rr            {Replace & Reload}
```

Step 4. Configure E1

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> e1                       {enter E1 menu}
RS160:\Config\E1> sccm loopback  {set config clocking mode master}
RS160:\Config\E1> sfm framed            {set frame mode framed}
RS160:\Config\E1> sllc hdb3             {set LUI line code HDB3}
RS160:\Config\E1> sltt e1_120           {set LUI buildout E1}
RS160:\Config\E1> slrt 120ohm           {set LUI Rx termination 120 Ohms}
RS160:\Config\E1> sfp pcm31             {set frame parameter PCM31}
RS160:\Config\E1> \c\rr                 {Replace & Reload}
```

Step 5. Configure TDMoIP

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> top                      {enter TDMoIP menu}
RS160:\Config\TDM_Over_Packet> ccip 10.128.46.19     {set target IP}
RS160:\Config\TDM_Over_Packet> sts 14 24 28 29 {set time slots}
RS160:\Config\TDM_Over_Packet> gfts     {get frame time slots}

Timeslot #              0----0----1----1----2----2----3-
                        0----5----0----5----0----5----0-

Running_config          FXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Modified Running_config F-------------X---------X---XX--

RS160:\Config\TDM_Over_Packet> \c\rr    {Replace & Reload}
```

Configuration Steps for Slave unit.
Step 1. dBase initialize

```
RS160:\> a                              {enter the admin menu}
RS160:\Admin> sddb e1 recovery   {call up initial database}
RS160:\Admin> \c\rr                     {Replace & Reload}
```

Step 2. Uplink's TCP/IP setting

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> up                       {enter Uplink menu}
RS160:\Config\UPLINK> ssip 10.128.46.19       {Set Static IP}
RS160:\Config\UPLINK> ssnm 255.255.254.0      {Set SubNet Mask}
RS160:\Config\UPLINK> \c\rr             {Replace & Reload}
```

Step 3. Uplink's default gateway

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> g                        {enter general menu}
RS160:\Config\General> sdg 10.128.46.2        {Set Default Gateway}
RS160:\Config\General> \c\rr            {Replace & Reload}
```

Step 4. Configure E1

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> e1                       {enter E1 menu}
RS160:\Config\E1> sccm recovery  {set config clocking mode slave}
RS160:\Config\E1> sfm framed            {set frame mode framed}
RS160:\Config\E1> sllc hdb3             {set LUI line code HDB3}
RS160:\Config\E1> sltt e1_120           {set LUI buildout E1}
RS160:\Config\E1> slrt 120ohm           {set LUI Rx termination 120 Ohms}
RS160:\Config\E1> sfp pcm31             {set frame parameter PCM31}
RS160:\Config\E1> \c\rr                 {Replace & Reload}
```

Step 5. Configure TDMoIP

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> top                      {enter TDMoIP menu}
RS160:\Config\TDM_Over_Packet> ccip 10.128.46.18     {set target IP}
RS160:\Config\TDM_Over_Packet> sts 14 24 28 29 {set time slots}
RS160:\Config\TDM_Over_Packet> gfts     {get frame time slots}

Timeslot #              0----0----1----1----2----2----3-
                        0----5----0----5----0----5----0-

Running_config          FXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Modified Running_config F-------------X---------X---XX--

RS160:\Config\TDM_Over_Packet> \c\rr    {Replace & Reload}
```

The previous TDM configuration is for E1, 120 ohm connection to the RJ-45 connectors. To connect via twisted pair on the RJ-45 TDM connector, the connections are:

1 - RRING
2 - RTIP
4 - TRING
5 - TTIP

No configuration was done for the local LAN port.
Connect the IP network to the Uplink connector, straight UTP will connect to switch.

Fine tuning

There are two parameters that should be adjusted to provide error free operation in "real" networks; they are the jitter buffer and the payload length.
Jitter Buffer: The default jitter buffer for a full E1 unframed transmission is only 5ms. If the latency of Ethernet on the master to slave units is more than 5ms, errors will occur. To check LAN latency, issue a ping from the LAN A to LAN B. Find the average latency and increase the jitter buffer to handle the latency. For voice applications, keep the jitter buffer under 250ms (1/4 second) to avoid any noticeable delay in voice. The command to modify the jitter buffer is:

```
RS160:\> c                              {enter configuration menu}
RS160:\Config> top                      {enter TDMoIP menu}
RS160:\Config\TDM_Over_Packet> cclk 100 {increase jitter to 100ms}
RS160:\Config\TDM_Over_Packet> \c\rr    {save}
```

Payload Length: In wireless applications, a large payload is preferred. In unframed E1, the default payload length is only 96bytes. To increase it do the following:

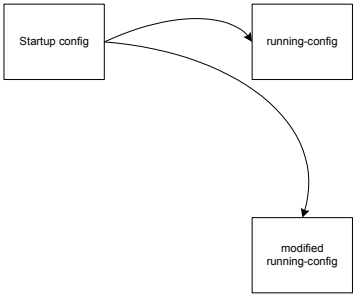
```
RS160:\> c                              {enter configuration menu}
RS160:\Config> top                      {enter TDMoIP menu}
RS160:\Config\TDM_Over_Packet> ccpl 265 {set payload to 256 bytes}
RS160:\Config\TDM_Over_Packet> \c\rr    {save}
```

3 CLI Commands

3

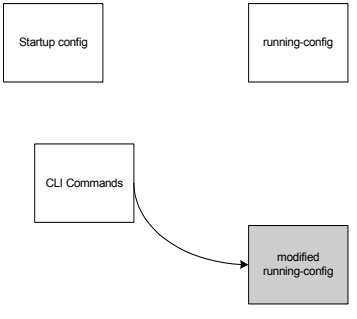
This chapter describes the command line interface (CLI) commands used to configure the RS-160 and to display the configuration and status of the device.

Configuring the RS-160

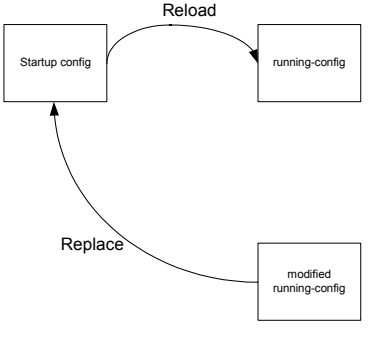


The RS-160 has an internal, non-volatile database that is activated when the device is powered up or restarted. The is database is called the Startup Config. At power on, the Startup config is copied to two locations: the running-config and the modified running-config.

The database contains all the information necessary to configure the RS-160 for an application. The initial values of the database are the default conditions of the device.



CLI commands are used to change the configuration parameters to adapt to a specific application of the RS-160. Most parameter changes are made to the modified running-config.



Once the modified running-configuration has been validated, copy it to the Startup config using the "replace" (rp) command.

Use the "reload" (rl) command to restart the RS-160 with the Startup config.

The "ReplaceReload" (rr) command copies the modified running-config to the Startup config and reloads with a single command.

The GetConfiguration (gc) command, used to display configuration information in various contexts, displays two sets of values: the parameters in the running-config and the corresponding values in the modified running-config.

How to Access the CLI

Connecting via the CONSOLE port

The CONSOLE is configured for the following parameters:

- Baud Rate: 115200
- Data Bit: 8
- Stop Bit: 1
- Parity: None
- Flow Control: None

Connect to the CONSOLE using a serial connection and a "dumb" terminal or a character terminal emulator such as Hyper terminal or a PC command window. Press return and the RS-160 will respond with the command prompt: (CM160:\>).

Connecting via Telnet and a network interface

The LAN port is configured with an IP address of 192.160.16.1, and the UPLINK port is configured either with an IP address of 169.254.1.5 (Master) or 169.254.1.6 (Slave). Both ports are configured with a subnet mask of 255.255.0.0. The user can connect via Telnet to the defined IP address using HyperTerminal or a command window on a PC or any other Telnet client. Once the connection is made, the RS-160 will respond with the command prompt (CM160:\>).

If the IP address needs to be changed to another value before making a network connection, first connect via the CONSOLE and change the LAN or UPLINK IP address and subnet mask using the following two commands:

- SetStaticIP (ssip) (see page 3-31)
- SetSubNetMask (ssnm) (see page 3-32)

CLI Command Description Conventions

The command descriptions in this document follow the following conventions:

- Command names and their abbreviations are shown in **bold font**.
- Command arguments are shown in angle brackets (**< >**).
- Required alternative keywords are grouped in braces and separated by vertical bars ({A|B|C})
- Elements in square brackets ([ ]) are optional.
- `Screen fonts` are used in examples of user entry and resulting output. User entry examples are in **`bold screen font.`**

If the user enters a command preceded by a question mark (?) and a blank, help is displayed, providing immediate help formatting commands, as shown in the following example:

```
CM160:\Config\TDM_Over_Packet>? ccap
Configures CES header protocol.
Parameters: <protocol: {RTP|Minimal}>
Optional Parameters:
[<ethertype(Hex)>
 <local-port>
 <target-port>]
```

Typing a ? after entering a command and one or more parameters results in a validation of the parameters and a display of the command help text. The command as entered is re-displayed. This capability is useful when the user has forgotten the sequence of parameters while in the middle of entering a command.

The CLI command parser evaluates each parameter and generates an error on the first error found, for example, entering **`ccap q`** (the first parameter must be "RTP" or "minimal") results in a parser error:

```
Error, Parameter 1, wrong value (keyword)
```

The following message is returned if the entered parameters are parsed correctly:

```
The request was updated successfully in modified
running_config.


The configuration change will be activated after the
next Replace&Reload (\c\rr)
```

If the command entered changes a dynamic parameter - one that is not recorded in the database - for example, a loopback command, the following message is returned:

```
The command completed successfully.
```

If the entered parameters parse correctly but not all required parameters are entered or the entered values are an incorrect combination for the selected command, the following message is sent:

```
Modified-running-config was not updated or accessed
with this request.
```

See the description of SetConfigCESProtocol on page 3-39 for an example of how the value of one parameter can constrain the value of other parameters.

CLI Command Hierarchy

The CLI commands are organized in a hierarchal directory structure as shown in Figure 3-1. Each directory has subdirectories and/or commands within it.

The following commands are used to navigate the command directories:

- **`dir`** - lists the commands and sub-directories in the current directory

- up arrow and down arrow - display previously entered commands (up to the last 12)
- Entering a sub-directory name or its abbreviation transfers control to that directory. One can move down the hierarchy by more than one level by entering the desired sub-directory path, with "\" separating the directory names, for example

```
CM160:\>m\lan
CM160:\Monitor\LAN>
```

- Starting with "\" allows entering the path to a directory starting from the root directory, for example:

```
CM160:\Monitor\LAN>\c\lan
CM160:\Config\LAN>
```

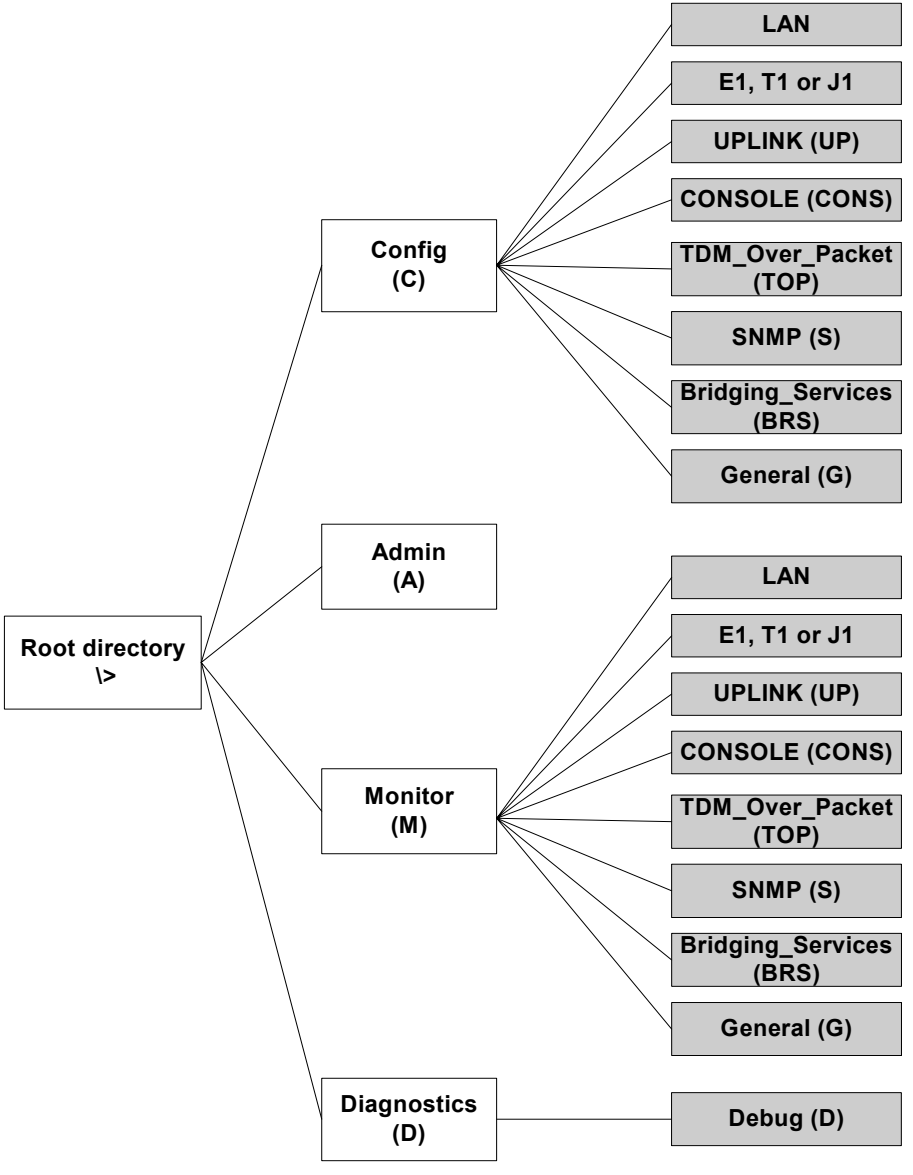
- If the full path to a directory is entered followed by a command, the default directory when the command was entered will remain the same., for example:

```
CM160:\Monitor\LAN>\c\lan
CM160:\Config\LAN>
```

- Entering "`..`" moves up the directory hierarchy one level. This can be repeated (`..\..`) or combined with directory names to move up and down the hierarchy, for example

```
\Monitor\UPLINK>..\..\a\top
\Monitor\TDM_Over_Packet>
```

Figure 3-1. Command Directory Hierarchy



Certain commands with the same name appear in more than one sub-directory. The command functions differently depending on the context, for example, the GetConfig (gc) command displays different results depending on the interface or application directory where it is executed.

Summary of CLI Commands

The commands in each CLI sub-directory are listed below. Note that the configuration or status commands are also present in the configuration directories for convenience.

Configuration Commands

```
CM160:\Config>dir
<dir> LAN       LAN
<dir> E1        E1
<dir> UP        UPLINK
<dir> CONS      CONSOLE
<dir> S         SNMP
<dir> ToP       TDM_Over_Packet
<dir> BRS       Bridging_Service
<dir> G         General
      gsb       GetStatusBoard(See page 3-10)
      gci       GetConfigIfs(See page 3-11)
      gsi       GetStatusIfs(See page 3-12)
      gcu       GetConfigUarts(See page 3-13)
      gdt       GetDateTime(See page 3-78)
      gv        GetVersion(See page 3-79)
      rr        ReplaceReload(See page 3-14)
      rp        Replace(See page 3-15)
      rl        Reload(See page 3-16)
```

Ethernet Configuration Commands (LAN and UPLINK)

```
CM160:\Config\LAN>dir or
CM160:\Config\UPLINK>dir
      sce       SetConfigEth(See page 3-17)
      scef      SetConfigEthFlowControl
                                  (See page 3-18)
      cel       setConfigEthLimit(See page 3-19)
      ssip      SetStaticIP(See page 3-31)
      ssnm      SetSubNetMask(See page 3-32)
      gst       GetStatistics(See page 3-37)
      sdml      SetDynamicMACLpbk(See page 3-87)
      gc        GetConfig(See page 3-33)
      gs        GetStatus(See page 3-35)
```

E1/T1 Configuration Commands

```
CM160:\Config\E1>dir or
CM160:\Config\T1>dir
      sccm      SetConfigBitstreamClockingMode
                                    (See page 3-20)
      sbuv      SetConfigBitStreamUnderVal
                                    (See page 3-21)
      sfm       SetFrameMode(See page 3-22)
      sbdl      SetBitstreamDynamicLpbk
                                    (See page 3-88)
      gst       GetStatistics(See page 3-37)
      gc        GetConfig(See page 3-33)
      gs        GetStatus(See page 3-33)
      sllc      SetConfigLIULineCode(See page 3-23)
      sltt      SetConfigLIULineBuildout
                                    (See page 3-26)
      slrt      SetConfigLIURxTerm(See page 3-27)
      sljt      SetConfigJitterAttenuation
                                    (See page 3-28)
      slrg      SetConfigMonitorGain(See page 3-29)
      sreg      SetRxEqualizerGainLimit
                                    (See page 3-30)
      sldl      SetLIUDynamicLpbk(See page 3-89)
      gfts      GetFrameTimeSlots(See page 3-23)
      sfp       SetFramedParams(See page 3-24)
```

CONSOLE Configuration Commands

```
CM160:\Config\CONSOLE>dir
      scu       SetConfigUART(See page 3-38)
      gc        GetConfig(See page 3-33)
```

SNMP Configuration Commands

```
CM160:\Config\SNMP>dir
      arm       AddRequestManager(See page 3-59)
      rrm       RemoveRequestManager(See page 3-60)
      grm       GetRequestManagers(See page 3-61)
      atm       AddTrapManager(See page 3-62)
      rtm       RemoveTrapManager(See page 3-63)
      gtm       GetTrapManagers(See page 3-64)
      srp       SetRequestPort(See page 3-65)
```

```
        stp       SetTrapPort(See page 3-67)
        gp        GetRequestTrapPorts(See page 3-66)
```

TDM over Packet Configuration Commands

```
CM160:\Config\TDM_Over_Packet>dir
        ccap      SetConfigCESProtocol(See page 3-39)
        ccip      SetConfigCESIP(See page 3-41)
        ccpl      SetConfigCESPayLength(See page 3-42)
        cclk      SetConfigCESClock(See page 3-43)
        ccvl      SetConfigCESVlan(See page 3-44)
        scr       SetCESreOrder(See page 3-45)
        cclr      SetConfigCESClockRange
                                    (See page 3-46)
        gfts      GetFrameTimeSlots(See page 3-23)
        sts       SetTimeSlots(See page 3-47)
        ats       AddTimeSlots(See page 3-48)
        rts       RemoveTimeSlots(See page 3-49)
        sfp       SetFramedParams(See page 3-24)
        sctm      SetCESappTestMode(See page 3-50)
        gc        GetConfig(See page 3-33)
        gs        GetStatus(See page 3-35)
```

Bridging Service Commands

```
CM160:\Config\Bridging_Service>dir
        sb        SetBridging(See page 3-52)
        sat       SetAgingTime(See page 3-53)
        cb        ClearBridging(See page 3-54)
        gc        GetConfig(See page 3-33)
        gs        GetStatus(See page 3-35)
```

General Configuration Commands

```
CM160:\Config\General>dir
        sdg       SetDefGateway(See page 3-55)
        gdg       GetDefGateway(See page 3-56)
        gma       GetMACAddress(See page 3-58)
```

Diagnostics Commands

```
CM160:\Diagnostics>dir
      fts       FunctionalTest(See page 3-84)
      gsb       GetStatusBoard(See page 3-10)
<dir> D         Debug
```

Admin Commands

```
CM160:\Admin>dir
      gbd       GetBoardData(See page 3-83)
      ddb       DispDBInfo(See page 3-82)
      gdt       GetDateTime(See page 3-78)
      sdt       SetDateTime(See page 3-77)
      sddb      SetDefaultDB(See page 3-85)
```

CLI Command Descriptions

The following pages contain descriptions of each CLI command.

GetStatusBoard

displays the operational status of the RS-160

Abbreviation

gsb

gsb

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Config>gsb

Power up test succeeded
Interface LAN link......:  UP
Interface E1 link.......:  UP
Interface UP link.......:  UP
```

GetConfigIfs

Displays the configuration of all three traffic interfaces

Abbreviation **gci**

gci

Syntax Description

Defaults

Usage Guidelines .

