Oracle® Enterprise Session Border Controller

Time Division Multiplexing Guide

Release S-Cz9.2.0
F74372-03
November 2024

ORACLE

Oracle Enterprise Session Border Controller Time Division Multiplexing Guide, Release S-Cz9.2.0

F74372-03

Contents

About This Guide

The *Time Division Multiplexing Configuration Guide* explains the concepts and procedures necessary for installing and configuring Time Division Multiplexing (TDM) on the Acme Packet 1100 and the Acme Packet 3900.

Documentation Set

The following table describes the documentation set for this release.

Configuration Guide	Contains conceptual and procedural information for configuring, administering, and troubleshooting the ESBC.
ACLI Reference Guide	Contains explanations of how to use the ACLI, as an alphabetical listings and descriptions of all ACLI commands and configuration parameters.
Admin Security Guide	Contains conceptual and procedural information for supporting the Admin Security, Admin Security with ACP, and JITC feature sets on the ESBC.
Call Traffic Monitoring Guide	Contains conceptual and procedural information for configuration using the tools and protocols required to manage call traffic on the ESBC.
FIPS Compliance Guide	Contains conceptual and procedural information about FIPS compliance on the ESBC.
HMR Guide	Contains conceptual and procedural information for header manipulation. Includes rules, use cases, configuration, import, export, and examples.
Platform Preparation and Installation Guide	Contains conceptual and procedural information for system provisioning, software installations, and upgrades.
Release Notes	Contains information about this release, including platform support, new features, and limitations.
Known Issues & Caveats	Contains information about the known issues and caveats for this release.
Security Guide	Contains information about security considerations and best practices from a network and application security perspective for the Oracle Communications Session Delivery Product family of products.
Time Division Multiplexing Guide	Contains the concepts and procedures necessary for installing, configuring, and administering Time Division Multiplexing (TDM) on the Acme Packet 1100, Acme Packet 3900, and Acme Packet 3950.
Web GUI Guide	Contains conceptual and procedural information for using the tools and features of the ESBC Web GUI.

Related Documentation

The following table describes related documentation for the Oracle® Enterprise Session Border Controller. You can find the listed documents on http://docs.oracle.com/en/industries/communications/ in the "Session Border Controller Documentation" and "Acme Packet" sections.

Document Name	Document Description
Acme Packet 3900 Hardware Installation Guide	Contains information about the components and installation of the Acme Packet 3900.
Acme Packet 4600 Hardware Installation Guide	Contains information about the components and installation of the Acme Packet 4600.
Acme Packet 4900 Hardware Installation Guide	Contains information about the components and installation of the Acme Packet 3950 and Acme Packet 4900.
Acme Packet 6100 Hardware Installation Guide	Contains information about the components and installation of the Acme Packet 6100.
Acme Packet 6300 Hardware Installation Guide	Contains information about the components and installation of the Acme Packet 6300.
Acme Packet 6350 Hardware Installation Guide	Contains information about the components and installation of the Acme Packet 6350.
Release Notes	Contains information about the current documentation set release, including new features and management changes.
Known Issues & Caveats	Contains known issues and caveats
Configuration Guide	Contains information about the administration and software configuration of the Service Provider Session Border Controller (SBC).
ACLI Reference Guide	Contains explanations of how to use the ACLI, as an alphabetical listings and descriptions of all ACLI commands and configuration parameters.
Maintenance and Troubleshooting Guide	Contains information about SBC logs, performance announcements, system management, inventory management, upgrades, working with configurations, and managing backups and archives.
MIB Guide	Contains information about Management Information Base (MIBs), Oracle Communication's enterprise MIBs, general trap information, including specific details about standard traps and enterprise traps, Simple Network Management Protocol (SNMP) GET query information (including standard and enterprise SNMP GET query names, object identifier names and numbers, and descriptions), examples of scalar and table objects.
Accounting Guide	Contains information about the SBC's accounting support, including details about RADIUS and Diameter accounting.
HDR Guide	Contains information about the SBC's Historical Data Recording (HDR) feature. This guide includes HDR configuration and system-wide statistical information.
Admin Security Guide	Contains information about the SBC's support for its Administrative Security license.
Security Guide	Contains information about security considerations and best practices from a network and application security perspective for the SBC family of products.
Platform Preparation and Installation Guide	Contains information about upgrading system images and any pre-boot system provisioning.

Document Name	Document Description
Call Traffic Monitoring Guide	Contains information about traffic monitoring and packet traces as collected on the system. This guide also includes WebGUI configuration used for the SIP Monitor and Trace application.
HMR Guide	Contains information about configuring and using Header Manipulation Rules to manage service traffic.
REST API	Contains information about the supported REST APIs and how to use the REST API interface.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

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Call the CAS main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at http://www.oracle.com/us/support/contact/index.html. When calling, make the selections in the sequence shown below on the Support telephone menu:

1. Select `2` for New Service Request.
2. Select `3` for Hardware, Networking, and Solaris Operating System Support.
3. Select one of the following options:
   - For technical issues such as creating a new Service Request (SR), select `1`.
   - For non-technical issues such as registration or assistance with My Oracle Support, select `2`.

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Emergency Response

In the event of a critical service situation, emergency response is offered by the Customer Access Support (CAS) main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at http://www.oracle.com/us/support/contact/index.html. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

A critical situation is defined as a problem with the installed equipment that severely affects service, traffic, or maintenance capabilities, and requires immediate corrective action. Critical situations affect service and/or system operation resulting in one or several of these situations:

- A total system failure that results in loss of all transaction processing capability
- Significant reduction in system capacity or traffic handling capability
- Loss of the system's ability to perform automatic system reconfiguration

- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

Any other problem severely affecting service, capacity/traffic, billing, and maintenance capabilities may be defined as critical by prior discussion and agreement with Oracle.

Locate Product Documentation on the Oracle Help Center Site

Oracle Communications customer documentation is available on the web at the Oracle Help Center (OHC) site, http://docs.oracle.com. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at http://www.adobe.com.

1. Access the Oracle Help Center site at http://docs.oracle.com.
2. Click **Industries**.
3. Under the Oracle Communications sub-header, click the **Oracle Communications documentation** link.
   The Communications Documentation page appears. Most products covered by these documentation sets appear under the headings "Network Session Delivery and Control Infrastructure" or "Platforms."
4. Click on your Product and then Release Number.
   A list of the entire documentation set for the selected product and release appears.
5. To download a file to your location, right-click the **PDF** link, select **Save target as** (or similar command based on your browser), and save to a local folder.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Revision History

The following table shows the dates and descriptions of revisions.

Date	Description
March 2023	• Initial release
December 2023	• Adds AP3950 to TDM list.
November 2024	• Adds TDM parameter caveat to PRI and BRI Configuration.

1

Time Division Multiplexing

Oracle® designed the Time Division Multiplexing (TDM) functionality for companies planning to migrate from TDM to SIP trunks by using a hybrid TDM-SIP infrastructure, rather than adopting VoIP-SIP as their sole means of voice communications. The TDM interface on the Oracle® Enterprise Session Border Controller (ESBC) provides switchover for egress audio calls, when the primary SIP trunk becomes unavailable. You can use TDM with legacy PBXs and other TDM devices.

