



**Kodiak PoC Solution  
Call Detail Record (CDR)  
Interface Control Document  
Version P7.10.2\_v02  
April, 2015**

**Kodiak Networks, Inc**  
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## Revision history

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1.0	04-Jan-2011	Bharat Setti	<ul style="list-style-type: none"> <li>Increased IP Address field length to 45 to allow IPv6 addresses including IPv4 tunnelling.</li> </ul>
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4.3	05-May-2014	Bharat Setti	<ul style="list-style-type: none"> <li>Added Diagnostic Details field.</li> </ul>
4.4	13-Jun-2014	Bharat Setti	<ul style="list-style-type: none"> <li>Corrected Corporate ID field length and description.</li> </ul>
4.5	07-Jul-2014	Bharat Setti	<ul style="list-style-type: none"> <li>Added more clarification for time stamp values.</li> <li>Updated file name and recording entity in all examples.</li> </ul>

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7.10_01	08-Jul-2014	Bharat Setti	<ul style="list-style-type: none"> <li>Merge ICDs from releases 7.8 and 7.9.</li> </ul>
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7.10_05	30-Oct-2014	Bharat Setti	<ul style="list-style-type: none"> <li>Add diagnostic value 116 for call leg pre-empted by higher priority call.</li> </ul>
7.10_06	24-Jan-2015	Bharat Setti	<ul style="list-style-type: none"> <li>Removed diagnostic value 128, since 115 is used and serves the same purpose.</li> </ul>
7.10_07	04-Feb-2015	Shibu Narendranathan	<ul style="list-style-type: none"> <li>Resolve 7.9, 7.10 document merge issues.</li> </ul>
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7.10.2_v02	10-Apr-2015	Bharat Setti	<ul style="list-style-type: none"> <li>Updated client types for RemoteEntity field.</li> </ul>

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# 1 Introduction

This document describes the Call Detail Records (CDR) generated by Kodiak PoC Solution. This document is typically used by the Mediation Centre of Wireless operator. It provides the functional description of CDR's generated by Billing Server. Following details shall be covered as part of this document.

- Generating/collecting internal call leg information
- Converting from internal to external CDR file.
- Use of the CDR Billing Server (BS).
- Transferring the CDR files to the Customer's MC via File Transfer Protocol (FTP/SFTP) in PULL fashion
- Basic File Retention Policy

## 1.1 Acronyms and Abbreviations

Acronym / Abbreviation	Description
BS	Billing Server
CDR	Call Detail Record
CP	Call Processing
DD	Dialed Digits to represent group/private call information
DN	Directory Number
DOY	Day of Year
DTMF	Dial Tone & Multi-Frequency
EMS	Element Management System
EOF	End Of File character
FCI	Furnish Charging Information
FR	File Replication
FTP	File Transfer Protocol
LCS	Location Services
LD	Long Distance network (i.e. CLASS 4)
MC	Mediation Centre
MCC	Mobile Country Code
MNC	Mobile Network Code
SC	Security Code

Acronym / Abbreviation	Description
SFTP	Secure File Transfer Protocol
PANI	P-Access-Network-Info

Table 1: Acronyms and Abbreviations

## 1.2 Terms

- **Mandatory** – A field categorized as mandatory means that the field must be in the CDR generated.
- **Optional** – A field categorized as optional means that the field may or may not be included in the actual content when generating the CDR
- **Primary** – A CDR file is classified as Primary when the file is not yet transferred to the Mediation Centre
- **Secondary** – A CDR file is classified as Secondary when the file is successfully transferred to the Mediation Centre
- **Originating Participating PoC Server** – The PoC server on which the calling subscriber is homed. Each PoC call has one such PoC server.
- **Terminating Participating PoC Server** – The PoC server on which the called subscriber is homed. There may be multiple such servers in a PoC call.
- **Controlling PoC Server** – For 1-1 and adhoc group PoC calls, this is the server on which the calling subscriber is homed. For pre-arranged group PoC calls, this is the server on which the group owner is homed. Controlling PoC server is colocated with either the originating participating PoC server or one of the terminating participating PoC servers. All three PoC server functions may also be colocated on the same PoC server.