Examples

```
CM160:\Config>gci

LAN interface configuration

                              Running_config        Modified Running_config
 Working mode...............:  ETH                   ETH
 AutoNeg....................:  On                    On
 Speed (Mb/s)...............:  -                     -
 Duplex mode................:  -                     -
 Interface BW (kb/s)........:  Unlimited             Unlimited
 MAC address................:  00-50-C2-15-CD-CE     00-50-C2-15-CD-CE
 IP address.................:  192.160.16.1          192.160.16.1
 Subnet mask................:  255.255.255.0        255.255.255.0

E1 interface configuration

                              Running_config        Modified Running_config
 Working mode...............:  Bitstream             Bitstream
 Clocking mode..............:  Loopback-master       Loopback-master
 Interface loopback.........:  Disabled              Disabled
 LIU line format............:  E1                    T1
 LIU line code..............:  HDB3                  B8ZS
 LIU line build out.........:  E1_75                 T1_133
 LIU Rx term................:  120ohm               100ohm
 LIU loopback...............:  Disabled              Disabled
 Framed mode................:  Unframed             Unframed

UP interface configuration

                              Running_config        Modified Running_config
 Working mode...............:  ETH                   ETH
 AutoNeg....................:  On                    On
 Speed (Mb/s)...............:  -                     -
 Duplex mode................:  -                     -
 Interface BW (kb/s)........:  Unlimited             Unlimited
 MAC address................:  00-50-C2-15-CD-CD     00-50-C2-15-CD-CD
 IP address.................:  10.101.1.225         10.101.1.225
 Subnet mask................:  255.255.255.0        255.255.255.0
```

GetStatusIfs

Displays status for all three traffic interfaces

Abbreviation

gsi

gsi

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Config>gsi

LAN interface configuration

Link ...................: UP
PHY status..............: Working
AutoNeg.................: Done
Peer advertisement value.: 43E1
Speed (Mb/s)............: 100
Duplex mode.............: FULL
Flow control............: OFF
MAC loopback............: Disabled

E1 interface configuration

Link....................:  UP
Alarm Status............:  -
LIU loopback............:  Disable
Interface loopback.....:  Disable

UP interface configuration

Link ...................: UP
PHY status..............: Working
AutoNeg.................: Done
Peer advertisement value.: 43E1
Speed (Mb/s)............: 100
Duplex mode.............: Full
Flow control............: Off
MAC loopback............: Disabled
```

GetConfigUarts

Returns the CONSOLE configuration

Abbreviation

gcu

gcu

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Config>gcu

CONS configuration

             Running_config          Modified Running_config

 Baud rate..........:  115200        115200
 Stop bit...........:  1             1
 Protocol...........:  Term          Term
 Mode...............:  Enabled       Enabled
```

ReplaceReload

Replaces the restart configuration with the modified running configuration and then restarts the RS-160

Abbreviation

rr

rr

Syntax Description

Defaults

Usage Guidelines

This command is used to capture the modified running configuration permanently. The modified running-config contains all parameter changes made since the last restart

Examples

```
CM160:\Config\>rr

Startup-config-DB replaced

Restarting from startup-config-DB
CM160 R01.01.02_D002-200
```

Replace

Replaces the restart configuration with the modified running configuration

Abbreviation

rp

rp

Syntax Description

Defaults

Usage Guidelines

This command is used to capture the modified running configuration permanently. The modified running-config contains all parameter changes made since the last restart

Examples

```
CM160:\Config\>rp

Startup-config-DB replaced
```

Reload

Restarts the RS-160 using the startup configuration

Abbreviation

rl

rl

Syntax Description

Defaults

Usage Guidelines

If any configuration changes were made to the modified running-config, they will be lost unless a Replace (rp) command was executed firs. Use the rr command to perform both operations in a single step.

Examples

```
CM160:\Config>rl

Restarting from startup-config-DB
CM160 R01.01.02_D002-200
```

SetConfigEth

Configures the parameters of an Ethernet interface (LAN or UPLINK)

Abbreviation

sce

sce <speed> [<duplex-mode>]

Syntax Description

<speed>	**{10|100|Auto}** selects Ethernet speed in Mbps or selects Auto negotiation for configuration
[<duplex-mode>]	**{Full|Half}** optionally selects Full Duplex or Half Duplex

Defaults

Usage Guidelines

Changing from Auto to an interface speed or from an interface speed setting to auto-negotiation requires a replace and reload to activate the change. changing interface speed does not requires a replace and reload.

Examples

```
CM160:\Config\LAN>sce 100 full

The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
```

SetConfigEthFlowControl

Sets LAN or UPLINK flow control mode

Abbreviation

scef

scef <flow-control-mode>

Syntax Description

<flow-control-mode> **{ON|OFF}** turns Ethernet flow control on or off

Defaults

Usage Guidelines

Examples

```
CM160:\Config\LAN>scef on

The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
```

SetConfigEthLimit

Defines a bandwidth limitation for either the LAN or UPLINK interface.

Abbreviation

cel

cel <BW-limit-in-kbits>

Syntax Description

<BW-limit-in-kbits > **1-100000** (0 indicates no limitation on this interface)

Defaults

Usage Guidelines

This value limits the bandwidth of traffic transmitted from the selected interface. The value on the UPLINK interface includes packetized E1/T1 traffic. The user must evaluate two values to determine this setting:
1. The amount of bandwidth used by the packetized E1/T1. Enter \c\top\gs to see the amount of bandwidth used.
2. The maximum bandwidth of the slowest link between one RS-160 and its peer.
If the bandwidth required is larger than the slowest link, reduce the packetized E1/T1 bandwidth by increasing the size of the packet payload. This reduces the number of packet headers and therefore the amount of required bandwidth.
Set the UPLINK bandwidth to the bandwidth of the slowest link.
If the interface is configured for 10Mbps, then the maximum permitted value is 10000.
The difference between the E1/T1 bandwidth and the set maximum bandwidth is available for packet traffice between the LAN and UPLINK interfaces.

Examples

In this example, packetized E1 requires 3.284 Mbps. The slowest link is 4Mbps.

```
CM160:\Config\UPLINK>cel 4000

The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
```

SetConfigBitStreamClockingMode

Sets the bitstream clocking mode for the E1/T1 interface. This setting determines whether the RS-160 is operating as a Master or as a Slave.

Abbreviation

sccm

sccm <clocking-mode>

Syntax Description

<clocking-mode>	**{RECOVERY|LOOPBACK}** "Recovery" uses the fine baud rate generator (BRG) clock calculated from received bitstream packets as the Tx clock (the other RS-160 is the Master). "Loopback" uses the local LIU clock, which is based on its E1 or T1 connection, as the Tx clock (this RS-160 is the Master).

Defaults

Usage Guidelines

Examples

```
CM160:\Config\E1>sccs loopback
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
```

SetConfigBitStreamUnderVal

Sets the Bit Stream underrun byte value configuration

Abbreviation

sbuv

sbuv <underrun_value>

Syntax Description

<underrun_value>	**underrun byte value (0x1 to 0xFF)** When a bitstream packet arrives late or is lost, or no data is received, filler bytes are transmitted with this underrun value

Defaults

Usage Guidelines

Examples

```
CM160:\Config\E1>sbuv 0x98
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
```

SetFrameMode

Selects the frame mode of operation

Abbreviation

sfm

sfm <frame_mode>

Syntax Description

<frame_mode>	**{Full | Framed | Unframed}** Full: Complete E1/T1 frames will be detected and forwarded Framed: Selected timeslots from E1/T1 frames will be forwarded Unframed: Bytes from the incoming bitstream will be grouped into a packet and forwarded, without synchronizing to the incoming frames.

Defaults

Usage Guidelines

Examples

```
CM160:\Config\E1>sfm framed
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
```

GetFrameTimeSlots

Displays the selected time slots that will be forwarded

Abbreviation

gfts

gfts

Syntax Description

Defaults

Usage Guidelines

The display varies depending on whether the RS-160 is operating in T1 or E1. The legend below explains the symbols used in the display.

Examples

The example below shows the selected time slot display for T1. The running-config is set for unframed, and the modified running-config is set to full.

```
CM160:\Config\TDM_Over_Packet>gfts
CM160:\Config\E1>gfts
TimeSlot#                00---0----1----1----2----
                         01---5----0----5----0----

Running_config           -------------------------
Modified Running_config  fXXXXXXXXXXXXXXXXXXXXXXX

X : Selected
- : Not selected
* : Not applicable
F : framing information in-band
f : framing information out-of-band
S : signaling information in-band
s : signaling information out-of-band
```

SetFramedParams

Defines framing parameters used to configure the internal framer.

Abbreviation

sfp

sfp <frame_format>

Syntax Description

<frame_format>	**E1: {PCM30|PCM31}** **T1: {ESF|D4}**

Defaults

Usage Guidelines

The framing option selected is used by the internal framer to synchronize with the E1/T1 source.

Examples

```
CM160:\Config\E1>sfp PCM31
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
```

SetConfigLIULineCode

Sets the LIU line coding

Abbreviation

sllc

sllc <line_code>

Syntax Description

<line_code>	**{AMI|HDB3|B8ZS}** HDB3 is used for E1; B8ZS is used for T1 and J1; AMI is used for both E1 and T1

Defaults

Usage Guidelines

The value used depends on the settings of the E1/T1/J1 source

Examples

```
CM160:\Config\E1>sllc ami
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
```

SetConfigLIUlineBuildout

Configures LIU line build out

Abbreviation

sltt

sltt <line_build_out>

Syntax Description

<line_build_out>	**E1 options:** **{E1_75|E1_120|E1_75_HRL|E1_120_HRL}** **T1/J1 options:** **{T1_133|T1_266|T1_399|T1_533|T1_655|T1_7.5|T1_15|T1_22.5}** Select this parameter as a function of the impedance or length of the connection to the E1/T1 source.

Defaults

Usage Guidelines

Examples

```
CM160:\Config\E1>sltt e1_75
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (c\rr)
```

SetConfigLIURxTerm

Sets the LIU line Rx termination

Abbreviation

slrt

slrt <line_Rx_termination>

Syntax Description

<line_Rx_termination>	**{TermDis|75ohm|100ohm|120ohm|110ohm}** "TermDis" indicates that the internal Rx termination is disabled. Valid values for different line formats: E1: 75 Ohm and 120 Ohm T1: 100 Ohm J1: 110 Ohm (supported in future release) See the LIU data sheet for more information about this parameter.

Defaults

Usage Guidelines

Examples

```
CM160:\Config\E1>slrt 120ohm
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (c\rr)
```

SetConfigJitterAttenuation

Enables/disables the LIU internal Tx jitter attenuator

Abbreviation

sljt

sljt <jitter_atten_activation>

Syntax Description

<jitter_atten_activation> **{Enable | Disable}**

Defaults

Usage Guidelines

Enabling this parameter adds a 128-bit FIFO to the Tx path.

Examples

```
CM160:\Config\E1>sljt enable
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetConfigMonitorGain

Sets the Rx monitor gain for an LIU

Abbreviation

slrg

slrg <monitor_gain>

Syntax Description

<monitor_gain> **{Norm | 20db | 26db | 32db}**

Defaults

Usage Guidelines

This parameter is usually left at "Norm".

Examples

```
CM160:\Config\E1>slrg norm
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetRxEqualizerGainLimit

Configures LIU receive equalizer gain limit

Abbreviation

sreg

sreg <receive-equalizer-gain-limit>

Syntax Description

<receive-equalizer-gain-limit>	**{short|long}** "short" and "long" are defined differently for E1 and T1:

	short	long
E1	-15 dB	-43 dB
T1	-15 dB	-36 dB

Defaults

Usage Guidelines

This parameter is set based on the characteristics of the line connecting to the E1/T1/J1 source.

Examples

```
CM160:\Config\E1>sreg short
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetStaticIP

Sets the static IP address of a selected interface (either LAN or UPLINK)

Abbreviation

ssip

ssip <IP-address>

Syntax Description

<IP-address>	IP address of the selected interface in the format "**nn.nn.nn.nn**.", where nn is a number from 0 to 255

Defaults

Usage Guidelines

An IP of all zeroes is invalid. Any other value is accepted.

Examples

```
CM160:\Config\UPLINK>ssip 100.10.200.45
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetSubNetMask

Configures the IP subnet mask for an interface

Abbreviation

ssnm

ssnm <ip-sub-net-mask>

Syntax Description

<ip-sub-net-mask>	Subnet mask of the selected interface in the format "**nn.nn.nn.nn**.", where nn is a number from 0 to 255

Defaults

Usage Guidelines

Examples

```
CM160:\Config\UPLINK>ssnm 255.255.255.0
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

GetConfig

Returns configuration information about an interface or an application

Abbreviation

gc

gc

Syntax Description

Defaults

Usage Guidelines

The function returns a different report based on the sub-directory where the function is called.

Examples

Configuration information for an interface configured as **bitstream**:

```
CM160:\Config\E1>gc
```

```
                          Running_config       Modified Running_config

Working mode..............:  Bitstream             Bitstream
Frame size (bytes).........:  96                    96
Underrun value.............:  0xFE                  0xFE
Clocking mode..............:  Loopback-master      Loopback-master
Tx clock polarity..........:  Rising                Rising
Rx clock polarity..........:  Falling               Falling
Interface loopback.........:  Disabled              Disabled
LIU line format............:  E1                    E1
LIU type...................:  DS2155                DS2155
LIU line code..............:  HDB3                  HDB3
LIU line build out.........:  E1_75                 E1_75
LIU Rx term................:  120ohm                120ohm
LIU monitor gain...........:  Norm                  Norm
LIU Rx equalizer gain limit:  Short                 Short
LIU jitter attenuation.....:  Disabled              Disabled
LIU loopback...............:  Disabled              Disabled
Framed mode................:  Unframed              Unframed
```

Configuration information for **LAN or UPLINK**

```
CM160:\Config\UPLINK>gc
```

```
                        Running_config       Modified Running_config

Working mode.......:  ETH                    ETH
MII/RMII...........:  MII                    MII
AutoNeg............:  On                     On
Speed (Mb/s).......:  -                      -
Duplex mode........:  -                      -
Flow control.......:  Disabled               Disabled
Clock source.......:  DTE                    DTE
RMII ref clock out.:  -                      -
Interface BW (kb/s):  Unlimited              Unlimited
MAC address........:  00-50-C2-15-89-A0      00-50-C2-15-89-A0
MAC loopback.......:  Disabled               Disabled
PHY configured.....:  Yes                    Yes
PHY number.........:  0                      0
```

GetConfig (continued)

```
     Advertisement..........:  10H 10F 100H 100F     10H 10F 100H 100F
     IP address.............:  169.254.1.5           169.254.1.5
     Subnet mask............:  255.255.255.0         255.255.255.0
```

CONSOLE configuration information:

```
CM160:\Config\CONSOLE>gc

                      Running_config          Modified Running_config
 Baud rate..........:  115200                  115200
 Stop bit...........:  1                       1
 Protocol...........:  Term                    Term
 Mode...............:  Enabled                 Enabled
```

TDM Over Packet application configuration information:

```
CM160:\Config\TDM_Over_Packet>gc

                        Running_config       Modified Running_config

 Subscriber interface.........:  E1                   E1
 Service interface............:  UP                   UP
 Header type..................:  RTP                  RTP
 Local port...................:  2000                 2000
 Target port..................:  2000                 2000
 Local IP address.............:  169.254.1.5         169.254.1.5
 Target IP address............:  169.254.1.5         169.254.1.6
 IP TOS.......................:  0                    0
 Payload length (bytes/frames):  96                   96
 Ethertype....................:  0x800                0x800
 Maximum jitter (ms)..........:  50                   50
 Clock lock range (ppm).......:  50                   50
 Reorder......................:  Disabled             Disabled
 VLAN support.................:  Disabled             Disabled
 VLAN ID......................:  0                    0
 VLAN priority................:  0                    0
 Framed mode..................:  Unframed            Unframed
```

Bridging application configuration information:

