

**Oracle® Communications
Convergent Charging Controller**

CDMA U-CA-IS41 Technical Guide

Release 6.0.1

April 2017

Copyright

Copyright © 2017, Oracle and/or its affiliates. All rights reserved.

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 installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. 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 Xeon 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, Opteron, the AMD logo, and the AMD Opteron 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 Document	v
Document Conventions	vi
Chapter 1	
System Overview	1
Overview	1
What is CDMA?	1
Non-WinRoaming	3
Alarms, Statistics, Reports and EDRs	5
Chapter 2	
Configuration.....	7
Overview	7
Configuration Overview	7
eserv.config Configuration	8
cdmagw.sh Configuration	22
Chapter 3	
Background Processes	25
Overview	25
cdmagw	25
cdmagw_sua	26
cdmagw_m3ua	26
Chapter 4	
Administrative Tasks	27
Overview	27
Starting and Stopping the U-CA-IS41 (CDMA)	27
Backing up the U-CA-IS41 (CDMA) Service	28
Chapter 5	
Troubleshooting.....	29
Overview	29
Common Troubleshooting Procedures.....	29
Chapter 6	
About Installation and Removal.....	31
Overview	31
Installation and Removal Overview	31

Appendix A	
Configuring IN Call Model Triggers	33
Glossary of Terms	39
Index	47

About This Document

Scope

The scope of this document includes all the information required to install, configure and administer the U-CA-IS41 (CDMA) component. It does not include a detailed design of the service.

Audience

This guide was written primarily for system administrators and persons installing, configuring and administering the U-CA-IS41 (CDMA). However, sections of the document may be useful to anyone requiring an introduction to the application.

Prerequisites

A solid understanding of UNIX and a familiarity with IN concepts are an essential prerequisite for safely using the information contained in this technical guide. Attempting to install, remove, configure or otherwise alter the described system without the appropriate background skills, could cause damage to the system; including temporary or permanent incorrect operation, loss of service, and may render your system beyond recovery.

Although it is not a prerequisite to using this guide, familiarity with the target platform would be an advantage.

This manual describes system tasks that should only be carried out by suitably trained operators.

Related Documents

The following documents are related to this document:

- *Oracle Communications Convergent Charging Controller Service Logic Execution Environment Technical Guide*
- *Oracle Communications Convergent Charging Controller Service Management System Technical Guide*
- *Oracle Communications Convergent Charging Controller Service Management System User's Guide*
- *Oracle Communications Convergent Charging Controller Advanced Control Services Technical Guide*
- *Oracle Communications Convergent Charging Controller Advanced Control Services User's Guide*
- *Oracle Communications Convergent Charging Controller SIGTRAN Technical Guide*

Document Conventions

Typographical Conventions

The following terms and typographical conventions are used in the Oracle Communications Convergent Charging Controller documentation.

Formatting Convention	Type of Information
Special Bold	Items you must select, such as names of tabs. Names of database tables and fields.
<i>Italics</i>	Name of a document, chapter, topic or other publication. Emphasis within text.
Button	The name of a button to click or a key to press. Example: To close the window, either click Close , or press Esc .
Key+Key	Key combinations for which the user must press and hold down one key and then press another. Example: Ctrl+P or Alt+F4 .
Monospace	Examples of code or standard output.
Monospace Bold	Text that you must enter.
<i>variable</i>	Used to indicate variables or text that should be replaced with an actual value.
menu option > menu option >	Used to indicate the cascading menu option to be selected. Example: Operator Functions > Report Functions
hypertext link	Used to indicate a hypertext link.

Specialized terms and acronyms are defined in the glossary at the end of this guide.

System Overview

Overview

Introduction

This chapter provides a high-level overview of the application. It explains the basic functionality of the system and lists the main components.

It is not intended to advise on any specific Oracle Communications Convergent Charging Controller network or service implications of the product.

In this Chapter

This chapter contains the following topics.

What is CDMA?	1
Non-WinRoaming	3
Alarms, Statistics, Reports and EDRs	5

What is CDMA?

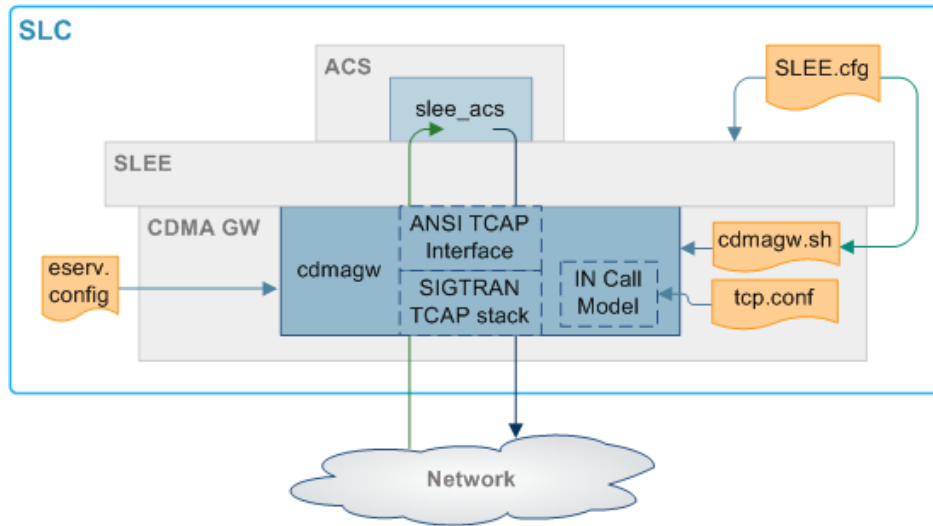
Introduction

The U-CA-IS41 (CDMA) enables operators to make use of the IS-41 protocol to provide telephone services to end users on CDMA networks.

CDMA exploits existing products and standard protocols in order to provide a cost-effective solution that potentially can be interfaced to a variety of service platforms.

Diagram

The diagram below illustrates the sub-system components that comprise the U-CA-IS41 (CDMA) service, including external interfaces.



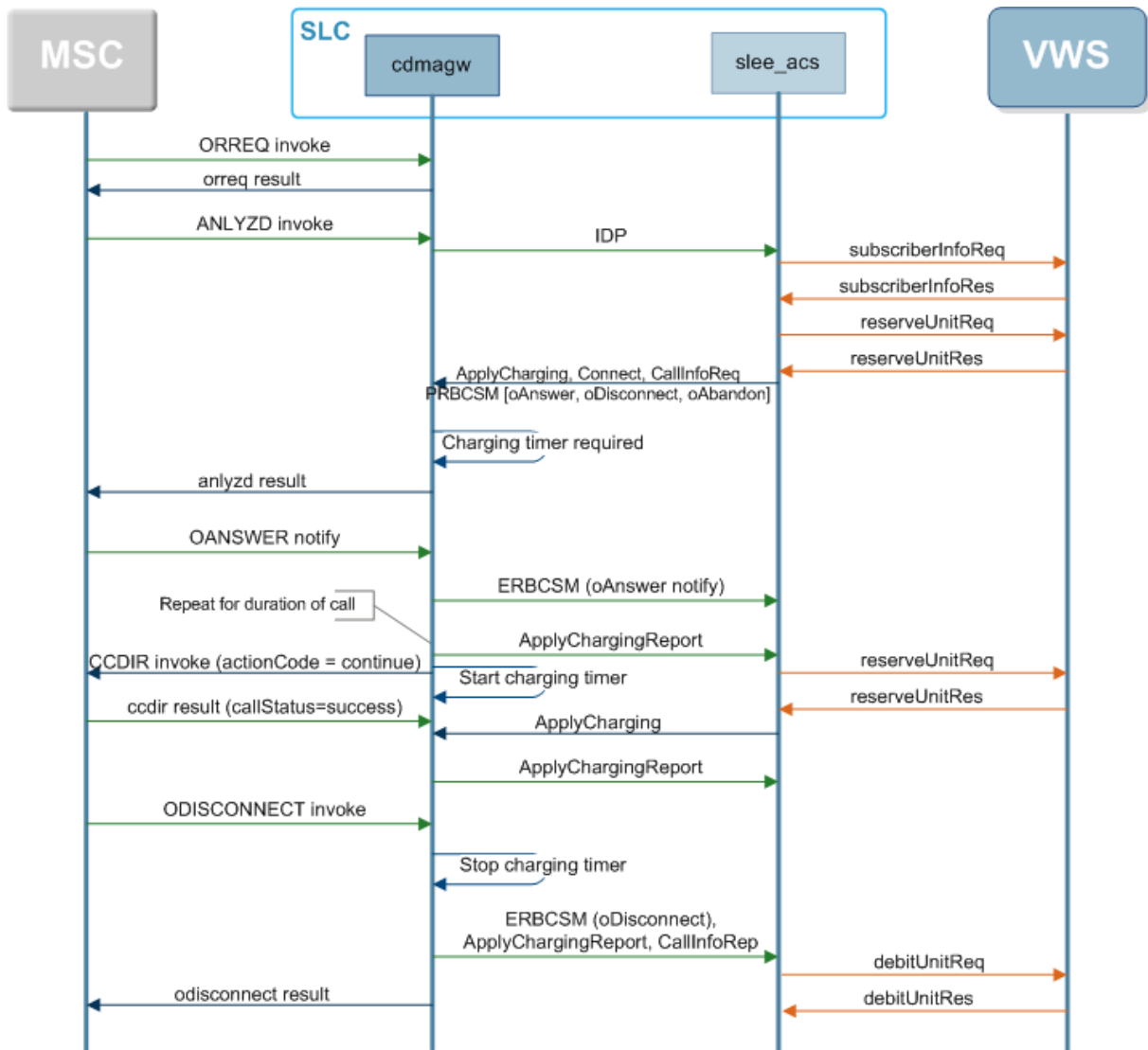
Component descriptions

This table describes the main components involved in the CDMA application.