- Only the Acme Packet 1100 and the Acme Packet 3900 platforms support TDM, which requires the optional TDM card.
- TDM supports bidirectional calls as well as unidirectional calls.
- TDM operations require you to configure **TDM Config** and **TDM Profile**, as well as local policies for inbound and outbound traffic.
- The software upgrade procedure supports the TDM configuration.
- Options for the Acme Packet 1100 and the Acme Packet 3900 platforms include Calling-Line Identification Presentation (CLIP) and Connected-Line Identification Presentation (COLP).
- Options for the Acme Packet 1100 platform include the four-port Primary Rate Interface (PRI), the Euro ISDN Basic Rate Interface (BRI), and the Foreign Exchange Office-Foreign Exchange Subscriber (FXO-FXS) card.

Interface Requirements

PRI—Digium1TE133F single-port or Digium 1TE435BF four-port card.

BRI—Digium 1B433LF four-port card

FXS—Digium 1A8B04F eight-port card, green module (ports 1-4)

FXO—Diguim 1A8B04F eight-port card, red module (ports 5-8)

Notes

When you deploy either the Acme Packet 1100 or the Acme Packet 3900 in a High Availability (HA) pair, the active system cannot replicate calls between SIP and TDM to the standby system.

The Acme Packet 1100 does not support HA for the PRI, BRI, and FXO-FXS interfaces.

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Time Division Multiplexing Configuration

To perform Time Division Multiplexing (TDM) operations on the Oracle® Enterprise Session Border Controller (ESBC), you must enable TDM, specify the parameters for the interface in use, run the TDM configuration wizard, and create local policies for routing TDM traffic.

TDM configuration requires the following process:

1. Configure the **TDM Config** element and its corresponding sub-elements. The **TDM Config** element, located under **System**, contains the parameters that are common to all TDM configurations. The sub-elements contain the particular parameters for the interface that the system detects in use on the ESBC. The system displays the sub-elements, as follows:
   - When the ESBC detects either the Primary Rate Interface (PRI) or the Basic Rate Interface (BRI) interface, **TDM Config** displays the **TDM Profile** sub-element with the parameters that correspond to the interface. See "Primary Rate Interface Support" and "Basic Rate Interface Support."
   - When the ESBC detects the Analog interface, **TDM Config** displays both the **FXO Profile** and the **FXS Profile** sub-elements with the parameters that correspond to the interface. See "Foreign Exchange Office-Foreign Exchange Subscriber Support."
2. Run the TDM configuration wizard to complete the configuration. The wizard creates the realm, SIP interface, steering pools, and other necessary configuration elements including the network interface and the phy-interface for SIP call routing. With SRTP enabled (default), the wizard also creates the **Media Sec Policy** object, enables the **Secured Network** attribute for the **SIP Interface** object, and configures the **Media Sec Policy** attribute for **Realm Config**. You can run the wizard from either the Web GUI (**Set TDM Configuration**) or the ACLI (**Setup TDM**).
   The ESBC requires running the TDM configuration wizard only after the initial TDM configuration. The system does not require you to run the wizard after you make changes to the existing configuration.

   > **Note:**
   >
   > When the Oracle Session Delivery Manager (SDM) manages the ESBC, you configure TDM from the SDM and you do not need to run the TDM configuration wizard. See "Time Division Multiplexing (TDM) Settings on the Session Delivery Manager (SDM)" for the required settings.
3. Configure the local policy for routing traffic through the TDM interface. For unidirectional TDM call routing, the system requires a local policy only for the call direction that you want. For example, inbound-only or outbound-only. For bi-directional TDM call routing, create both inbound and outbound local policies. See "Local Policy Configuration for Time Division Multiplexing."

You can configure TDM from the following locations:

- ACLI—Use the **TDM Config**, **TDM Profile**, **FXO Profile**, and **FXS Profile** elements located under **System**.
- Web GUI—Use the **TDM Config**, **TDM Profile**, **FXO Profile**, and **FXS Profile** elements located under **System**.

- Session Delivery Manager (SDM)—Launch the Web GUI from SDM and use the **TDM Config**, **TDM Profile**, **FXO Profile**, and **FXS Profile** elements located under **system**.

TDM Configuration Restart Guidelines

The Oracle® Enterprise Session Border Controller (ESBC) uses the Digium Asterisk Hardware Device Interface (DAHDI) to support Time Division Multiplexing (TDM) operations. In certain situations, the DAHDI requires a restart to apply changes to any **tdm-config**, **tdm-profile**, **fxo-profile**, or **fso-profile** configuration parameter that the system cannot update by simply reloading the configuration. When you attempt to activate configuration changes, the system detects any change that requires a restart and issues the **dahdi restart** command. Oracle recommends making changes to parameters that require a restart during a maintenance window because the system terminates all active TDM calls during the restart process.

The following tables show which parameters cause the system to restart or reload after you change them.

tdm-config

State	Restart
Logging	No configuration change required for resetting logging
Line mode	Restart. The PRI interface also requires a reboot.
Tone zone	Restart
Calling pres	Reload
Caller ID	• Between pai<->rpid - reload • Between no<->pai, rpid - restart

tdm-profile

Name	Restart
Signaling	Restart
Switch type	Restart
B-channel	Restart
D-channel	Restart
Span number	Restart
Route group	Restart
Line build out	Restart
Framing value	Restart
Coding value	Restart
Term resistance	Restart
Timing source	Restart

Rx gain	Reload
tx gain	Reload
Echo cancellation	Reload
Overlap dial	Restart
Incoming pattern	Reload
Options	Reload

fxo-profile, fso-profile

Name	Restart
Channels	Restart
Rx gain	Reload
Tx gain	Reload
Echo cancellation	Reload
Fax detect	Reload
Route group	Reload
Call group	Reload
Pickup group	Reload
Immediate answer	Reload
Signaling	Reload
Phone number	Reload
Full name	Reload
CID signaling	Reload
Options	Reload

Incoming Call Pattern Guidelines

When you configure either the Primary Rate Interface (PRI) or Basic Rate Interface (BRI) interface for Time Division Multiplexing (TDM), you can set a list of extension numbers and match patterns for routing incoming calls. You can specify exact matches as well as patterns that route to a range of destinations.

For example, suppose that a company with 300 employees deploys the Oracle® Enterprise Session Border Controller (ESBC) and connects to the PSTN network by way of an ISDN interface. The company allocates 300 extension numbers: numbers 7100 - 7399 for employee desk phones, and number 70 for the reception desk so that it is easy to remember.

The service provider assigns the prefix 49331200 to the company, so the reception desk PSTN number becomes 4933120070 and the employee numbers become 493312007100, 493312007101-493312007399.

The incoming pattern in this example will match either the reception desk number or one of the other extensions. When the match is successful, the received number is complete and the call setup can proceed. You can configure TDM to match the reception desk number as a whole: "4933120070," and to match any of the other extensions through a single pattern: "_493312007[1-3]XX". To put these rules together, set the **incoming-pattern** parameter to the following value: "4933120070|_493312007[1-3]XX".

In match patterns, separate single extension numbers with the vertical bar (|) character. Start a match pattern with the underscore (_) character before the first number of the pattern. Do not use the underscore with an exact match. Type the exact match, starting with the first number because an exact match does not use an extension pattern. Note the meaning of the following characters:

X matches any digit from 0-9

Z matches any digit from 1-9

N matches any digit from 2-9

[1237-9] matches any digit in the brackets (in this example, 1,2,3,7,8,9).