```
CM160:\Config\Bridging_Service>gc

                     Running_config       Modified Running_config

 Bridge interface...:  LAN                    LAN
 Bridge mode........:  ON                     ON
 Aging time (sec)...:  30                     30
 Mac table size.....:  1024                   1024
```

GetStatus

Returns the operational status of a selected interface or of the overall system

Abbreviation

gs

gs [r]

Syntax Description

[r]	optional reset of TDM Over Packet statistics

Defaults

Usage Guidelines

The status returned depends on the directory where the command is executed. The command returns a different status for an interface operating as an Ethernet port or as a bitstream port. The TDM Over Packet application has its own status report. Enter "gs r" to reset the jitter overflow and underflow counts in the TDM Over Packet report. Examples of all the "gs" reports are shown below.

Examples

Operational status of an **Ethernet** interface (UPLINK or LAN):

```
CM160:\Config\UPLINK>gs

Status of interface
Link .....................: UP
PHY status................: Working
AutoNeg...................: Done
Peer advertisement value.: 43E1
Speed (Mb/s)..............: 100
Duplex mode...............: FULL
Flow control..............: OFF
MAC loopback..............: Disabled
```

Operational status of the **bitstream** interface (E1 or T1):

```
CM160:\Config\E1>gs

Status of interface
Link.....................:  UP
Alarm Status.............:  -
LIU loopback.............:  Disable
Interface loopback.......:  Disable
```

Additional formats are described on the following page.

GetStatus (continued)

Display status of the **TDM Over Packet application**

```
CM160:\Config\TDM_Over_Packet>gs
 Item                                Value/Status

 Clocking mode..................:  Loopback-master
 Connectivity...................:  UP
 Rx path........................:  UP
 Current jitter buffer delay (ms):  4.970
 Jitter overflow................:  0
 Jitter underflow...............:  1
 Bandwidth utilization(kb/s).....:  2476
 Successful recoveries..........:  0
 Recovery process starts........:  0
 Successful Rx Paths............:  1
 Jitter minimum level (ms).......:  4.970
 Jitter maximum level (ms).......:  5.467
 Peer reachable.................:  YES
 Peer MAC address...............:  00-50-C2-15-42-60
 Peer ping round-trip time (ms)..:  7
 CES application test mode.......:  -
```

The "Connectivity" parameter is "UP" when packetized bitstream data is being forwarded to the paired RS-160. The parameter is "DOWN" when no packets are being sent, due to no bitstream data being received on E1/T1.
The "Peer reachable" parameter is "YES" when the RS-160 has successfully received a response to a "ping' of the paired RS-160.

Display of the status of the **Bridging application**:

```
CM160:\Config\Bridging_Service>gs

 No. of entries currently in MAC addr. table......:  17
 Max no. in table since last reset................:  23
```

GetStatistics

Returns performance statistics of a selected interface.

Abbreviation

gst

gst [r]

Syntax Description

r	Entering an optional "r" resets the statistics for this interface.

Defaults

Usage Guidelines

Examples

Ethernet statistics (UPLINKand LAN interfaces):

```
CM160:\Config\UPLINK>gst
Ethernet Statistics on UPLINK interface

In octets.................:    1149528505
Out octets................:    1149528953
Frames transmitted.......:    7464486
Frames received..........:    7464479
```

Statistics of E1/T1:

```
CM160:\Config\E1>gst
Bitstream Statistics on E1 interface
In octets.................:    749148492
Out octets................:    749148347
Frames received..........:    7803630
Frames transmitted.......:    7660648
```

SetConfigUART

Sets the CONSOLE port configuration

Abbreviation

scu

scu <baud-rate> [<stop_bit>]

Syntax Description

<baud-rate>	**{9600 | 19200 | 38400 | 57600 | 115200 | 230400 | 460800 | 921600}**
[<stop_bit>]	**1 or 2 stop bits**

Defaults

The default number of stop bits is 1. The default baud rate is 115200.

Usage Guidelines

Examples

```
CM160:\Config\CONSOLE>scu 9600 2
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetConfigCESProtocol

Sets the TDM over Packet CES header format and other parameters

Abbreviation

ccap

ccap <Protocol>[<Ethertype> <Local_Port> <Target_ Port>]

Syntax Description

<Protocol>	**{RTP|Minimal}** Header format for PSN packets.
[<Ethertype>]	hexadecimal value; 0x800 for RTP; 0x0600 - 0xFFFF for Minimal (0xF1FF is the default value for Minimal)
[<Local_Port>]	decimal value (2000 to 65535) for RTP; 0 to 15 for Minimal
[<Target_ Port>]	decimal value (2000 to 65535) for RTP; 0 to 15 for Minimal

Defaults

Usage Guidelines

A paired RS-160 must be configured with complementary port values and the same protocol and Ethertype as the paired RS-160.

Examples

The following examples configure first for RTP protocol, then for the Minimal protocol. The port numbers are changed automatically to values that are correct for the protocol.

```
CM160:\Config\TDM_Over_Packet>ccap rtp 0x800 2000 2002
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
CM160:\Config\TDM_Over_Packet>gc

                    Running_config       Modified Running_config

Subscriber interface.........:  E1                 E1
Service interface............:  UP                 UP
Header type..................:  RTP                RTP
Local port...................:  2000               2000
Target port..................:  2000               2002
Local IP address.............:  10.101.1.225      10.101.1.225
Target IP address............:  10.101.1.226      10.101.1.226
IP TOS.......................:  0                  0
Payload length (bytes/frames):  96                 96
Ethertype....................:  0x800              0x800
Maximum jitter (ms)..........:  5                  5
Clock lock range (ppm).......:  50                 50
Reorder......................:  Disabled           Disabled
VLAN support.................:  Disabled           Disabled
VLAN ID......................:  0                  0
VLAN priority................:  0                  0
Framed mode..................:  Unframed          Unframed
```

```
CM160:\Config\TDM_Over_Packet>
CM160:\Config\TDM_Over_Packet>ccap minimal
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
CM160:\Config\TDM_Over_Packet>gc


                    Running_config       Modified Running_config

 Subscriber interface.........:  E1               E1
 Service interface............:  UP               UP
 Header type..................:  RTP              Minimal
 Local port...................:  2000             1
 Target port..................:  2000             0
 Local IP address.............:  10.101.1.225     10.101.1.225
 Target IP address............:  10.101.1.226     10.101.1.226
 IP TOS.......................:  0                0
 Payload length (bytes/frames):  96               96
 Ethertype....................:  0x800            0xFF1F
 Maximum jitter (ms)..........:  5                5
 Clock lock range (ppm).......:  50               50
 Reorder......................:  Disabled         Disabled
 VLAN support.................:  Disabled         Disabled
 VLAN ID......................:  0                0
 VLAN priority................:  0                0
 Framed mode..................:  Unframed         Unframed
```

SetConfigCESIP

Sets the TDM over Packet application IP configuration

Abbreviation

ccip

ccip <target_ip_address> [<local_port> <target_port> <ip_tos_value]

Syntax Description

<target_ip_address>	IP address of the target RS-160 in the format "**nn.nn.nn.nn**.", where nn is a number from 0 to 255
<local_port>	decimal value (2000 to 65535) for RTP; 0 to 15 for Minimal
<target_port>	decimal value (2000 to 65535) for RTP; 0 to 15 for Minimal
<ip_tos_value>	Value of the IP Type of Service field (0 to 7)

Defaults

Usage Guidelines

The target IP is required so that the RS-160 can identify the paired RS-160. This is required for both the RTP header and the minimal header. The local and target port numbers must be complementary to the port settings on the paired RS-160.

Examples

```
CM160:\Config\TDM_Over_Packet>ccip 200.120.34.08 5 2004
2006
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetConfigCESPayLength

Configures the TDM over Packet application payload size

Abbreviation

ccpl

ccpl <payload_length> [<max_jitter>]

Syntax Description

<payload_length>	Unframed: **Number of bytes** in the payload of the CES packets after all headers. With the Minimal header, the range is 42 to 1492 bytes. With the RTP header, must be a multiple of the E1/J1 (32 bytes) or T1 (24 bytes) frame size. The range for E1/J1 is 32 to 1440. The range for T1 is 24 to 1440. Full or Framed: **Number of frames** in the payload of the CES packet. The application will calculate the number of bytes based on the frame length and, in the case of Framed, the number of timeslots selected for transmission.
<max_jitter>	**0 to 6200 msec -** The maximum jitter can be changed optionally with this command. It is an estimate of the maximum jitter (+ or -). For example, a setting of 50 milliseconds results in a range from 0 to 100 msec. This parameter determines the length of the jitter buffer used to smooth the effects of distortion due to network congestion, timing drift, or route changes. The jitter buffer delays the arriving packetized bitstream so that the end user experiences a clear connection with very little distortion.

Defaults

Default payload length is 96 bytes (unframed) or three frames (framed or full).

Usage Guidelines

The payload length and the maximum jitter combine to define the length of the jitter buffer. The jitter buffer is also impacted by the clock rate of the data and whether packet reordering is enabled. This function will return a message with the valid range of max jitter and payload length if an invalid value is entered.

Examples

The example is in Unframed mode, so the packet length is in bytes:

```
CM160:\Config\TDM_Over_Packet>ccpl 512
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

In the following example, the header format is minimal, the framing mode is Full E1, the maximum jitter is set to 5 msec.

```
CM160:\Config\TDM_Over_Packet>ccpl 20
Invalid max jitter
Possible correct values:

Payload-length-in-frames=20,  max-jitter between (13 - 2000).
Max-jitter=5,  payload-length-in-frames between (1 - 8).
```

SetConfigCESClock

Configures the TDM over Packet application maximum jitter

Abbreviation

cclk

cclk <max_jitter> [<payload-length>]

Syntax Description

<max_jitter>	**0 to 6200 msec -** Estimate of the maximum jitter (+ or -). For example, a setting of 50 milliseconds results in a range of 0 to 100 msec. This parameter determines the length of the jitter buffer used to smooth the effects of distortion due to network congestion, timing drift, or route changes. The jitter buffer delays the arriving packetized bitstream so that the end user experiences a clear connection with very little distortion.
<payload-length>	**24-1492 bytes -** The payload length can be changed optionally with this command. See "SetConfigCESPayLength" on page 3-42

Defaults

Usage Guidelines

The maximum jitter and the payload length combine to define the length of the jitter buffer. The jitter buffer is also impacted by the clock rate of the data and whether packet reordering is enabled. This function will return a message with the valid range of max jitter and payload length if an invalid value is entered.

Examples

```
CM160:\Config\TDM_Over_Packet>cclk 50
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

In the following example, the header is set to minimal, the line format is E1 (2.048 Mbps) unframed, and packet reordering is disabled:

```
CM160:\Config\TDM_Over_Packet>cclk 5000 42

Invalid max jitter

Possible correct values:
Payload-length-in-bytes=42,  max-jitter between (1 - 131).
Max-jitter=4675,  payload-length-in-bytes between (1496 -
1496).
```

SetConfigCESVlan

Sets the TDM over Packet application VLAN configuration

Abbreviation

ccvl

ccvl <vlan_mode> [<vlan_id> <vlan_priority>]

Syntax Description

<vlan_mode>	**{Enable|Disable}**
<vlan_id>	**0 to 4095**
<vlan_priority>	**0 to 7**

Defaults

VLAN is disabled by default.

Usage Guidelines

When a virtual LAN is defined for the TDM over packet data, the priority can be raised (0 is the highest priority) to ensure that the TDM data has first use of the available bandwidth.

Examples

```
CM160:\Config\TDM_Over_Packet>ccvl enable 2000 0
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetCESreOrder

Enables and disables the TDM over Packet application packet reorder feature.

Abbreviation

scr

scr <reorder-feature>

Syntax Description

<reorder-feature> **{Enable | Disable}**

Defaults

Usage Guidelines

This feature monitors packets containing encapsulated TDM data and transmits them according to an embedded sequence number, not necessarily in the order that they were received. When a packet with the right sequence number was not received, underrun bytes will be sent in place of the bytes in the missing packet. The length of the jitter buffer determines how late a packet has to be before it is replaced with a packet's worth of filler characters. If the packet arrives late, past the time when it should have been transmitted, it will be discarded.

Examples

```
CM160:\Config\TDM_Over_Packet>scr enable

The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetConfigCESClockRange

Adjusts the TDM over Packet application clock lock range used during clock recovery

Abbreviation

cclr

cclr <clock-lock-range>

Syntax Description

<clock-lock-range> **10-300 ppm**

Defaults

50 ppm

Usage Guidelines

This command sets the maximum variation from the nominal frequency associated with the line format. This parameter is used when the RS-160 performs clock recovery. Use a value other than the standard 50 ppm when system conditions require a wider or narrower variation.

Examples

```
CM160:\Config\TDM_Over_Packet>cclr 100

The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

SetTimeSlots

Replaces the current list of time slots with a new list of timeslots

Abbreviation

sts

sts <list_of_timeslots>

Syntax Description

<list_of_timeslots>	individual time slots separated by a space and/or one or more ranges of timeslots separated by a "-" E1 time slots are numbered 0 to 31 T1 time slots are numbered 1 to 24

Defaults

Usage Guidelines

The number of time slots selected impact the size of the transmitted packet, since the packet payload is a defined number of frames X the number of selected time slots. An error message will be displayed if there is a problem with the resulting payload size.

Examples

The following T1 example shows multiple ranges can be entered and that time slots do not have to be entered in ascending order. The resulting assignments are displayed with the **gfts** command.

```
CM160:\Config\TDM_Over_Packet>sts 12-24 10 1 3-6
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
CM160:\Config\TDM_Over_Packet>gfts

TimeSlot#                00---0----1----1----2----
                         01---5----0----5----0----

Running_config           -------------------------
Modified Running_config  fX-XXXX---X-XXXXXXXXXXXXX

X : Selected
- : Not selected
* : Not applicable
F : framing information in-band
f : framing information out-of-band
S : signaling information in-band
s : signaling information out-of-band
```

AddTimeSlots

Adds time slots to the existing list of time slots

Abbreviation

ats

ats <list_of_timeslots>

Syntax Description

<list_of_timeslots>	individual time slots separated by a space and/or one or more ranges of timeslots separated by a "-" E1 time slots are numbered 0 to 31 T1 time slots are numbered 1 to 24

Defaults

Usage Guidelines

The number of time slots selected impact the size of the transmitted packet, since the packet payload is a defined number of frames X the number of selected time slots. An error message will be displayed if there is a problem with the resulting payload size.

Examples

The following example adds time slot 8 to the example on the preceding page and displays the new set of defined time slots.

```
CM160:\Config\TDM_Over_Packet>ats 8

The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)

CM160:\Config\TDM_Over_Packet>gfts

TimeSlot#                00---0----1----1----2----
                         01---5----0----5----0----

Running_config           -------------------------
Modified Running_config  fX-XXXX-X-X-XXXXXXXXXXXXX

X : Selected
- : Not selected
* : Not applicable
F : framing information in-band
f : framing information out-of-band
```

RemoveTimeSlots

Removes time slots from the list of time slots

Abbreviation

rts

rts <list_of_timeslots>

Syntax Description

<list_of_timeslots>	individual time slots separated by a space and/or one or more ranges of timeslots separated by a "-" E1 time slots are numbered 0 to 31 T1 time slots are numbered 1 to 24

Defaults

Usage Guidelines

The number of time slots selected impact the size of the transmitted packet, since the packet payload is a defined number of frames X the number of selected time slots. An error message will be displayed if there is a problem with the resulting payload size.

Examples

CM160: The following example removes time slots 6 through 12 from the list defined on the previous page. Note that the defined range includes some time slots that were not defined.

```
CM160:\Config\TDM_Over_Packet>rts 6-12
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload (\c\rr)
.

CM160:\Config\TDM_Over_Packet>gfts

TimeSlot#                00---0----1----1----2----
                         01---5----0----5----0----

Running_config           -------------------------
Modified Running_config  fX-XXX-------XXXXXXXXXXXX

X : Selected
- : Not selected
* : Not applicable
F : framing information in-band
f : framing information out-of-band
S : signaling information in-band
s : signaling information out-of-band
```

SetCESAppTestMode

Sets the test mode for the TDM Over Packet CES application

Abbreviation

sctm

sctm [<side> <mode>]

Syntax Description

<side>	**{UP|E1}**
<mode>	**{Enable|Disable}**

Defaults

Entering sctm with no parameters enables loopback testing without a second RS-160

Usage Guidelines

This command must be executed to do loopbck testing using only one RS-160. Enter **sctm up enable** so that the TDM Over PAcket application will send and receive data without a paired unit.

Examples

```
CM160:\Config\TDM_Over_Packet>sctm up enable
CES test is being activated on service side
The command completed successfully.
```

GetCesRecoveryHistory

Displays a report of up to twenty recovery actions

Abbreviation

gch

gch [<num_of_records>]

Syntax Description

<num_of_records> 1 to 20

Defaults

If no parameter is entered, all recovery records will be displayed.

Usage Guidelines

Recovery records are not saved across a restart of the product. This functions if for test and debugging purposes.

Examples

```
CM160:\Config\TDM_Over_Packet>gch

No data to display in recovery history
```

SetBridging

Enables/disables the bridging service on the LAN interface

Abbreviation

sb

sb <mode>

Syntax Description	**<mode>** **{Enable | Disable}**
Defaults	
Usage Guidelines	This function starts and stops the bridging service. The service learns source MAC addresses on received packets and filters packets that are addressed to those MACs. This eliminates unnecessary traffic from being transmitted on the UPLINK interface. Bridging activates immediately. Perform a ResetReload (\c\rr) so that bridging is activated on every restart.

Examples	`CM160:\Config\Bridging_Service>sb enable`
	
	`The command completed successfully.`
	
	`The request was updated successfully in modified running_config.`

SetAgingTime

Sets bridging aging time

Abbreviation

sat

sat <aging-time-seconds>

Syntax Description

<aging-time-seconds> **{10-3600}**

Defaults

30 seconds

Usage Guidelines

The bridging service maintains a table of up to 1024 source MAC addresses. If no packets are received from one of the addresses after a period of time, it may be that the station at that address is no longer active (for example, in a wireless LAN environment, a user has moved from one location to another). The aging time determines how long a MAC must be inactive before it is removed from the source MAC table. An aging time change is activated immediately. Perform a ResetReload (\c\rr) so that the selected aging time is activated on every restart.