Component	Description	Further Information
cdmagw	cdmagw is the main binary for the CDMA. It is responsible for handling CDMA interactions with MSCs and HLRs, and for triggering appropriate IN interactions to slee_acs. Supports SUA by soft linking to <i>cdmagw_sua</i> (on page 26). Supports M3UA by soft linking to <i>cdmagw_m3ua</i> (on page 26).	<i>cdmagw</i> (on page 25)
slee_acs	Provides the main call processing and service logic.	<i>ACS Technical Guide</i>

Possible processing stages

The following diagram illustrates the possible processing stages initiated by CDMA when an IS-41 message is received from the MSC, converted to INAP and forwarded to the SCF.



Non-WinRoaming

non-WinRoaming traffic

CDMA supports non-WinRoaming traffic, based on relaying pre-IS-826 calls (that is, IS-771 or earlier) from the HLR by informing the requester to retrigger to a local IS-826 capable MSC. The local MSC will then perform IS-826 interactions with the SLC, to permit real-time charging to occur.

CDMA supports real-time control of MO voice calls in a non-WIN capable VPLMN (foreign network). CDMA supports this by causing the calls in the non-WIN capable VPLMN (foreign network) to be re-routed back to the WIN-capable HPLMN (home network) for re-origination of an IS-826 controlled call.

Network element requirements

This table describes the standards compliance requirements for the network elements needed to support this solution.

Network element	Requirement specification
Foreign MSC	Must support ANSI-41 as per: <ul style="list-style-type: none"> • TIA/EIA ANSI-41D, Cellular Radiotelecommunications Intersystem Operations, December 1997 • 6.4.2.30 OriginationRequest (ORREQ) • 6.5.2.90 OriginationTriggers • OriginationTriggers contains a value for All Origination)
Home HLR	Must support the IS-771 ORREQ relay capability as per: <ul style="list-style-type: none"> • TIA/EIA IS-771, Wireless Intelligent Network, July 1999, Section 4.19.Y Successful Relay of OriginationRequest
Home MSC	Must be IS-826 WIN capable as per: <ul style="list-style-type: none"> • TIA/EIA IS-826, Wireless Intelligent Network Capabilities for Pre-paid Charging, August 2000.

Non-WinRoaming processing

This process describes how non-WinRoaming calls are handled.

Stage	Description
1	A new IS-771 call arrives at <i>cdmagw</i> (on page 25). If OriginationTriggers (ORIGTRIG) Value = All Origination, <i>cdmagw</i> attempts to apply the non-WinRoaming treatment. Otherwise <i>cdmagw</i> continues using the normal message flow (that is, it sends an empty (successful) ORREQ reply).
2	<p><i>cdmagw</i> determines the GMSC to use, based on the MSID in the call via the MSID prefix to GMSC name mapping in the file specified by <i>msidGmscFile</i> (on page 17). The <i>gmscName</i> (on page 20) is later used to determine which TSAN range to use.</p> <p>If no <i>msidGmscFile</i> is specified, this lookup is not used.</p> <p>If no GMSC is found:</p> <ul style="list-style-type: none"> • The call will be assigned the default range specified in <i>defaultTsanPool</i> (on page 13). • If no default TSANs are available, AccessDeniedReason is set to <i>noTsanDeniedReason</i> (on page 18).
3	<p><i>cdmagw</i> allocates a TSAN for storing call data.</p> <p><i>cdmagw</i> stores the IS-771 call data required for charging purposes by the following IS-826 call, indexed on TSAN. This data is globally available to all following calls, so it can be retrieved when the corresponding IS-826 call is retriggered. (Use <i>nonWinRoamDataTimeout</i> (on page 17) to timeout call data if no retriggered call arrives.)</p> <p><i>cdmagw</i> uses the next available TSAN from one of the ranges of TSANs which corresponds to the GMSC. If no free TSAN can be allocated, it drops the call by sending back an orreq with AccessDeniedReason set to <i>noTsanDeniedReason</i> (on page 18).</p>
4	<i>cdmagw</i> extracts relevant telephony data and sends back a modified orreq message containing the MSCID, and the TSAN in PSTN Termination->DestinationDigits.
5	<i>cdmagw</i> waits for a IS-826 ANYLZD originated by the IS-771 call. When an IS-826 ANYLZD arrives, <i>cdmagw</i> determines if data associated with a corresponding IS-771 call has been stored.
6	If the IS-826 has TRIGTYPE=Specific_Called_Party_Digit_String, <i>cdmagw</i> extracts the

Stage	Description
	TSAN from the Mobile Directory Number (MDN) field of the first ANLYZD message. cdmagw uses the TSAN as a key to check the call data for previously encountered IS-771 call data. This data is stored for triggering to <code>slee_acs</code> .
7	<p>A second ANLYZD message may be received containing data (specifically the Original Calling Party number) which was not received in the first. If <code>waitForCallingParty</code> (on page 22) = true, cdmagw waits for the Original Calling Party number to be received in <code>CallingPartyNumberDigits1</code> before the call progress.</p> <p>The second ANLYZD message doesn't include a TSAN, so cdmagw uses the <code>BillingID</code> to map to the call data instead.</p> <p>If a second ANLYZD is received and the call has already been authorized, an empty <code>anlyzd</code> response is sent back.</p>
8	<p>cdmagw sends Analyzed Response (<code>anlyzd</code>) message with:</p> <ul style="list-style-type: none"> • The original dialed number in the <code>Digits (dialed)</code> parameter • The full originating <code>TriggerAddressList</code> parameter

Supported ANLYZD parameters

The following parameters are supported in ANLYZD messages:

- `BillingId`
- `Digits (Dialed)`
- `TriggerType`
- `CallingPartyNumberDigits1`
- `DestinationDigits`
- `MSCID`
- `MobileDirectoryNumber`
- `MSID (MIN or IMSI)`

Alarms, Statistics, Reports and EDRs

Alarms

CDMA uses the SMS integrated alarms collection, viewing and forwarding system. The alarms generated by all components of CDMA are consolidated on the SMS and stored in a centralised alarm database.

The operator can:

- View the alarms through the alarm viewer built into the SMS screens
- Forward all alarms to an integrated external fault management system using SNMP v1 or v3.

Alarms can be automatically deleted from the SMF alarm database after a configurable period.

For more information about the:

- Specific alarms generated by CDMA, see *CDMA Alarms Guide*.
- SMS alarms subsystem, see *SMS User's Guide*.

Statistics

The following table shows the statistics that will be generated by the cdmagw service if statistics are enabled. For more information about how cdmagw generates statistics, see *Configuration* (on page 7).

Statistic ID	Description
NUM_ORREQ_INVOKE	Total origination requests.
NUM_ORREQ_RESPONSE	Total origination responses.
NUM_ANLYZD_INVOKE	Total analyzed information requests.
NUM_ANLYZD_RESPONSE	Total analyzed information responses.
NUM_OANSWER_INVOKE	Total origination answer requests.
NUM_TANSWER_INVOKE	Total termination answer requests.
NUM_ODISCONNECT_INVOKE	Total origination disconnect requests.
NUM_ODISCONNECT_RESPONSE	Total origination disconnect responses.
NUM_TDISCONNECT_INVOKE	Total termination disconnect requests.
NUM_TDISCONNECT_RESPONSE	Total termination disconnect responses.
NUM_CCDIR_INVOKE	Total call control directive requests.
NUM_CCDIR_RESPONSE	Total call control responses.
NUM_SUCCESSFUL_CALLS	Total successfully completed call attempts.
NUM_FAILED_CALLS	Total failed call attempts.
NUM_CONNRES_INVOKE	Total connect to resource requests.
NUM_CONNRES_SUCCESS	Total connect to resource successful responses.
NUM_CONNRES_FAILED	Total connect to resource failed responses.
NUM_BULKDISCONN_INVOKE	Total bulk disconnect requests.
NUM_BULKDISCONN_RESPONSE	Total bulk disconnect responses.

Reports

CDMA does not install any specific SMS reports. However, you can report on any statistics which are recorded using the SMS Application report on the SMS Report Functions screen. For more information about running SMS reports, see *SMS User's Guide*.

EDRs

CDMA does not write any EDRs itself. However messages sent from cdmagw to slee_acs will result in an EDR being written by slee_acs. For more information about what EDRs are written by slee_acs, see *Event Detail Record Reference Guide*.

Configuration

Overview

Introduction

This chapter explains how to configure the Oracle Communications Convergent Charging Controller application.

In this chapter

This chapter contains the following topics.