## 1.3 References

- Kodiak PoC Architecture Document

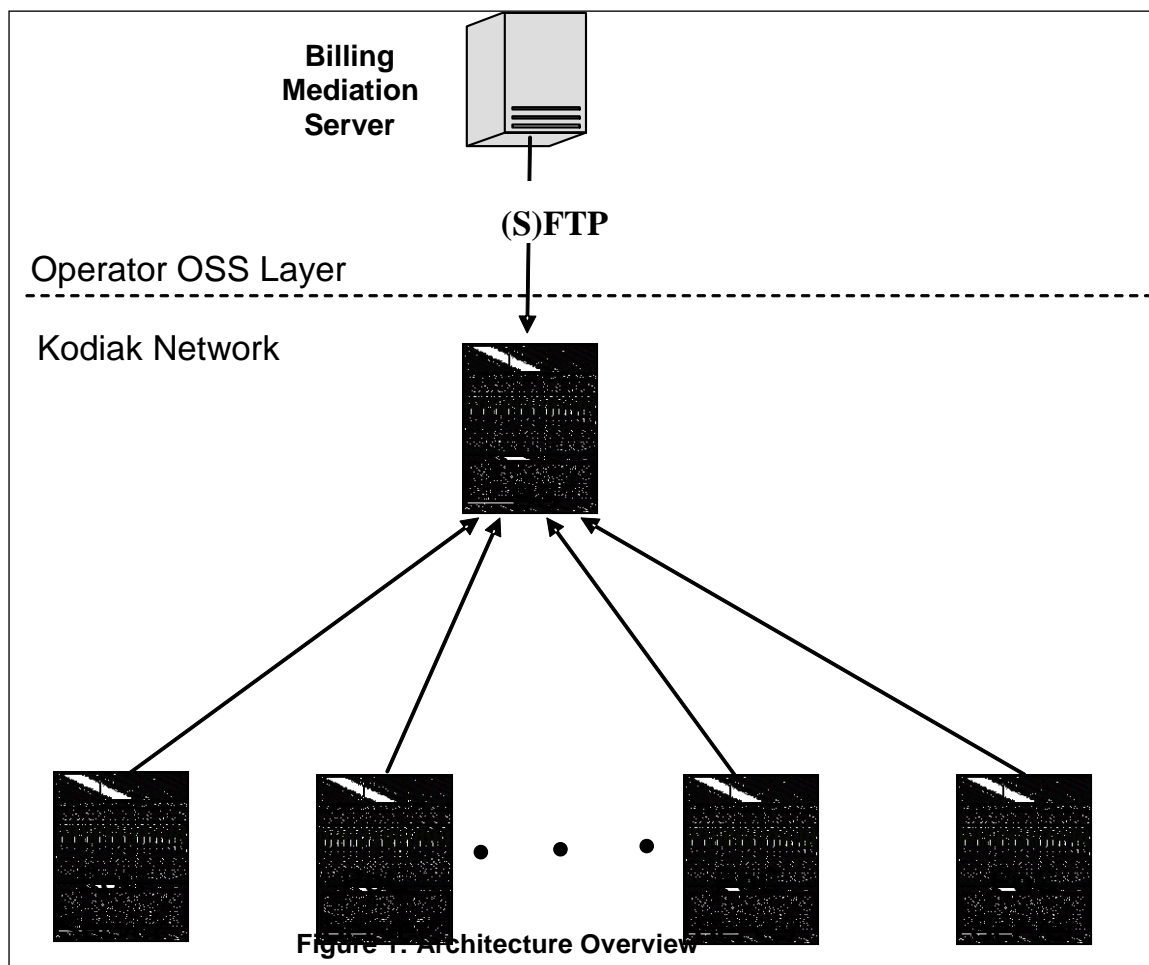
## 2 Architecture Overview

Kodiak's billing solution offers integration of the PoC services billing solution into the operator's existing billing system. It provides flexibility to offer duration based billing for PoC services. Offering the ability to bill each leg of the group call individually provides further flexibility. This section provides overview of billing architecture supported for PoC services in a carrier's network.

A dedicated blade is added into PoC solution architecture to host the billing server. The billing server subsystem configuration management is managed through the EMS subsystem.

PoC server captures raw CDR for calls and pushes to the billing server. The billing server converts raw CDR information into the external CDR format (ASCII) and stores the CDR into a file, which is then retrieved by Mediation Centre (MC). The billing server supports 1+1 and Geo redundant configuration.

For all PoC sessions, each PoC server generates CDR for the call legs that it manages. The fields in CDR for a call leg will typically include calling party address, called party address and call start and end times.



## **2.1 Data Flow**

The following steps depict how the CDR is generated, stored, and eventually pulled by mediation center:

- When a call is released in the PoC server, internal raw leg records are generated and CallP puts the records into tables.
- The raw leg records are transferred to the active billing server as well as standby billing server.
- Based on the raw data received, the active billing server generates the CDRs based on the configurable setup and stores the CDR data into a CDR file.
- Once the CDR file is full (i.e. reach the file size or open period), the file is closed and available to be pulled by MC via FTP or SFTP.
- After successful transfer of file by MC, the file will be stored for configurable period of time before getting deleted.

## **2.2 File Management**

This section describes how to manage the CDR files in general.

### **2.2.1 CDR Format**

Kodiak supports ASCII CDR Format.

### **2.2.2 CDR Generation Policy**

Kodiak supports generating Mobile Originating and Mobile Terminating Leg CDRs. The billing server generates one set of MO and MT CDRs using the call data received from the controlling PoC server of each call.

In call attempt failure scenarios such as calling an invalid number, there may only be a MO CDR with no corresponding MT CDR, when only one PoC server is involved – i.e. both calling and called parties are homed on the same PoC server. For inter-PoC server calls in similar call failure scenarios, both MO and MT CDRs will be generated by the controlling PoC server.

### **2.2.3 File Policy**

#### **2.2.3.1 File Name Policy**

The filename mainly consists of reporting entity, timestamp, and sequence number.

#### 2.2.3.1.1 Filename for Voice Call CDR

Billing server supports generating PoC session CDR in the following format:

**PoCServerID.ServiceType.YYYYMMDD.HHMMSS.SSSSSS**, where

- **PoCServerID** is the alpha-numeric PoC server ID (name)
- **ServiceType** indicates the service for which CDRs were generated and stored in the file. In this release, only the string “voice” is defined, indicating that the CDRs contained in the file were generated for PoC voice calls. Other strings may be defined in later releases as required,
- **YYYYMMDD** represents the file creation date. The timestamp in the CDR filename will be UTC (GMT) time.
- **HHMMSS** represents the file create time in hours (24-hour format), minutes and seconds. The timestamp in CDR filename will be UTC (GMT) time.
- **SSSSSS** represents 6 digits of system generated incremental sequence number starting with 000001 and incrementing by one until it reaches the maximum number, then wrapping around to the beginning

For example, the file name may look like “PROD\_POC1.voice.20140305.225527.000001”.

#### 2.2.3.2 File size Policy

Both the file size and the open period are configurable via EMS.

The file size ranges from 1,000 to 10,000 CDR records with default of 1000 CDRs. All the CDR with the same call reference generated by the same recording entity shall stay within the same CDR file. This implies that for any given call, if CDRs for all the legs can not be fit into a file, then the file shall be closed and a new file shall be opened so that all the CDRs with same call reference stay within the file.

#### 2.2.3.3 File Open Policy

The file open period ranges from 5 minutes to 24 hours with default of 15 minutes. If no CDRs are generated during the file open period, the file is closed with only the header. File is then closed, sequence number is incremented and a new file is created.

#### 2.2.3.4 CDR Directory

All CDR files are stored in a directory at the configured path. Since the file names contain the PoC server ID, they can be easily filtered as required.

### 2.2.3.5 Call CDR Backup Directory

After keeping the CDR files in the active directory for configurable period of time, the files shall be moved to a backup directory. The files shall be kept in this directory for a configurable number of days and cannot exceed 30 days. The path for the backup directory is also configured.

## 2.2.4 File Structure

Each file is structured as the following:

Header	CDR contents
--------	--------------

Where:

- a) Header
  - Consists of the filename (containing various characters) [refer to [2.2.3](#)] and number of records.
  - For e.g., the header would look like the following:
  - **PROD\_POC1.voice.20140305.225527.000001,4**
  - Where PROD\_POC1.voice.20140305.225527.000001 is the filename and 4 is the number of records
- b) CDR contents
  - Consist of PoC call CDRs. Each field in the record will be comma separated. For fields that are not applicable to PoC solution and have no value, it will be encoded with no data. For e.g. for fields with no value it will encoded with a single comma “,”.

## 2.2.5 File Retention Policy

All closed un-transferred CDR files are classified as Primary. All the primary files (i.e. files that are no longer being written to) are located in the primary directory. MC needs to pull the files from the primary directory. The files shall be saved for a configurable amount of time for later use.