. wildcard, matches one or more characters

! wildcard, matches zero or more characters immediately

3 Primary Rate Interface Configuration

The Acme Packet 1100 and the Acme Packet 3900 support the ISDN Primary Rate Interface (PRI) for higher call-volume customers who want to connect PRI lines (t1,e1), analog trunk lines, analog phones (Extensions), Fax machines, and other analog communications devices to IP PBX/IP telephony systems. The PRI cards provide greater call-volume capacity than the Basic Rate Interface (BRI) card by providing more channels. In the U. S., the PRI card supports 23 b-channels for voice and user data at 64 Kbit per second and 1 d-channel for signaling. In Europe, the PRI card supports 30 b-channels for voice and user data at 64 Kbit per second and 1 d-channel for signaling.

When the system detects the PRI interface, it displays the corresponding configuration parameters in **tdm-config** and **tdm-profile**.

- With the single-port PRI, **tdm-profile** supports creating only one profile that applies to all spans.
- With the four-port PRI, **tdm-profile** supports applying a TDM profile to each span for more targeted routing. The **tdm-profile** sub-element supports enabling a particular span as the timing source, enabling echo cancellation for improved audio quality, and specifying a group of profiles for routing. When configuring multiple tdm-profiles, you can create a profile for each span individually or assign multiple spans to one profile. You can assign the profiles to a route group with either the same number or a different number per profile. For example you can configure a call to go to tdm:profileName, tdm:span:1 or tdm:group:2. You can send the call to a specific tdm interface or a group of them.

Span Configuration

TDM supports creating up to four profiles on the four-port PRI card. You can configure each span exclusively or set several spans (up to four) to share the same configuration. Each span represents a physical network interface. The **span-number** parameter in **tdm-profile** indicates the interface to which the profile applies. For example, **span-number** = 1,2,3,4 means that the profile applies to all spans. **span-number** = 1 means that the profile applies only to span 1. You can specify more than one span and fewer than four spans in the same profile, for example, **span-number** = 1,2. During configuration, the system validates that a particular span is assigned to only one profile.

On the single-port PRI card, you can set only one profile and it includes all spans.

Signaling Configuration

Depending on your deployment, you might need the Oracle® Enterprise Session Border Controller (ESBC) to act as the customer premises equipment (CPE) side of the connection or to act as the network (NET) side of the connection.

For example:

- The ESBC can act as the NET side of the deployment and connect to a PBX.
- The ESBC can act as the CPE side of the deployment and connect to a network provider's ISDN line.

The system supports the coexistence of multiple profiles for both CPE and NET, and you can configure up to four profiles each. For PRI use pri_cpe and pri_net. For BRI use bri_cpe and bri_net.

Upgrade Configuration to Correct TON in TDM Deployments

The **calling-type-of-number** parameter in your **tdm-config** specifies the Type of Number (TON) the ESBC should specify within its signaling.

When upgrading from any version prior to 920p6 to any version after, the ESBC begins to include an incorrect type of number (TON) label in "prilocaldialplan" attribute when you have configured the value of the **calling-type-of-number** attribute in your **tdm-config** to **unknown**. Specifically, the ESBC begins to provide the value "national" instead of "unknown" as the TON. This issue occurs regardless of other configuration.

To resolve this issue, you configure the ESBC with the **default-tdm-calling-ton=unknown** option in the **system-config**.

```
ORACLE(system=config)#options +default-tdm-calling-ton=unknown
```

This change requires a reboot. You can satisfy this reboot requirement by setting the option before you upgrade, or by upgrading, setting the option, then rebooting.

Routing Configuration

For control over routing TDM traffic, each TDM profile includes the route-group number parameter that you can use to group profiles together for routing. You can route traffic by setting the following parameters for next-hop in the **local-policy** configuration:

next-hop = tdm:span:<number> Use span number to specify routing endpoints.

next-hop = tdm:group:<number> Each TDM profile includes **route-group** number, so that you can group profiles together. The route-group number can address several profiles for routing. During routing, the embedded Asterisk software that the ESBC uses to connect PSTN and VoIP phone services to each other picks the first available span and the first available channel when routing to a group.

next-hop= tdm:<profileName> During configuration, the system checks to confirm that no other profile contains the same routing.

Configure the Single-Port Primary Rate Interface

The Acme Packet 1100 and the Acme Packet 3900 support the single-port ISDN Primary Rate Interface (PRI). To configure the PRI interface, you must set the parameters in **tdm-config** and **tdm-profile** under **system**. After you create the configuration, you must run either the **Set TDM Configuration** Wizard from the Web GUI or the **setup tdm** command from the ACLI to complete the configuration.

- Confirm the presence of the single-port PRI interface on the Acme Packet 1100.

Note that because the single-port interface supports only one profile, you can set either **pri_cpe** (Customer Premises Equipment) or **pri_net** (Network) for signaling. The setting you choose depends on the setting at the other end of the connection. Set this configuration to the opposite of the other end. For example, when the setting at the other end is **pri_net**, set **pri_cpe** in this configuration.

> **Note:**
>
> The system requires the four-port interface to support profiles for both **pri_cpe** and **pri_net**.

1. Access the **tdm-config** configuration element.

```
ORACLE# configure terminal
ORACLE(configure)# system
ORACLE(system)# tdm-config
ORACLE(tdm-config)#
```

2. In **tdm-config**, set the following:

state	Set to **enable** to allow TDM operations.
logging	Set to **enable** to allow logging.
line-mode	Set either t1 (North America) or e1 (Europe).
tone-zone	Set the TDM tone zone. Valid values: ae | ar | at | au | be | bg | br | ch | cn | cr | cz | de | dk | ee | es | fi | fr | gr | hu | il | in | it | jp | lt | mo | mx | my | nl | no | nz | pa | ph | pl | pt | ru | se | sq | th | tw | uk | us | us-old | ve | za. Default: us.
calling-pres	Set the type of call ID presentation for this profile. Valid values: allowed_not_screened | allowed_failed_screen | allowed_passed_screen | prohib_not_screened | prohib_passed_screen | prohib_failed_screen | prohib | unavailable Default: allowed_not_screened
caller-ID	Set the type of caller ID for CLIP and COLP that you want for the SIP header. Valid values: no, rpid (remote-party-ID), pai (p-asserted-ID) Default: No
called-type-of-number	Set the type of Number and Numbering Plan associated with Called Party information. Valid values: unknown | local | national | international | dynamic.
calling-typre-of-number	Set the type of Number and Numbering Plan associated with Calling Party information. Valid values: unknown | local | national | international | dynamic.

3. In **tdm-profile**, set the following:

Name	Set the name for this TDM profile.
Signaling	Do one of the following: • Set pri_net when you want the ESBC to represent the network side of the connection. • Set pri_cpe when you want the ESBC to represent the Customer Premises Equipment side of the connection. Default.