Configuration Overview	7
eserv.config Configuration	8
cdmagw.sh Configuration	22

Configuration Overview

Introduction

This topic provides a high level overview of how the CDMA component is configured.

Configuration components

CDMA is configured by the following components:

Component	Locations	Description	Further Information
cdmagw.sh	All SLC machines	This shell script sets the command line parameters for the main <i>cdmagw</i> (on page 25) binary.	<i>cdmagw.sh Configuration</i> (on page 22)
eserv.config	All SLC machines	The CDMA is configured in the <i>cdmagw</i> section of the eserv.config file.	eserv.config Configuration (on page 8)
msidGmscFile	All SLCs	This file holds the MSID to GMSC mapping used to locate an available TSAN when supporting non-WinRoaming.	<i>msidGmscFile</i> (on page 8)
tdp.conf	All SLC machines	The tdp.conf file configures the IN Call Model in <i>cdmagw</i> .	<i>IN Call Model configuration</i> (on page 8)
SLEE.cfg	All SLC machines	The SLEE configuration must be altered to include the CDMA. The system is configured so that the CDMA and associated interfaces all start together. This is performed by the SLEE and is defined using	<i>SLEE Technical Guide</i>

Component	Locations	Description	Further Information
		SLEE.cfg.	
SMF database	SMS	Statistics and EFM alarms configuration for CDMA. Configured automatically when cdmaSms is installed.	<i>Installation Guide</i>

IN Call Model configuration

Configuration for the IN Call Model element of the U-CA-IS41 (CDMA) is contained in the `/IN/service_packages/SLEE/etc/tdp.conf` file. This text shows an example of the file.

```
# mandatory params:
CAMEL
ADDITIONALNUMS
IMSI_QUAL=129

# optional params: (comment out if not required)
ACH_WARN_PERIOD=10
ACH_TONE=20,0
ACH_ANNOUNCE=156

# the trigger/service key definition
3 1 3 request all all
```

For more information about how to configure the `tdp.conf` file, see [Configuring IN Call Model Triggers](#).

msidGmscFile

The `msidGmscFile` file is only used for non-WIN roaming redirection to pick a GMSC TSAN pool to use.

It contains multiple entries (one entry per line) in the form:

```
MSID_Prefix,GMSC_Name
```

Notes:

- Each MSID Prefix must be less than `maxMsidForGmscSelect` (on page 16) characters long.
- The GMSC name must exist in the `eserv.config` under `tsanPools` (on page 20).
- On configuration reload, the file specified in `msidGmscFile` (on page 17) is read. This can be triggered by a SIGHUP.
- Lines that begin with hashes (#), are ignored by `cdmagw` (on page 25).

Example: This text shows an example of a line from `msidGmscFile`.

```
189883,MSC1
```

eserv.config Configuration

Introduction

The `eserv.config` file is a shared configuration file, from which many Oracle Communications Convergent Charging Controller applications read their configuration. Each Convergent Charging Controller machine (SMS, SLC, and VWS) has its own version of this configuration file, containing configuration relevant to that machine. The `eserv.config` file contains different sections; each application reads the sections of the file that contains data relevant to it.

The `eserv.config` file is located in the `/IN/service_packages/` directory.

The `eserv.config` file format uses hierarchical groupings, and most applications make use of this to divide the options into logical groupings.

Configuration File Format

To organize the configuration data within the `eserv.config` file, some sections are nested within other sections. Configuration details are opened and closed using either `{ }` or `[]`.

- Groups of parameters are enclosed with curly brackets – `{ }`
- An array of parameters is enclosed in square brackets – `[]`
- Comments are prefaced with a `#` at the beginning of the line

To list things within a group or an array, elements must be separated by at least one comma or at least one line break. Any of the following formats can be used, as in this example:

```
{ name="route6", id = 3, prefixes = [ "00000148", "0000473" ] }
{ name="route7", id = 4, prefixes = [ "000001049" ] }
```

or

```
{ name="route6"
  id = 3
  prefixes = [
    "00000148"
    "0000473"
  ]
}
{ name="route7"
  id = 4
  prefixes = [
    "000001049"
  ]
}
```

or

```
{ name="route6"
  id = 3
  prefixes = [ "00000148", "0000473" ]
}
{ name="route7", id = 4
  prefixes = [ "000001049" ]
}
```

Editing the File

Open the configuration file on your system using a standard text editor. Do not use text editors, such as Microsoft Word, that attach control characters. These can be, for example, Microsoft DOS or Windows line termination characters (for example, `^M`), which are not visible to the user, at the end of each row. This causes file errors when the application tries to read the configuration file.

Always keep a backup of your file before making any changes to it. This ensures you have a working copy to which you can return.

Example `cdmagw` Configuration Section

Here is an example of the `cdmagw` section in the `eserv.config` file, showing the CDMA configuration.

```
cdmagw = {
  ImsiIdpQualifier=129
  CallStatusTimeout=30
  ResetSrfTimeout=30
  DisconnectTimeout=30
  BusyStatusTimeout=10
}
```

```

CcdirTimeout=30
CallFailedTimeout=1
DisconnectWarningType='T'
DisconnectWarningID=24
LowCreditWarningType='T'
LowCreditWarningID=24
TestInterfaceEnabled=false
TestInterfacePort=14875
SoakTestInterfaceEnabled=false
SoakTestInterfacePort=14876
EnableDisConnRes=true
ANLYZDActionCodeRequired=false
ThrottlingCallRate=0
EnableStats=false
AnnouncementsUseCCDIR=true
MaxStatusCheckFailures=1
LocationIdIncludesMSCID=false
SoakTestCalledNumber="1234567890"
SoakTestCallingNumber="1234567890"
CompareDestinationDigits=false
AllowInitialTermination=false
Dynamic_DMHServiceID=false
DMHServiceID_ANLYZD_OnRelease=false
DMHServiceID_ANLYZD=""
DMHServiceID_ORREQ=""
DMHServiceID_ODISCONNECT=""
DMHServiceID_TDISCONNECT=""
DMHServiceID_DynamicPrefix="1.1"
waitForCallingParty = false
abortOnCallFail = false
forceCorrelationID = false
dummyMDNForCallLookup="0000"
msidGsmcFile=""
maxMsidForGsmcSelect=6
msidRequiredDeniedReason= 0
cfnaOnRedirectionIndicators = [3,17]
nonWinRoamDataTimeout = 30
noTsanDeniedReason = 3
keepTsanLocal = true
dummyMsid = "989123"
defaultTsanPool = "MSC1"
tsanAnlyzdField = "Digits"
tsanPools = [
  {
    gsmcName="MSC1"
    tsanNature = 4
    ranges = [
      {
        rangeStart = "8049096367"
        rangeEnd = "8049096417"
      }
      {
        rangeStart = "9876540850"
        rangeEnd = "9876540890"
      }
    ]
  }

  {
    gsmcName="MSC2"
    ranges = [
      {
        rangeStart = "0987650990"

```


Chapter 2

AnnouncementsUseCCDIR

Flag to control whether switch-based announcements use CCDIR or ANLYZD/ODISCONNECT responses.

Default: false

Allowed: true or false

BusyStatusTimeout

A periodic timer that sets the number of seconds to wait before checking whether the called party was busy before a call has been answered.

Default: 30 seconds

Allowed: Integer

CallFailedTimeout

The amount of time between verifying a call failure and releasing a call.

Default: 1 second

Allowed: Integer, minimum value 1 second.

Note: Cannot be disabled.

CallStatusTimeout

A periodic timer that checks the status of the call to make sure no calls have been dropped by the MSC without notifying the Cdma Gateway.

Default: 30 seconds

Allowed: Integer

Ccdirtimeout

A periodic timer that sets the number of seconds to wait before assuming that the CCDIR invoke operation failed.

Default: 30 seconds

Allowed: Integer

cfnaOnRedirectionIndicators

Syntax: `cfnaOnRedirectionIndicators = [array]`

Description: The value specified indicates the *DMH_RedirectionIndicator* that will be used when handling Call Forward No Answer (CFNA) scenarios.

Type: Array

Optionality: Optional (default used if not set).

Allowed:

Default: [3]

Notes: Specifying 0 means the indicator will not be checked. It overrides all values.

Example: `cfnaOnRedirectionIndicators = [3,17]`

CompareDestinationDigits

Syntax: `CompareDestinationDigits = false|true`

Description: Which digits to use to determine whether the Called Party number has changed on receipt of a Connect operation from `slee_acs`.

Type: Boolean

Optionality: Optional (default used if not set).
Allowed: true Compare destination digits.
 false Compare dialed digits.
Default: false
Notes:
Example:

ConnresTimeout

A periodic timer that sets the number of seconds to wait before assuming that the CONNRES was successful.

Default: 10 seconds
Allowed: Integer
Note: The timer can be disabled if the MSC is configured to send TC_CANCEL (0 = disabled)

defaultTsanPool

Syntax: defaultTsanPool = "name"
Description: The name of the default GMSC TSAN pool to use if a MSID isn't available or it's not found in *msidGmscFile* (on page 8).
Type: String
Optionality: Optional (default used if not set).
 Mandatory for IS-826 retriggering.
Allowed: This must exist in the tsanPools section.
Default: none (No default pool)
Notes: For more information about TSANs, see *Non-WinRoaming processing* (on page 4).
Example: defaultTsanPool = "MSC1"

DisconnectTimeout

A periodic timer that sets the number of seconds to wait before assuming that the forced release (using a CCDIR) has failed.

