

Oracle® Enterprise Session Border Controller

Time Division Multiplexing Configuration Guide



Release E-CZ8.1.0
F20166-02
November 2020

The Oracle logo, consisting of a solid red square with the word "ORACLE" in white, uppercase, sans-serif font centered within it.

ORACLE®

F20166-02

Copyright © 2013, 2020, Oracle and/or its affiliates.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs (including any operating system, integrated software, any programs embedded, installed or activated on delivered hardware, and modifications of such programs) and Oracle computer documentation or other Oracle data delivered to or accessed by U.S. Government end users are "commercial computer software" or "commercial computer software documentation" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, reproduction, duplication, release, display, disclosure, modification, preparation of derivative works, and/or adaptation of i) Oracle programs (including any operating system, integrated software, any programs embedded, installed or activated on delivered hardware, and modifications of such programs), ii) Oracle computer documentation and/or iii) other Oracle data, is subject to the rights and limitations specified in the license contained in the applicable contract. The terms governing the U.S. Government's use of Oracle cloud services are defined by the applicable contract for such services. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Inside are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Epyc, and the AMD logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Contents

About This Guide

1 Time Division Multiplexing

2 Time Division Multiplexing Configuration

TDM Configuration Restart Guidelines 2-2

Incoming Call Pattern Guidelines 2-4

3 Primary Rate Interface Configuration

Configure the Single-Port Primary Rate Interface 3-2

Configure the Four-Port Primary Rate Interface 3-5

Backward Compatibility for Multiple TDM Profiles 3-8

4 Basic Rate Interface Configuration

Configure the Basic Rate Interface 4-2

5 Local Policy Configuration for Time Division Multiplexing

Configure the Inbound TDM Policy 5-1

Configure the Outbound TDM Policy 5-2

6 FXO-FXS Support

FXO-FXS Configuration 6-1

Add an FXO-FXS Profile 6-1

FXO Port Tuning Support 6-3

Perform FXO Port Tuning 6-3

Reset the FXO Port Tuning Defaults 6-4

7	Fax Transcoding Support for the Acme Packet 1100	
	Configure Fax Transcoding for the Acme Packet 1100	7-1
8	Overlap Dialing for Call Routing	
	Configure Overlap Dialing for Call Routing	8-2
9	ACLI Show Commands for TDM	

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 documents included in the Oracle® Enterprise Session Border Controller (E-SBC) E-CZ8.1.0 documentation set.

ACLI Configuration Guide	Contains conceptual and procedural information for configuring, administering, and troubleshooting the E-SBC.
Administrative Security Guide	Contains conceptual and procedural information for supporting the Admin Security license, the Admin Security ACP license, and JITC on the E-SBC.
Call Traffic Monitoring Guide	Contains conceptual and procedural information for configuration using the tools and protocols required to manage call traffic on the E-SBC.
FIPS Compliance Guide	Contains conceptual and procedural information about FIPS compliance on the E-SBC.
HMR Guide	Contains conceptual and procedural information for header manipulation. Includes rules, use cases, configuration, import, export, and examples.
Installation and Platform Preparation Guide	Contains conceptual and procedural information for system provisioning, software installations, and upgrades.
Release Notes	Contains information about the E-CZ8.1.0 release, including platform support, new features, caveats, known issues, and limitations.
Time Division Multiplexing Guide	Contains the concepts and procedures necessary for installing, configuring, and administering Time Division Multiplexing (TDM) on the Acme Packet 1100 and the Acme Packet 3900.
Web GUI User Guide	Contains conceptual and procedural information for using the tools and features of the E-SBC Web GUI.

Related Documentation

The following table describes related documentation for the Oracle® Enterprise Session Border Controller (E-SBC). You can find the listed documents on <http://>

docs.oracle.com/en/industries/communications/ in the "Session Border Controller Documentation" and "Acme Packet" sections.

Accounting Guide	Contains information about the E-SBC accounting support, including details about RADIUS accounting.
ACLI Reference Guide	Contains explanations of how to use the ACLI, as an alphabetical listings and descriptions of all ACLI commands and configuration parameters.
Acme Packet 1100 Hardware Installation Guide	Contains information about the hardware components and features of the Acme Packet 1100, as well as conceptual and procedural information for installation, start-up, operation, and maintenance.
Acme Packet 3900 Hardware Installation Guide	Contains information about the hardware components and features of the Acme Packet 3900, as well as conceptual and procedural information for installation, start-up, operation, and maintenance.
Acme Packet 4600 Hardware Installation Guide	Contains information about the hardware components and features of the Acme Packet 4600, as well as conceptual and procedural information for installation, start-up, operation, and maintenance.
Acme Packet 6300 Hardware Installation Guide	Contains information about the hardware components and features of the Acme Packet 6300, as well as conceptual and procedural information for installation, start-up, operation, and maintenance.
HDR Resource Guide	Contains information about the E-SBC Historical Data Recording (HDR) feature. This guide includes HDR configuration and system-wide statistical information.
Maintenance and Troubleshooting Guide	Contains information about E-SBC logs, performance announcements, system management, inventory management, upgrades, working with configurations, and managing backups and archives.
MIB Reference Guide	Contains information about Management Information Base (MIBs), Acme Packet'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.
Security Guide	Contains information about security considerations and best practices from a network and application security perspective for the E-SBC family of products.

Revision History

The following table lists revisions to this guide and the dates of publication.

