

# *Subscriber Data Management*

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**Release 9.2**

## **Feature Notice**

910-6838-001 Revision A

September 2013



# Subscriber Data Management (SDM) - IMS/LTE Home Subscriber Server (HSS) Copyright, Notice, Trademarks, and Patents

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7,155,206; 7,260,207; 7,650,367; 7,701,925; 7,738,488; 7,787,445; 7,848,767; 7,907,713; 7,933,608; 8,015,293; 8,204,052; 8,238,884; 8,254,551; 8,358,768; 8,400,947;

### Foreign Patent Numbers:

ZL 200680049126.1; ZL 200780034932.6;

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### Foreign Patent Numbers:

ZL 200680049126.1; ZL 200780034932.6;

# Subscriber Data Management (SDM) - User Data Repository (UDR) Copyright, Notice, Trademarks, and Patents

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### Foreign Patent Numbers:

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# Subscriber Data Management

This document includes a brief description on the SDM Product, an overview of the hardware platform, an overview of the software architecture, new feature descriptions, and explains how to find customer documentation on the Customer Support Site.

## Introduction

Subscriber Data Management is used to consolidate and manage cross-domain subscriber data as a single logical profile. Data is stored in the back-end database, which supports multiple front-end applications.

Feature notices are distributed to customers with each new release of software.

This *Feature Notice* includes the following topics:

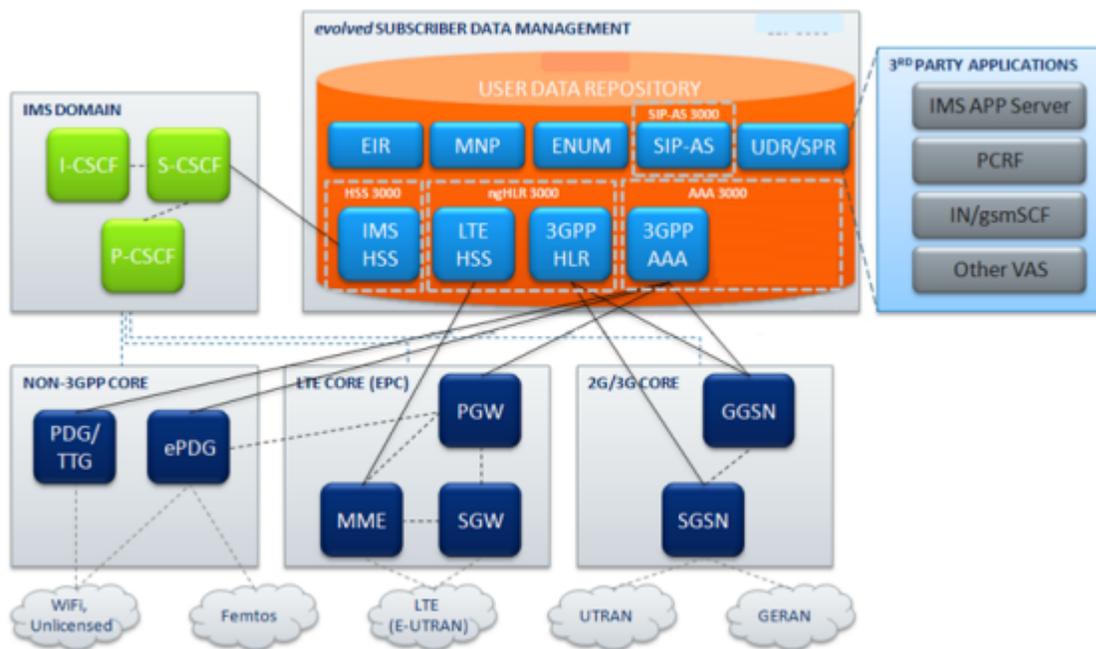
- [SDM Description](#)
- [Hardware Platform Overview](#)
- [Software Architecture](#)
- [New and Enhanced Features](#)