Examples

```
CM160:\Config\Bridging_Service>sat 300

The command completed successfully.

The request was updated successfully in modified
running_config.
```

ClearBridging

Clears all entries in the bridging service source MAC address table

Abbreviation

cb

cb

Syntax Description

Defaults

Usage Guidelines

When the table has been cleared, the service will re-learn any active MAC addresses on the LAN interface.

Examples

```
CM160:\Config\Bridging_Service>cb

Clearing bridging table data succeeded
```

SetDefGateway

Sets the default Gateway IP address

Abbreviation

sdg

sdg <default-GW-IP-address>

Syntax Description

<default-GW-IP-address>	IP address of the default gateway in the format "**nn.nn.nn.nn**.", where nn is a number from 0 to 255

Defaults

10.101.1.1

Usage Guidelines

This parameter is required when sending messages to IP addresses that are not on the local subnet.

Examples

```
CM160:\Config\General>sdg  50.45.123.01
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

GetDefGateway

Returns the default Gateway IP address

Abbreviation

gdg

gdg

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Config\General>gdg

                            Running_config        Modified Running_config

 Default gateway IP addr:  10.101.1.1            50.45.123.1
```

SetMacAddress

Sets the UPLINK and LAN MAC addresses and saves them in Flash memory

Abbreviation

sma

sma <MAC_addr_of_UPLINK>

Syntax Description

<MAC_addr_of_ UPLINK>	Hexadecimal MAC address in the following format **00-nn-nn-nn-nn-nn**

Defaults

Usage Guidelines

The LAN MAC address will be one up from the UPLINK MAC address. The RS-160 MAC address is built in to the unit but it can be changed with this command. In normal circumstances, **this command should never be used**. The MAC address is not provided by the configuration database, so it must be configured via this command.

Examples

```
CM160:\Config\General>sma 00-50-C2-15-03-0a
The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

GetMacAddress

Returns the UPLINK and LAN MAC addresses

Abbreviation

gma

gma

Syntax Description

Defaults

Usage Guidelines

The LAN MAC address will be one up from the UPLINK MAC address.

Examples

In the following example, the MAC address is set, then displayed.

```
CM160:\Config\General>sma 00-a1-fb-c2-03-0a
The configuration change will be activated after the next
Replace&Reload  (\c\rr)

CM160:\Config\General>gma
Current MAC Address for UP interface...:  00-50-C2-15-CD-CD
Current MAC Address for LAN interface..:  00-50-C2-15-CD-CE
MAC Address for UP interface in flash..:  00-50-C2-15-03-0A
MAC Address for LAN interface in flash.:  00-50-C2-15-03-0B
```

AddRequestManager

Adds a community name to the list of those supported by SNMP

Abbreviation

arm

arm <mngr_comm_name> <ip_addr> [<permission_level>]

Syntax Description

<mngr_comm_name>	String of one to 15 characters defining community name. The string must be bounded by double quotes (" ") if there are any embedded spaces in the community name.
<ip_addr>	IP address of new request community **nn.nn.nn.nn, where nn** is a value from **1** to **255**
<permission_level>	**{G|GS}** Defines the community as read-only or read-write

Defaults

Usage Guidelines

The user can define up to a total of fifteen manager communities. The manager ID displayed by the community name is used when the community is to be removed from the list.

Examples

```
CM160:\Config\SNMP>arm remote_comm 1.2.3.4 gs
The request was updated successfully in active ConfigDB
CM160:\Config\SNMP>grm
Mngr ID  Mngr Community name  IP addr          Permission
---- --  ------------------  -------          ----------
1        remote_comm         1.2.3.4          get/set
```

RemoveRequestManager

Removes a request community name from the SNMP list of communities

Abbreviation

rrm

rrm <manager_id>

Syntax Description

<manager_id>	Identification of the ID number of the request manager to be removed; display the ID number of a request manager by executing the grm function

Defaults

Usage Guidelines

Examples

```
CM160:\Config\SNMP>rrm 2
The request was updated successfully in active ConfigDB
```

GetRequestManagers

Displays a list of the SNMP request managers (communities) and their ids

Abbreviation

grm

grm

Syntax Description

Defaults

Usage Guidelines

The displayed manager ID is used when calling the rrm function to delete a request manager entry

Examples

```
CM160:\Config\SNMP>grm
Mngr ID  Mngr Community name  IP addr          Permission
---- --  ------------------  -------          ----------
1        1                   4.3.2.1          get
2        mngt_console        50.100.100.10    get/set
3        Q                   4.3.2.1          get
4        2                   4.3.2.1          get
5        &                   252.253.254.255  get
6        3                   4.3.2.1          get
7        4                   4.3.2.1          get
8        5                   4.3.2.1          get/set
9        6                   4.3.2.1          get/set
10       7                   4.3.2.1          get
11       8                   4.3.2.1          get/set
12       9                   4.3.2.1          get/set
13       10                  4.3.2.1          get
14       remote_comm         4.3.2.1          get/set
```

AddTrapManager

Adds a Trap manager to the SNMP trap list

Abbreviation

atm

atm <manager_community_name> <ip_addr>

Syntax Description

<manager_community_name>	String of one to 15 characters defining trap manager community name. The string must be bounded by double quotes (" ") if there are any embedded spaces in the community name.
<ip_addr>	IP address of new trap community **nn.nn.nn.nn,** where **nn** is a value from **1** to **255**

Defaults

Usage Guidelines

The user can define up to a total of fifteen trap communities. The manager ID displayed by the community name is used when the community is to be removed from the list.

Examples

```
CM160:\Config\SNMP>atm trap2 10.20.30.40
The request was updated successfully in active ConfigDB

CM160:\Config\SNMP>atm trap3 11.21.31.41
The request was updated successfully in active ConfigDB

CM160:\Config\SNMP>atm trap4 12.22.32.42
The request was updated successfully in active ConfigDB

CM160:\Config\SNMP>atm trap5 13.23.33.43
The request was updated successfully in active ConfigDB

CM160:\Config\SNMP>gtm
Mngr ID  Mngr Community Name  IP addr
---- --  ------------------  -------
1        Trp Dflt name       10.101.1.200
2        trap2               10.20.30.40
3        trap3               11.21.31.41
4        trap4               12.22.32.42
5        trap5               13.23.33.43
```

RemoveTrapManager

Removes a manager from the list of SNMP Trap managers

Abbreviation

rtm

rtm <manager_id>

Syntax Description

<manager_id>	Identification of the ID number of the trap manager to be removed; display the ID number of a trap manager by executing the gtm function

Defaults

Usage Guidelines

Examples

In the following example, after listing the Trap communities, the second in the list is removed. Displaying the list again shows that the remaining communities retain the same ID that they had before the community was deleted.

```
CM160:\Config\SNMP>gtm
Mngr ID  Mngr Community Name  IP addr
---- --  ------------------  -------
1        Trp Dflt name       10.101.1.200
2        trap2               10.20.30.40
3        trap3               11.21.31.41
4        trap4               12.22.32.42
5        trap5               13.23.33.43
\Config\SNMP>rtm 2
The request was updated successfully in active ConfigDB

CM160:\Config\SNMP>gtm
Mngr ID  Mngr Community Name  IP addr
---- --  ------------------  -------
1        Trp Dflt name       10.101.1.200
3        trap3               11.21.31.41
4        trap4               12.22.32.42
5        trap5               13.23.33.43
```

GetTrapManagers

Displays a list of the SNMP Trap managers and their IDs

Abbreviation

gtm

gtm

Syntax Description

Defaults

Usage Guidelines

The displayed manager ID is used when calling the rtm function to delete a request manager entry

Examples

```
CM160:\Config\SNMP>gtm
Mngr ID  Mngr Community Name  IP addr
---- --  ------------------  -------
1        Trp Dflt name       10.101.1.200
2        trap2               10.20.30.40
3        trap3               11.21.31.41
4        trap4               12.22.32.42
5        trap5               13.23.33.43
```

SetRequestPort

Sets the SNMP request port to a specific value

Abbreviation

srp

srp <port>

Syntax Description

<port>	The port can be any value between 1 and 65,535

Defaults

The default request port is 161

Usage Guidelines

Examples

```
CM160:\Config\SNMP>srp 2000
The request was updated successfully in modified
running_config.

The configuration change will be activated after the next
Replace&Reload  (\c\rr)
```

GetRequestTrapPorts

Displays the SNMP request port and trap port

Abbreviation

gp

gp

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Config\SNMP>gp
                        Current config        Next start up config
 Request port.......:  161                   2000
 Trap port..........:  162                   162
```

SetTrapPort

Sets the SNMP Trap port to a selected value

Abbreviation

stp

stp <trap-port>

Syntax Description

<trap-port>	The port can be any value between 1 and 65,535

Defaults

The default trap port is 162

Usage Guidelines

When the port is changed, the new value is written to the configuration database. The change does not take effect until the next reset.

Examples

```
CM160:\Config\SNMP>stp 3000
The request was updated successfully in active ConfigDB

Reset required to make the configuration effective
```

DumpMemRange

Displays the contents of a range of memory locations

Abbreviation

dmr

dmr <from_addr> [<to_addr>]

Syntax Description

<from_addr>	Starting address in hexadecimal format **(0xnnnnn)**
<to_addr>	Ending address in hexadecimal format (must be greater than the start address)

Defaults

Usage Guidelines

This command is for debug purposes only. Reading certain memory addresses can cause a system reset. Use with caution!

Examples

DumpMemLength

Displays the contents of a defined number of memory locations starting at a defined location

Abbreviation

dml

dml <from_addr> [<length>]

Syntax Description

<from_addr>	Starting address in hexadecimal format **(0xnnnnnnnn)**
<length>	optional decimal value of the number of locations to dump rounded up to the next multiple of 16.

Defaults

If no length is supplied, the function will return 48 locations

Usage Guidelines

This command is for debug purposes only. Reading certain memory addresses can cause a system reset. Use with caution!

Examples

ShowFreeHeapSize

Displays the size of the available Heap

Abbreviation

sfh

sfh

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Diagnostics\Debug>sfh
Available memory size is 2439176.
```

SetTraceLevel

Sets the trace level for built-in error and debugging messages

Abbreviation

stl

stl <new_level>

Syntax Description

<new_level>	**-1 to 6** **0:** No SWERRs and no traces **-1:** SWERRs and no traces **1 to 6:** SWERRs plus traces of the same level and below

Defaults

Usage Guidelines

Examples

```
CM160:\Diagnostics\Debug>stl 3
The command completed successfully.
```

SetTraceMessageType

Sets the output format of trace messages

Abbreviation

stmt

stmt <format>

Syntax Description

<format>	**{F|MP|MO}** **F**: Full report **MP**: Message and parameters **MO**: Message only

Defaults

Usage Guidelines

Examples

```
CM160:\Diagnostics\Debug>stmt mp
The command completed successfully.
```

ClearSwerrs

Clears the table of SWERR messages

Abbreviation

cs

cs

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Diagnostics\Debug>cs
The command completed successfully.
```

SetTraceDestination

Sets the destination for printing trace and SWERR messages

Abbreviation

std

std <destination>

Syntax Description

<destination>	**{C|U|CU}** **C**: CLI interface (may be UART or Telnet/network connection) **U**: Generic UART **CU**: CLI and generic UART

Defaults

Usage Guidelines

Examples

```
CM160:\Diagnostics\Debug>std c
The command completed successfully.
```

PrintSwerrs

Prints the SWERRs in the SWERR buffer

Abbreviation

ps

ps [<number_of_last>]

Syntax Description

<number_of_last>	Number of most recent SWERRs to print **(1 to 64).** If no value is entered, the default is 64.

Defaults

Usage Guidelines

This command is used for debugging purposes only.

Examples

GetTraceStatus

Returns trace settings

Abbreviation

gts

gts

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Diagnostics\Debug>gts

 Agos trace level...:  1
 Swerrs.............:  Enabled
 Output level.......:  Full
 Destination........:  -
```

SetDateTime

Sets the system date/time

Abbreviation

sdt

sdt <dd/MMM/yyy> [<HH:MM:SS>]

Syntax Description

<dd/MMM/yyy>	Date in days, months and years, separated by "/"; as shown in the example below, the month is a three-letter abbreviation
<HH:MM:SS>	Time in hours, minutes and seconds, separated by ":"

Defaults

Usage Guidelines

Examples

```
CM160:\Admin>sdt 25/Jun/2003 11:54:30
Date and time set successfully
 Current date: 25 Jun 2003
 Current time: 11:54:30
```

GetDateTime

Returns the current date and time

Abbreviation

gdt

gdt

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Admin>gdt
 Current date: 25 Jun 2003
 Current time: 11:55:58
```

GetVersion

Returns the version of the RS-160 firmware

Abbreviation

gv

gv

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Config>gv
CM160 R01.01.02_D002-200
```

SetMemory

Set a memory address to a value

Abbreviation

sm

sm <address> <value>

Syntax Description

<address>	memory address in hexadecimal format **(0xnnnnnnnn)**
<value>	value of the 32-bit location in hexadecimal format **(0xnnnnnnnn)**

Defaults

Usage Guidelines

The starting address will be aligned to a 32-bit address.
This command is for debug purposes only. Writing to certain memory addresses can cause a system reset. Use with caution!

Examples

SetMemoryRange

Sets a range of memory addresses to a selected value

Abbreviation

smr

smr <from_address> <to_address> <value>

Syntax Description

<from_address>	start memory address in hexadecimal format **(0xnnnnnnnn)**
<to_address>	end memory address in hexadecimal format **(0xnnnnnnnn)**
<value>	value to be written, in hexadecimal format **(0xnnnnnnnn)**

Defaults

Usage Guidelines

This command is for debug purposes only. Writing to certain memory addresses can cause a system reset. Use with caution!

Examples

DisplayDBInfo

Displays information about the parameter database

Abbreviation

ddb

ddb

Syntax Description

Defaults

Usage Guidelines

Examples

```
\Admin>ddb
                                Active running-config

 Internal database name..:  160
 Customer database name..:  A100C
 Serial number...........:
 Database version........:  01.00.002
 Database size...........:  2934 (0xb76)
 Model name..............:  R160CL00A1Y
```

GetBoardData

Returns information about the RS-160 internal circuit board configuration.

Abbreviation

gbd

gbd

Syntax Description

Defaults

Usage Guidelines

Examples

```
CM160:\Admin>gbd
                                Board information

 Detect card.............:  Enabled
 Card type...............:  100TE
 CPLD version............:  0
 Board PLL type..........:  no PLL
```

"The Detect card" parameter within the RS-160 device, if enabled in the database, makes the additional check of the card type, CPLD version and presence of a PLL. (Standard RS-160 cards do not have a PLL). If there is a PLL, this function returns the PLL type as well (T1 or E1).

FunctionalTest

Starts an internal self-test that runs continuously or for a defined duration

Abbreviation

fts

fts [<time>]

Syntax Description

<time>	**<1-65,535 seconds>** The number of iterations, at one iteration per second zero: continuous operation no value entered: 10 iterations

Defaults

continuous operation

Usage Guidelines

This test exercises the RS-160 by routing traffic through all the device interfaces and checking for correct performance. The command performs a device reset before the test and after the test.

The following setup must be done for the function to operate successfully:

1. Connect LAN to UPLINK with a cross-cable.
2. Connect a loopback connector to the E1/T1 connector.
3. While the command is running, RS-160 SYS OK LED displays the status of the test:
   - When the LED is lit continuously, it indicates the test is proceeding without error
   - A repeated pattern of two short ons followed by a long off indicates the test has detected a failure
4. If the test was set to run continuously or for a long interval, the user can cycle power to stop the test
5. When the test completes the device is reset and the version string is sent to the Console

Examples

The following output is displayed with a successful test:

```
CM160:\Diagnostics>fts 2
Board Test: successful iteration: 0
Board Test: successful iteration: 1
Board Test: ENDED SUCCESSFULLY
CM160 R01.01.02_D002-200
```

The following output is displayed when there is no loopback on the E1/T1 port:

```
CM160:\Diagnostics>fts 2
Board Test: successful iteration: 0
Failed interface: 2, in-frames=0, frames-discards=0, bytes-
discards=0
**** SELF TEST FAILED **** (continue scan) : 1
Board Test: TEST FAILED!!!!!!!:
CM160 R01.01.02_D002-200
```

SetDefaultDB

Sets the RS-160 startup configuration database to a default state based on the line format and the Tx clock source

Abbreviation

sddb

sddb <line-format> <Tx-clock-source> [<model_template>]

Syntax Description

<line-format>	**{E1|T1|J1}**
<Tx-clock-source>	{RECOVERY|LOOPBACK} "RECOVERY" uses the clock calculated from received bitstream packets as the Tx clock (the other RS-160 is the Master) "LOOPBACK" uses the local LIU clock, which is based on its E1 or T1 connection, as the Tx clock (this RS-160 is the Master)
<model-template>	optional model template; this will set the default parameters for this model

Defaults

Usage Guidelines

This command sets an RS-160 to a default status. It should be used only for initial configuration of the device. Any individual parameter changes in the modified running-config will be lost.
See Appendix A, Default Database for the default database parameters and the default values for the line format/Tx clock source combinations.

Examples

```
CM160:Admin>sddb e1 loopback
The command completed successfully.

The request was updated successfully in startup-config.