Default: 30 seconds
Allowed: Integer

DisconnectWarningID

The ID of the tone to be played when a call is disconnected using CCDIR.

Default: PPCDisconnectTone (24)
Allowed: Integer
Note: This is ignored if the type is set to 'N'.

DisconnectWarningType

Plays a tone, or announcement, or nothing when about to disconnect.

Default: T
Allowed: T = Tone, A = Announcement, N = None

Chapter 2

DMHServiceID_ANLYZD

The DMH_ServiceID to send to the MSC as part of an ANLYZD result. If this is set to an empty value no DMH_ServiceID is sent in the result.:

Default: ""
Allowed: String
Note: The format is "marketID.marketSegmentId.ServiceIdValue"

DMHServiceID_ANLYZD_OnRelease

Flag to enable sending a DMH_ServiceID in an ANLYZD response that releases a call.

Default: true
Allowed: true or false

DMHServiceID_DynamicPrefix

The prefix to add to the dynamic DMH_ServiceID. Only used when dynamic dmh_service ids are enabled, this should be set to an empty value. If this is set to an empty value no DMH_ServiceID is sent in the ANLYZD result.

Default: 1.1
Allowed: String
Note: The format is "marketID.marketSegmentId"

DMHServiceID_ODISCONNECT

The DMH_ServiceID to send to the MSC as part of an ODISCONNECT result. If this is set to an empty value no DMH_ServiceID is sent in the result.

Default: ""
Allowed: String
Note: The format is "marketID.marketSegmentId.ServiceIdValue"

DMHServiceID_ORREQ

The DMH_ServiceID to send to the MSC as part of an ORREQ result. If this is set to an empty value no DMH_ServiceID is sent in the result.

Default: ""
Allowed: String
Note: The format is "marketID.marketSegmentId.ServiceIdValue"

DMHServiceID_TDISCONNECT

The DMH_ServiceID to send to the MSC as part of an TDISCONNECT result. If this is set to an empty value no DMH_ServiceID is sent in the result.

Default: ""
Allowed: String
Note: The format is "marketID.marketSegmentId.ServiceIdValue"

dummyMDNForCallLookup

Syntax: dummyMDNForCallLookup = "number"
Description: The dummy MDN number to use as part of look up key for call lookup.
Type: String
Optionality: Optional (default used if not set).
Allowed:
Default: none (no default pool)

Notes: This is used because the key for call lookup for a second ANLYZD message, consists of both billing ID and MDN.
Setting this effectively means that MDN is not used.
For more information about how this is used, see *Non-WinRoaming processing* (on page 4).

Example: `dummyMDNForCallLookup = "0000"`

`dummyMsid`

Syntax: `dummyMsid = "number"`

Description: This is used to set the MSID internally when no MIN is received in the ANLYZD message.

Type: String

Optionality: Optional (default used if not set).

Allowed:

Default: "0"

Notes: However, if a MIN is received in the ANLYZD, that will be used to set the MSID internally instead.

Example: `dummyMsid = "989123"`

`Dynamic_DMHServiceID`

Flag to enable dynamic DMH_ServiceIDs, set by the SCP using FCI. Enabling this overrides the static ANLYZD DMH_ServiceID.

Default: false

Allowed: true or false

`EnableDisConnRes`

Flag to enable or disable whether the CdmaGateway should send a DISCONNRES before sending an ANLYZD or ODISCONNECT result to an MSC following a CONNRES announcement.

Default: true

Allowed: true or false

`EnableStats`

Flag to enable the reporting of statistics.

Default: false

Allowed: true or false

`forceCorrelationID`

Syntax: `forceCorrelationID = true|false`

Description: Indicates whether to force the correlation ID to be set for the following operations:

- Connect to Resource
- ResetTimer
- Disconnect Resource

Type: Boolean

Optionality: Optional (default used if not set).

Allowed: true or false

Default: false

Chapter 2

Notes:

Example: `forceCorrelationID = false`

ImsiIdpQualifier

The identifier that is used when sending the IMSI in an IDP.

Default: 129 (Binary: 10000001)

Allowed: Integer

Note: This value MUST be the same as specified in the 'tdp.conf' file.

keepTsanLocal

Syntax: `keepTsanLocal = true|false`

Description: If this parameter is set to true, the gateway checks if the `Digits` or `DestinationDigits` in a received `ANLYZD` message match a non-WIN roaming `TSAN` record.

If yes, it will replace these fields with stored values from a previous origination request, preventing the `TSAN` from being sent to the service.

Type: Boolean

Optionality: Optional (default used if not set).

Allowed: true or false

Default: true

Notes:

Example: `keepTsanLocal = true`

LocationIdIncludesMSCID

Flag to enable including the MSCID in the Location Area ID (MSCID is prepended to the `ServingCellID`).

Default: false

Allowed: true or false

LowCreditWarningID

The ID of the tone to be played when a call has reached its low credit threshold.

Default: `PPCDisconnectTone` (24)

Allowed: Integer

Note: This is ignored if the type is set to 'N'.

LowCreditWarningType

Plays a tone, announcement or nothing when credit balance is low.

Default: T

Allowed: T = Tone, A = Announcement, N = None

maxMsidForGmscSelect

Syntax: `maxMsidForGmscSelect = len`

Description: The maximum length of an acceptable MSID prefix within the file specified by `msidGmscFile` (on page 17) for GMSC lookup.

Type: Integer

Optionality: Optional (default used if not set).

Allowed:

Default: 6
Notes: If an entry in the `msidGmscFile` is more than this limit, a WARNING alarm is logged and the row is ignored.
Example: `maxMsidForGmscSelect = 6`

MaxStatusCheckFailures

How may CCDIR failures to allow before assuming that the call has failed.

Default: 1
Allowed: Integer
Note: Setting this to 1 means that the first failure will cause the call to fail.

msidGmscFile

Syntax: `msidGmscFile = "path/file"`
Description: The name and location of file which defines the mapping of MSIDs with to GMSCs.
Type: String
Optionality: Optional (default used if not set).
Allowed:
Default: none (that is, no mapping file)
Notes: For more information about the file, see *msidGmscFile* (on page 8).
 On configuration reload, the file specified in *msidGmscFile* (on page 17) is read. This can be triggered by a SIGHUP.
 For more information about how this mapping is used, see *Non-WinRoaming processing* (on page 4).
Example: `msidGmscFile =
 "/IN/service_packages/IS41/etc/msidtogmsc.mapping"`

msidRequiredDeniedReason

Syntax: `msidRequiredDeniedReason = reason`
Description: The `AccessDeniedReason` returned if no MSID is available in ORREQ for roaming calls.
Type: Integer
Optionality: Optional (default used if not set).
Allowed:
Default: 0 (MSID not required, TSAN will be allocated from the default TSAN pool)
Notes: For more information about how roaming calls are handled, see *Non-WinRoaming processing* (on page 4).
Example: `msidRequiredDeniedReason = 0`

nonWinRoamDataTimeout

Syntax: `nonWinRoamDataTimeout = seconds`
Description: The number of seconds to retain call data for non-WinRoaming calls.
Type: Integer
Optionality: Optional (default used if not set).
Allowed:

Chapter 2

Default: 30
Notes: For more information about how roaming calls are handled, see *Non-WinRoaming processing* (on page 4).
Example: `nonWinRoamDataTimeout = 30`

`noTsanDeniedReason`

Syntax: `noTsanDeniedReason = reason`
Description: The AccessDeniedReason to send back if all TSANs are in use.
Type: Integer
Optionality: Optional (default used if not set).

Allowed:

0	Not used.
1	Unassigned directory number (the MS is not served by the accessed system).
2	Inactive (the MS is not active in the accessed system and the HLR pointer to the MSs VLR should be maintained).
3	Busy (the MS is busy in the accessed system and cannot accept additional calls).
4	Termination Denied (terminations to this MS are not allowed).
5	No Page Response (the MS was paged by the accessed system but did not respond).
6	Unavailable (the MS is currently not available and the HLR pointer to the MSs VLR should be maintained and the MS shall remain in the same state).

Default: 3
Notes: For more information about TSANs, see *Non-WinRoaming processing* (on page 4).
Example: `noTsanDeniedReason = 3`

`ResetSrfTimeout`

A periodic timer that resets the 'SSFT' MSC timer.

Default: 30 seconds
Allowed: Integer
Note: This must be sent during an IP interaction, initiated by a CONNRES.

`SoakTestCalledNumber`

The default value for called numbers when using the `SoakTestInterface`.
Used for DEST and CALLED numbers.

Default: "1234567890"
Allowed: String

`SoakTestCallingNumber`

The default value for calling numbers when using the `SoakTestInterface`.
Used for MDN and CALLING numbers.

Default: "1234567890"
Allowed: String

`SoakTestInterfaceEnabled`

Flag to enable or disable the soak test interface. In a production system this can be disabled by default but enabled so that a soak test can be run on the system.