Switch Type	Set a switch type for this configuration. Valid values: national, dms100, 4ess, 5ess, euroisdn, ni1, qsig.
B-channel	Set the B channel value according to the line mode that you specified for this configuration. • For t1: 1-23 • For e1: 1-15,17-31
D-channel	Set the D channel value according to the line mode that you specified for this configuration. • For t1: 24 • For e1: 16
Span Number	Set the span number to 1.
Route Group	Set the number of the associated route group to use this profile. Valid values: 0-63.
Line Build Out	Set the decibel (db) level per foot of line length. Valid values: 0-7. 0db up to 133 feet. Increment by 1db/133 feet after 133 feet. For example, 2db for 266-399 feet.
Framing Value	Set the framing value according to the line mode that you specified for this configuration. • For t1: esf • For e1: ccs
Coding Value	Set the coding value according to the line mode that you specified for this configuration. • For t1: b8zs • For e1: hdb3
CRC4 Checking	For e1, only. Enable or disable crc4-checking to match the setting of the PBX or service provider. Default: Disabled.
Time Source	Set the timing source. Valid values: 0-4. Default: 1. • 0—The interface provides its own timing. • 1—The interface receives timing from the remote end. • 2—The interface receives secondary timing from the remote end. • 3—The interface receives tertiary backup timing from the remote end. • 4—The interface receives quaternary backup timing from the remote end.
RX Gain	Set the decibel level that increases or decreases the TDM receiving channel volume.

	Valid values: 0.0-9.9. Default: 0.0.
TX Gain	Set the decibel level that increases or decreases the TDM transmitting channel volume. Valid values: 0.0-9.9. Default: 0.0.
Echo Cancellation	Enable or disable echo cancellation.
Overlap Dial	Set the overlap dialing function to either **no** or **incoming**, where incoming means yes.
Incoming Pattern	Set a list of extension numbers or match patterns. Separate single extension numbers with the vertical bar (|) character. A pattern starts with the underscore (_) character. In an extension pattern, note the meaning of the following characters: X matches any digit from 0-9 Z matches any digit from 1-9 N matches any digit from 2-9 [1237-9] matches any digit in the brackets (in this example, 1,2,3,7,8,9). . wildcard matches one or more characters ! wildcard matches zero or more characters immediately Syntax examples: Suppose the main number is 800-555-1234, one key extension is number 80, and the range of other extensions is from 8100-8399. • Match the exact number including the extension: 800555123480 • Match the extension in a range: _80055512348[1-3]XX • Match the exact number including the extension or match an extension in a range: 800555123480|_80055512348[1-3]XX

4. Type **done** to save the configuration.

- Run the TDM configuration wizard.
- Configure the inbound and outbound TDM local policies.

Configure the Four-Port Primary Rate Interface

The Acme Packet 1100 and the Acme Packet 3900 support the four-port ISDN Primary Rate Interface (PRI) for carrying multiple Digital Signal 0 (DS0) voice and data transmissions between the network and an endpoint. To configure the PRI interface, you must set the parameters in **tdm-config** and **tdm-profile** under **system**. After you create the configuration, you must run either the **Set TDM Configuration** wizard from the Web GUI or the **setup tdm** command from the ACLI to complete the configuration.

- Confirm the presence of the four-port PRI.
- Plan the number of TDM profiles that you want. (You can add or delete profiles later, if your needs change.)

When the Oracle® Enterprise Session Border Controller (ESBC) detects the PRI interface, it displays the corresponding configuration parameters. In the PRI configuration, the line mode

that you specify dictates certain corresponding settings. You can set either t1 or e1 for line-mode, but note that each one requires certain uniquely compatible settings. For example, when you specify the t1 line mode you must specify esf for the framing-value. Do not specify an e1 value for the t1 line mode or a t1 value for the e1 line mode. The following procedure shows the specific t1 and e1 settings, where required.

1. Access the **tdm-config** configuration element.

```
ORACLE# configure terminal
ORACLE(configure)# system
ORACLE(system)# tdm-config
ORACLE(tdm-config)#
```

2. In **tdm-config**, set the following:

state	Set to **enable** to allow TDM operations.
logging	Set to **enable** to allow logging.
line-mode	Set either **t1** (North America) or **e1** (Europe).
tone-zone	Set the TDM tone zone. Valid values: ae | ar | at | au | be | bg | br | ch | cn | cr | cz | de | dk | ee | es | fi | fr | gr | hu | il | in | it | jp | lt | mo | mx | my | nl | no | nz | pa | ph | pl | pt | ru | se | sq | th | tw | uk | us | us-old | ve | za. Default: us.
calling-pres	Set the type of call ID presentation for this profile. Valid values: allowed_not_screened, allowed_failed_screen, allowed_passed_screen, prohib_not_screened, prohib_passed_screen, prohib_failed_screen, prohib, unavailable. Default: allowed_not_screened
caller-ID	Set the type of caller ID for CLIP and COLP for this profile. Valid values: no, rpid (remote-party-ID), pai (p-asserted-ID) Default: No
called-type-of-number	Set the type of Number and Numbering Plan associated with Called Party information. Valid values: unknown | local | national | international | dynamic.
calling-typre-of-number	Set the type of Number and Numbering Plan associated with Calling Party information. Valid values: unknown | local | national | international | dynamic.

3. In **tdm-profile**, set the following:

Name	Set the name for this TDM profile.
Signaling	Do one of the following: • Set pri_net when you want the ESBC to represent the network side of the connection. • Set pri_cpe when you want the ESBC to represent the Customer Premises Equipment side of the connection. Default.
Switch Type	Set a switch type for this configuration. Valid values: national, dms100, 4ess, 5ess, euroisdn, ni1, qsig.

B-channel	Set the B channel value according to the line mode that you specified for this configuration. • For t1: 1-23 • For e1: 1-15,17-31
D-channel	Set the D channel value according to the line mode that you specified for this configuration. • For t1: 24 • For e1: 16
Span Number	Set the number of the spans affected by this profile. Valid values: Single numbers 1-4. Any combination of 1,2,3,4 comma separated.
Route Group	Set the number of the associated route group to use this profile. Valid values: 0-63.
Line Build Out	Set the decibel (db) level per foot of line length. Valid values: 0-7. 0db up to 133 feet. Increment by 1db/133 feet after 133 feet. For example, 2db for 266-399 feet.
Framing Value	Set the framing value according to the line mode that you specified for this configuration. • For t1: esf • For e1: ccs
Coding Value	Set the coding value according to the line mode that you specified for this configuration. • For t1: b8zs • For e1: hdb3
CRC4 Checking	For e1, only. Enable or disable crc4-checking to match the setting of the PBX or service provider. Default: Disabled.
Time Source	Set the timing source. Valid values: 0-4. Default: 1. • 0—The interface provides its own timing. • 1—The interface receives timing from the remote end. • 2—The interface receives secondary timing from the remote end. • 3—The interface receives tertiary backup timing from the remote end. • 4—The interface receives quaternary backup timing from the remote end.
RX Gain	Set the decibel level that increases or decreases the TDM receiving channel volume.