Reload is required to make the configuration effective
('\c\rl')
```

SetUARTMDP

Sets a selected serial interface to the Maintenance Download Protocol. until the next reset.

Abbreviation

smd

smd <UART>

Syntax Description

<UART>	**{CONS|CON2|UA|UB}** Selects which serial interface will be used (Console or console 2, UART A or UART B). The CONSOLE port is the only port available externally on the RS-160

Defaults

Usage Guidelines

This command is used when the RS-160 application image is not running on the Flash and the image must be updated. Note that this command has an immediate effect.

Examples

```
CM160:\Diagnostics\Debug>smd cons
```

A response message will be displayed only if the CLI connection is not via the serial interface that is re-configured by this command.

SetDynamicMACLpbk

Enables/disables loopback in the MAC. The directory from where the command is run determines which MAC is set to loopback (UPLINK or LAN).

Abbreviation

sdml

sdml <MAC-loopback-mode>

Syntax Description

<MAC-loopback-mode> {ON|OFF}

Defaults

OFF

Usage Guidelines

This command is for test and debug purposes only.. Note that this command has an immediate effect.

Examples

```
CM160:\Config\UPLINK>sdml on

The command completed successfully.
```

SetBitstreamDynLpbk

Configures the bitstream interface for loopback operations until the next device reset

Abbreviation

sbdl

sbdl <loop-mode>

Syntax Description

<loop-mode>	**{Local+Tx | Local | Remote+Rx | Remote | Dual}** Local: Transmitted traffic is looped back and received. Remote: Received traffic is looped back and retransmitted. Local+Tx: Transmitted traffic is looped back and received. It is also transmitted externally. Remote+Rx: Received traffic is looped back and retransmitted. It is also received by the RS-160 processor.

Defaults

Usage Guidelines

This command is for test and debug purposes only. Note that this command has an immediate effect.

Once a loopback mode is set it stays in place until the next device reset.

Examples

```
CM160:\Config\E1>sbdl local+tx
The command completed successfully.
```

SetLIUDynamicLpbk

Configures the internal line interface unit (LIU) for loopback until the next device reset

Abbreviation

sldl

sldl <LIU-loopback-mode>

Syntax Description

<LIU-loopback-mode>	**{Dual | Local | Remote | Analog}** Local: Transmitted traffic is looped back and received. Remote: Received traffic is looped back and retransmitted. Dual: Performs both local and remote loopback. Analog: Not applicable

Defaults

Usage Guidelines

Analog mode does not apply to the RS-160. Local and Dual mode only operate when the Tx clock is in Recovery (slave) mode. Once a loopback mode is selected, it stays in place until the next device reset.

Examples

```
CM160:\Config\E1>sldl remote
The command completed successfully.
```

SetUARTRCP

Sets a selected UART to accept RCP (Redux Control Protocol) messages (the messaging application) until the next device reset. After reset the UART will return to the last setting of the UART.

Abbreviation

sur

sur <UART>

Syntax Description

<UART>	**{CONS|CON2|UA|UB}** Selects which serial interface will be used (Console or console 2, UART A or UART B). The CONSOLE port is the only port available externally on the RS-160

Defaults

Usage Guidelines

This command is used by the Management Console to temporarily switch into RCP mode to do a database upload or download.

Examples

```
CM160:\Diagnostics\Debug>sur cons
```

GetBitstreamFrequency

Returns the frequency associated with the interface

Abbreviation

gbf

gbf <interface>

Syntax Description

<interface>	**{E1|T1|J1}** Identifies the selected interface

Defaults

Usage Guidelines

This command is used for debugging purposes only

Examples

```
CM160:\Diagnostics\Debug>gbf e1
Bitstream interface E1 frequency is: 1075611272
```

4 Control Protocol

This Redux Control Protocol (RCP) is a CPU-to-CPU messaging interface to the RS-160. The user can control the RS-160 and request status from it with binary messages without having to create or interpret the text messages used in the CLI. The RCP parallels the CLI and, in fact, performs many of the same functions. The names of commands in the RCP are the same as the corresponding CLI functions.

The RS-160 CD contains a PC-based sample program. The source code of this program demonstrates use of the RCP to control and request status from the RS-160.

Connecting to the RCP

The RCP is accessed as an application on one of the RS-160 serial interfaces. When a UART is configured with the Messaging application, messages received on the UART are assumed to be in RCP format and are interpreted accordingly.

The RS-160 also supports RCP messages received over TCP. It processes RCP messages sent to a network interface (Interface C only in Release 1.0), addressed to the interface IP address and encapsulated in TCP, with a target port of 2100.

Message Overview

There are three types of messages:

- Call messages - Messages sent from a host CPU to the RS-160
- Response messages - The RS-160 sends a response message to the host CPU after processing any call message
- Unsolicited messages - messages sent from the RS-160 to the host without a preceding call message (There are no unsolicited messages in Release 1.0 of the RS-160)

Message Format

The general message format is shown in Table 4-1. Each message has a unique ID (listed in Table 4-2 on page 4-3) sent in the first two bytes. The message type, contained in the next two bytes, is one of the three types listed above. The next field contains the message payload length in bytes. This is followed by a status field, then by the payload itself.

All messages, including call messages, have a status field. The status in a call message is always an acknowledge (ACK.). Response messages return a status value that reports on the success or otherwise of the corresponding call message.

TABLE 4-1. General Message Format.

Item	Size (Bytes)	Range of Values	Description
Message ID	2		Unique message ID (see Table 4-2)
Message Type	2	AG_RCP_CALL AG_RCP_RESPONSE AG_RCP_UNSOLICITED	AG_RCP_CALL: message sent to the RS-160 AG_RCP_RESPONSE: message sent from the RS-160 as a response to a previous AG_RCP_CALL message AG_RCP_UNSOLICITED: unsolicited message sent from the RS-160
Message Length	2	0 - (AG_RCP_MAX_SIZE - AG_RCP_HDR_SIZE)	Number of bytes in the payload of the message
Status	2	AG_RCP_ACK AG_RCP_NACK AG_RCP_BAD_PARAMS AG_RCP_UNKNOWN_ID	AG_RCP_ACK: call message processed successfully; also value used in call messages AG_RCP_NACK: an error occurred in processing the call message AG_RCP_BAD_PARAMS: bad parameters were passed in the call message AG_RCP_UNKNOWN_ID: unknown message ID was passed in the call message
Payload		Length in Message Length	Fields defined in message type, if any

Each message has specific payload fields and is a fixed length, consisting of the header (8 bytes) plus the payload. Some payload fields are marked as 'optional'. Those fields have a flag field preceding them that indicates whether the value of the optional field should be examined or not. See page 4-11 for an example of an optional field.

Call Messages

Call messages are messages sent to the RS-160. Their message type is AG_RCP_CALL, and their status is always AG_RCP_ACK. The call messages are divided into two groups: 'set' messages, and 'get' messages.

'Set' messages are used for configuring one or more parameters. After a set message is sent, a response message is returned, with its 'status' field indicating whether the set operation succeeded or not.

'Get' messages are used for querying configuration parameters. After a 'get' message is sent, a response message is returned with a payload containing the requested information.

Response Messages

Response messages are messages sent from the target, as a response to a previous call message. The message ID is that of the corresponding call message. The message type is AG_RCP_RESPONSE, and the status can be one of the following:

- AG_RCP_ACK - The call message was received and processed successfully
- AG_RCP_NACK - An error occurred while receiving and processing the corresponding call message
- AG_RCP_BAD_PARAMS - At least one of the parameters in the call message was erroneous
- AG_RCP_UNKNOWN_ID - The message ID in the call message was unknown

If the previous call message was a 'set' message, the response message usually will contain no payload. See “SetConfigEth Response” on page 4-51 for an exception to this.

If the previous call message was a 'get' message, the payload of the response message will contain the requested data.

Unsolicited Messages

Unsolicited messages are messages sent from the RS-160 without previous call message. There are no unsolicited messages defined in RS-160 Release 1.0.

Message IDs

Each RCP message has a unique message ID. Table 4-2 lists all the IDs, and their associated function, and a brief description of the function. See the corresponding function in See Chapter 3, CLI Commands, for a discussion of the parameters associated with a command.

TABLE 4-2. Functions and RCP Message IDs

Function	Message ID	Message Description
SetConfigEth	AG_RCP_SET_CFG_ETH_MSG_ID (0x200)	(See page 4-11)
SetConfigEthFlowControl	AG_RCP_SET_CFG_ETH_FLOW_MSG_ID (0x203)	(See page 4-12)
SetConfigEthLoopback	AG_RCP_SET_CFG_ETH_LPBK_MSG_ID (0x205)	(See page 4-13)
GetEthStatus	AG_RCP_GET_ETH_STATUS_MSG_ID (0x207)	(See page 4-14)
GetConfigEth	AG_RCP_GET_CFG_ETH_MSG_ID (0x208)	(See page 4-15)
SetConfigBitStream	AG_RCP_SET_CFG_BS_MSG_ID (0x400)	(See page 4-16)
SetConfigBitStreamClkSrc	AG_RCP_SET_CFG_BS_CLK_SRC_MSG_ID (0x401)	(See page 4-17)

Function	Message ID	Message Description
SetConfigBitStreamUnderVal	AG_RCP_SET_CFG_BS_UNDRUN_VAL_MSG_ID (0x402)	(See page 4-18)
GetBitStreamStatus	AG_RCP_GET_BS_STATUS_MSG_ID (0x403)	(See page 4-19)
GetConfigBitStream	AG_RCP_GET_CFG_BS_MSG_ID (0x404)	(See page 4-20)
SetConfigLIU	AG_RCP_SET_CFG_LIU_MSG_ID (0x500)	(See page 4-21)
SetConfigLIULineCode	AG_RCP_SET_CFG_LIU_LINE_CODE_MSG_ID (0x501)	(See page 4-23)
SetConfigLIUlineBuildout	AG_RCP_SET_CFG_LIU_LINE_BLD_OUT_MSG_ID (0x502)	(See page 4-24)
SetConfigLIURxTerm	AG_RCP_SET_CFG_LIU_RX_TRM_MSG_ID (0x503)	(See page 4-25)
SetConfigJitterAttenuation	AG_RCP_SET_CFG_LIU_JITTER_MSG_ID (0x504)	(See page 4-26)
SetConfigLIUMonGain	AG_RCP_SET_CFG_LIU_MON_GAIN_MSG_ID (0x506)	(See page 4-27)
GetLIUStatus	AG_RCP_GET_LIU_STATUS_MSG_ID (0x507)	(See page 4-28)
GetConfigLIU	AG_RCP_GET_CFG_LIU_MSG_ID (0x508)	(See page 4-29)
SetStaticIP	AG_RCP_SET_STATIC_IP_MSG_ID (0x600)	(See page 4-30)
GetStaticIPCfg	AG_RCP_GET_STATIC_IP_CFG_MSG_ID (0x601)	(See page 4-31)
SetSubNetMask	AG_RCP_SET_SUB_NET_MASK_MSG_ID (0x602)	(See page 4-32)
GetConfig	AG_RCP_GET_CFG_CES_APP_MSG_ID (0xA07)	(See page 4-33)
SetConfigUART	AG_RCP_SET_CFG_UART_MSG_ID (0x700)	(See page 4-36)
SetConfigUARTApp	AG_RCP_SET_CFG_UART_APP_MSG_ID (0x701)	(See page 4-37)
SetConfigUARTMode	AG_RCP_SET_CFG_UART_MODE_MSG_ID (0x702)	(See page 4-38)
GetConfigUART	AG_RCP_GET_CFG_UART_MSG_ID (0x703)	(See page 4-39)
GetVersion	AG_RCP_GEN_GET_VERSION_MSG_ID (0x800)	(See page 4-40)
SetConfigCESIP	AG_RCP_SET_CFG_CES_IP_MSG_ID (0xA01)	(See page 4-42)
SetConfigCESProtocol	AG_RCP_SET_CFG_CES_PROT_MSG_ID (0xA00)	(See page 4-41)
SetConfigCESPayLength	AG_RCP_SET_CFG_CES_PAYLD_LEN_MSG_ID (0xA03)	(See page 4-43)
SetConfigCESClock	AG_RCP_SET_CFG_CES_CLK_MSG_ID (0xA04)	(See page 4-44)
SetConfigCESVlan	AG_RCP_SET_CFG_CES_VLAN_MSG_ID (0xA05)	(See page 4-45)
GetStatusCesApp	AG_RCP_GET_STATUS_CES_APP_MSG_ID (0xA08)	(See page 4-34)
ResetCesStatus	AG_RCP_RESET_CES_STATUS_MSG_ID (0xA09)	(See page 4-35)
DumpMemRange	AG_RCP_DUMP_MEM_RANGE_MSG_ID (0xC00)	(See page 4-46)
DumpMemLength	AG_RCP_DUMP_MEM_LEN_MSG_ID (0xC01)	(See page 4-47)
ShowFreeHeapSize	AG_RCP_FREE_HEAP_SIZE_MSG_ID (0xC02)	(See page 4-48)
Reset	AG_RCP_RESET_MSG_ID (0xC03)	(See page 4-49)

Response Message Format

Table 4-3 lists the defined response messages. Table 4-4 shows the generic response message sent for any successfully processed call message. The message varies only in that the message ID is that of the original call message.

TABLE 4-3. List of Response Messages

Function	Message ID	Message Description
SetConfigEth Response	AG_RCP_SET_CFG_ETH_MSG_ID	(See page 4-51)
GetEthStatus Response	AG_RCP_GET_ETH_STATUS_MSG_ID	(See page 4-52)
GetConfigEth Response	AG_RCP_GET_CFG_ETH_MSG_ID	(See page 4-53)
GetBitStreamStatus Response	AG_RCP_GET_BS_STATUS_MSG_ID	(See page 4-55)
GetConfigBitStream Response	AG_RCP_GET_CFG_BS_MSG_ID	(See page 4-56)
GetLIUStatus Response	AG_RCP_GET_LIU_STATUS_MSG_ID	(See page 4-57)
GetConfigLIU Response	AG_RCP_GET_CFG_LIU_MSG_ID	(See page 4-58)
GetStaticIPCfg Response	AG_RCP_GET_STATIC_IP_CFG_MSG_ID	(See page 4-60)
GetConfig Response	AG_RCP_GET_CFG_CES_APP_MSG_ID	(See page 4-63)
GetStatusCesApp Response	AG_RCP_GET_STATUS_CES_APP_MSG_ID	(See page 4-67)
GetConfigUART Response	AG_RCP_GET_CFG_UART_MSG_ID	(See page 4-61)
GetVersion Response	AG_RCP_GEN_GET_VERSION_MSG_ID	(See page 4-61)
DumpMemRange Response	AG_RCP_DUMP_MEM_RANGE_MSG_ID	(See page 4-65)
DumpMemLength Response	AG_RCP_DUMP_MEM_LEN_MSG_ID	(See page 4-66)
ShowFreeHeapSize Response	AG_RCP_FREE_HEAP_SIZE_MSG_ID	(See page 4-67)

TABLE 4-4. Generic Response Message

Item	Size (Bytes)	Range of Values	Description
Message ID	2	ID of associated call message	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	0	
Status	2	AG_RCP_ACK AG_RCP_NACK AG_RCP_BAD_PARAMS AG_RCP_UNKNOWN_ID	AG_RCP_ACK: call message processed successfully; also value used in call messages AG_RCP_NACK: an error occurred in processing the call message AG_RCP_BAD_PARAMS: bad parameters were passed in the call message AG_RCP_UNKNOWN_ID: unknown message ID was passed in the call message

Parameter Logicals

Redux-defined logical parameters have been used for all message parameters except those that require a user-selected numerical value, such as an IP address. The logicals are defined in the .h files included in the RS-160 CD.

The Redux logicals are all named with the prefix "AG_". The name allows the system designer to devise his own naming system with concern for conflicting with the Redux naming scheme.

RCP Example Program

The RCP example program eases the task of creating host code to interact with the RS-160. It implements construction of all the call messages and processes all of the response messages. The example program runs on a PC and has a simple user interface to allow the system developer to experiment with the RCP commands. The program runs on a PC Running Window 2000 or Windows XP, and compiles with MS Visual C++ 6.0.

The files supplied include a MSVC6.0 workspace and project files. The supplied directory structure is shown in Table 4-5.

The project is organized into four libraries:

- **Uart library** - this library implements the UART communication layer.

asynch_protocol.c implements the byte stuffing protocol as supported by the RS-160.

The function **uart_handle_rx_message** is called for each received message. Users of this library must provide an implementation of this function.

The function **uart_send_msg** is used to send UART messages.

The rest of the .c and .h files that are part of this library are from Microsoft example code for using the UART.

generic_uart.dsp is the MSVC6.0 project file for the UART library

- **TCP library** - this library implements the TCP/IP communication layer.

  The function **ag_client_handle_rx_message** is called for each received message. Users of this library must provide an implementation of this function.

  The function **ag_client_send_msg** is used to send TCP messages.

  tcp_client.dsp is the MSVC6.0 project file for the TCP library.

- **RCP library** - This library implements the formatting of the RCP messages and provides some abstraction to the underlying communication layer (TCP or UART). Note that RCP message parameters are always in network order.

  gen_net.c / **gen_net.h** - This file implements functions for converting network order to host order values and vice versa.

  rcp_gen.c / **rcp_gen.h** - gives a general layer which encapsulates the communication layer (TCP or UART)

  The function **ag_rcp_set_time_out** is called in order to wait to a response before sending a new message.

  The functions **ag_rcp_db_load** and **ag_rcp_db_download** implement upload from the RS-160 target into a file and download of a configuration DB file to the RS-160, using lower level RCP messages.

  rcp_msg_processing.c / **rcp_msg_processing.h** and all the **shwrp_app_rcp_XXX.h** files:

  These files define a function for each RCP message that requests and receives parameters in a user-friendly manner, using enumerations in host order. Each function also gets a pointer to the RCP payload memory which is filled with the correct values. each function returns the payload size.

  rcp.dsp is the MSVC6.0 project file for the RCP library.

- **Rs160 rcp example executable** - This is the main application. It provides a command line interface for setting and getting configuration parameters.

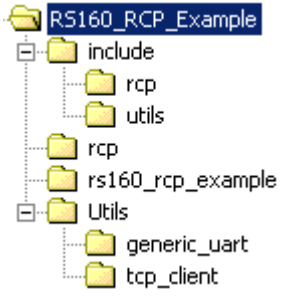
  rs160_rcp_example.c - The main file.

  rs160_rcp_functions.c - function which gets input from the stdin device

  rs160_rcp_example.dsp - the MSVC6.0 project file for the overall application

  rs160_rcp_example.dsw - this is MSVC6.0 workspace file which includes all the relevant modules.

TABLE 4-5. RCP Sample Program Directory Structure

Directory Tree	Contents
	General Redux type definitions Logicals for each group of commands Logicals and prototypes for comm layer Source for RCP library Source for example program Source for comm layer libraries Source for UART comm layer library Source for TCP comm layer library

Creating the Sample Application

To create the sample application:

1. Start the Developer Studio application
2. Open the file **rs160_rcp_example\rs160_rcp_example.dsw**
3. Make all the projects by invoking the "**[Build] Batch build**" command.

The libraries and executable are saved at **pc_bin\release and pc_bin\debug**:

- **generic_uart.lib**
- **rcp.lib**
- **tcp_client.lib**
- **rs160_rcp_example.exe**

Running the Sample Application

Run the application either by connecting via a UART configured to use the messaging application or via a network connection.

The user is prompted for a message ID. The user needs to know the hexadecimal value of the message ID in order to use the application. This value has been included in Table 4-2 with the list of logical message IDs. The application prompts for each message payload parameter. The user can then use one of the configuration or status commands to see the result of a "send" message that changed the value of a database parameter.

The following message is displayed when there has been an error trying to activate the sample program. It provides a guide to calling the program.