## 2.2.6 Disk Utilization

The billing server monitors the disk usage. When the disk space crosses a configurable watermark (e.g. low, medium, & high), an alarm is generated so that the craft person can take proper action to ensure the health of billing server.

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## 2.2.7 File Synchronization

The Primary, Secondary and Geo billing server synchronize the files so that Secondary BS is always ready to take over the task whenever the Primary BS fails. MC pulls CDR files from active billing server.

## 2.2.8 Transferring CDR Files

Billing server supports transfer of CDR's to the MC via PULL mechanism. The billing server shall be able to accept the PULL request command from MC via FTP/SFTP and start transferring all or specific primary CDR file(s) to the destination specified by the MC. After the CDR file is created, the file will be stored for a configurable number of days for later use. Since it is a pull, the MC shall retry when it experiences the transfer failure. The CDR files shall be transferred to MC using FTP/SFTP. Billing Server shall support up to 64 simultaneous FTP/SFTP sessions.

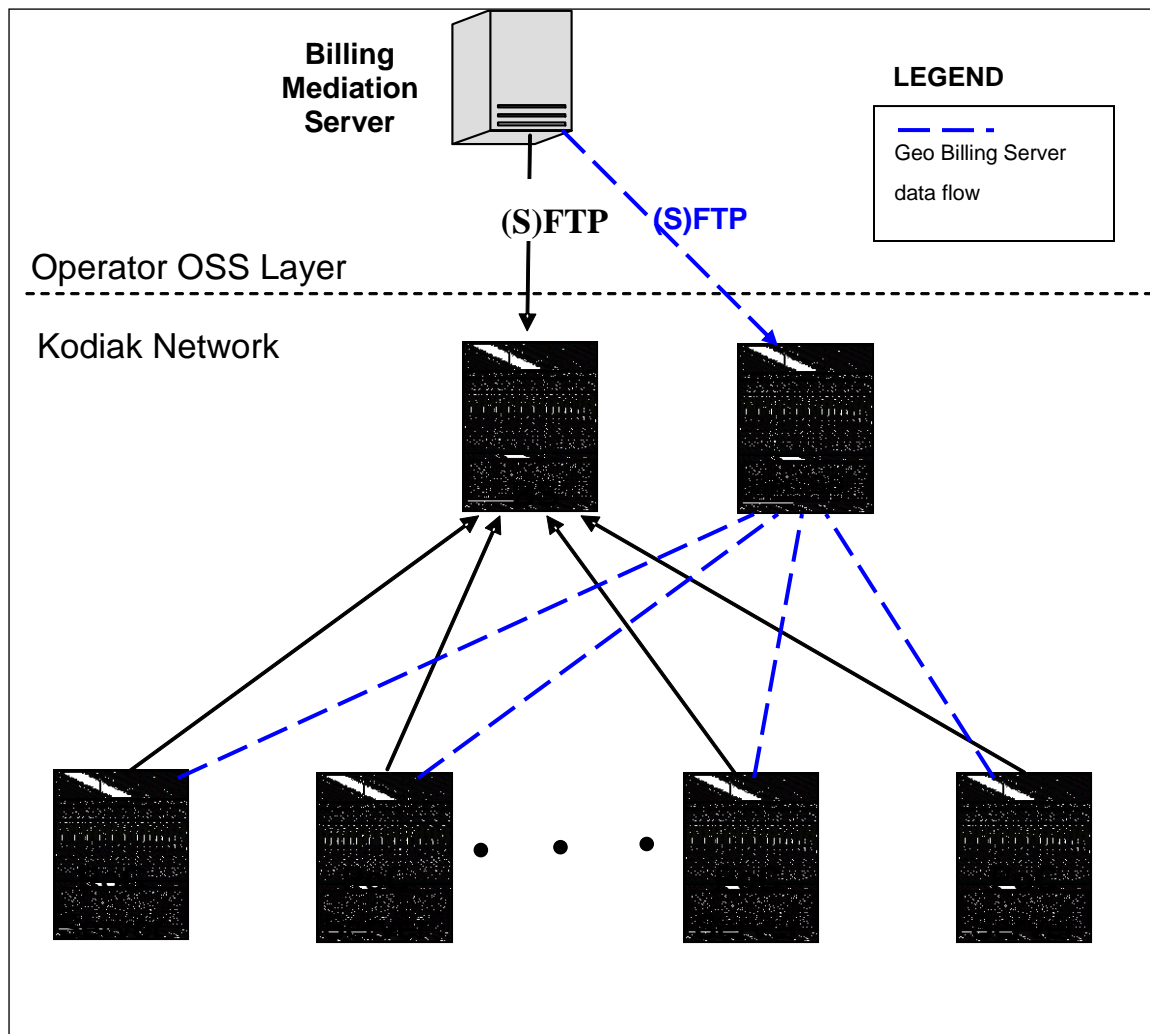
MC may also rename the file to mark it as read, to easily identify new CDR files generated since the last pull. The billing server will replicate the file renaming between the primary, secondary and geo billing servers.

## 2.2.9 Billing Server CDR Generation for Geo PoC Server

Kodiak PoC solution supports both 1+1 and Geographical redundancy for PoC calls. When a PoC call initiated by a client fails due to timeout, the client initiates the request again to the Geo PoC server. The geo PoC server then handles the call for the duration of the call. When the call ends, the geo PoC server generates raw CDR data, which is then pushed and replicated across primary, secondary and geo billing servers. PoC servers implement a similar mechanism for inter PoC server communication.

## 2.2.10 Transferring CDR Files from Geo Billing Server

Kodiak billing solution supports geographically redundant billing server. This kind of redundancy setup is required in order to support catastrophic events like fire, earthquake etc. There is a heartbeat message between Serving Billing Server chassis and redundant Billing Server chassis. If one of the serving Billing Server chassis fails, the redundant Billing Server chassis shall take over the role of the active Billing Server. The switchover decision is made based on heartbeat message failure between Serving and Redundant Billing Server chassis. In case of a switchover from Serving Billing Server to Redundant Billing Server, Mediation center shall communicate with the new Active Billing Server. A 3-way Database and CDR file synchronization between primary, secondary and the redundant Billing server shall be configured. In case of serving Billing Server chassis failure, Mediation center needs to connect to the redundant chassis for CDR files.



**Figure 2: Billing Server Geo Architecture Overview**

Above figure depicts Geo Billing server architecture. In case of failure in Primary BS, the CDR files shall be generated by Geo Billing server. In the event of primary billing server failure, Data mediation center need to retrieve the CDR files from the Geo Billing Server.