Date	Revision
December 2017	Initial release
June 2018	<ul style="list-style-type: none"><li data-bbox="976 310 1406 394">• Edits to the "BRI Configuration", "PRI Configuration", and "FXO-FSO Configuration" topics for clarity.
August 2018	<ul style="list-style-type: none"><li data-bbox="976 403 1446 466">• Adds the Oracle accessibility statement to "About This Guide"
November 2020	<ul style="list-style-type: none"><li data-bbox="976 474 1451 701">• Adds the "Called Type of Number" and "Calling Type of Number" parameters available in 810pX and later to the "Configure the Single-Port Primary Rate Interface", "Configure the Four-Port Primary Rate Interface", "Configure the Basic Rate Interface", and "Add an FXO or FXS Profile" topics.

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 (E-SBC) 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 the configuration of **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 Subscriber Office (FXO-FXS) card.

Interface Requirements

PRI—Digium 1TE133F 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—Digium 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.

2

Time Division Multiplexing Configuration

To perform Time Division Multiplexing (TDM) operations on the Oracle® Enterprise Session Border Controller (E-SBC), 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 E-SBC. The system displays the sub-elements, as follows:
 - When the E-SBC 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 E-SBC 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 Oracle® Enterprise Session Border Controller (E-SBC) 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 E-SBC, 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:

- CLI—Use the **tdm-config**, **tdm-profile**, **fxo-profile**, and **fxs-profile** elements located under **system**.
- Web GUI—Basic mode. Double-click the TDM icon in the network diagram to display the TDM configuration dialog.
- Web GUI—Expert mode. 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 (E-SBC) 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.

Use the information in the following tables to know which parameters cause the system to restart or reload when they are changed.

tdm-config

State	Restart
Logging	No configuration change required for resetting logging
Line mode	Restart. The PRI also requires a reboot.
Tone zone	Restart
Calling pres	Reload
Caller ID	<ul style="list-style-type: none"> • 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 (E-SBC) 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 preceding the first number of the pattern. Do not use the underscore with an exact match. Type the exact match, starting with the first number. An exact match does not use 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

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 (E-SBC) 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 E-SBC can act as the NET side of the deployment and connect to a PBX.

- The E-SBC 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`.

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 E-SBC 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-type-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: <ul style="list-style-type: none"> Set pri_net when you want the E-SBC to represent the network side of the connection. Set pri_cpe when you want the E-SBC 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. <ul style="list-style-type: none"> 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.

	<ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • For t1: esf • For e1: ccs
Coding Value	Set the coding value according to the line mode that you specified for this configuration. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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	<p>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:</p> <p>X matches any digit from 0-9</p> <p>Z matches any digit from 1-9</p> <p>N matches any digit from 2-9</p> <p>[1237-9] matches any digit in the brackets (in this example, 1,2,3,7,8,9).</p> <p>. wildcard matches one or more characters</p> <p>! wildcard matches zero or more characters immediately</p> <p>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.</p> <ul style="list-style-type: none"> • 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 CLI 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 (E-SBC) 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-type-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: <ul style="list-style-type: none"> Set pri_net when you want the E-SBC to represent the network side of the connection. Set pri_cpe when you want the E-SBC 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. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • For t1: esf • For e1: ccs
Coding Value	Set the coding value according to the line mode that you specified for this configuration. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> 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 (E-SBC) 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 E-SBC can act as the NET side of the deployment and connect to a PBX.
- The E-SBC 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.

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 E-SBC 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 (E-SBC) 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 enable to allow TDM operations.
logging	Set to enable 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-type-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: <ul style="list-style-type: none"> Set bri_net, if you want the E-SBC to represent the network side of the connection. Set bri_cpe, if you want the E-SBC 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.

	<ul style="list-style-type: none"> • Enable terminating resistance when the E-SBC operates as the CPE side. For example, the E-SBC is a terminal endpoint connecting to a Telco through NT1. • Disable terminating resistance when the E-SBC operates as the NET side, and you encounter difficulties establishing a link to the terminal endpoint. For example, the E-SBC is emulating a Telco line.
time-source	<p>Set the timing source. Valid values: 0-4. Default: 1.</p> <ul style="list-style-type: none"> • 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	<p>Set the decibel level that increases or decreases the TDM receiving channel volume. Valid values: 0.0-9.9. Default: 0.0.</p>
tx-gain	<p>Set the decibel level that increases or decreases the TDM transmitting channel volume. Valid values: 0.0-9.9. Default: 0.0.</p>
echo-cancellation	<p>Enable or disable echo cancellation.</p>
overlap-dial	<p>Set the overlap dialing function to either no or incoming.</p>
incoming-pattern	<p>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:</p> <p>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</p> <p>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.</p>

- 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, you need only to create the local inbound policy for TDM calls.

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.
	<p>policy-attributes Set the following policy attributes:</p> <ul style="list-style-type: none"> 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.

- 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.

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

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

- 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	<p>Set the following policy attributes:</p> <ul style="list-style-type: none"> • 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 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 configuring 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.

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 E-SBC 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. <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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 fxtone run** command creates the fxtone 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 E-SBC.

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 E-SBC.

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 (E-SBC) to ask the Fax gateway to switch to the T.38 codec. You must configure the E-SBC, 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 (E-SBC) 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 the **tdm-profile** element:

- 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 (E-SBC) 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 **overlap dial** 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: <ul style="list-style-type: none">• 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 	Displays the state and configuration profile of a specified span.
show tdm channels	Displays the following information about the TDM channels: <ul style="list-style-type: none">• 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.