Default: false

Allowed: true or false

Note: Enabling this interface overrides the normal test interface.

`SoakTestInterfacePort`

The tcp network port that the soak test interface will listen on (if it is enabled).

Default: 14876

Allowed: Integer

`TestInterfaceEnabled`

Flag to enable or disable the test interface. In a production system this can be disabled by default but enabled so that a test can be run on the system.

Default: false

Allowed: true or false

Note: Enabling the soak test interface overrides this interface.

`TestInterfacePort`

The tcp network port that the test interface will listen on (if it is enabled).

Default: 14875

Allowed: Integer

`ThrottlingCallRate`

Limits (throttles) how much traffic the cdmagw will process per second.

Description: Limits (throttles) the traffic the cdmagw processes per second.

Type: Integer

Default: 0 (disabled)

Allowed: Any Integer

Notes: If suaCdmaGateway or m3uaCdmaGateway fail to create a new SLEE dialog due to overload then new calls are rejected until the end of the monitor period. That is, until the end of the current second.

`tsanAnlyzdField`

Syntax: `tsanAnlyzdField = "field"`

Description: The number field containing the `TSAN` for nonWinRoaming.

Type: String

Optionality: Optional (default used if not set).

Allowed:

- DestinationDigits
- Digits
- MDN

Default: "Digits"

Notes:

Example: `tsanAnlyzdField = "Digits"`

Chapter 2

tsanPools

Syntax:

```
tsanPools = [  
  {  
    gmscName="name"  
    ranges = [  
      {  
        rangeStart = "tsan"  
        rangeEnd = "tsan"  
      }  
      ...  
    ]  
  }  
  ...  
]
```

Description: The list of permissible TSANs per GMSC.

Type: Array

Optionality: Optional (not used if not set)

Mandatory for IS-826 retriggering

Allowed:

Default:

Notes: For more information about IS-826 and TSANs, see *Non-WinRoaming processing* (on page 4).

Example:

```
tsanPools = [  
  {  
    gmscName="MSC1"  
    ranges = [  
      {  
        rangeStart = "8049096367"  
        rangeEnd = "8049096417"  
      }  
      {  
        rangeStart = "9876540850"  
        rangeEnd = "9876540890"  
      }  
    ]  
  }  
  {  
    gmscName="MSC2"  
    ranges = [  
      {  
        rangeStart = "0987650990"  
        rangeEnd = "0987650150"  
      }  
      {  
        rangeStart = "5402946949"  
        rangeEnd = "5402946999"  
      }  
    ]  
  }  
]
```

gmscName

Syntax: gmscName = "name"

Description: The name of the Gateway MSC for the range of TSANs defined by the corresponding range parameter.

Type: String

Optionality: Optional (ranges not used if not set)
Mandatory for IS-826 retriggering

Allowed: A string up to 50 characters long

Default:

Notes: For more information about TSANs, see *Non-WinRoaming processing* (on page 4).

Example: `gmscName = "MSC1"`

`ranges`

Syntax:

```
ranges = [
    {}
    ...
]
```

Description: The TSAN pools which can be used with this Gateway MSC.

Type: Array

Optionality: Optional (not used if not set)
Mandatory for IS-826 retriggering

Allowed:

Default: none

Notes:

Example: For an example of this parameter used in context, see *tsanPools* (on page 20).

`rangeEnd`

Syntax: `rangeEnd = "tsan"`

Description: The last TSAN in a range in a TSAN pool.

Type: String

Optionality: Mandatory if *ranges* (on page 21) is used.

Allowed:

Default:

Notes: For more information about TSANs, see *Non-WinRoaming processing* (on page 4).

Example: For an example of this parameter used in context, see *tsanPools* (on page 20).

`rangeStart`

Syntax: `rangeStart = "tsan"`

Description: The first TSAN in a range in a TSAN pool.

Type: String

Optionality: Mandatory if *ranges* (on page 21) is used.

Allowed:

Default:

Notes: For more information about TSANs, see *Non-WinRoaming processing* (on page 4).

Example: For an example of this parameter used in context, see *tsanPools* (on page 20).

Chapter 2

tsanNature

Syntax:	<code>tsanNature = noa</code>
Description:	This is the NoA (nature of address) of the TSAN which is sent in the orreq (Origination Request Result) in both the <code>DialedDigits</code> and the <code>DestinationDigits</code> fields (See Notes below).
Type:	Integer
Optionality:	Optional (default used if not set)
Allowed:	3 Sets national for the INAP representation of NOA for the TSAN. 4 Sets international for the INAP representation of the TSAN.
Default:	3 (national)
Notes:	<ul style="list-style-type: none">• These values will be converted into an IS41 Nature of Address in the <code>OriginationRequest</code> return result. i.e. 0 for national and 1 for international.• The <code>DestinationDigits</code> field is derived from <code>TerminationList -> PSTNTermination -> DestinationDigits</code>.
Example:	<code>tsanNature = 4</code>

waitForCallingParty

Syntax:	<code>waitForCallingParty = false true</code>
Description:	How long to wait for a calling party value in a message before sending an IDP.
Type:	Boolean
Optionality:	Optional (default used if not set).
Allowed:	true If there is no calling party number in the first ANLYZD message, wait until the second ANLYZD message is received. false If there is not a calling party number in the first or second ANLYZD messages use the MDN.
Default:	false
Notes:	For more information about message flows and ANLYZD messages, see <i>Non-WinRoaming processing</i> (on page 4).
Example:	

SIGTRAN configuration

cdmagw also supports the configuration for `sua>If` and `m3ua>If` from the SIGTRAN TCAP Interface in the `cdmagw` section. The SIGTRAN parameters are used as if they were inside the `sigtran` section.

For more information about the available parameters, see *SIGTRAN TCAP IF Technical Guide*.

cdmagw.sh Configuration

About cdmagw.sh configuration

The CDMA startup shell script `/IN/service_packages/IS41/bin/cdmagw.sh` contains additional configuration for the ANSI TCAP Interface.

This setting states where the `tdp.conf` file is located (this file is installed during setup):

```
TDP_DEFINITIONS=/IN/service_packages/SLEE/etc/tdp.conf
export TDP_DEFINITIONS
```

```

# the following settings should be configured to reflect your system
# setup:
# -ssns    = subsystem numbers - default = 19
# -autoac  = auto app context set - default = yes
# -defoutac = Specify object identifier to use for TCAP Interface Application
context
# -stps    = comma seperated list of STPs
# -monitorperiod = the period over which to monitor call attempts for throttling -
default = 1000
# -retssn  = return SSN address
# -retpc   = return PC address
# -retgt   = return GT address
# -retri   = return RI
# -asibase = application server id base

```

Note: The start up option `-retpc` can also be expressed as either an existing single integer, or as an ANSI network-cluster-member point code representation.

For example:

```

-retpc 2193
-retpc 10-20-42

```

cdmagw.sh example

This text shows an example `cdmagw.sh`:

```

TDP_DEFINITIONS=/IN/service_packages/SLEE/etc/tdp.conf
export TDP_DEFINITIONS

exec /IN/service_packages/IS41/bin/cdmagw \
    -ssns 11,146 \
    -stps 2596 \
>> /IN/service_packages/IS41/tmp/cdmagw.log 2>&1

```


Background Processes

Overview

Introduction

This chapter explains the processes that are started automatically by Service Logic Execution Environment (SLEE).

Note: This chapter also includes some plug-ins to background processes which do not run independently.

In this chapter

This chapter contains the following topics.

cdmagw	25
cdmagw_sua	26
cdmagw_m3ua	26

cdmagw

Purpose

cdmagw is the main binary for the CDMA. It is responsible for handling CDMA interactions with MSCs and HLRs, and for triggering appropriate IN interactions to slee_acs. Uses the IN call model.

Note: cdmagw is usually a link to one of *cdmagw_sua* (on page 26) or *cdmagw_m3ua* (on page 26). The binary linked to it defines which version of the SIGTRAN stack is being used.

Location

This binary is located on SLCs.

Startup

This task is started by the SLEE by the following line in **SLEE.cfg**:

```
INTERFACE=cdmagw cdmagw.sh /IN/service_packages/IS41/bin EVENT
```

Notes:

- **cdmagw.sh** is a shell script which starts cdmagw. For more information about the configuration which must be set in this file, see *cdmagw.sh Configuration* (on page 22).
- The above are defaults and may vary.

cdmagw_sua

Purpose

cdmagw_sua provides the cdmagw binary compiled against the sua_if version of the SIGTRAN stack. It provides CDMA voice over SCCP over SUA.

For more information about sua_if, see *SIGTRAN TCAP IF Technical Guide*.

Location

This binary is located on SLCs.

Startup

If this binary is linked to from cdmagw, it will be started in the way described in *Startup* (on page 25).

Configuration

cdmagw_sua is configured using **eserv.config** and **cdmagw.sh**. For more information about the available parameters, see *Configuration* (on page 7).

cdmagw_m3ua

Purpose

cdmagw_m3ua provides the cdmagw binary compiled against the m3ua_if version of the SIGTRAN stack. It provides CDMA voice over SCCP over M3UA.