### 3 The Content of the CDR

The following tables describe the contents of each of the call records generated in the Kodiak PoC solution. The content of the CDRs is specified on the interface from the Kodiak network to the billing system that is used for CDR transport. The rules governing the CDR specifications on these interfaces are summarized in the following clause.

#### 3.1 Partial CDR's

Billing Server does not support generating partial CDR's in the event of system failure.

#### 3.2 Description of the CDR

Kodiak Billing Server supports generating PoC CDRs. The following sections describe the fields supported in mobile originating and mobile terminating PoC call CDRs.



**Note 1:** In the following tables, "Conditional" fields may be omitted by the billing server only if the value for the field is not available at the billing server generating the CDR. If the value for a conditional field is available, then the billing server **MUST** include the value in the CDR.

**Note 2:** Optional fields may be omitted by the billing server even if the value is available, but it is recommended to include in the CDR.

##### 3.2.1 Mobile Originating PoC Call CDR record fields

Mobile Originating PoC Related Call Attempt captures all the originating call related information such as calling party, called party, duration, type of the call etc.

Field	Type	Field Type	Format	Size	Description
Record Type	Mandatory	Number	Integer	2	Mobile originated service
Calling Party	Mandatory	String	Tel URI	20	The tel: URI of the calling party
Called Party	Mandatory	String	Tel URI	1-125	The tel: URI of the called party or the PoC group URI if group owner is homed on different server,

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Field	Type	Field Type	Format	Size	Description
Recording Entity	Mandatory	String	Alpha Numeric	6	The identification of the PoC server producing the record
Call Type	Mandatory	Number	Integer	1	1-1, Adhoc, Pre-arranged PoC group session
Call reference	Mandatory	Number	Integer	1-8	A unique Identifier for the PoC call within PoC server
Leg Type	Mandatory	Number	Integer	1	Originating
Seizure Time	Mandatory	String	Time Stamp	17	Seizure time: time of outgoing or incoming traffic channel seizure
Answer Time	Mandatory	String	Time Stamp	17	Time at which handset answered the call
Release Time	Mandatory	String	Time Stamp	17	Release time: time of traffic channel release.
Call duration	Mandatory	Number	Integer	1-5	The duration (in seconds) of the connection for successful calls.
Cause for termination	Mandatory	Number	Integer	1	Reason for call termination
Diagnostic	Optional	Number	Integer	0-3	More detailed description of call termination cause.
Group ID	Conditional	String	Tel URI	0-125	The group URI to which the call was originated in case of pre-arranged PoC group call.
Pay Type	Conditional	Number	Integer	1	Indicating Post paid or pre-paid for the originating party.
Location	Conditional	String	Integer	0-6	MCC + MNC
Media IP Address	Conditional	String	IP Address	0-45	IP address of the media server.
Media Port	Conditional	Number	Integer	0-5	Media port of the media server.
Subscriber Type	Conditional	Number	Integer	0-1	Type of originating subscriber (Public, Corporate, Corporate_Public)
IMEI	Conditional	String	IMEI	0-15	IMEI of the originating party
PoC Server Type	Optional	Number	Integer	0-1	Identifies the type of PoC server (Controlling, originating, terminating) that generated this CDR.
Remote Entity	Optional	Number	Integer	0-1	Identifies the type of remote entity for this call leg – PoC client or another PoC server.

Field	Type	Field Type	Format	Size	Description
PANI	Optional	String	String	0-128	P-Access-Network-Info which contains cell-location information or wifi-related information.
Codec Type	Optional	Number	Integer	0-3	Codec Type which contains information of pre defined codec information.
Internal corporate id	Optional	Number	Number	0-10	Internal corporate id of the corporation to which the subscriber belongs.  This field will not be present for public subscribers
Diagnostic Details	Conditionally Optional:	Number	Integer	0-4	This field is mandatory if "Diagnostic" field has value 31. This contains the detailed diagnostic code.
APN String	Conditional	String	String	0-20	
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.

**Table 2: Mobile Originating PoC Call CDR Fields**

**Note:** Depending on the CDR version value, the last 10 fields in the above table (includes Diagnostic details, APN string and the 8 reserved fields) may not be included in the generated CDR files.

## 3.2.2 Mobile Terminating PoC Call CDR record fields

Mobile Terminating PoC Related Call Attempt captures all the terminating call related information such as calling party, called party, duration, type of the call etc.

Field	Type	Field Type	Format	Size	Description
-------	------	------------	--------	------	-------------

Field	Type	Field Type	Format	Size	Description
Record Type	Mandatory	Number	Integer	2	Mobile terminated service
Calling Party	Mandatory	String	Tel URI	20	The tel: URI of the calling party
Called Party	Mandatory	String	Tel URI	1-125	The tel: URI of the called party or the PoC group URI if group owner is homed on different server
Recording Entity	Mandatory	String	Alpha Numeric	6	The identification of the PoC server producing the record
Call Type	Mandatory	Number	Integer	1	1-1, Adhoc, Pre-arranged PoC group session
Call reference	Mandatory	Number	Integer	1-8	A unique Identifier for the PoC call within PoC server
Leg Type	Mandatory	Number	Integer	1	Terminating
Seizure Time	Mandatory	String	Time Stamp	17	Seizure time: time of outgoing or incoming traffic channel seizure
Answer Time	Mandatory	String	Time Stamp	17	Time at which handset answered the call
Release Time	Mandatory	String	Time Stamp	17	Release time: time of traffic channel release.
Call duration	Mandatory	Number	Integer	1-5	The duration (in seconds) of the connection for successful calls.
Cause for termination	Mandatory	Number	Integer	1	Reason for call termination
Diagnostic	Optional	Number	Integer	0-3	More detailed description of call termination cause.
Group ID	Conditional	String	Tel URI	0-125	The group URI to which the call was originated in case of pre-arranged PoC group call.
Pay Type	Conditional	Number	Integer	1	Indicating Post paid or pre-paid for the terminating party.
Location	Conditional	String	Integer	0-6	MCC + MNC
Media IP Address	Conditional	String	IP Address	0-45	IP address of the media server.
Media Port	Conditional	Number	Integer	0-5	Media port of the media server.
Subscriber Type	Conditional	Number	Integer	0-1	Type of terminating subscriber (Public, Corporate, Corporate_Public)
IMEI	Conditional	String	IMEI	0-15	IMEI of the terminating party

Field	Type	Field Type	Format	Size	Description
PoC Server Type	Optional	Number	Integer	0-1	Identifies the type of PoC server (Controlling, originating, terminating) that generated this CDR.
Remote Entity	Optional	Number	Integer	0-1	Identifies the type of remote entity for this call leg – PoC client or another PoC server.
PANI	Optional	String	String	0-128	P-Access-Network-Info which contains cell-location information or wifi-related information.
Codec Type	Optional	Number	Integer	0-3	Codec Type which contains information of pre defined codec information.
Internal corporate id	Optional	Number	Integer	0-10	Internal corporate id of the corporation to which the subscriber belongs.  This field will not be present for public subscribers
Diagnostic Details	Conditionally Optional:	Number	Integer	0-4	This field is mandatory if “Diagnostic” field has value 31. This contains the detailed diagnostic code.
APN String	Conditional	String	String	0-20	
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.
Reserved	Optional	N/A	N/A	N/A	Not defined. Reserved for future extension.