For further details on the SDM product and on each feature covered in this document, refer to the SDM Customer Documentation set's Product Description. The SDM Documentation Roadmap should be your document of reference to get the list of all the SDM Customer Documents available and a description of each of their purpose. This will map you to the right document based on the type of information you need. For instructions on how to locate the SDM Customer Documentation, go to this section: [Locate Product Documentation on the Customer Support Site](#)

## SDM Description

The Tekelec Subscriber Data Management (SDM) product family is a multi-profile subscriber management system, designed with an objective to consolidate all the information (or profiles) of a mobile subscriber. It enables centralization of subscriber information/data in one logical place and convergence of subscriber's registration, authentication and call termination at the core of the network, regardless of the access domain (including GSM/UMTS, IMS, SIP, LTE, and others).

The evolved Subscriber Data Management (SDM) solution features a distributed and layered architecture that provides a scalable back-end database, the Subscriber Data Server (SDS), which centralizes subscriber data from multiple front ends such as these applications: 3GPP ngHLR and AuC functions, MNP, SIP-AS, IMS-HSS, LTE-HSS, EIR, LTE-EIR, ENUM, 3GPP AAA, and SPR. In other releases, it can also include other functional elements, or network applications, as depicted in this figure.



**Figure 1: The SDM and typical network architecture**

### Hardware Platform Overview

The Tekelec Subscriber Data Management (SDM) software solution supports one software stream and can use one of the following hardware platforms:

The EAGLE XG hardware used for the Subscriber Data Management (SDM) application is available for AC and DC power. The hardware consists of the following cabinets and components depending on customer-specific configurations:

- Cabinets
  - HP Enterprise cabinet (AC)
  - Telect CoreMAX seismic cabinet (DC)
- Power distribution units (AC) or panels (DC)
  - HP AC PDU
  - Telect 100A 4-Position Demarcation DC PDP
  - Telect 100A Dual feed DC PDP
- Cisco 4948E/4948E-F aggregation switch
- HP c7000 enclosure with
  - Onboard Administrator
  - Cisco 3020 blade switch
  - HP BL460 G6/Gen8 blade server
  - D2200sb storage blade
- HP DL360 G6 rackmount server
- HP DL380 G6/Gen8 rackmount management/application server