For more information about m3ua_if, see *SIGTRAN TCAP IF Technical Guide*.

Location

This binary is located on SLCs.

Startup

If this binary is linked to from cdmagw, it will be started in the way described in *Startup* (on page 25).

Configuration

cdmagw_m3ua is configured using **eserv.config** and **cdmagw.sh**. For more information about the available parameters, see *Configuration* (on page 7).

Administrative Tasks

Overview

Introduction

This chapter provides the procedures for administering the U-CA-IS41 (CDMA) application.

In this chapter

This chapter contains the following topics.

Starting and Stopping the U-CA-IS41 (CDMA)	27
Backing up the U-CA-IS41 (CDMA) Service	28

Starting and Stopping the U-CA-IS41 (CDMA)

Introduction

This topic explains how to start or stop the U-CA-IS41 (CDMA) application.

Starting the U-CA-IS41 (CDMA) service

To start the automated shell script, which in turn starts the U-CA-IS41 (CDMA) service, as the user `acs_oper`, enter:

```
/IN/service_packages/SLEE/bin/slee.sh
```

Result: This shell script starts the `slee_acs` and the associated interfaces `cdmagw`, `timer IF` and `cdriF`.

The stdout and stderr from `slee.sh` will appear on the screen, so if this screen is closed the output will no longer be viewable. If this information is required then redirect output to a file, for example `slee.sh` to `sleeout.log`.

Startup output

When the SLEE service starts various information is presented on stdout and the syslog.

Stopping the U-CA-IS41 (CDMA) service

To stop the automated shell script, which in turn stops the U-CA-IS41 (CDMA) service, as the user `acs_oper`, enter:

```
/IN/service_packages/SLEE/bin/stop.sh
```

Note: It also recommended to run a `./clean` following the stop.

If the `SLEE_FILE` variable is being used it must be visible to the stop program. If it is not visible, the program will not be able to clear the shared memory and will exit with error 3005.

Note: If the service has stopped for any abnormal reasons a manual cleanup should be performed, that is, `ps -fu acs_oper` to find the remaining processes, then `kill pid` each one. You should check the shared memory using `ipcs | grep acs`, then remove `acs_oper` owned ones using `ipcrm` and `clean`.

Backing up the U-CA-IS41 (CDMA) Service

Introduction

The filesystem areas that should be backed up for the U-CA-IS41 (CDMA) service are `/IN/service_packages/IS41/`.

The standard UNIX restore utilities can then be used.

Troubleshooting

Overview

Introduction

This chapter explains the important processes on each of the server components in Convergent Charging Controller, and describes a number of example troubleshooting methods that can help aid the troubleshooting process before you raise a support ticket.

In this chapter

This chapter contains the following topics.

Common Troubleshooting Procedures..... 29

Common Troubleshooting Procedures

Introduction

Refer to *System Administrator's Guide* for troubleshooting procedures common to all Convergent Charging Controller components.

Debug output

Debugging output is available. Do not enable debugging under production call loads. Enable debugging only when advised to do so by Oracle support.

To switch the debug level, send *cdmagw* (on page 25) a SIGUSR1.

To turn on SCCP logging, send *cdmagw* a SIGUSR2.

About Installation and Removal

Overview

Introduction

This chapter provides information about the installed components for the Convergent Charging Controller application described in this guide. It also lists the files installed by the application that you can check for, to ensure that the application installed successfully.

In this Chapter

This chapter contains the following topics.

Installation and Removal Overview 31

Installation and Removal Overview

Introduction

For information about the following requirements and tasks, see *Installation Guide*:

- Convergent Charging Controller system requirements
- Pre-installation tasks
- Installing and removing Convergent Charging Controller packages

CDMA (U-CA-IS41) packages

An installation of CDMA (U-CA-IS41) includes the following packages:

- cdmaSms on the SMS
- cdmagw on the SLC

Configuring IN Call Model Triggers

Overview

This introduces the generic configuration requirements of the Convergent Charging Controller IN Call Model.

The Convergent Charging Controller IN Call Model is not a separate product, rather it is a set of libraries that is bound into a final usable interface (such as the UCA-ISUP).

Environment variables

This table describes the UNIX shell environment variables to be configured.

Environment Variable Name	Description	Example Value
TDP_DEFINITIONS	Defines the full path name of the Trigger Detection Point definition file.	/IN/service_packages/SLEE/etc/tdp.conf

Trigger detection point (TDP) definition file

The `tdp.conf` file has two sections:

- 1 A number of configuration parameters.
- 2 The trigger tables used to determine when to trigger a call to the SCF.

Example: This text shows an example `tdp.conf` file:

```
# A comment
KEEP SD
ETC RULES=6 3
3 1 3 request all 123 6
4 2 4 notify all 222 keep
3 1 3 request 2:122 3:222 5 keep
```

Note: All lines starting with # are treated as comments. If no TDP definition file is defined, a default action is taken where:

- ALL calls are triggered to the SCF with a service key of 1 (one) and a trigger point of 3 (analyzedInformation.)
- None of the global configuration parameters are considered set.

Global configuration parameters

The following configuration parameters may be set once on individual lines in the TDP definition file.

Global Parameter	Description
KEEP SD	If defined ALL all stop digits (defined by the BCD digit 'F') on the end of called party numbers are kept in the called party number. By default the stop digit is stripped from ALL triggered numbers.
CAMEL	This parameter is intended for CAMEL testing purposes only and should not be defined under normal usage. If defined, the called party number is also copied into the initialDP's

Global Parameter	Description
	calledPartyBCDNumber CAMEL parameter. The NOA of the called party number becomes the BCD number type.
ADDITIONALNUMS	<p>If defined, the IN Call Model will request all additional numbers available from the underlying protocol and insert them into the InitialDP message sent to the SLC.</p> <p>All these additional numbers are placed into a G8 extension in the InitialDP except any additional calling party number that is placed in the additionalCallingPartyNumber field.</p>
ETC RULES= c or ETC RULES= c s	<p>If defined then additional EstablishTemporaryConnection (ETC) rules are used.</p> <p>If the integer c is defined, the correlationID in all ETC messages from the SCF are appended on to the end of the assistingSSPIPRoutingAddress that is used, the digits are padded to a width of c digits.</p> <p>If s is also defined, then the scfID of the ETC is also appended on afterwards in the same way.</p> <p>For example:</p> <p>With "ETC RULES=6 4" and an ETC message with: assistingSSPIPRoutingAddress =1111, correlationID =55, scfID =0x42 Then the actual assistingSSPIPRoutingAddress used will be "11110000550042".</p>
USER LIB = <i>library</i>	If defined the call model will use the user written shared object <i>library</i> specified by the full pathname library when dealing with ApplyCharging operations.
AC= <i>a,b,c...</i>	Sets the TCAP application context used by the call model to the comma separated list of OIDs supplied.
ORIG_PC= pc	<p>If defined, all InitialDPs will be sent with an SCCP calling party (origination) address that includes a Point Code defined by the integer pc.</p> <p>If not defined, and ORIG_SSN and ORIG_GT are not defined, all InitialDPs will be sent without an SCCP calling party address.</p> <p>Note: This value may be defined in hex using a prefix of 0x.</p>
ORIG_SSN= ssn	<p>If defined, all initialDPs will be sent with an SCCP calling party (origination) address that includes a subsystem number defined by the integer ssn.</p> <p>If not defined, and ORIG_PC and ORIG_GT are not defined, all InitialDPs will be sent without an SCCP calling party address.</p>
ORIG_GT=1, n, addr or ORIG_GT=2, t, addr or ORIG_GT=3, t, p, addr or ORIG_GT=4, t, p, n, addr	<p>If defined, all initialDPs will be sent with an SCCP calling party (origination) address that includes a Global Title defined by the integers n, t, p and the number string addr.</p> <p>The initial value (1 to 4) identifies the Global Title type:</p> <ul style="list-style-type: none"> • n is the NOA • t is the translation type • p is the numbering plan • addr is the address digits (0 to 9, A to F) <p>If not defined, and ORIG_PC and ORIG_SSN are not defined, all InitialDPs will be sent without an SCCP calling party address.</p>
DEST_PC= pc	If defined, all initialDPs will be sent with an SCCP called party (destination) address that includes a Point Code defined by the integer pc.

Global Parameter	Description
	Note: This value may be defined in hex using a prefix of 0x.
DEST_SSN= ssn	If defined, all initialDPs will be sent with an SCCP called party (destination) address that includes a subsystem number defined by the integer ssn.
DEST_GT=1, n, addr or DEST_GT=2, t, addr or DEST_GT=3, t, p, addr or DEST_GT=4, t, p, n, addr	If defined all initialDPs will be sent with an SCCP called party (destination) address that includes a Global Title defined by the integers n, t, p and the number string addr. The initial value (1 to 4) identifies the Global Title type: <ul style="list-style-type: none"> • n is the NOA • t is the translation type • p is the numbering plan • addr is the address digits (0 to 9, A to F)
ACH WARN PERIOD= <i>period</i>	Sets the default ApplyCharging warning to occur <i>period</i> seconds before the end of the call.
ACH RESOURCE= <i>ad</i>	Sets the default ApplyCharging warning announcement/tone to use the resource identified by the address digits <i>ad</i> . Note: This is only applicable if the underlying controlled call supports the ability to play announcements or tones.
ACH ANNOUNCE= <i>messageId</i>	Causes the default ApplyCharging warning to use the announcement with message identifier <i>messageId</i> . Note: This is only applicable if the underlying controlled call supports the ability to play announcements or tones.
ACS TONE= <i>id,dur</i>	Causes the default ApplyCharging warning to use tone with identifier <i>id</i> for a duration of <i>dur</i> seconds. Note: This is only applicable if the underlying controlled call supports the ability to play announcements or tones.