**Table 3: Mobile Terminating PoC Call CDR Fields**

**Note:** Depending on the CDR version value, the last 10 fields in the above table (includes Diagnostic details, APN string and the 8 reserved fields) may not be included in the generated CDR files.

## 3.3 Description of the Record Fields

This section contains a brief description of each field of the CDRs described in the previous section:

---

### 3.3.1 Call Duration

This field contains the relevant call duration in seconds. For completed (answered) calls this is the chargeable duration from answer to release of the traffic channel. The answer time is based on User answering the call, and from a signaling standpoint, it's the receipt of MBCP Connect Ack message from the Terminating client.

### 3.3.2 Call Reference

This field uniquely identifies a call or transaction on both sides of the interface (i.e. 'A' and 'B' side). It can be 1) integer value ranging from 0 to 99999999 or 2) up to 8 character of octet string of unique value. This is used for correlating all the CDRs generated for a call.

### 3.3.3 Calling Party

This field contains the "tel:" URI of the calling party. The calling party's number is encoded in the E.164 format.

### 3.3.4 Called Party

This field contains the [tel:](#) URI of the called party. For an adhoc or pre-arranged PoC group call where the originating participating PoC server function and controlling PoC server function are colocated, since separate MO and MT CDRs are generated for each called party, each CDR will contain the [tel:](#) URI of one of the called parties. For a pre-arranged PoC group call where the controlling PoC server function is different from the originating participating PoC server function, the originating PoC server generates only one MO and MT CDR. This may happen when the PoC group is owned by a subscriber who is homed on a different PoC server than the calling party. The called party field is set to the group URI in this case. The group URI is also filled in the "Group ID" field for consistency.

### 3.3.5 Call Type

The field identifies the type of the call: Private or Group.

The valid values are

- 0: 1-1 PoC call
- 1: Pre-arranged PoC group call
- 2: Adhoc PoC group call
- 3: (reserved)
- 4: (reserved)
- 5: (reserved)

- 6: Broadcast call
- 9: None – this value may be set in error scenarios where PoC server had not determined the call type.

### 3.3.6 Cause for Termination

This field contains a generalized reason for the release of the connection including the following:

- normal release;
- unsuccessful call attempt;
- abnormal termination during the stable phase;

So the valid values are:

**Successful Call Scenario:**

- 0: normal release  
This value is set when the call was successful and released normally
- 4: stable call abnormal termination

**This value is set in the following scenarios:**

- If the call is successfully established and during the active call, if PoC server media resources fail then PoC server shall release all the legs and generate CDR's for each leg with value set to 4. The CDR's will have the information including the duration of call for each Leg.

**Failure Scenario:**

- 3: unsuccessful call attempt

**This value is set in the following scenarios:**

- In a group call, when none of the participants join the call.
- If the PoC server rejects the call termination to one or all the members in a group call
- If the PoC server rejects the call termination to the called party in a 1-1 call

### 3.3.7 Diagnostics

This field includes a more detailed technical reason for the release of the connection. The following values are supported:

- 1: Unallocated
- 3: No Route Available
- 16: Normal Clearing or Originator abandoned

- 17: User Busy in GSM call
- 19: No Answer (connect timeout)
- 20: Subscriber Absent
- 21: Call Rejected
- 23: Voice Mail
- 28: Invalid Number
- 29: Facility Rejected
- 31: Normal Unspecified
- 34: No Circuit Available
- 41: Temporary Failure
- 44: Channel Unavailable
- 47: Resource Unavailable
- 50: Requested Facility Not Authorized
- 63: Service Not Available
- 95: Invalid Message
- 112: Terminating party has set DND
- 113: Terminating party has set group camping
- 114: Terminating party is offline
- 115: Terminating party is busy in another POC call
- 116 call was pre-empted by higher priority call
- 116: Call leg pre-empted by higher priority call
- 127: Remote Call Rejected

### **3.3.8 Event Time Stamps**

These fields contain the event time stamps relevant for each of the individual record types.

The call records may contain the following significant call handling time stamps:

- The time at which the resource is allocated (Seizure time).
- The time at which the call was answered (Answer time).
- The time at which the resource was released (Release time).

For Mobile Originated PoC calls, the Seizure time is the time at which the SIP REFER request is received from the calling party. For Mobile Terminated PoC calls, the time at which the first MBCP Connect message is sent to the called party.



For both Mobile Originated and Mobile Terminated PoC calls, the Answer time is the time at which the MBCP Connect Ack message is received from the calling or called party. In case of failed call attempts when answer time is not available, this value is set to 0.

When the client disconnects from the call, Release time is recorded as the time at which SIP REFER (BYE) request is received from the client. When a call leg is released by the server, the Release time is recorded as the time at which MBCP Disconnect message is sent to the called party.

The call duration recorded is the chargeable duration i.e. the difference between the Answer and Release time stamps.

**Format of Event Timestamps:**

This field represents Time stamp at which the resources were allocated. It's encoded in the following format

c) **YYMMDDhhmmssShhmm**

d) --- Where

- 2. YY = Year 00 to 99
- 3. MM = Month 01 to 12
- 4. DD = Day 01 to 31
- 5. hh = hour 00 to 23
- 6. mm = minute 00 to 59
- 7. ss = second 00 to 59
- 8. S = Sign = "+", "-"
- 9. hh = UTC offset hour 00 to 23
- 10. mm = UTC offset minute 00 to 59

The timestamp is always provided in Local Time, with the Sign (S) and value of hours and minutes that follow indicating the offset of this encoded timestamp with respect to UTC. For example, if the timestamp is encoded as 101216094729+0530, this local time corresponds to 16<sup>th</sup> December 2010 04:17:29 UTC. This indicates that the local time is 5:30 hours ahead (east) of UTC. Similarly if the timestamp is encoded as 101216094729-0600, this local time corresponds to 16<sup>th</sup> December 2010 15:47:29 UTC and indicates that the local time is behind (west of) UTC by 6 hours.