```
======================USAGE=======================================
rs160_rcp_example.exe <com#|tcp> [baud=#|ip=#.#.#.#] [dbg]
        com=#:  The RS232 port to use. For example com1, com2 etc.

        baud=#: The RS232 baud rate.
                Should be the same as the Rs160 target baud rate
                Valid values are: 9600,19200,38400,57600,115200
                For example baud=115200

        tcp:    Specifies to use the TCP/IP for communication.

        ip=#.#.#.#: Specifies the IP address of the Rs160 target

        dbg: tells the program to print communication debug
             information

for example:
        rs160_rcp_example.exe com1 baud=115200 dbg
            connects using com1 with baud rate of 115200 and print
            debug info.
        rs160_rcp_example.exe tcp ip=10.100.2.3
            connects using TCP/IP to address 10.100.2.3 port 1025
==================================================================
```

In the following example, the sample program connects to the RS-160 via TCP/IP.. The CES get configuration command is executed, the port numbers are changed, and the get configuration command re-executed, showing that the ports did change.

```
rs160_rcp_example.exe tcp ip=10.101.1.225
===connecting using TCP to ip/port 10.101.1.225/1025 ===

Done with initializing TCP. server ip is: 10.101.1.225  port is:
2100

Enter message ID. 0x100 to exit
0xa07
Enter interface: 0 for C, 1 for A, 2 for B
2
Message ID 0xa07 succeeded
Ces application configuration is (reset may be needed):
Header type.............: RTP
Target IP address......: 10.101.1.226
Subscriber interface...: B
Service interface......: C
IP TOS..................: 0
Target port.............: 7D2
Local port..............: 7D0
Ether type..............: 0x0800
Payload size............: 96
Max jitter delay.......: 5
VLAN mode...............: Disabled
VLAN ID.................: 65535
VLAN priority...........: 51

Enter message ID. 0x100 to exit
0xa00
Enter interface: 0 for C, 1 for A, 2 for B
2
Enter protocol (header format) type configuration:
0 for RTP
1 for Minimal
```

```
0
Do you want to determine an Ether Type?  1 for yes, 0 for NO
0
Do you want to determine a source port?  1 for yes, 0 for NO
1
Enter local port (hex): 0x800
Do you want to determine a target port?  1 for yes, 0 for NO
1
Enter target port (hex): 0x800
Message ID 0xa00 succeeded

Enter message ID. 0x100 to exit
0xa07
Enter interface: 0 for C, 1 for A, 2 for B
2
Message ID 0xa07 succeeded
Ces application configuration is (reset may be needed):
Header type.............: RTP
Target IP address......: 10.101.1.226
Subscriber interface...: B
Service interface......: C
IP TOS..................: 0
Target port.............: 800
Local port..............: 800
Ether type..............: 0x0800
Payload size............: 96
Max jitter delay.......: 5
VLAN mode...............: Disabled
VLAN ID.................: 65535
VLAN priority...........: 51