Trigger detection point definitions

After any global parameters have been set, the configuration file may take one or more trigger detection point (TDP) definitions.

Each line defines a single trigger; its trigger parameter values that get sent and the conditions under which it gets sent.

Each line takes the following form:

```
tdp svcKey eventType msgType cgPn cdPn [wild] [keep]
```

The table below defines the meanings and forms of these parameters.

Global Parameter Value	Type	Description
<i>tdp</i>	integer	This integer value defines the point that the TDP is triggered at. Together with <i>cgPn</i> , <i>cdPn</i> and <i>wild</i> it defines the condition that the trigger will fire on. See the TDP event type table for a list of valid values and meanings.

Global Parameter Value	Type	Description
<i>svcKey</i>	integer	This parameter defines the serviceKey value that will be inserted into the initialDP message when this trigger fires.
<i>eventType</i>	integer	This parameter defines the eventTypeBCSM value that will be inserted into the InitialDP message when this trigger fires. See the TDP event type table for a list of valid values and meanings. Generally this will be the same value as <i>tdp</i> .
<i>msgType</i>	request or notify	This parameter defines whether the TDP is sent as a TDP-R (request) or TDP-N(notify). Generally request is used here.
<i>cgPn</i>	<i>num</i> or <i>nat.num</i> or all	This parameter defines the calling party numbers that will trigger the TDP. Together with <i>tdp</i> , <i>cdPn</i> and <i>wild</i> it defines the condition that the trigger will fire on. <ul style="list-style-type: none"> <i>num</i> defines the prefix of the calling party digits, numbers must begin with these digits for the trigger to fire. <i>nat</i> is optional and defines additionally a nature of address (NOA) of the calling party that must match for the trigger to fire. If not provided a nature of 2 (unknown) is assumed. If all is defined then ALL calling party numbers will match.
<i>cdPn</i>	<i>num</i> or <i>nat.num</i> or all	This parameter defines the called party numbers that will trigger the TDP. Together with <i>tdp</i> , <i>cgPn</i> and <i>wild</i> it defines the condition that the trigger will fire on. <ul style="list-style-type: none"> <i>num</i> defines the prefix of the called party digits, numbers must begin with these digits for the trigger to fire. <i>nat</i> is optional and defines additionally a nature of address (NOA) of the called party that must match for the trigger to fire. If not provided a nature of 2 (unknown) is assumed. If all is defined then ALL called party numbers will match.
<i>wild</i>	integer	This optional parameter defines the number of digits that must be present in the called party numbers before the TDP will trigger. Together with <i>tdp</i> , <i>cgPn</i> and <i>cdPn</i> it defines the condition that the trigger will fire on. If set the trigger will not fire until the called party number has this number of digits. Note: The <i>wild</i> parameter can be set to a special value of "stop". If it is set to this value, then the trigger will only fire when a stop digit is received.
keep	-	If this optional flag is defined then all numbers triggered by this TDP will keep their stop digits (if they have one).

TDP event type values

The following table defines the list of TDPs as defined by the CS-1 standard. It also defines the point at which the trigger will be instantiated by the Convergent Charging Controller IN Call Model.

TDP	CS-1 Trigger Name	Call Model TDP Creation Point
1	origAttemptAuthorized	digitsReceived
2	collectedInfo	digitsReceived
3	analyzedInformation	digitsReceived
4	routeSelectFailure	released (cause != 16, 17, 18, 19, 21 or 31)
5	oCalledPartyBusy	released (Aparty, cause==17)
6	oNoAnswer	released (Aparty, cause==18, 19 or 21)
7	oAnswer	answered(Aparty)
8	oMidCall	not supported
9	oDisconnect	released (Aparty, cause==16 or 31)
10	oAbandon	released (Aparty, cause==16 or 31)
12	termAttemptAuthorized	digitsReceived
13	tCalledPartyBusy	released (Bparty, cause==17)
14	tNoAnswer	released (Bparty, cause==18, 19 or 21)
15	tAnswer	answered(Bparty)
16	tMidCall	not supported
17	tDisconnect	released (Bparty, cause==16 or 31)
18	tAbandon	released (Bparty, cause==16 or 31)
100	n/a	ringing (Aparty)
101	n/a	ringing (Bparty)

Glossary of Terms

AC

Application Context. A parameter in a TCAP message which indicates what protocol is conveyed. May indicate, for example, MAP, CAMEL, or INAP. Also usually specifies the particular version of the conveyed protocol, for example, which CAMEL Phase.

ACS

Advanced Control Services configuration platform.

CAMEL

Customized Applications for Mobile network Enhanced Logic

This is a 3GPP (Third Generation Partnership Project) initiative to extend traditional IN services found in fixed networks into mobile networks. The architecture is similar to that of traditional IN, in that the control functions and switching functions are remote. Unlike the fixed IN environment, in mobile networks the subscriber may roam into another PLMN (Public Land Mobile Network), consequently the controlling function must interact with a switching function in a foreign network. CAMEL specifies the agreed information flows that may be passed between these networks.

CC

Country Code. Prefix identifying the country for a numeric international address.

CDMA

Code Division Multiple Access is a method for describing physical radio channels. Data intended for a specific channel is modulated with that channel's code. These are typically pseudo-random in nature, and possess favourable correlation properties to ensure physical channels are not confused with one another.

Connection

Transport level link between two peers, providing for multiple sessions.

Convergent

Also "convergent billing". Describes the scenario where post-paid and pre-paid calls are handed by the same service platform and the same billing system. Under strict converged billing, post-paid subscribers are essentially treated as "limited credit pre-paid".

DP

Detection Point

DTMF

Dual Tone Multi-Frequency - system used by touch tone telephones where one high and one low frequency, or tone, is assigned to each touch tone button on the phone.

FCI

Furnish Charging Information. An INAP operation sent from ACS to the SSP to control the contents of EDRs produced by the SSP.

FDA

First Delivery Attempt - the delivery of a short message directly to the SME rather than relaying it through the MC.

GMSC

Gateway MSC. The first MSC which handles a call. For a MOC, this is the caller's attached MSC. For an MTC, this is the first non-transit MSC in the subscriber's network that receives the inbound call.

GPRS

General Packet Radio Service - employed to connect mobile cellular users to PDN (Public Data Network- for example the Internet).

GSM

Global System for Mobile communication.

It is a second generation cellular telecommunication system. Unlike first generation systems, GSM is digital and thus introduced greater enhancements such as security, capacity, quality and the ability to support integrated services.

GT

Global Title.

The GT may be defined in any of the following formats:

- Type 1: String in the form "1,<noa>,<BCD address digits>"
- Type 2: String in the form "2,<trans type><BCD address digits>"
- Type 3: String in the form "3,<trans type>,<num plan>,<BCD address digits>"
- Type 4: String in the form "4,<trans type>,<num plan>,<noa>,<BCD address digits>"

The contents of the Global Title are defined in the Q713 specification, please refer to section 3.4.2.3 for further details on defining Global Title.

HLR

The Home Location Register is a database within the HPLMN (Home Public Land Mobile Network). It provides routing information for MT calls and SMS. It is also responsible for the maintenance of user subscription information. This is distributed to the relevant VLR, or SGSN (Serving GPRS Support Node) through the attach process and mobility management procedures such as Location Area and Routing Area updates.

HPLMN

Home PLMN

IDP

INAP message: Initial DP (Initial Detection Point)

IMSI

International Mobile Subscriber Identifier. A unique identifier allocated to each mobile subscriber in a GSM and UMTS network. It consists of a MCC (Mobile Country Code), a MNC (Mobile Network Code) and a MSIN (Mobile Station Identification Number).

The IMSI is returned by the HLR query (SRI-SM) when doing FDA. This tells the MSC exactly who the subscriber is that the message is to be sent to.

IN

Intelligent Network

INAP

Intelligent Network Application Part - a protocol offering real time communication between IN elements.

Initial DP

Initial Detection Point - INAP Operation. This is the operation that is sent when the switch reaches a trigger detection point.

IP

1) Internet Protocol

2) Intelligent Peripheral - This is a node in an Intelligent Network containing a Specialized Resource Function (SRF).

IS-41

Interim Standard 41 is a signaling protocol used in cellular telecommunications systems. It deals with the signalling between the MSC and other network elements for the purpose of handovers and roaming etc.

ISDN

Integrated Services Digital Network - set of protocols for connecting ISDN stations.

ISUP

ISDN User Part - part of the SS7 protocol layer and used in the setting up, management, and release of trunks that carry voice and data between calling and called parties.

ITU

International Telecommunication Union

M3UA

MTP3 User Adaptation. The equivalent of MTP in the SIGTRAN suite.