### 3.3.9 Group ID

The field identifies the pre-arranged PoC group ID to which the call was originated, in case of pre-arranged PoC group call. This field is empty for 1-1 and adhoc calls.

### **3.3.10 IMEI**

The field identifies the IMEI of the mobile device used by the originating or terminating party, depending on the leg type.

### **3.3.11 Leg Type**

The field identifies the type of the leg: Originating or terminating.

The valid values are

- 0: Originating ( also leader in the group call)
- 1: Terminating
- 2: Participating

### **3.3.12 Location**

The field identifies the MCC (Mobile Country Code) and MNC (Mobile Network Code) of the originating or terminating subscriber, depending on the leg type. This is a 6 character field with MCC followed by MNC. The MCC and MNC values are as determined at the time of call initiation.

### **3.3.13 Media IP Address**

The field identifies the IP address of the media server for sending and receiving RTP packets.

### **3.3.14 Media Port**

The field identifies the port used by the media server for sending and receiving RTP packets.

### **3.3.15 Pay Type**

The field identifies the type of the pay category.

The valid values are

- 0: post paid
- 1: pre-paid

---

### 3.3.16 PoC Server Type

The field identifies the PoC server function performed by the server that generated this CDR..

The valid values are

- 0: Controlling – This PoC server is the controlling PoC server for the call. Originating or Terminating or both PoC server functions may be colocated with the server.
- 1: Originating – This PoC server is the originating participating PoC server for this call leg. Controlling PoC server function is performed by a different PoC server.
- 2: Terminating – This PoC server is the terminating participating PoC server for this call leg. Controlling PoC server function is performed by a different PoC server.

### 3.3.17 Recording Entity

The field identifies which PoC server generates this record. The value is set to the numeric PoC server ID.

### 3.3.18 Record Type

The field identifies the type of the record, such as mobile originated or mobile terminated.

The valid values are

- 60: Mobile originated PoC call
- 61: Mobile terminated PoC call

### 3.3.19 Remote Entity

The field identifies the type of the remote entity for this call leg. This is used for distinguishing between direct MO and MT call legs and inter-PoC server call legs.

The valid values are

- 0: PoC Server
- 1: PoC Handset Client
- 2: PoC Desktop Client
- 3: PoC Dispatcher Client
- 4: PDR Client
- 5: Wifi Client
- 10: Cross Carrier Client

### **3.3.20 Subscriber Type**

The field identifies the type of the subscriber.

The valid values are

- 0: Public
- 1: Corporate
- 2: Corporate+Public
- 3: NNI

### **3.3.21 PANI (P-Access-Network-Info)**

The field contains cell-location or wifi-ssid information

### **3.3.22 Codec Type**

The field contains integer value of codec which is used during the call.

Below is the list of defined values:

- 0: AMR 4.75**
- 1: AMR 5.15**
- 2: AMR 5.9**
- 3: AMR 6.7**
- 4: AMR 7.4**
- 5: AMR 7.95**
- 6: AMR 10.2**
- 7: AMR 12.2**
- 16: G.711 u-law PCMU**
- 17: G.711 a-law PCMA**

### **3.3.23 Internal corporate id**

The field contains Internal Corporate id of the corporation to which the subscriber belongs.

### **3.3.24 Diagnostic details**

This field is mandatory if “Diagnostic” field has value 31. This field includes a more detailed technical reason for the release of the connection if the “diagnostic” field has the value 31. The following values are supported:

513: Terminator is no longer in the group  
904: Hardware failure (media card connection failed) – For originator  
514: Terminator info not present  
852: Media manager messages response timeout  
871: Terminator - no session  
875: No termination leg joined the call  
920: Media manager failed to process connect message.  
981: Originator not authorized  
982: Terminator not activated  
983: Terminator not authorized  
989: Originator not activated  
1009: Hardware failure (media card connection failed) – For terminator

**Notes:**

Call was pre-empted – This is indicated by [diagnostics field=116](#)

Originator info not present – No CDR is generated in this case.

Originator abandoned – This is indicated by [diagnostics field= 16](#)

### **3.3.25 APN String**

This field specifies the APN which the client uses when connecting through cellular network. Even when the client is connected through wifi, this field will contain the APN through which client is expected to use when connects through cellular network. Typically, this is specified at the time of activation. Value of this field is not necessarily the actual APN used by the client; they can be internal code names that uniquely identify each APN or access network profile. This field must be filled with appropriate value in deployments that support multiple profiles for cellular access.

## **3.4 ASCII Encoding Rules**

**Following rules apply while encoding the fields in the ASCII format:**

- Each byte is encoded in the ASCII format.
- Each Leg CDR field is separated by a comma
- Each Leg record is separated by a newline character
- When a field is empty (e.g. reserved field or group ID in a 1-1 or adhoc call), the field value is set to an empty string (string of length zero). The normal field or record separator is added as usual. Refer section 2.2.4 File Structure for details.

- Any new / unrecognized fields that may be added later to the CDRs may be ignored by the charging function when processing the CDR records.

---

## 4 Sample Use Cases

In the following scenarios, users A, B and C are used. CDR is generated for each call leg separately, by each PoC Server. All users are in their home networks.

- User A:
  - URI: tel:+19726653401
  - Group A1:
    - URI: tel:+19726653401;group=PoC\_Team
    - Members: User B, User C
  - Post-paid
  - Public subscriber
  - IMEI: 490154203237518
  - Homed on PoC Server 1
- User B:
  - URI: tel:+19726653402
  - Pre-paid
  - Corporate-Public subscriber
  - Internal Corporate ID: 2311
  - IMEI: 490154203237526
  - Homed on PoC Server 1
- User C:
  - URI: tel:+19726653403
  - Group C1:
    - URI: tel:+19726653403;group=PTT\_Group
    - Members: User A, User B
  - Post-paid
  - Public subscriber
  - IMEI: 490154203237534
  - Homed on PoC Server 2
- PoC Server 1:
  - PoC Server ID: PROD\_POC1 (441011)
- PoC Server 2:
  - PoC Server ID: PROD\_POC2 (441021)

CDR file names are PROD\_POC1.voice.20140305.225527.000001 and PROD\_POC2.voice.20140305.225527.000001 for CDRs generated by PoC Server 1 and PoC Server 2 respectively, for all scenarios as applicable. For the sake of clarity, only the CDRs generated for the specific scenario being described are shown as the respective CDR file contents.