	Valid values: 0.0-9.9. Default: 0.0.
TX Gain	Set the decibel level that increases or decreases the TDM transmitting channel volume. Valid values: 0.0-9.9. Default: 0.0.
Echo Cancellation	Enable or disable echo cancellation.
Overlap Dial	Set the overlap dialing function to either **no** or **incoming**, where incoming means yes.
Incoming Pattern	Set a list of extension numbers or match patterns. Separate single extension numbers with the vertical bar (|) character. A pattern starts with the underscore (_) character. In an extension pattern, note the meaning of the following characters: X matches any digit from 0-9 Z matches any digit from 1-9 N matches any digit from 2-9 [1237-9] matches any digit in the brackets (in this example, 1,2,3,7,8,9). . wildcard matches one or more characters ! wildcard matches zero or more characters immediately Syntax examples: Suppose the main number is 800-555-1234, one key extension is number 80, and the range of other extensions is from 8100-8399. • Match the exact number including the extension: 800555123480 • Match the extension in a range: _80055512348[1-3]XX • Match the exact number including the extension or match an extension in a range: 800555123480|_80055512348[1-3]XX

4. Type **done** to save the configuration.

- Run the TDM configuration wizard.
- Configure the inbound and outbound TDM local policies.

Backward Compatibility for Multiple TDM Profiles

Suppose you configured the Primary Rate Interface (PRI) in a previous release that did not support multiple Time Division Multiplexing (TDM) profiles. Later, you upgraded to a release that supports multiple TDM profiles, and rebooted. The system sets route-group to 0 and span-number to 1,2,3,4 (on a 4 span card). The result is that all spans remain configured as before, when a single tdm-profile was the only possible configuration. The system routes through the same TDM profile as before the upgrade. If you want to route to specific spans after the upgrade, you can create TDM profiles for specific spans or refer to the exact span number in the next-hop (tdm:span:<number>) parameter under local-policy.

4

Basic Rate Interface Configuration

The Acme Packet 1100 supports the optional analog Euro-ISDN Basic Rate Interface (BRI) interface for lower call-volume customers who want to connect their BRI Lines, analog trunk lines, analog phones, fax machines, and other analog communications devices to their IP PBX/IP telephony systems. The BRI interface supports fewer channels than the Primary Rate Interface (PRI) interface, but it can support two calls at the same time on one line. The BRI interface supports 2 b-channels for voice and user data at 128 Kbit/s and 1 d-channel for signaling.

When the system detects the BRI the interface, it displays the corresponding configuration parameters in **tdm-config** and **tdm-profile**. The **tdm-config** element supports creating multiple TDM profiles with different names, so that you can create more than one BRI span configuration for more targeted routing. The **tdm-profile** sub-element supports enabling a particular span as the timing source, enabling echo cancellation for improved audio quality, and assigning profiles to routing groups. When configuring multiple tdm-profiles, you can create a profile for each span individually or assign multiple spans to one profile. You can assign the profiles to a route group with either the same number or a different number per profile. For example you can configure a call to go to tdm:profileName, tdm:span:1 or tdm:group:2. You can send the call to a specific tdm interface or a group of them.

Span Configuration

TDM supports up to four profiles with the BRI interface, so that you can apply a TDM profile to each span. You can configure each span exclusively or set several spans (up to four) to share the same configuration. Each span represents a physical network interface. The **span-number** parameter in **tdm-profile** indicates the interface to which the profile applies. For example, **span-number** = 1,2,3,4 means that the profile applies to all spans. **span-number** = 1 means that the profile applies only to span 1. You can specify more than one span and fewer than four spans in the same profile, for example, **span-number** = 1,2. During configuration, the system validates that a particular span is assigned to only one profile.

Signaling Configuration

Depending on your deployment, you might need the Oracle® Enterprise Session Border Controller (ESBC) to act as the customer premises equipment (CPE) side of the connection or to act as the network (NET) side of the connection.

For example:

- The ESBC can act as the NET side of the deployment and connect to a PBX.
- The ESBC can act as the CPE side of the deployment and connect to a network provider's ISDN line.

The system supports the coexistence of multiple profiles for both CPE and NET, and you can configure up to four profiles each.

Upgrade Configuration to Correct TON in TDM Deployments

The **calling-type-of-number** parameter in your **tdm-config** specifies the Type of Number (TON) the ESBC should specify within its signaling.

When upgrading from any version prior to 920p6 to any version after, the ESBC begins to include an incorrect type of number (TON) label in "prilocaldialplan" attribute when you have configured the value of the **calling-type-of-number** attribute in your **tdm-config** to **unknown**. Specifically, the ESBC begins to provide the value "national" instead of "unknown" as the TON. This issue occurs regardless of other configuration.

To resolve this issue, you configure the ESBC with the **default-tdm-calling-ton=unknown** option in the **system-config**.

```
ORACLE(system=config)#options +default-tdm-calling-ton=unknown
```

This change requires a reboot. You can satisfy this reboot requirement by setting the option before you upgrade, or by upgrading, setting the option, then rebooting.

Routing Configuration

For control over routing TDM traffic, each TDM profile includes the route-group number parameter that you can use to group profiles together for routing. You can route traffic by setting the following parameters for next-hop in the **local-policy** configuration:

next-hop = tdm:span:<number> Use span number to specify a routing endpoint.

next-hop = tdm:group:<number> Each TDM profile includes **route-group** number, so that you can group profiles together. The route-group number can address several profiles for routing. During routing, the embedded Asterisk software that the ESBC uses to connect PSTN and VoIP phone services to each other picks the first available span and the first available channel when routing to a group.

next-hop= tdm:<profileName> During configuration, the system checks to confirm that no other profile contains the same routing.

Configure the Basic Rate Interface

To configure the Basic Rate Interface (BRI) card, you must set the parameters in **TDM Config** and **TDM Profile** under **System**. Note that the system supports coexisting profiles for both **bri_cpe** (Customer Premises Equipment) and **bri_net** (Network). After you create the configuration, you must run either the **Set TDM Configuration** wizard from the Web GUI or the **Setup TDM** command from the ACLI to complete the configuration.

- Confirm the presence of the BRI interface on the Acme Packet 1100.
- Plan the number of TDM profiles that you want. (You can add or delete profiles later, if your needs change.)

When the Oracle® Enterprise Session Border Controller (ESBC) detects the BRI interface, it displays the corresponding parameters and inserts certain values that you cannot change.

1. Access the **tdm-config** configuration element.

```
ORACLE# configure terminal
ORACLE(configure)# system
ORACLE(system)# tdm-config
ORACLE(tdm-config)#
```

2. In **tdm-config**, set the following:

state	Set to **ebable** to allow TDM operations.

logging	Set to **ebable** to allow logging.
line-mode	The system sets BRI.
tone- zone	Set the tone zone. Valid values: ae | ar | at | au | be | bg | br | ch | cn | cr | cz | de | dk | ee | es | fi | fr | gr | hu | il | in | it | jp | lt | mo | mx | my | nl | no | nz | pa | ph | pl | pt | ru | se | sq | th | tw | uk | us | us-old | ve | za. Default: us.
calling- pres	Set the type of call ID presentation for this profile. Valid values: allowed_not_screened, allowed_failed_screen, allowed_passed_screen, prohib_not_screened, prohib_passed_screen, prohib_failed_screen, prohib, unavailable. Default: allowed_not_screened
caller-ID	Set the type of caller ID for CLIP and COLP that you want for this profile. Valid values: no, rpid (remote-party-ID), pai (p-asserted-ID) Default: No
called-type-of-number	Set the type of Number and Numbering Plan associated with Called Party information. Valid values: unknown | local | national | international | dynamic.
calling-typre-of-number	Set the type of Number and Numbering Plan associated with Calling Party information. Valid values: unknown | local | national | international | dynamic.