Enter message ID. 0x100 to exit
0x
```

Call Message Descriptions

The following pages contain descriptions of each call message.

SetConfigEth

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_ETH_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	16	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C AG_IF_A	Interface to configure
Speed	4	AG_RCP_ETH_RATE_10 AG_RCP_ETH_RATE_100 AG_RCP_ETH_RATE_AUTO	Interface speed in Mbps, or determined using auto-negotiation
Duplex Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Duplex Mode (optional)	4	AG_RCP_ETH_HALF_DUPLEX, AG_RCP_ETH_FULL_DUPLEX	Sets the duplex mode to be half or full

Usage Guidelines

This message sets the Ethernet configuration. When this command configures an interface to operate using auto-negotiation, the interface will also be configured to use a PHY.

All changes will go into effect only after a device reset, except for a change in the speed parameter.

The response message indicates whether a reset is required or not.
See "SetConfigEth Response" on page 4-51.

SetConfigEthFlowControl

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_ETH_FLOW_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C AG_IF_A	Interface to configure
Flow Control Mode	4	AG_RCP_SWITCH_OFF AG_RCP_SWITCH_ON	Sets the interface flow control mode to be on or off

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigEthLoopback

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_ETH_LPBK_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C AG_IF_A	Interface to configure
Loopback Mode	4	AG_RCP_SWITCH_OFF AG_RCP_SWITCH_ON	Sets the Ethernet interface loopback mode to be on or off; this is MAC loopback

Usage Guidelines

This change will go into effect only after a device reset.

GetEthStatus

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_ETH_STATUS_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C AG_IF_A	Ethernet interface

Usage Guidelines

GetConfigEth

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_ETH_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C AG_IF_A	Ethernet interface

Usage Guidelines

SetConfigBitStream

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_BS_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	36	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A, AG_IF_B	Interface to configure
Underrun Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Underrun Value (optional)	4	1 - AG_RCP_BS_UNDERRUN_VAL_MAX	Bit Stream underrun byte value configuration
Tx Clock Source Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Tx Clock Source (optional)	4	AG_RCP_WAN_CLOCK_RECOVERY_MODE AG_RCP_WAN_CLOCK_LPBK_MODE	Tx clock source
Tx Clock Polarity Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Tx Clock Polarity (optional)	4	AG_RCP_TX_CLOCK_FALLING AG_RCP_TX_CLOCK_RISING	Tx clock polarity
Rx Clock Polarity Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Rx Clock Polarity (optional)	4	AG_RCP_TX_CLOCK_FALLING AG_RCP_TX_CLOCK_RISING	Rx clock polarity;

Usage Guidelines

The changes in this command will go into effect only after a device reset.

SetConfigBitStreamClkSrc

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_BS_CLK_SRC_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A, AG_IF_B	Interface to configure
Tx Clock Source	4	AG_RCP_WAN_CLOCK_RECOVERY_MODE AG_RCP_WAN_CLOCK_LPBK_MODE	Tx clock source

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigBitStreamUnderVal

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_BS_UNDRUN_VAL_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Interface to configure
Underrun Value	4	1-AG_RCP_BS_UNDERRUN_VAL_MAX	Bitstream underrun byte value; 0x01 to0xFF

Usage Guidelines

This change will go into effect only after a device reset.

GetBitStreamStatus

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_BS_STATUS_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_B AG_IF_A	Bitstream interface

Usage Guidelines

GetConfigBitStream

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_BS_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_B AG_IF_A	Bitstream interface

Usage Guidelines

SetConfigLIU

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_LIU_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	48	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A, AG_IF_B	Interface to configure
Mode	4	AG_RCP_BITSTREAM_MODE_E1 AG_RCP_BITSTREAM_MODE_T1 AG_RCP_BITSTREAM_MODE_J1	Bit Stream mode
Line Code Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Line Code (optional)	4	For E1: AG_RCP_LIU_LINE_CODE_E1_HDB3 For T1/J1: AG_RCP_LIU_LINE_CODE_T1_B8ZS For E1/T1/J1: AG_RCP_LIU_LINE_CODE_AMI	Line code
Line Build Out Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Line Build Out (optional)	4	For E1: AG_RCP_TXBO_NM_75_OHM AG_RCP_TXBO_NM_120_OHM AG_RCP_TXBO_75_HRL AG_RCP_TXBO_120_HRL For T1/J1: AG_RCP_TXBO_DSX1_133FT AG_RCP_TXBO_DSX1_266FT AG_RCP_TXBO_DSX1_399FT AG_RCP_TXBO_DSX1_533FT AG_RCP_TXBO_DSX1_655FT AG_RCP_TXBO_75DB_CSU AG_RCP_TXBO_15DB_CSU AG_RCP_TXBO_225DB_CSU	Line Build Out
Rx Term Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Rx Term (optional)	4	AG_RCP_INTTER_DISABLE AG_RCP_INTTER_120_OHM AG_RCP_INTTER_100_OHM AG_RCP_INTTER_75_OHM	Line Rx termination
Rx Equalizer Gain Limit Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted

Item	Size (Bytes)	Range of Values	Description
Rx Equalizer Gain Limit (optional)	4	For E1: AG_RCP_RX_E1_EQ_GAIN_MIN_12_DB AG_RCP_RX_E1_EQ_GAIN_MIN_43_DB For T1/J1: AG_RCP_RX_T1_EQ_GAIN_MIN_36_DB AG_RCP_RX_T1_EQ_GAIN_MIN_30_DB	Rx equalizer gain limit value
Monitor Gain Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Monitor Gain	4	AG_RCP_MG_20dB AG_RCP_MG_26dB AG_RCP_MG_32dB	Monitor gain level

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigLIULineCode

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_LIU_LINE_CODE_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A, AG_IF_B	Interface to configure
Line Code	4	For E1: AG_RCP_LIU_LINE_CODE_E1_HDB3 For T1/J1: AG_RCP_LIU_LINE_CODE_T1_B8ZS For E1/T1/J1: AG_RCP_LIU_LINE_CODE_AMI	Line code

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigLIULineBuildout

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_LIU_LINE_BLD_OUT_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A, AG_IF_B	Interface to configure
Line Build Out	4	For E1: AG_RCP_TXBO_NM_75_OHM AG_RCP_TXBO_NM_120_OHM AG_RCP_TXBO_75_HRL AG_RCP_TXBO_120_HRL For T1: AG_RCP_TXBO_DSX1_133FT AG_RCP_TXBO_DSX1_266FT AG_RCP_TXBO_DSX1_399FT AG_RCP_TXBO_DSX1_533FT AG_RCP_TXBO_DSX1_655FT AG_RCP_TXBO_7_5DB_CSU AG_RCP_TXBO_15DB_CSU AG_RCP_TXBO_22_5DB_CSU	Line Build Out

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigLIURxTerm

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_LIU_RX_TRM_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A, AG_IF_B	Interface to configure
Rx Term	4	AG_RCP_INTTER_DISABLE AG_RCP_INTTER_120_OHM AG_RCP_INTTER_100_OHM AG_RCP_INTTER_75_OHM	Line Rx termination

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigJitterAttenuation

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_LIU_JITTER_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Interface to configure
Jitter Attenuator	4	AG_TRUE AG_FALSE	Enables/disables a LIU Tx jitter attenuator

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigLIUMonGain

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_LIU_MON_GAIN_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Interface to configure
Rx Gain Limit	4	AG_RCP_MG_NORMAL_OPERATION AG_RCP_MG_20dB AG_RCP_MG_26dB AG_RCP_MG_32dB	Sets LIU Monitor gain value

Usage Guidelines

This change will go into effect only after a device reset.

GetLIUStatus

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_LIU_STATUS_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_B AG_IF_A	Interface for which information is desired

Usage Guidelines

GetConfigLIU

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_LIU_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_B AG_IF_A	Interface for which information is desired

Usage Guidelines

SetStaticIP

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_STATIC_IP_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C AG_IF_A	Interface to configure
IP Address	4	Each byte value should be from range 0 - 255	Sets the interface's static IP address

Usage Guidelines

This change will go into effect only after a device reset.

GetStaticIPCfg

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_STATIC_IP_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C AG_IF_A	Interface for which information is desired

Usage Guidelines

SetSubNetMask

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_SUB_NET_MASK_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C, AG_IF_A	Interface to configure
Subnet Mask	4	Each byte value should be from range 0 - 255	Sets the interface's sub-net mask

Usage Guidelines

This change will go into effect only after a device reset.

GetConfig

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_CES_APP_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Subscriber interface

Usage Guidelines

This function requests the current configuration of the CES application. See page 3-24 for an example of the CES application GetConfig report. See page 4-63 for the GetConfig response message.

GetStatusCesApp

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_STATUS_CES_APP_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Subscriber interface

Usage Guidelines

This function requests the status of the CES application. See page 3-24 for an example of the CES application GetConfig report. See page 4-63 for the GetConfig response message.

ResetCesStatus

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_RESET_CES_STATUS_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Subscriber interface

Usage Guidelines

This function resets CES status information - the varying numeric parameters that are reported in the GetStatusCesApp response message are set to zero.

SetConfigUART

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_UART_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	16	
Status	2	AG_RCP_ACK	
UART	4	AG_UART_A, AG_UART_B	UART to configure
Speed	4	AG_RCP_UART_BAUD_RATE_9600 AG_RCP_UART_BAUD_RATE_19200 AG_RCP_UART_BAUD_RATE_38400 AG_RCP_UART_BAUD_RATE_57600 AG_RCP_UART_BAUD_RATE_115200 AG_RCP_UART_BAUD_RATE_230400 AG_RCP_UART_BAUD_RATE_460800 AG_RCP_UART_BAUD_RATE_921600	Sets UART baud rate
Stop Bit Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Stop Bit	4	AG_RCP_UART_1_STOP_BITS AG_RCP_UART_2_STOP_BITS	Sets UART Stop Bit

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigUARTApp

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_UART_APP_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
UART	4	AG_UART_A, AG_UART_B	UART to configure
Application Mode	4	AG_RCP_UART_USAGE_PPP AG_RCP_UART_USAGE_LDP AG_RCP_UART_USAGE_TERMINAL AG_RCP_UART_USAGE_MESSAGE AG_RCP_UART_USAGE_TRACE AG_RCP_UART_USAGE_RS_MASTER AG_RCP_UART_USAGE_RS_SLAVE AG_RCP_UART_USAGE_TDM	Sets UART application mode

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigUARTMode

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_UART_MODE_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	8	
Status	2	AG_RCP_ACK	
UART	4	AG_UART_A AG_UART_B	UART to configure
UART Mode	4	AG_TRUE AG_FALSE	Sets UART mode

Usage Guidelines

This change will go into effect only after a device reset.

GetConfigUART

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_UART_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	4	
Status	2	AG_RCP_ACK	
UART	4	AG_UART_A AG_UART_B	Interface for which information is desired

Usage Guidelines

GetVersion

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GEN_GET_VERSION_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	0	
Status	2	AG_RCP_ACK	

Usage Guidelines

SetConfigCESProtocol

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_CES_PROT_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	20	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Subscriber interface
Protocol	4	AG_RCP_TDM_O_IP_HEADER_RTP AG_RCP_TDM_O_IP_HEADER_MINIMAL	Header protocol
Ether Type Flag	2	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Ether Type (optional)	2	For RTP Header: 0x800 For Minimal Header: 0x0600 - 0xffff	Ether type
Local Port Flag	2	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Local Port (optional)	2	For RTP header: AG_RCP_CES_RTP_PORT_MIN - 0xffff For Minimal header: 0 - AG_RCP_CES_MINIMAL_HEADER_PORT_MAX	Local port
Target Port Flag	2	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Target Port (optional)	2	For RTP header: AG_RCP_CES_RTP_PORT_MIN - 0xffff For Minimal header: 0 - AG_RCP_CES_MINIMAL_HEADER_PORT_MAX	Target port

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigCESIP

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_CES_IP_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	22	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A, AG_IF_B	Subscriber interface
Target IP Address	4	Each byte value should be from range 0 - 255	Target IP address
TOS	2	AG_RCP_CES_TOS_MIN - AG_RCP_CES_TOS_MAX	IP TOS
Target Port	2	0 - 0xffff	Target port
Local Port	2	0 - 0xffff	Local port
Source RTP SSRC Flag	2	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Source RTP SSRC Value (optional)	2	NA	
Target RTP SSRC Flag	2	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Target RTP SSRC Value (optional)	2	NA	

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigCESPayLength

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_CES_PAYLD_LEN_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	6	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Subscriber interface
Payload Length	2	AG _RCP_CES_PAYLOAD_LEN_MIN - AG_RCP_CES_PAYLOAD_LEN_MAX	Payload Length in bytes

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigCESClock

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_CES_CLK_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	10	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Subscriber interface
Max Jitter Delay	2	AG _RCP_CES_MAX_JITTER_MIN - AG _RCP_CES_MAX_JITTER_MAX	Maximum jitter delay (milliseconds)
Reserved Jitter Delay	2	AG _RCP_CES_JITTER_MIN_RESERVE_MIN - AG_RCP_CES_JITTER_MIN_RESERVE_MAX	Minimum jitter delay (percentage)
Reserved	2		

Usage Guidelines

This change will go into effect only after a device reset.

SetConfigCESVlan

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_CES_VLAN_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	10	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_A AG_IF_B	Subscriber interface
VLAN Mode	2	AG_TRUE AG_FALSE	Sets VLAN mode to enabled/disabled
VLAN ID	2	AG_RCP_CES_VLAN_ID_MIN - AG_RCP_CES_VLAN_ID_MAX	VLAN ID

Usage Guidelines

This change will go into effect only after a device reset.

DumpMemRange

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_DUMP_MEM_RANGE_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	12	
Status	2	AG_RCP_ACK	
Start Address	4	0 - 0xffffffff	Start address of the dump memory range
End Address Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
End Address	4	0 - 0xffffffff	End address of the memory range

Usage Guidelines

This change will go into effect only after a device reset.

DumpMemLength

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_DUMP_MEM_LEN_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	12	
Status	2	AG_RCP_ACK	
Address	4	0 - 0xffffffff	Start address of the dump memory range
Length Flag	4	AG_TRUE AG_FALSE	If AG_TRUE, the next field will be interpreted
Length (optional)	4	1 - AG_RCP_RW_MEM_MAX_SIZE_IN_BYTES	Number of bytes to dump

Usage Guidelines

This change will go into effect only after a device reset.

ShowFreeHeapSize

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_FREE_HEAP_SIZE_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	0	
Status	2	AG_RCP_ACK	

Usage Guidelines

This change will go into effect only after a device reset.

Reset

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_RESET_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	0	
Status	2	AG_RCP_ACK	

Response Message Descriptions

The following pages contain descriptions of each response message.

SetConfigEth Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_SET_CFG_ETH_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Reset Required	4	AG_TRUE AG_FALSE	If AG_TRUE, the changes in the call message require a device reset before they take effect If AG_FALSE, no reset is required; this will occur if the speed parameter was the only one changed

GetEthStatus Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_ETH_STATUS_MSG_ID	
Message Type	2	AG_RCP_CALL	
Message Length	2	60	
Status	2	AG_RCP_ RESPONSE	
Link State Flag	4	AG_TRUE AG_FALSE	
Link State	4	AG_RCP_IF_UNKNOWN_STATE AG_RCP_IF_LINK_UP,AG_RCP_IF_LINK_DOWN	
PHY State Flag	4	AG_TRUE AG_FALSE	
PHY State Reset	4	AG_TRUE AG_FALSE	
Auto Negotiation Flag	4	AG_TRUE AG_FALSE	
Auto Negotiation	4	AG_TRUE AG_FALSE	
Peer Advertisement Value Flag	4	AG_TRUE AG_FALSE	
Peer Advertisement Value	4		
Current Speed Flag	4	AG_TRUE AG_FALSE	
Current Speed	4	AG_RCP_IF_SPEED_UNKNOWN AG_RCP_IF_SPEED_10 AG_RCP_IF_SPEED_100	
Current Duplex Mode Flag	4	AG_TRUE AG_FALSE	
Current Duplex Mode	4	AG_RCP_IF_DUP_UNKNOWN AG_RCP_IF_DUP_HALF AG_RCP_IF_DUP_FULL	
Current Flow Control Flag	4	AG_TRUE AG_FALSE	
Current Flow Control	4	AG_RCP_IF_FC_UNKNOWN AG_RCP_IF_FC_ON AG_RCP_IF_FC_OFF	
MAC Loopback	4	AG_TRUE AG_FALSE	

GetConfigEth Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_ETH_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2		
Status	2	AG_RCP_ACK	
Hardware Interface mode	4	AG_RCP_ETH_HW_INTERFACE_MII AG_RCP_ETH_HW_INTERFACE_RMII	
Ethernet rate	4	AG_RCP_ETH_RATE_10 AG_RCP_ETH_RATE_100 AG_RCP_ETH_RATE_AUTO	
Duplex Mode Flag	4	AG_TRUE AG_FALSE	Indicates if duplex mode parameter is set
Duplex Mode	4	AG_RCP_ETH_HALF_DUPLEX AG_RCP_ETH_FULL_DUPLEX	
Flow Control	4	AG_RCP_SWITCH_OFF AG_RCP_SWITCH_ON	
Clock Source Flag	4	AG_TRUE AG_FALSE	Indicates if flow control parameter is set
Clock Source	4	AG_RCP_ETH_CLOCK_DCE AG_RCP_ETH_CLOCK_DTE	
RMII Reference Clock Out Flag	4	AG_TRUE AG_FALSE	Indicates if RMII reference clock out parameter is set
RMII Reference Clock Out	4	AG_RCP_SWITCH_OFF AG_RCP_SWITCH_ON	
Bandwidth limit	4		0 - no limit
MAC loopback mode	4	AG_RCP_SWITCH_OFF AG_RCP_SWITCH_ON	
PHY mode	4	AG_RCP_SWITCH_OFF AG_RCP_SWITCH_ON	
PHY number	4		Set only when the PHY mode is AG_RCP_SWITCH_ON
Advertisement Flag	4	AG_TRUE AG_FALSE	Indicates if the advertisement parameters are set

Item	Size (Bytes)	Range of Values	Description
Advertisement Speed: 10Duplex Mode: Half	4	AG_TRUE AG_FALSE	
Advertisement Speed: 10Duplex Mode: Full	4	AG_TRUE AG_FALSE	
Advertisement Speed: 100Duplex Mode: Half	4	AG_TRUE AG_FALSE	
Advertisement Speed: 100Duplex Mode: Full	4	AG_TRUE AG_FALSE	
MAC Address	6	Array of bytes	

GetBitStreamStatus Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_BS_STATUS_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	16	
Status	2	AG_RCP_ACK	
Link State	4	AG_RCP_IF_UNKNOWN_STATE AG_RCP_IF_LINK_UP AG_RCP_IF_LINK_DOWN	
AIS Alarm	4	AG_TRUE AG_FALSE	
LOS Alarm	4	AG_TRUE AG_FALSE	
Bit Stream Loopback State	4	AG_RCP_BS_LOOPBACK_DISABLED AG_RCP_BS_LOOPBACK_EXIST_WITH_TX AG_RCP_BS_LOOPBACK_EXIST AG_RCP_BS_LOOPBACK_REMOTE_WITH_RX AG_RCP_BS_LOOPBACK_REMOTE AG_RCP_BS_LOOPBACK_DUAL	

GetConfigBitStream Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_BS_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	24	
Status	2	AG_RCP_ACK	
Frame Size	4		
Under Run Value	4		
Clock Source	4	AG_RCP_WAN_CLOCK_INPUT_MODE AG_RCP_WAN_CLOCK_OUTPUT_MODE AG_RCP_WAN_CLOCK_RECOVERY_MODE AG_RCP_WAN_CLOCK_LPBK_MODE	
Tx Clock Polarity	4	AG_RCP_TX_CLOCK_FALLING AG_RCP_TX_CLOCK_RISING	
Rx Clock Polarity	4	AG_RCP_RX_CLOCK_RISING AG_RCP_RX_CLOCK_FALLING	
Loopback	4	AG_RCP_BS_LOOPBACK_DISABLED AG_RCP_BS_LOOPBACK_EXIST_WITH_TX AG_RCP_BS_LOOPBACK_EXIST AG_RCP_BS_LOOPBACK_REMOTE_WITH_RX AG_RCP_BS_LOOPBACK_REMOTE AG_RCP_BS_LOOPBACK_DUAL	

GetLIUStatus Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_LIU_STATUS_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	8	
Status	2	AG_RCP_ACK	
LIU type	4	AG_RCP_ID_NOAPP AG_RCP_DS_21348 AG_RCP_DS_2155	
LIU loop-back state	4	AG_RCP_LIU_LOOPBACK_DISABLED AG_RCP_LIU_LOOPBACK_DUAL AG_RCP_LIU_LOOPBACK_LOCAL AG_RCP_LIU_LOOPBACK_REMOTE AG_RCP_LIU_LOOPBACK_ANALOG	

GetConfigLIU Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_LIU_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2		
Status	2	AG_RCP_ACK	
Line Format Flag	4	AG_TRUE AG_FALSE	Indicates if Line Format parameter is set
Line Format	4	AG_RCP_BITSTREAM_MODE_E1 AG_RCP_BITSTREAM_MODE_T1 AG_RCP_BITSTREAM_MODE_J1	
LIU type	4	AG_RCP_ID_NOAPP AG_RCP_DS_21348 AG_RCP_DS_2155	
Line Code Flag	4	AG_TRUE AG_FALSE	Indicates if Line Code parameter is set
Line Code	4	For E1: AG_RCP_LIU_LINE_CODE_E1_HDB3 AG_RCP_LIU_LINE_CODE_AMI For T1/J1: AG_RCP_LIU_LINE_CODE_T1_B8ZS AG_RCP_LIU_LINE_CODE_AMI	
Line Build Out Flag	4	AG_TRUE AG_FALSE	Indicates if Line Build Out parameter is set
Line Build Out	4	E1 line termination values: AG_RCP_TXBO_NM_75_OHM = 0, AG_RCP_TXBO_NM_120_OHM= 1 AG_RCP_TXBO_75_HRL = 4 AG_RCP_TXBO_120_HRL= 5 T1/J1 line termination values: AG_RCP_TXBO_DSX1_133FT = 0 AG_RCP_TXBO_DSX1_266FT= 1 AG_RCP_TXBO_DSX1_399FT= 2 AG_RCP_TXBO_DSX1_533FT= 3 AG_RCP_TXBO_DSX1_655FT= 4 AG_RCP_TXBO_7_5DB_CSU= 5 AG_RCP_TXBO_15DB_CSU= 6 AG_RCP_TXBO_22_5DB_CSU= 7	
Rx termination Flag	4	AG_TRUE AG_FALSE	Indicates if Rx Termination parameter is set

Item	Size (Bytes)	Range of Values	Description
Rx Termination	4	AG_RCP_INTTER_DISABLE AG_RCP_INTTER_120_OHM AG_RCP_INTTER_100_OHM AG_RCP_INTTER_75_OHM	
Monitor Gain Flag	4	AG_TRUE AG_FALSE	Indicates if Monitor Gain parameter is set
Monitor Gain	4	AG_RCP_MG_NORMAL_OPERATION AG_RCP_MG_20dB AG_RCP_MG_26dB AG_RCP_MG_32dB,	
Equalizer Gain Limit Flag	4	AG_TRUE AG_FALSE	Indicates is Equalizer Gain Limit parameter is set
Equalizer Gain Limit	4	E1 options: AG_RCP_RX_E1_EQ_GAIN_MIN_12_DB AG_RCP_RX_E1_EQ_GAIN_MIN_43_DB T1 /J1 options: AG_RCP_RX_T1_EQ_GAIN_MIN_36_DB AG_RCP_RX_T1_EQ_GAIN_MIN_30_DB	
Jitter Attenuation Flag	4	AG_TRUE AG_FALSE	Indicates if Jitter Attenuation Enable parameter is set
Jitter Attenuation Enable	4	AG_TRUE AG_FALSE	
LIU loopback	4	AG_RCP_LIU_LOOPBACK_DISABLED AG_RCP_LIU_LOOPBACK_DUAL AG_RCP_LIU_LOOPBACK_LOCAL AG_RCP_LIU_LOOPBACK_REMOTE AG_RCP_LIU_LOOPBACK_ANALOG	

GetStaticIPCfg Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_STATIC_IP_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	12	
Status	2	AG_RCP_ACK	
Interface	4	AG_IF_C AG_IF_A	Interface for which information is desired
IP Address	4		IP address for the selected interface
IP Subnet Mask	4		IP subnet mask for the selected interface

GetConfigUART Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_UART_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2		
Status	2	AG_RCP_ACK	
UART rate	4	AG_RCP_UART_BAUD_RATE_9600 AG_RCP_UART_BAUD_RATE_19200 AG_RCP_UART_BAUD_RATE_38400 AG_RCP_UART_BAUD_RATE_57600 AG_RCP_UART_BAUD_RATE_115200 AG_RCP_UART_BAUD_RATE_230400 AG_RCP_UART_BAUD_RATE_460800 AG_RCP_UART_BAUD_RATE_921600	
UART Stop Bit	4	AG_RCP_UART_1_STOP_BITS AG_RCP_UART_2_STOP_BITS	
UART Application Mode	4	AG_RCP_UART_USAGE_PPP AG_RCP_UART_USAGE_LDP AG_RCP_UART_USAGE_TERMINAL AG_RCP_UART_USAGE_MEASSAGE AG_RCP_UART_USAGE_TRACE AG_RCP_UART_USAGE_RS_MASTER AG_RCP_UART_USAGE_RS_SLAVE AG_RCP_UART_USAGE_TDM	
UART Mode	4	AG_TRUE AG_FALSE	

GetVersion Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GEN_GET_VERSION_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	AG_RCP_VERSION_STR_SIZE + 4	
Status	2	AG_RCP_ACK	
Version Length	4	0 to AG_RCP_VERSION_STR_SIZE	Length of the version string
Version	AG_RCP_VERSION_STR_SIZE		Product version

GetConfig Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_CFG_CES_APP_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	38	
Status	2	AG_RCP_ACK	
Protocol	4	AG_RCP_TDM_O_IP_HEADER_RTP or AG_RCP_TDM_O_IP_HEADER_MINIMAL	Header protocol
IP Address	4		Target IP Address
Subscriber Interface	4	AG_IF_A AG_IF_B	Subscriber interface
Service Interface	4	AG_IF_C AG_IF_A	Service Interface
IP TOS	2	AG_RCP_CES_TOS_MIN - AG_RCP_CES_TOS_MAX	IP TOS
Target Port	2	For RTP header: AG_RCP_CES_RTP_PORT_MIN - 0xffff For Minimal header: 0 - AG_RCP_CES_MINIMAL_HEADER_PORT_MAX	Target port
Source Port	2	For RTP header: AG_RCP_CES_RTP_PORT_MIN - 0xffff For Minimal header: 0 - AG_RCP_CES_MINIMAL_HEADER_PORT_MAX	Source port
Ether Type	2	For RTP header: 0x800 For Minimal header: 0x0600 - 0xffff	Ether type
Payload Length	2	AG_RCP_CES_PAYLOAD_LEN_MIN - AG_RCP_CES_PAYLOAD_LEN_MAX	Payload Length in bytes
Max Jitter Delay	2	AG_RCP_CES_MAX_JITTER_MIN - AG_RCP_CES_MAX_JITTER_MAX	Maximum jitter delay (milliseconds)
Reserved Jitter Delay	2	AG_RCP_CES_JITTER_MIN_RESERVE_MIN - AG_RCP_CES_JITTER_MIN_RESERVE_MAX	Minimum jitter delay (percentage)
Recovery Clock Accuracy	2	AG_RCP_CES_RECOVERY_CLOCK_ACCURACY_MIN - AG_RCP_CES_RECOVERY_CLOCK_ACCURACY_MAX	Recovery Clock Accuracy (PPM)
VLAN Mode	2	AG_TRUE, AG_FALSE	Indicates whether VLAN mode is enabled/disabled

Item	Size (Bytes)	Range of Values	Description
VLAN ID	2	AG_RCP_CES_VLAN_ID_MIN - AG_RCP_CES_VLAN_ID_MAX	VLAN ID
VLAN Priority	2	AG_RCP_CES_VLAN_PRIORITY_MIN - AG_RCP_CES_VLAN_PRIORITY_MAX	VLAN priority

DumpMemRange Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_DUMP_MEM_RANGE_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	AG_RCP_RW_MEM_MAX_SIZE_IN_BYTES + 4	
Status	2	AG_RCP_ACK	
Length	4	0 - AG_RCP_RW_MEM_MAX_SIZE_IN_BYTES	Number of bytes dumped from memory
Memory Dump	AG_RCP_RW_MEM_MAX_SIZE_IN_BYTES		Array containing Length relevant dumped bytes

DumpMemLength Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_DUMP_MEM_LEN_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	AG_RCP_RW_MEM_MAX_SIZE_IN_BYTES + 4	
Status	2	AG_RCP_ACK	
Length	4	0 - AG_RCP_RW_MEM_MAX_SIZE_IN_BYTES	Number of bytes dumped from memory
Memory Dump	AG_RCP_RW_MEM_MAX_SIZE_IN_BYTES		Array containing Length relevant dumped bytes

GetStatusCesApp Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_GET_STATUS_CES_APP_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2		
Status	2	AG_RCP_ACK	
Jitter Level	4		Current jitter buffer level
Jitter Over-flow	4		Number of times the Jitter buffer exceeded MAX depth
Jitter Under-flow	4		number of times the Jitter buffer fell below MIN depth
Utilization bandwidth	4		current CES application configuration bandwidth utilization
Jitter MIN level	4		jitter minimum level since last ResetCesStatus
Jitter MAX level	4		jitter maximum level since last ResetCesStatus
Connectivity Status	4	AG_RCP_CONNCTIY_STATUS_UP AG_RCP_CONNCTIY_STATUS_DOWN AG_RCP_CONNCTIY_STATUS_MISCON AG_RCP_CONNCTIY_STATUS_FE_UNREACH AG_RCP_CONNCTIY_STATUS_FE_FAIL	CES Connectivity status
Tx Clock Source	4	AG_RCP_CLOCK_INPUT_MODE AG_RCP_CLOCK_OUTPUT_MODE AG_RCP_CLOCK_RECOVERY_MODE AG_RCP_CLOCK_LPBK_MODE	Transmit Clock Source
Is Reach-able Flag	4	AG_TRUE AG_FALSE	target host ping reachable (if AG_TRUE, - received response to ping)
Last ping trip ms time	4		target host last ping round trip time in msec
MAC Address	6		MAC Address of target

ShowFreeHeapSize Response

Item	Size (Bytes)	Range of Values	Description
Message ID	2	AG_RCP_FREE_HEAP_SIZE_MSG_ID	
Message Type	2	AG_RCP_RESPONSE	
Message Length	2	4	
Status	2	AG_RCP_ACK	
Free heap size	4		Size of available heap in bytes

5 Testing and Troubleshooting

The Redux RS-160 CLI provides tools for evaluating the performance of the device in test conditions and in customer installations. The tools include **loopback options** and **statistics** and **status commands**.

Loopback Options

The CLI has four commands for setting up loopbacks on the device interfaces. These commands can be used for verifying correct performance of the RS-160 and for isolating link and network problems. The commands are:

- **SetDynamicMACLb (sdml)** -Sets MAC loopback on the service (uplink) interface (see page 3-74)
- S**etBitstreamDynLpbk (sbdl)** -Sets one of the bitstream interface loopback options (see page 3-75)
- **SetLIUDynamicLb (sldl)** - Sets one of the LIU internal loopback options (see page 3-76)
- **SetAppLoopback (slbk) -** Configures the CES application so it will operate without the presence of a paired RS-160 (see page 3-77)

Note that once a loopback setting is made, the loopback remains in place and cannot be changed until the RS-160 is reset.

Table 5-1 describes each loopback mode.

TABLE 5-1. Description of Loopback Modes

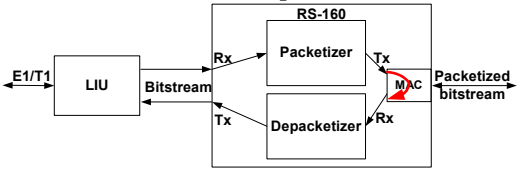
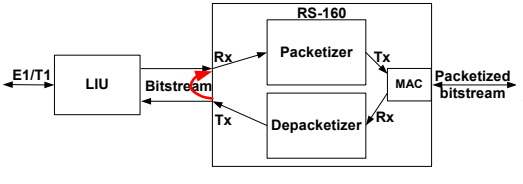
Loopback Mode	Description
MAC Loopback 	Applies to Interface C. Frames transmitted via this interface are looped back and received on the same interface. No frames are actually transmitted to or received from the packet network. CLI Command: **SetDynamicMACLb (sdml)**
Bitstream Loopback-Local 	Applies to Interface B. Bitstream data transmitted via this interface are looped back and received on the same interface. No data actually arrives at the LIU. CLI Command: **SetBitstreamDynLpbk (sbdl)**

TABLE 5-1. Description of Loopback Modes

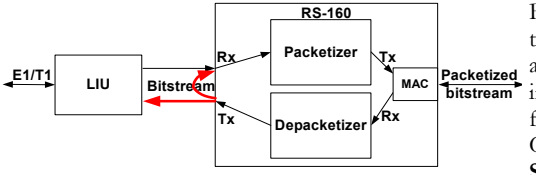
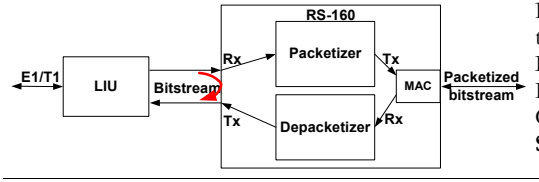
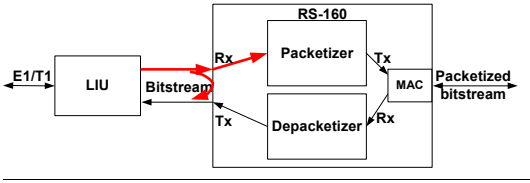
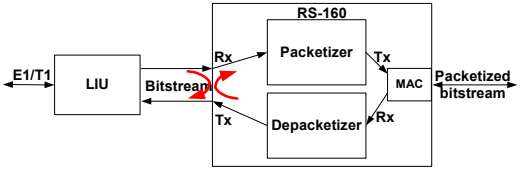
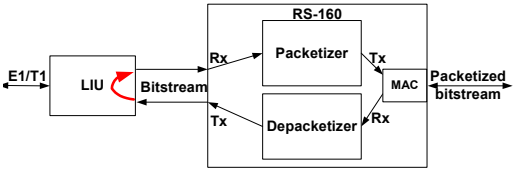
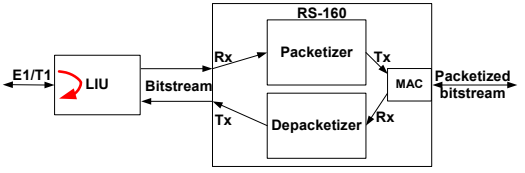
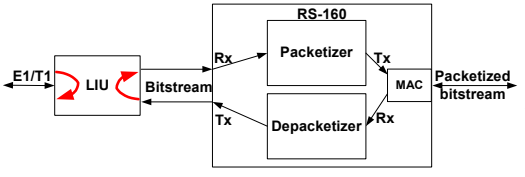
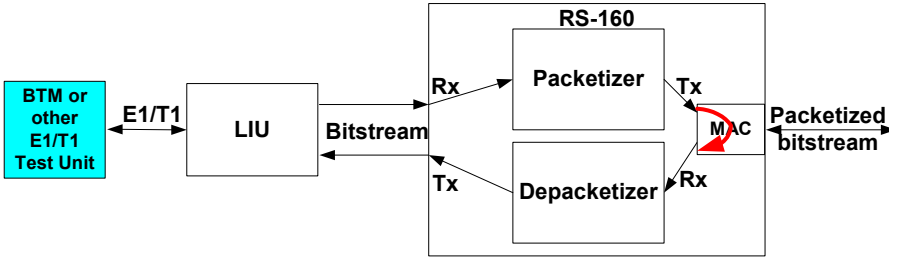
Loopback Mode	Description
Bitstream Loopback-Local+Tx 	Applies to Interface B. Bitstream data transmitted via this interface are looped back and received on the same interface. Data is also forwarded to the LIU. CLI Command: **SetBitstreamDynLpbk (sbdl)**
Bitstream Loopback-Remote 	Applies to Interface B. Bitstream data received from the LIU is looped back to the LIU. No data is received by the RS-160. CLI Command: **SetBitstreamDynLpbk (sbdl)**
Bitstream Loopback-Remote+Rx 	Applies to Interface B. Bitstream data received from the LIU is looped back to the LIU. The data is also received by the interface for processing. CLI Command: **SetBitstreamDynLpbk (sbdl)**
Bitstream Loopback-Dual 	Applies to Interface B. This mode is a combination of the local and remote modes. Bitstream data transmitted via this interface are looped back and received on the same interface. Bitstream data received from the LIU is looped back to the LIU. The two data streams do not interact. CLI Command: **SetBitstreamDynLpbk (sbdl)**
LIU Loopback-Local 	The LIU loops back the bitstream received from the RS-160. No data is transmitted to or received from the E1/T1 circuit. The Tx clock must be configured for Recovery (Slave) for this mode to operate. CLI Command: **SetLIUDynamicLb (sldl)**

TABLE 5-1. Description of Loopback Modes

Loopback Mode	Description
LIU Loopback-Remote 	The LIU loops back the data stream received from the E1/T1 circuit. No data is transmitted to or received from the RS-160. CLI Command: **SetLIUDynamicLb (sldl)**
LIU Loopback-Dual 	This mode is a combination of the LIU local and remote modes. The LIU loops back the data stream received from the E1/T1 circuit. It also loops back the bitstream received from the RS-160. The two data streams do not interact. The Tx clock must be configured for Recovery (Slave) for this mode to operate. CLI Command: **SetLIUDynamicLb (sldl)**

The following example shows how the loopback settings can be used to verify operation of the RS-160 (Figure 5-1 shows the test setup):

Figure 5-1. Loopback Test Setup



Enter the following CLI commands:

```
\>m\i\c
\Maint\Interfaces\Interface_C>sdml on

The request was updated successfully in active ConfigDB.

\Maint\Interfaces\Interface_C>\a\d
\Admin\Debug>slbk
The command completed successfully.
```

"sdml" sets up the MAC loopback, while "slbk" enables the RS-160 to transmit packets to the uplink (service) interface without a paired RS-160 present. The user can now start an T1 or E1 data flow on the test unit and evaluate the looped back response.

Using the Get Status Command to Evaluate Performance

The CES application GetStatus CLI command reports on the status of the performance of the RS-160. The following is a sample output of the command:

```
\View\App\CES>\v\a\ces\gs b
 Item                                Value/Status

 Clock source.....................:  Loopback-master
 Connectivity.....................:  UP
 Current Jitter Buffer Delay (ms):  4.970
 Jitter Overflow..................:  0
 Jitter Underflow.................:  01
 Bandwidth Utilization(kbps).....:  2476
 Jitter minimum level (ms).......:  4.970
 Jitter maximum level (ms).......:  5.467
 Peer reachable...................:  YES
 Peer MAC address.................:  01 84 C8 91 42 60
 Peer ping time (ms).............:  7
```

The key parameters are those related to the jitter performance, which are described in Table 5-2..

TABLE 5-2. Reported Jitter Parameters

Parameter	Description
Current Jitter Buffer Delay	The delay represented by the packets currently in the jitter buffer, in milliseconds. This is calculated by multiplying the number of packets times the packet length divided by the data rate of the bit-stream interface
Jitter Overflow	Number of times that the jitter buffer overflowed, defined as enough packets to be a jitter delay of twice the maximum jitter setting
Jitter Underflow	Number of times the jitter buffer has reached the minimum value of one packet.
Jitter minimum level	The minimum jitter buffer delay seen since the last reset of these statistics, in milliseconds
Jitter maximum level	The maximum jitter buffer delay seen since the last reset of these statistics, in milliseconds

The ResetStatistics command clears the values in statistics counters. The parameters cleared are a function of the directory where the command is executed. For example,

```
\Maint\Interfaces\Interface_C>rst
```

clears the statistics displayed by:

```
\View\Interfaces\Interface_C>st
```

The CES ClearStatistics command clears the jitter overflow and underflow and the maximum and minimum jitter parameters described above. It is executed as follows:

```
\Maint\App\CES>rst b
```

Troubleshooting Guide

Here are a few suggestions to follow if there are performance problems with the RS-160.

1. Check the physical hookup for correctness: The CM-160 requires an E1/T1 cross cable in its connection to the T1/E1 source. An ethernet cross-cable is also required if two CM-160s are connected back-to-back. A PC or dumb terminal connection to the serial port must use a null modem (RS232) cross cable.
2. Check that the Ethernet configuration parameters are correct.

   The following CLI command displays the bitstream interface configuration:

```
\Config\Interfaces\Interface_C>gc

                        Current config        Next start up config

 Working mode.......:  ETH                   ETH
 MII/RMII...........:  MII                   MII
 AutoNeg............:  ON                    ON
 Speed (Mb/s).......:  -                     -
 Duplex Mode........:  -                     -
 Flow control.......:  Disabled              Disabled
 Clock source.......:  DTE                   DTE
 RMII ref clock out.:  -                     -
 Interface BW (kb/s):  Unlimited             Unlimited
 MAC address........:  CD CD CD CD CD CD     CD CD CD CD CD CD
 MAC Loopback.......:  Enabled               Disabled
 PHY configured.....:  YES                   YES
 PHY number.........:  0                     0
 Advertisement......:  10H 10F 100H 100F     10H 10F 100H 100F
```

3. Be sure that the LIU configuration parameters are compatible with the E1/T1 signal source (line code, line build out, etc.).

   The following CLI command displays the bitstream interface configuration:

```
\Config\Interfaces\Interface_B>gc

                      Current config        Next start up config

 Working mode...............:  BitStream             BitStream
 Frame Size (bytes).........:  96                    96
 Underrun value.............:  0xFE                  0xFE
 Clock source...............:  Loopback-master      Loopback-master
 Tx clock polarity..........:  Falling               Falling
 Rx clock polarity..........:  Rising                Rising
 Interface loopback.........:  Disabled              Disabled
 LIU line format............:  E1                    E1
 LIU type...................:  DL_2155              DL_2155
```

```
LIU line code.............:  HDB3                 HDB3
LIU line build out........:  E1_75                E1_75
LIU rx term...............:  100ohm               100ohm
LIU monitor gain..........:  Norm                 Norm
LIU Rx Equlizer Gain Limit.:  -12db               -12db
LIU Jitter Attenuation....:  Disabled             Disabled
LIU loopback..............:  Disabled             Disabled
```

The Interface C gs command shows whether the link to the Ethernet is operational and whether the PHY has connected properly. Check your settings if this status report shows that there are problems.

4. Confirm that the configuration of the RS-160 pair is compatible and consistent. See "Configuring a Pair of RS-160s" on page 1-5.

   The CES GetStatus (gs) command (see page 5-4) shows whether there is connectivity with the peer RS-160 and the peer is reachable.

5. If the Tx clocks on both RS-160s are configured as Loopback-Master, make sure that the clock source driving both units is stable. Otherwise, change one of the units to Recovered-Slave. Operating both units as Slave is not recommended and may produce unpredictable results.

Table 5-3 lists observations and suggested causes and corrections.

TABLE 5-3. Observations and Corrections

Observations	Possible Cause	Corrections
Jitter overflow and underflow is occurring on both RS-160s	The maximum jitter setting is too low.	Look at the ping round-trip time on the CES GetStatus display. This is an indication of the network delay. The maximum jitter should be at least this long.
Wide variation between maximum and minimum jitter levels but no occurrence of jitter overflow or underflow	The jitter buffer is operating correctly. There is variability in the packet network possibly due to congestion.	If the minimum is close to zero or the maximum close to twice the maximum jitter setting, increase the maximum jitter setting to avoid future overflow or underflow.

If you have any questions, problems or suggestions with your Redux product, contact us at support@reduxcom.com

A Default Database

The RS-160 maintains its configurable parameters in an internal, non-volatile database. The default values of the parameters are those assigned by the RS-160 firmware in the absence of a predefined configuration. Some of the parameters are dynamically configurable. Many of the parameters can be changed but do not take effect until a replace or replace/restart command is executed. The tables in this appendix list the default values of all the parameters and the CLI command used to modify the parameter, where a command is available. The tables also indicate where the Management Console can be used to configure the parameter.

Default Configuration Databases

Four databases are used for the basic configuration of RS-160 Release 1.10. These databases vary by a small number of parameters to account for the required differences. These four databases support E1 Master, E1 Slave, T1 Master, and T1 Slave. The **sddb** CLI command is used to change between these databases. See page 3-85. Table A-1 lists the defaults for the parameters that differ between the four databases.

Table A-1. Default Configurations

Parameter	E1 Master	E1 Slave	T1 Master	T1 Slave
Source IP	10.101.1.225	10.101.1.226	10.101.1.225	10.101.1.226
CES Target IP	10.101.1.226	10.101.1.225	10.101.1.226	10.101.1.225
Bitstream clock source	Loopback	Recovery	Loopback	Recovery
Bitstream Line Format	E1	E1	T1	T1
LIU Line Code	HDB3	HDB3	B8ZS	B8ZS
LIU Line Build Out	75 Ohms Normal	75 Ohms Normal	0 to 133 feet	0 to 133 feet
Rx Equalizer Gain Limit	short	short	short	short
Internal Rx Termination	120 Ohms	120 Ohms	100 Ohms	100 Ohms

Main Parameters

Table A-2. Main Parameters

Parameter	Default Value	CLI Functions	Mgt. Console
Default Gateway IP address	10.101.1.1	SetDefGatewayIPaddr (sgip)	✓
Product Version	1.10		
Product Name	RS-160		
Model	A0100ETEB0000		✓
Serial Number	Undefined		✓

Ethernet Parameters

Table A-3. Ethernet Parameters (UPLINK)

Parameter	Default Value	CLI Functions	Mgt. Console
Flow Control	Disable	SetConfigEthFlow-Control (scef)	✓
Auto Negotiation	Enable	SetConfigEth (sce)	✓
Rate	-	SetConfigEth (sce)	✓
Duplex Mode	-	SetConfigEth (sce)	✓
AutoNeg Advertise	10/100 Mbits Half/Full Duplex		✓
Bandwidth Limit	Unlimited	SetConfigEthLimit (cel)	✓

Table A-4. Ethernet Parameters (LAN)

Parameter	Default Value	CLI Functions	Mgt. Console
Flow Control	Disable	SetConfigEthFlow-Control (scef)	✓
Auto Negotiation	Enable	SetConfigEth (sce)	✓
Rate	-	SetConfigEth (sce)	✓
Duplex Mode	-	SetConfigEth (sce)	✓
AutoNeg Advertise	10/100 Mbits Half/Full Duplex		✓
Bandwidth Limit	Unlimited	SetConfigEthLimit (cel)	✓

E1/T1 Interface Parameters

Table A-5. Bitstream Parameters (E1/T1 Interface)

Parameter	Default Value	CLI Functions	Mgt. Console
LIU Line format	E1	SetDefaultDB (sddb)	✓
Underrun value	0xFE	SetConfigBitStreamUnderVal (sbuv)	✓
Clocking mode	Loopback (Master) or Recovery (Slave)	SetDefaultDB (sddb)	✓
Line Build Out	75 Ohm normal	SetConfigLIUlineBuildout (sltt)	✓
Jitter Attenuator	Disable	SetConfigJitterAttenuation (sljt)	✓
Rx Equalizer Gain Limit	Short Haul	SetRxEqualizerGainLimit (sreg)	✓
Monitor Gain	Normal operation	SetConfigMonitorGain (slrg)	✓
Internal Rx Term	120 Ohm Enabled	SetConfigLIURxTerm (slrt)	✓
Line code	HDB3	SetConfigLIULineCode (sllc)	✓
Framing Mode	Unframed	SetFrameMode (sfm)	✓
Line Status Trap	Disabled		✓
Circuit Identifier	Null string		✓

Console Parameters

Table A-6. ConsoleParameters

Parameter	Default Value	CLI Functions	Mgt. Console
Stop Bits	1 bit	SetConfigUART (scu)	✓
Baud Rate	115200	SetConfigUART (scu)	✓

Static IP Parameters

Table A-7. Static IP Parameters

Parameter	Default Value	CLI Functions	Mgt. Console
IP address	UPLINK/LAN- 10.101.1.225 (Master) 10.101.1.226 (Slave)	SetStaticIP(ssip)	✓
Subnet mask	UPLINK/LAN- 255.255.255.0	SetSubNetMask(ssnm)	✓

Bridging Service (LAN Interface)

Table A-8. Bridging Parameters

Parameter	Default Value	CLI Functions	Mgt. Console
Enabled/Disabled	Disabled	SetBridging(sb)	✓
Aging Time	30 seconds	SetAgingTime(sat)	✓

TDM Over Packet Parameters

Table A-9. TDM Over Packet Parameters

Parameter	Default Value	CLI Functions	Mgt. Console
Header Type	RTP	SetConfigCESProtocol(ccap)	✓
Target IP address	10.101.1.226 (Master) 10.101.1.225 (Slave)	SetConfigCESIP(ccip)	✓
Local port	2000	SetConfigCESProtocol(ccap)	✓
Target port	2000	SetConfigCESProtocol(ccap)	✓
Payload length	96	SetConfigCESPayLength(ccpl)	✓
IP TOS	0	SetConfigCESIP(ccip)	✓
Max Jitter	5	SetConfigCESClock(cclk)	✓
Clock Lock Range	50	SetConfigCES ClockRange (cclr)	✓
Packet reordering	Disabled	SetCESreOrder (scr)	✓
Ether Type	0x800	SetConfigCESProtocol(ccap)	✓
VLAN	Disabled	SetConfigCESVlan(ccvl)	✓
VLAN ID	0	SetConfigCESVlan(ccvl)	✓
VLAN Priority	0	SetConfigCESVlan(ccvl)	✓

SNMP Parameters

Table A-10. SNMP Parameters

Parameter	Default Value	CLI Functions	Mgt. Console
Request port	161	SetRequestPort (srp)	✓
Trap port	162	SetTrapPort (stp)	✓
Request Manager Community Name	"Req Dflt name"	AddRequestManager (arm)	✓
Manager IP address	10.101.1.200	AddRequestManager (arm)	✓
Permission level	Get (Read)	AddRequestManager (arm)	✓
Trap Manager Community Name	"Trp Dflt name"	AddTrapManager (atm)	✓
Trap IP address	10.101.1.200	AddTrapManager (atm)	✓
System Description	Empty string		✓
System Contact	Technical Support support@arranto.net		✓
System Name	ArrantoRS-160		✓