## 4.1 1-1 PoC Call

User A originates a 1-1 PoC session to User B. The contents of CDR file PROD\_POC1.voice.20140305.225527.000001 look like this:

```
PROD_POC1.voice.20140305.225527.000001,2
60,tel:+19726653401,tel:+19726653402,441011,0,733454,0,101217041729-
0600,101217041730-0600,101217041843-
0600,73,0,16,,0,310410,10.156.172.203,55555,0,490154203237518,0,1,3GPP-UTRAN-
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,,,INET,,,,,,,,,
61,tel:+19726653401,tel:+19726653402,441011,0,733454,1,101217041730-
0600,101217041730-0600,101217041843-
0600,73,0,16,,1,310410,10.156.172.123,54545,2,490154203237526,0,1,3GPP-UTRAN-
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,2311,,INET,,,,,,,,,
```

In the above CDR file, the CDR records correspond to the call legs as listed below:

Record #1: Mobile Origination A-B call leg

Record #2: Mobile Termination A-B call leg

## 4.2 Adhoc PoC Group Call – Scenario 1

User A originates an adhoc PoC session to User B and User C by selecting them manually from the contact list and initiating the call. User B drops out of the call first, while User A and User C continue with the call for some more time before ending it. The contents of CDR file PROD\_POC1.voice.20140305.225527.000001 looks like this:

```
PROD_POC1.voice.20140305.225527.000001,4
60,tel:+19726653401,tel:+19726653402,441011,2,2834645,0,101217051729-
0600,101217051730-0600,101217051843-
0600,73,0,16,,0,310410,10.156.172.203,55555,0,490154203237518,0,1,3GPP-UTRAN-
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,,,INET,,,,,,,,,
61,tel:+19726653401,tel:+19726653402,441011,2,2834645,1,101217051730-
0600,101217051730-0600,101217051843-
0600,73,0,16,,1,310410,10.156.172.123,54545,2,490154203237526,0,1,3GPP-UTRAN-
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,2311,,INET,,,,,,,,,
60,tel:+19726653401,tel:+19726653403,441011,2,2834645,0,101217051729-
0600,101217051730-0600,101217051856-
```



---

```
0600,86,0,16,,0,310410,10.156.172.203,55555,0,490154203237518,0,1,3GPP-UTRAN-  
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,,,INET,,,,,,,,,  
61,tel:+19726653401,tel:+19726653403,441011,2,2834645,1,101217051730-  
0600,101217051730-0600,101217051856-  
0600,86,0,16,,0,310410,10.10.2.1,54321,0,490154203237534,0,0,3GPP-UTRAN-  
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,,,INET,,,,,,,,,
```

In the above CDR file, the CDR records correspond to the call legs as listed below:

Record #1: Mobile Origination A-B call leg

Record #2: Mobile Termination A-B call leg

Record #3: Mobile Origination A-C call leg

Record #4: Mobile Termination A-C call leg

### 4.3 Adhoc PoC Group Call – Scenario 2

User A originates an adhoc PoC session to User B and User C by selecting them manually from the contact list and initiating the call. User A drops out of the call first, while User B and User C continue with the call for some more time before ending it. Since user A is the call originator, both the call legs are charged against user A for the duration of the call even after user A disconnects. The contents of CDR file PROD\_POC1.voice.20140305.225527.000001 looks like this:

```
PROD_POC1.voice.20140305.225527.000001,4  
60,tel:+19726653401,tel:+19726653402,441011,2,2834645,0,101217051729-  
0600,101217051730-0600,101217051856-  
0600,73,0,16,,0,310410,10.156.172.203,55555,0,490154203237518,0,1,3GPP-UTRAN-  
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,,,INET,,,,,,,,,  
61,tel:+19726653401,tel:+19726653402,441011,2,2834645,1,101217051730-  
0600,101217051730-0600,101217051856-  
0600,86,0,16,,1,310410,10.156.172.123,54545,2,490154203237526,0,1,3GPP-UTRAN-  
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,2311,,INET,,,,,,,,,  
60,tel:+19726653401,tel:+19726653403,441011,2,2834645,0,101217051729-  
0600,101217051730-0600,101217051843-  
0600,73,0,16,,0,310410,10.156.172.203,55555,0,490154203237518,0,1,3GPP-UTRAN-  
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,,,INET,,,,,,,,,  
61,tel:+19726653401,tel:+19726653403,441011,2,2834645,1,101217051730-  
0600,101217051730-0600,101217051856-  
0600,86,0,16,,0,310410,10.10.2.1,54321,0,490154203237534,0,0,3GPP-UTRAN-  
TDD;utran-cell-id-3gpp=31041032AD0000A07,7,,,INET,,,,,,,,,
```

In the above CDR file, the CDR records correspond to the call legs as listed below:

Record #1: Mobile Origination A-B call leg

Record #2: Mobile Termination A-B call leg

Record #3: Mobile Origination A-C call leg

---

Record #4: Mobile Termination A-C call leg

## 4.4 Pre-arranged PoC Group Call – Scenario 1

User A originates a pre-arranged PoC session to the PoC group URI

“tel:+19726653401;group=PoC\_Team”, whose members are User B and User C. User B drops out of the call first, while User A and User C continue with the call for some more time before ending it. The contents of CDR file PROD\_POC1.voice.20140305.225527.000001 looks like this:

```
PROD_POC1.voice.20140305.225527.000001,4
60,tel:+19726653401,tel:+19726653402,441011,1,2834645,0,101217051729-
0600,101217051730-0600,101217051843-
0600,73,0,16,tel:+19726653401;group=PoC_Team,0,310410,10.156.172.203,55555,0,
490154203237518,0,1,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,,,INET,,,,,,,,
61,tel:+19726653401,tel:+19726653402,441011,1,2834645,1,101217051730-
0600,101217051730-0600,101217051843-
0600,73,0,16,tel:+19726653401;group=PoC_Team,1,310410,10.156.172.123,54545,2,
490154203237526,0,1,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,2311,,INET,,,,,,,,
60,tel:+19726653401,tel:+19726653403,441011,1,2834645,0,101217051729-
0600,101217051730-0600,101217051856-
0600,86,0,16,tel:+19726653401;group=PoC_Team,0,310410,10.156.172.203,55555,0,
490154203237518,0,1,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,,,INET,,,,,,,,
61,tel:+19726653401,tel:+19726653403,441011,1,2834645,1,101217051730-
0600,101217051730-0600,101217051856-
0600,86,0,16,tel:+19726653401;group=PoC_Team,0,310410,10.10.2.1,54321,0,49015
4203237534,0,0,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,,,INET,,,,,,,,
```