3. In **tdm-profile**, do the following:

name	Set the name for this TDM profile.
signaling	Do one of the following: • Set bri_net, if you want the ESBC to represent the network side of the connection. • Set bri_cpe, if you want the ESBC to represent the Customer Premises Equipment side of the connection. Default.
switch-type	Set the switch type for this configuration. Valid value: euroisdn
b-channel	Set 1-2 for the B channel value.
d-channel	Set 3 for the D channel value.
span-number	Set a span list for this profile. Separate multiple spans with commas. Default: 1.
route-group	Set the number of the associated route group to use this profile. Valid values: 0-63.
line-build-out	Set the decibel (db) level per foot of line length. Valid values: 0-7. 0db up to 133 feet. Increment by 1db/133 feet after 133 feet. For example, 2db for 266-399 feet.
framing-value	Set the framing value to **ccs**.

coding-value	Set the framing value to **hdb3**.
term-resistance	Enable or disable terminating resistance. Default: Disabled. • Enable terminating resistance when the ESBC operates as the CPE side. For example, the ESBC is a terminal endpoint connecting to a Telco through NT1. • Disable terminating resistance when the ESBC operates as the NET side, and you encounter difficulties establishing a link to the terminal endpoint. For example, the ESBC is emulating a Telco line.
time-source	Set the timing source. Valid values: 0-4. Default: 1. • 0—The card provides its own timing. • 1—The card receives timing from the remote end. • 2—The card receives secondary timing from the remote end. • 3—The card receives tertiary backup timing from the remote end. • 4—The card receives quaternary backup timing from the remote end.
rx-gain	Set the decibel level that increases or decreases the TDM receiving channel volume. Valid values: 0.0-9.9. Default: 0.0.
tx-gain	Set the decibel level that increases or decreases the TDM transmitting channel volume. Valid values: 0.0-9.9. Default: 0.0.
echo-cancellation	Enable or disable echo cancellation.
overlap-dial	Set the overlap dialing function to either **no** or **incoming**.
incoming-pattern	Set a list of extension numbers or match patterns. Separate single extension numbers with the vertical bar (|) character. A pattern starts with the underscore (_) character. In an extension pattern, note the meaning of the following characters: X matches any digit from 0-9 Z matches any digit from 1-9 N matches any digit from 2-9 [1237-9] matches any digit in the brackets (in this example, 1,2,3,7,8,9). . wildcard matches one or more characters ! wildcard matches zero or more characters immediately Syntax examples: Suppose the main number is 800-555-1234, one key extension is number 80, and the range of other extensions is from 8100-8399. • Match the exact number including the extension: 800555123480

- Match the extension in a range: _80055512348[1-3]XX
- Match the exact number including the extension or match an extension in a range: 800555123480|_80055512348[1-3]XX

4. Type **done** to save the configuration.

- Run the TDM configuration wizard.
- Configure the inbound and outbound TDM local policies.

5

Local Policy Configuration for Time Division Multiplexing

Time Division Multiplexing (TDM) operations require policies for directing traffic to and from the TDM realm. After configuring the parameters for the TDM interface and running the Set TDM Configuration Wizard, you must configure the local policy for traffic routing through the TDM interface. For unidirectional TDM call routing, the system requires a local policy only for the call direction that you want. For example, inbound-only or outbound-only. For bi-directional TDM call routing, create both inbound and outbound local policies. In the inbound local policy, you specify **tdmRealm** for the source realm. In the outbound local policy, you specify the **next-hop** for TDM traffic.

> **Note:**
>
> When you upgrade from a previous release in which you configured an outbound TDM policy and you want to add an inbound TDM policy to the newer release, you need only to create the local inbound policy for TDM calls. The outbound TDM policy from the previous release persists.

Configure the Inbound TDM Policy

Time Division Multiplexing (TDM) operations require policies for directing traffic to and from the TDM realm. In the following procedure, you specify the attributes for inbound TDM traffic.

- Configure TDM.

In the following procedure, the **to-address** and **from-address** can match the caller and called phone number or you can use any of the valid values noted. You must use **tdmRealm** for source-realm.

1. Access the **local-policy** configuration element.

```
ORACLE# configure terminal
ORACLE(configure)# session-router
ORACLE(session-router)# local-policy
ORACLE(local-policy)#
```

2. Set the following parameters.

from-address	Set the origin address. Valid values: <ipv4> | <ipv6> | POTS Number | E.164 Number | hostname | wildcard
to-address	Set the destination IP address. Valid values: <ipv4> | <ipv6> | POTS Number | E.164 Number | hostname | wildcard.
source-realm	Set tdmRealm as the source realm.
description	Enter a description of the policy.

state	Set state to enable. Valid values: enable | disable.
policy-priority	Set the priority of the policy. Valid values: none | normal | urgent | non-urgent | emergency.
policy-attributes	Set the following policy attributes: • next hop. Set the next hop. Valid values: Only for the PRI and BRI interfaces—**next-hop tdm:span:<number>** Only for the Analog interface—**next-hop tdm:channel:<number>** **next-hop tdm:group:<number>** **next-hop tdm:<profileName>** • realm: Set the realm for the next hop. • action: Set the action to take. Valid values: none | redirect | replace-uri. Default: none. • cost: Set the cost. Range: 0-999999999. Default: 0.

3. Type **done** to save your configuration.

- If your deployment requires an outbound TDM policy, see "Configure the Outbound TDM Policy."

Configure the Outbound TDM Policy

Time Division Multiplexing (TDM) operations require policies for directing traffic to and from the TDM realm. In the following procedure, you specify the attributes for outbound TDM traffic.

For the **next-hop:tdm** attribute, note that span and channel hops depend on the interface.

1. Access the **local-policy** configuration element.

```
ORACLE# configure terminal
ORACLE(configure)# session-router
ORACLE(session-router)# local-policy
ORACLE(local-policy)#
```

2. Set the following parameters.

from-address	Set the origin address. Valid values: <ipv4> | <ipv6> | POTS Number | E.164 Number | hostname | wildcard
to-address	Set the destination IP address. Valid values: <ipv4> | <ipv6> | POTS Number | E.164 Number | hostname | wildcard.
source-realm	Set the source realm.
description	Enter a description of the policy.
state	Set state to enable. Valid values: enable | disable.
policy-priority	Set the priority of the policy. Valid values: none | normal | urgent | non-urgent | emergency.
policy-attributes	Set the following policy attributes:

- next hop. Set the next hop. Valid values:
  For the PRI and BRI interfaces—**next-hop tdm:span:<number>**

  For the Analog interface—**next-hop tdm:channel:<number>**

  next-hop tdm:group:<number>

  next-hop tdm:<profileName>
- realm: Set the realm for the next hop.
- action: Set the action to take. Valid values: none | redirect | replace-uri. Default: none.
  Do not set the replace-uri action when routing to a TDM interface.
- cost: Set the cost. Range: 0-999999999. Default: 0.

3. Type **done** to save your configuration.

- If your deployment requires an inbound TDM local policy, see "Configure the Inbound TDM Policy."

6

FXO-FXS Support

The Acme Packet 1100 supports using Foreign Exchange Office-Foreign Exchange Subscriber (FXO-FXS) interfaces in the U.S. to connect analog devices, such as fax machines, to a VoIP network. The FXO-FXS interfaces provide a way for you to direct traffic to a specific analog endpoint by creating a unique profile per channel. FXO-FXS support requires the optional transcoding Digital Signaling Processor (DSP) for reliable fax transmission with transcoding.