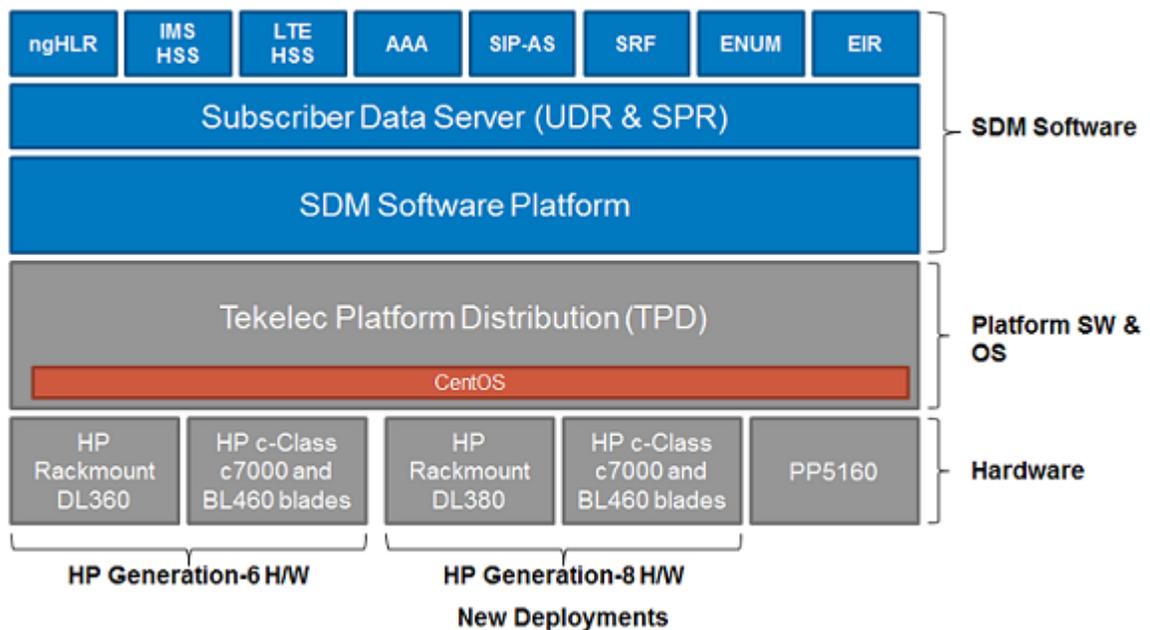


Figure 2: Hardware Platforms

**Software Architecture**

The figure shows a high level view of the SDM software architecture.

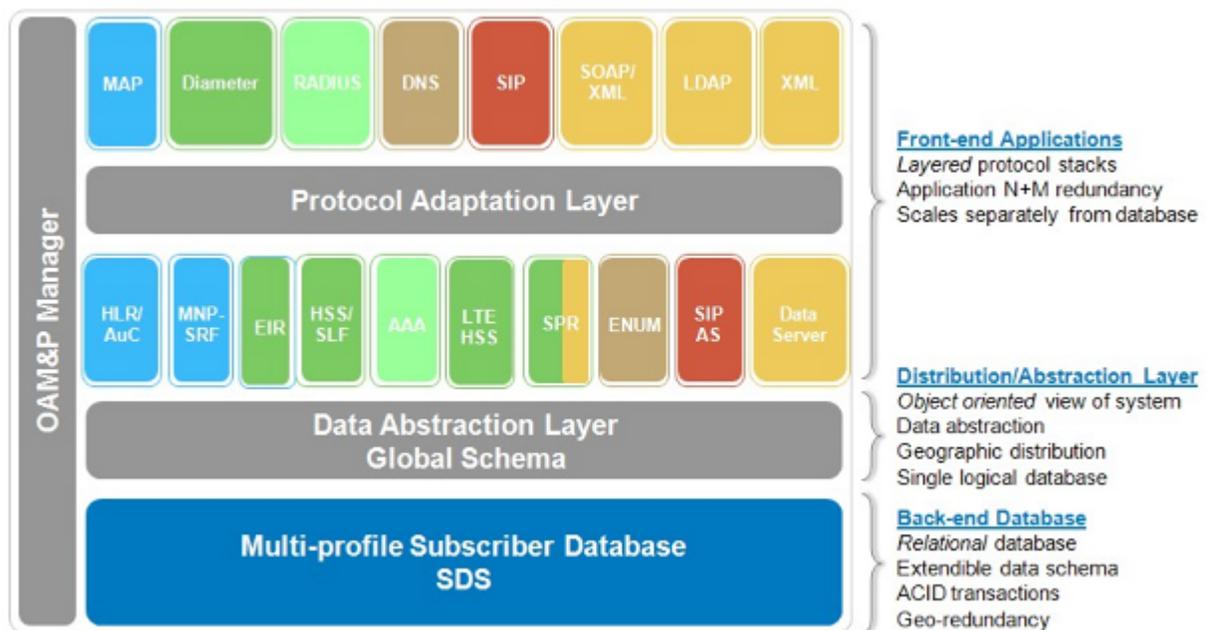


Figure 3: SDM high level software architecture

The system can be composed of up to 2 slots for rackmount Single Board Computers (SBC), and up to 16 slots for blade SBCs. This means that up to two or sixteen slots can have assigned SBCs that offer services.

**Note:** The number of HP server/storage blades supported depends on the configuration of the system.

# New and Enhanced Features

## Dialogue Re-Initiation upon Failure

This feature allows the HLR to reinitialize dialogue retries for the following operations:

- Standalone Insert Subscriber Data (ISD)
- Standalone Delete Subscriber Data (DSD)
- Cancel Location (CL)

When the ISD, DSD, or CL operations are not executed properly, data inconsistency issues may arise as subscriber data is transferred by the HLR to the VLR in a standalone mode or separate dialogue. (Refer to 3GPP specification, 29.002 v10.2.0 section 25.7.3, for handling procedures of standalone ISD messages.) In the deactivated state, this feature resends a dialogue in waiting, but does not retry on failure. With the feature activated, the HLR retries a dialogue up to five times at different intervals based on these trigger conditions:

- Provider error with response "No response from peer"
- Abort message with cause "Message rejected, node not reachable"

The feature can be activated to reinitialize either ISD and DSD messages or ISD, DSD, and CL messages.