In the above CDR file, the CDR records correspond to the call legs as listed below:

Record #1: Mobile Origination A-B call leg

Record #2: Mobile Termination A-B call leg

Record #3: Mobile Origination A-C call leg

Record #4: Mobile Termination A-C call leg

## 4.5 Pre-arranged PoC Group Call – Rejoin

This scenario should be considered as continuation of the previous scenario (Pre-arranged group call – scenario 1) where user B rejoins the group call by calling the group URI from call history. The controlling PoC server generates additional MO and MT CDRs for rejoin leg with calling party as user B and called party as user A (calling party of original call). These CDRs are in addition to the CDRs generated for the

original call as described in previous scenario. In these CDRs, the leg type is set to “participating” to indicate rejoin leg and the time stamps and call duration correspond to the rejoin leg.

The contents of CDR file PROD\_POC1.voice.20140305.225527.000001 looks like this (in addition to the CDRs specified in previous scenario):

```
PROD_POC1.voice.20140305.225527.000001,6
60,tel:+19726653401,tel:+19726653402,441011,1,2834645,0,101217051729-
0600,101217051730-0600,101217051843-
0600,73,0,16,tel:+19726653401;group=PoC_Team,0,310410,10.156.172.203,55555,0,
490154203237518,0,1,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,,,INET,,,,,,
61,tel:+19726653401,tel:+19726653402,441011,1,2834645,1,101217051730-
0600,101217051730-0600,101217051843-
0600,73,0,16,tel:+19726653401;group=PoC_Team,1,310410,10.156.172.123,54545,2,
490154203237526,0,1,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,2311,,INET,,,,,,
60,tel:+19726653401,tel:+19726653403,441011,1,2834645,0,101217051729-
0600,101217051730-0600,101217051856-
0600,86,0,16,tel:+19726653401;group=PoC_Team,0,310410,10.156.172.203,55555,0,
490154203237518,0,1,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,,,INET,,,,,,
61,tel:+19726653401,tel:+19726653403,441011,1,2834645,1,101217051730-
0600,101217051730-0600,101217051856-
0600,86,0,16,tel:+19726653401;group=PoC_Team,0,310410,10.10.2.1,54321,0,49015
4203237534,0,0,3GPP-UTRAN-TDD;utran-cell-id-
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60,tel:+19726653402,tel:+19726653401,441011,1,2834645,2,101217051747-
0600,101217051748-0600,101217051855-
0600,7,0,16,tel:+19726653401;group=PoC_Team,1,310410,10.156.172.123,54545,2,4
90154203237526,0,1,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,2311,,INET,,,,,,
61,tel:+19726653402,tel:+19726653401,441011,1,2834645,2,101217051748-
0600,101217051748-0600,101217051855-
0600,7,0,16,tel:+19726653401;group=PoC_Team,0,310410,10.156.172.203,55555,0,4
90154203237518,0,1,3GPP-UTRAN-TDD;utran-cell-id-
3gpp=31041032AD0000A07,7,,,INET,,,,,,
```

In the above CDR file, the CDR records correspond to the call legs as listed below:

Record #1: Mobile Origination A-B call leg

Record #2: Mobile Termination A-B call leg

Record #3: Mobile Origination A-C call leg

Record #4: Mobile Termination A-C call leg

Record #5: Mobile Origination B-A rejoin call leg

Record #6: Mobile Termination B-A rejoin call leg

Since the PoC group's home server is the controlling PoC server, CDRs generated by it are identical whether the rejoining subscriber is homed on the same PoC server or different PoC server. If the same participant rejoins and leaves the call multiple times, each time a set of CDRs as described above will be generated.

In the case of calling party of original call drops out of the call, the remaining participants continue on the call till only one participant is left in the call. If the calling user rejoins the call before it ends, the CDRs generated by the controlling PoC server contain the calling user's tel URI in both calling and called party fields. The time stamps and call duration correspond to that of the rejoin call leg. For example, CDRs are generated for the following call legs:

MO A→B (original call, originating)  
MT A→B (original call, terminating)  
MO A→C (original call, originating)  
MT A→C (original call, terminating)  
MO A→A (rejoin call, participating)  
MT A→A (rejoin call, participating)

## 5 Handling of Failure Scenarios

This section describes a few failure scenarios where the active billing server fails at various points.

### 5.1 Scenario 1

**Use case:** PoC server reports usage data to the active (primary) billing server. Before the usage data is processed and CDR written to file, the primary (active) billing server fails.

**PoC system behavior:** PoC server reports usage data to the billing server through TimesTen DB. The active billing server reads the usage data from the DB, generates CDR and writes it to the CDR file. After the CDR is written to the file, the usage data is removed from the DB. Since TimesTen DB handles synchronization of unread usage data to secondary and geo billing servers, even if the primary (active) billing server fails, the secondary billing server will read this data and generate the CDRs.

### 5.2 Scenario 2

**Use case:** PoC server reports usage data to the active (primary) billing server. Billing server reads the usage data and generates CDR. Before the CDR is written to file, the primary (active) billing server fails.

**PoC system behavior:** Usage data reported by PoC server is removed from the TimesTen DB only after the CDR is successfully written to CDR file. In this use case, since the billing server failed before the CDR is written to file, the usage data remains in the DB. This gets synchronized to the secondary and geo billing servers. When the primary (active) billing server fails, the secondary billing server will read this data and generate the CDRs.

### 5.3 Scenario 3

**Use case:** PoC server reports usage data to the active (primary) billing server. Billing server reads the usage data, generates CDR and writes it to the CDR file. Before the usage data is removed from the DB, the primary (active) billing server fails.

**PoC system behavior:** In this use case, since the billing server failed after writing the CDR to file but before the usage data is removed from DB, the usage data gets synchronized to the secondary and geo billing servers. When the primary (active) billing server fails, the secondary billing server will read this data and generate duplicate CDRs.

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## 5.4 Scenario 4

**Use case:** Both primary and secondary billing servers are down and geo billing server has become active. Mediation server pulls CDR files from the geo billing server and marks them as read. CDR files are also moved to the backup directory. Now the primary and secondary billing servers are brought back online.

**PoC system behavior:** Cluster file system of the billing server platform handles synchronizing the CDR files from geo billing server back to primary and secondary billing servers. So, the CDRs will be available through the primary billing server when it becomes active.