MAP

Mobile Application Part - a protocol which enables real time communication between nodes in a mobile cellular network. A typical usage of the protocol would be for the transfer of location information from the VLR to the HLR.

MC

Message Centre. Also known as SMSC.

MCC

Mobile Country Code. In the location information context, this is padded to three digits with leading zeros. Refer to ITU E.212 ("Land Mobile Numbering Plan") documentation for a list of codes.

MDN

Mobile Directory Number

MIN

Mobile Identification Number, also known as an MSID.

MNC

Mobile Network Code. The part of an international address following the mobile country code (MCC), or at the start of a national format address. This specifies the mobile network code, that is, the operator owning the address. In the location information context, this is padded to two digits with a leading zero. Refer to ITU E.212 ("Land Mobile Numbering Plan") documentation for a list of codes.

MO

Mobile Originated

MOC

Managed Object Class

MS

Mobile Station

MSC

Mobile Switching Centre. Also known as a switch.

MSID

Mobile Subscriber Identification, also known as an MIN.

MSIN

Mobile Station Identification Number.

MT

Mobile Terminated

MTC

Mobile Terminated Call. The part of the call associated with a subscriber receiving an inbound call.

MTP

Message Transfer Part (part of the SS7 protocol stack).

MTP3

Message Transfer Part - Level 3.

NOA

Nature Of Address - a classification to determine in what realm (Local, National or International) a given phone number resides, for the purposes of routing and billing.

PC

Point Code. The Point Code is the address of a switching point.

PLMN

Public Land Mobile Network

SCCP

Signalling Connection Control Part (part of the SS7 protocol stack).

SCF

Service Control Function - this is the application of service logic to control functional entities in providing Intelligent Network services.

SCP

Service Control Point. Also known as SLC.

SGSN

Serving GPRS Support Node

SLC

Service Logic Controller (formerly UAS).

SLEE

Service Logic Execution Environment

SME

Short Message Entity - This is an entity which may send or receive short messages. It may be located in a fixed network, a mobile, or an SMSC.

SMS

Depending on context, can be:

- Service Management System hardware platform
- Short Message Service

- Service Management System platform
- Convergent Charging Controller Service Management System application

SNMP

Simple Network Management Protocol. Usually responsible for notifying faults on a network.

SRF

Specialized Resource Function – This is a node on an IN which can connect to both the SSP and the SLC and delivers additional special resources into the call, mostly related to voice data, for example play voice announcements or collect DTMF tones from the user. Can be present on an SSP or an Intelligent Peripheral (IP).

SRI

Send Routing Information - This process is used on a GSM network to interrogate the HLR for subscriber routing information.

SS7

A Common Channel Signalling system is used in many modern telecoms networks that provides a suite of protocols which enables circuit and non-circuit related information to be routed about and between networks. The main protocols include MTP, SCCP and ISUP.

SSN

Subsystem Number. An integer identifying applications on the SCCP layer.

For values, refer to *3GPP TS 23.003*.

SSP

Service Switching Point

SUA

Signalling Connection Control Part User Adaptation Layer

System Administrator

The person(s) responsible for the overall set-up and maintenance of the IN.

TCAP

Transaction Capabilities Application Part – layer in protocol stack, message protocol.

TDP

Trigger Detection Point.

TSAN

Temporary Service Access Number

VLR

Visitor Location Register - contains all subscriber data required for call handling and mobility management for mobile subscribers currently located in the area controlled by the VLR.

VWS

Oracle Voucher and Wallet Server (formerly UBE).

Index

A

- abortOnCallFail • 11
- About cdmagw.sh configuration • 22
- About Installation and Removal • 31
- About This Document • v
- AC • 39
- ACS • 39
- Administrative Tasks • 27
- Alarms • 5
- Alarms, Statistics, Reports and EDRs • 5
- AllowInitialTermination • 11
- ANLYZDActionCodeRequired • 11
- AnnouncementsUseCCDIR • 12
- Audience • v

B

- Background Processes • 25
- Backing up the U-CA-IS41 (CDMA) Service • 28
- BusyStatusTimeout • 12

C

- CallFailedTimeout • 12
- CallStatusTimeout • 12
- CAMEL • 39
- CC • 39
- CcdirTimeout • 12
- CDMA • 39
- CDMA (U-CA-IS41) packages • 31
- cdmagw • 2, 4, 7, 8, 25, 29
- cdmagw.sh Configuration • 7, 22, 25
- cdmagw.sh example • 23
- cdmagw_m3ua • 2, 25, 26
- cdmagw_sua • 2, 25, 26
- cfnaOnRedirectionIndicators • 12
- Common Troubleshooting Procedures • 29
- CompareDestinationDigits • 12
- Component descriptions • 2
- Configuration • 6, 7, 26
- Configuration components • 7
- Configuration File Format • 9
- Configuration Overview • 7
- Configuring IN Call Model Triggers • 33
- Connection • 39
- ConnresTimeout • 13
- Convergent • 39
- Copyright • ii

D

- Debug output • 29
- defaultTsanPool • 4, 13
- Diagram • 2
- DisconnectTimeout • 13
- DisconnectWarningID • 13

- DisconnectWarningType • 13
- DMHServiceID_ANLYZD • 14
- DMHServiceID_ANLYZD_OnRelease • 14
- DMHServiceID_DynamicPrefix • 14
- DMHServiceID_ODISCONNECT • 14
- DMHServiceID_ORREQ • 14
- DMHServiceID_TDISCONNECT • 14
- Document Conventions • vi
- DP • 39
- DTMF • 39
- dummyMDNForCallLookup • 14
- dummyMsid • 15
- Dynamic_DMHServiceID • 15

E

- Editing the File • 9
- EDRs • 6
- EnableDisConnRes • 15
- EnableStats • 15
- Environment variables • 33
- eserv.config Configuration • 7, 8
- Example cdmagw Configuration Section • 9

F

- FCI • 40
- FDA • 40
- forceCorrelationID • 15

G

- Global configuration parameters • 33
- GMSC • 40
- gmscName • 4, 20
- GPRS • 40
- GSM • 40
- GT • 40

H

- HLR • 40
- HPLMN • 40

I

- IDP • 40
- IMSI • 41
- ImsildpQualifier • 16
- IN • 41
- IN Call Model configuration • 7, 8
- INAP • 41
- Initial DP • 41
- Installation and Removal Overview • 31
- Introduction • 1, 7, 8, 27, 28, 29, 31
- IP • 41
- IS-41 • 41
- ISDN • 41
- ISUP • 41
- ITU • 41

K

keepTsanLocal • 16

L

Location • 25, 26

LocationIdIncludesMSCID • 16

LowCreditWarningID • 16

LowCreditWarningType • 16

M

M3UA • 41

MAP • 41

maxMsidForGmscSelect • 8, 16

MaxStatusCheckFailures • 17

MC • 42

MCC • 42

MDN • 42

MIN • 42

MNC • 42

MO • 42

MOC • 42

MS • 42

MSC • 42

MSID • 42

msidGmscFile • 4, 7, 8, 13, 16, 17

msidRequiredDeniedReason • 17

MSIN • 42

MT • 42

MTC • 42

MTP • 43

MTP3 • 43

N

Network element requirements • 4

NOA • 43

nonWinRoamDataTimeout • 4, 17

Non-WinRoaming • 3

Non-WinRoaming processing • 4, 13, 15, 17, 18, 20, 21, 22

non-WinRoaming traffic • 3

noTsanDeniedReason • 4, 18

O

Overview • 1, 7, 25, 27, 29, 31, 33

P

Parameters • 11

PC • 43

PLMN • 43

Possible processing stages • 3, 11

Prerequisites • v

Purpose • 25, 26

R

rangeEnd • 21

ranges • 21

rangeStart • 21

Related Documents • v

Reports • 6

ResetSrfTimeout • 18

S

SCCP • 43

SCF • 43

Scope • v

SCP • 43

SGSN • 43

SIGTRAN configuration • 22

SLC • 43

SLEE • 43

SME • 43

SMS • 43

SNMP • 44

SoakTestCalledNumber • 18

SoakTestCallingNumber • 18

SoakTestInterfaceEnabled • 19

SoakTestInterfacePort • 19

SRF • 44

SRI • 44

SS7 • 44

SSN • 44

SSP • 44

Starting and Stopping the U-CA-IS41 (CDMA) • 27

Starting the U-CA-IS41 (CDMA) service • 27

Startup • 25, 26

Startup output • 27

Statistics • 6

Stopping the U-CA-IS41 (CDMA) service • 27

SUA • 44

Supported ANLYZD parameters • 5

System Administrator • 44

System Overview • 1

T

TCAP • 44

TDP • 44

TDP event type values • 37

TestInterfaceEnabled • 19

TestInterfacePort • 19

ThrottlingCallRate • 19

Trigger detection point (TDP) definition file • 33

Trigger detection point definitions • 35

Troubleshooting • 29

TSAN • 44

tsanAnlyzdField • 19

tsanNature • 22

tsanPools • 8, 20, 21

Typographical Conventions • vi

V

VLR • 45

VWS • 45

W

waitForCallingParty • 5, 22

What is CDMA? • 1