FXO-FXS Configuration

When the system detects the Foreign Exchange Office-Foreign Exchange Subscriber (FXO-FXS) interfaces, it displays the **fxo-profile** and **fxs-profile** sub-elements in **tdm-config**.

You can configure one or more profiles each for FXO and FXS interface, which allows you to configure different attributes. For example, you might create one profile named for the fax machine in the purchasing department and another named for the fax machine in the shipping department. The FXS card supports channels 1-4 and the FXO card supports channels 5-8. You can create separate a **fxo-profile** and **fxs-profile** for each channel, or for several channels. For example, you can set one FXO profile for channel 5 and another for channels 6-8. You can also group the profiles for routing purposes. You can assign the profiles to a route group with either the same number or a different number per profile.

For control over routing TDM traffic, each TDM profile includes the **route-group** number parameter that you can use to group profiles together for routing. You can route traffic by setting the following parameters for **next-hop** in the **local-policy** configuration:

next-hop = tdm:channel:<number> Use channel number to specify routing endpoints.

next-hop = tdm:group:<number> Each TDM profile includes **route-group** number, so that you can group profiles together. The route-group number can address several profiles for routing. During routing, the embedded Asterisk software that the ESBC uses to connect PSTN and VoIP phone services to each other picks the first available span and the first available channel when routing to a group.

next-hop= tdm:<profileName> During configuration, the system checks to confirm that no other profile contains the same routing.

Echo cancellation, which is beneficial for voice transmissions, is not beneficial for data transmissions such as fax. You can configure the system to detect the fax tone, disable the echo canceller, and set the gain to zero to avoid any distortion in the communication to the Foreign Exchange Office-Foreign Exchange Subscriber (FXO-FXS) cards.

Add an FXO-FXS Profile

When your deployment requires Foreign Exchange Office-Foreign Exchange Subscriber (FXO-FXS) profiles, you can add up to four profiles each to support different attributes at different endpoints. For example, you might create profiles based on user name, department, location, and so on. You can create FXO profiles only, FSO profiles only, or both. To configure the FXO-FXS profiles, go to **TDM Config** under **System**, and create the profiles that you need.

- Requires the FXO-FXS interface

The configuration process includes configuring **TDM Config** and a corresponding **FXO Profile** or **FXS Profile**.

1. Access the **tdm-config** configuration element.

```
ORACLE# configure terminal
ORACLE(configure)# system
ORACLE(system)# tdm-config
ORACLE(tdm-config)#
```

2. In **tdm-config**, set the following:

state	Enable or disable the configuration. Default: Disabled.
logging	Enable or disable logging. Default: Disabled.
line mode	The system sets Analog, when it detects the FXO-FXS interface.
tone zone	Set the tone zone value. Default: us. Valid values: ae | ar | at | au | be | bg | br | ch | cn | cr | cz | de | dk | ee | es | fi | fr | gr | hu | il | in | it | jp | lt | mo | mx | my | nl | no | nz | pa | ph | pl | pt | ru | se | sq | th | tw | uk | us | us-old | ve | za. Default: us.
caller id	Set the type of caller ID for CLIP and COLP that you want for this profile. Default: No. Valid values: no, rpid (remote-party-ID), pai (p-asserted-ID).
called-type-of-number	Set the type of Number and Numbering Plan associated with Called Party information. Valid values: unknown | local | national | international | dynamic.
calling-type-of-number	Set the type of Number and Numbering Plan associated with Calling Party information. Valid values: unknown | local | national | international | dynamic.

3. For each **fxo-profile** and **fxs-profile** that you want to create, set the following:

name	Enter a name for this profile.
channels	Enter the channels that apply to this profile. You can enter any combination of the four that apply to the particular card. • FXS—1,2,3,4 • FXO—5,6,7,8
rx-gain	Set the TDM receive volume in decibels. Default: 0.0. Valid values: 0.0-9.9.
tx-gain	Set the TDM transmit volume in decibels. Default: 0.0. Valid values: 0.0-9.9.
echo-cancellation	Enable or disable. Default: Enabled.
fax-detect	For fax transcoding, set fax-detect to one of the following: • both (default) • incoming • outgoing

	• no
route-group	Enter the number of the route-group for this profile. Range: 0-63.
signaling	Set the signaling type. • For the fxo-profile—Valid values: fxs_ls, fxs_gs, fxs_ks. Default: fxs_ks. • For the fxs-profile—Valid values: fxo_ls, fxo_gs, fxo_ks. Default: fxo_ks.
phone-number	Enter the caller's number. Required.
full-name	Enter the caller's name.
cid-signaling	Set the caller ID signaling type. Default: Bell. Valid values: Bell, v23, v23_ip, dtmf, of smdi.

4. Type **done** to save the configuration.

- Run the TDM Configuration Wizard.
- Configure the inbound and outbound TDM local policies.

FXO Port Tuning Support

The Acme Packet 1100 supports Foreign Exchange Office (FXO) port tuning because the on-board echo canceller might not work efficiently under some circumstances. For example, the hybrids on the analog line cause echo while converting between 2 and 4 wires, and the long cable plants yield imperfect impedance matches. Tuning the FXO ports can reduce the echo and mitigate the quality issues by calibrating the line impedance, which helps the echo canceler to work more efficiently. Oracle recommends tuning the FXO port whenever you detect an audible voice quality issue.

Perform FXO Port Tuning

Tuning the Foreign Exchange Office (FXO) ports can help the echo canceller to work more efficiently. The **setup fxotune run** command creates the fxotune configuration file, which contains the script that fine tunes the Digium Asterisk Hardware Device Interface (DAHDI) FXO channels, and restarts the system. The tuning takes place during the restart. After FXO tuning, the system saves the result in a configuration file that is automatically applied after each subsequent restart. No additional user action is necessary.

- Configure one or more FXO profiles and activate the configuration.

Note that the following procedure requires a system restart, which can take longer than usual due to the tuning process.

1. From the command line, type **setup fxotune run**.
2. Restart the ESBC.

Reset the FXO Port Tuning Defaults

If you ever want to reset the **setup fxotune run** boot parameter, use the **setup fxotune reset** command. The command resets the boot parameter for **setup fxotune run** to the default tuning values and removes the fxotune configuration file.

Note that the following procedure requires a system restart.

1. From the command line, type **setup fxotune reset**.
2. Restart the ESBC.

7

Fax Transcoding Support for the Acme Packet 1100

When equipped with the Foreign Exchange Office-Foreign Exchange Subscriber (FXO-FXS) interface and a transcoding Digital Signal Processor (DSP), the Acme Packet 1100 can transcode analog fax calls into the T.38 codec for better transmission quality. When the DSP detects Fax tones, it triggers the Oracle® Enterprise Session Border Controller (ESBC) to ask the Fax gateway to switch to the T.38 codec. You must configure the ESBC, by way of codec policies, local policies, and realm configurations, to accept the T.38 codec and let the DSP detect the fax tone to trigger the codec negotiation.

For more information about transcoding, see the *ACLI Configuration Guide*.

Configure Fax Transcoding for the Acme Packet 1100

The system requires two codec policies, two local policies, and two realms to support fax transcoding.

- Before you begin, configure one realm that points to the Internet and one realm that points to the Time Division Multiplexing (TDM) interface.

For example, suppose you name the internet-facing codec policy "Remote" and you name the TDM-facing codec policy "TDM." Use the following guidelines for configuration:

Codec policies

- In the "Remote" **codec-policy**, set **allow-codecs** to **T.38 PCMU PCMA** and set **add-codecs-on-egress** to **T.38OFD**.
- In the "TDM" **codec-policy**, set **allow-codecs** to **PCMU PCMA** and set **add-codecs-on-egress** to **G711FB**.

Local Policies

- In the "Remote" **local-policy**, set **source-realm** to **remote**.
- In the "TDM" **local-policy**, set **source-realm** to **tdmRealm**.

Realms

- In the "Remote" **realm-config**, set **identifier** to **remote**, set the **codec-policy** type, and set **codec-manip-in-realm** to **enabled**.
- In the "TDM" **realm-config**, set **identifier** to **tdmRealm**, set the **codec-policy** type, and set **codec-manip-in-realm** to **enabled**.

8

Overlap Dialing for Call Routing

Some countries use variable length numbers in call plans, which can cause the Oracle® Enterprise Session Border Controller (ESBC) to trigger the SIP INVITE before all of the digits arrive. Overlap dialing provides a mechanism that the Acme Packet 1100 and Acme Packet 3900 can use in a Time Division Multiplexing (TDM)-to-SIP deployment to wait for all of the digits and answer a Q.931 SETUP message with the SETUP ACKNOWLEDGE instead of an immediate PROCEEDING or ALERTING message.

Without overlap dialing enabled, the Acme Packet 1100 and Acme Packet 3900 consider only the digits in the SETUP message and ignore subsequent digits. The behavior causes the Acme Packet 1100 and Acme Packet 3900 to build the SIP INVITE too soon and the SIP call either stops or connects to the wrong destination.

With overlap dialing enabled, the Acme Packet 1100 and Acme Packet 3900 can work with the information in the SETUP message. When the SETUP message contains no "Sending Complete" element, the system waits for three seconds to receive an additional digit. Each additional digit restarts the digit collection timer until all digits are collected. The system creates the SIP INVITE only after collecting all of the digits, resulting in successful calls.

In some circumstances, even three seconds might be too short to collect all of the digits. The system may need more time, but the underlying hardware does not allow you to alter the digit collection time span. You can extend the digit collection time span by way of the software with the **incoming-pattern** parameter in the **tdm-profile** configuration. When the collected digits do not map to a pattern, for example when a number is longer than the pattern, the system triggers a longer timer. With the **incoming-pattern** set, the system can respond in the following ways:

- The number does not match any pattern—The digit collection timer waits up to eight seconds for more digits. If the timer expires before collecting the necessary digits, the system releases the call. If the system receives more digits, the extension matching procedure repeats.
- The number matches a pattern and there might be enough digits received to route the call, but the match is still ambiguous—The digit collection timer waits three seconds for more digits. If the timer expires, the system sends the SIP INVITE. If the system receives more digits, the extension matching procedure repeats.
- The number matches, does not allow any more digits, and no other pattern would match even if more digits were received—The system sends the SIP INVITE without waiting.

Configuration

The configuration process includes setting the following parameters in **tdm-profile**:

- Set the **overlap-dial** parameter to **incoming** to enable overlap dialing.
- Specify the match pattern in the **incoming-pattern** parameter. See "Incoming Call Patterns for TDM" for rules and syntax.

> **Note:**
>
> Overlap dialing does not prevent **en-bloc** dialing from working.

Supported Platforms

Acme Packet 1100—with the single-port or four-port PRI interface, the four-port Euro ISDN BRI interface, and the analog interface

Acme Packet 3900—with the four-port PRI interface.

Configure Overlap Dialing for Call Routing

When you enable overlap dialing and set the incoming match pattern, the Oracle® Enterprise Session Border Controller (ESBC) can work with the information in the SETUP message to successfully route calls through the Primary Rate Interface (PRI) and Basic Rate Interface (BRI) in a Time Division Multiplexing (TDM) deployment.

- Plan the match patterns that you want for incoming calls. See "Incoming Call Patterns Guidelines" for rules and syntax.
- Confirm that the **TDM Profile** that you want to enable for overlap dialing exists.

> **Note:**
>
> If the **TDM Profile** that you want does not exist, you can set the **Overlap Dial** and **Incoming Pattern** parameters when you create the profile. The following procedure assumes the profile already exists.

Access **TDM Config** and use the **TDM Profile** sub-element to set the **OverlapDial** and **Incoming Pattern** parameters.

1. Access the **tdm-profile** configuration element.

```
ORACLE# configure terminal
ORACLE(configure)# system
ORACLE(system)# tdm-config
ORACLE(tdm-config)# tdm-profile
```

2. Type **select** to display the existing **tdm-profile** objects.

   For example:

```
ORACLE(tdm-profile)# select
<name>:
1: profile 1
2: profile 2
3: profile 3
4: profile 4

selection:1
ORACLE(tdm-profile)#
```

3. Select the TDM profile that you want.
4. Set the **Overlap Dial** parameter to **Incoming**.
5. Set a list of extension numbers or match patterns for the **Incoming Pattern** parameter.

Separate single extension numbers with the vertical bar (|) character. A pattern starts with the underscore (_) character. In an extension pattern, note the meaning of the following characters:

X matches any digit from 0-9

Z matches any digit from 1-9

N matches any digit from 2-9

[1237-9] matches any digit in the brackets (in this example, 1,2,3,7,8,9).

. wildcard matches one or more characters

! wildcard matches zero or more characters immediately

Syntax examples:
Suppose the main number is 800-555-1234, one key extension is number 80, and the range of other extensions is from 8100-8399.

- Match the exact number including the extension: 800555123480
- Match the extension in a range: _80055512348[1-3]XX
- Match the exact number including the extension or match an extension in a range: 800555123480|_80055512348[1-3]XX

6. Type **done** to save the configuration.

9

ACLI Show Commands for TDM

Time Division Multiplexing (TDM) uses a unique set of ACLI "show" commands to provide information about the TDM configuration and its operations.

The following TDM "show" commands work only on the Acme Packet 1100 and Acme Packet 3900 platforms with a TDM card installed. No other Oracle® Enterprise Session Border Controller platforms recognize the TDM "show" commands. Oracle recommends using show commands for troubleshooting, and only with guidance from Oracle support technicians.

show running-config tdm-config	Displays the tdm-config element, which is located under system.
show running-config tdm-profile	Displays the tdm-profile sub-element, which is located under tdm-config.
show tdm spans	Displays the following states for TDM spans: • Active—The span is powered. • Down—The span is not connected. • In alarm—The connected span is down. • Up—The span is connected.
show tdm <span # >	Displays the state and configuration profile of a specified span.
show tdm channels	Displays the following information about the TDM channels: • Context—Incoming TDM calls = from-pstn. Outgoing TDM calls = from-sbc. • State—The status of the TDM channels, for example, In Service.
show tdm channel #	Displays the profile of the specified channel.
show tdm status	Displays the enablement status of State and Logging, plus the TDM profile.
show tdm dialplan	Displays the TDM dial plan.