For logging purposes and to send XML notifications, the VLR Message Notification feature must be enabled for the whole system and the respective logging and notification options (VlrNotificationOpt) must be turned on. In addition, the SubsVlrMessageNotificationOn attribute in the Subscriber Profile table must be enabled.

When a dialogue fails to complete successfully, the VLR generates an error message and logs the retry attempts with the corresponding error code in the VLR Message Notification Log file. This file indicates if a retry was performed, whether or not it was successful, and the number of retries. Upon reception of this message, the HLR generates an XML notification (VlrMessageNotification) and sends it to the external application.

The network operator must contact the Customer Care Center to make the Dialogue Re-initiation upon Failure feature available. Once available, the network operator can activate or deactivate the feature dynamically.

This table indicates the feature impact on the system:

New Alarms	New Error Messages	New Counters	New Hardware	New Configuration tables/attributes	New Subscriber Provisioning tables/attributes	New Network/Subscriber Provisioning interfaces
Y	Y	N	N	Y/Y	N/N	N/N

For more information about this feature, refer to *Dialogue Re-initiation upon Failure* in the *Product Description* of the SDM 9.2 documentation set.

**Note:** The Dialogue Re-Initiation upon Failure feature is only supported in lab configurations due to concerns around message timing and performance limitations. Limitations may occur under certain conditions when the HLR sends new subscriber data to a VLR while a re-initiation process for the VLR is in progress.

## STN-SR and T-ADS Support for VoLTE on LTE-HSS

This feature allows an LTE-HSS in a VoLTE (voice over LTE) network to support Single Radio Voice Call Continuity (SR-VCC) for graceful voice call handover between LTE and non-LTE networks.

SR-VCC is a handover technology that preserves a live voice call when subscribers roam between their VoLTE IMS-based voice service and a legacy circuit-switch (CS)-based voice service.

The LTE-HSS manages the Session Transfer Numbers for SR-VCC (STN-SRs) and their role in the Terminating Access Domain Selection (T-ADS).

The STN-SR uniquely identifies the subscriber UE. The LTE-HSS stores the STN-SR and downloads it to the MME when the UE starts connecting from the LTE network to an eUTRAN network. The LTE-HSS also informs the MME when the STN-SR was modified or removed.

The Terminating Access Domain Selection (T-ADS) information identifies the Radio Access Technology (RAT) type that is serving the UE (e.g., eUTRAN) and whether or not an IMS-voice-over-PS Session is supported at the current Routing Area/Tracking Area.

The Sh interface is the reference point between the SCC-AS and the LTE-HSS. For this feature, the Sh interface supports only Data Read (Sh-Pull) requests for T-ADS information and Data Update (Sh Update) requests for the STN-SR.

Between the LTE-HSS and the MME using the S6a interface, the Insert Subscriber Data (ISD) procedure requests or updates certain user data in the MME to update the STN-SR as a result of an Sh interaction with an SCC-AS. Insert Subscriber Data Requests (IDR) use only the S6a interface.

LTE-HSS feature configuration requires two new tables and a field in the LTE-HSS Options (LteHssOptions) table.

- The **VoLTE STN-SR (VoLteStnSR) table** specifies the default STN-SR for the corresponding PLMNs when there is no STN-SR for the UE in volatile data.
- The **Application Server (AS) Permission List (ASPermList) table** contains a list of each AS that can communicate with the LTE-HSS. The list contains the originating host, the associated allowed data references, and a permission list.
- The **IDRTimeout field in the LteHssOptions table** specifies an IDR timeout value for the LTE-HSS on how long to wait for the corresponding IDA when retrieving T-ADS information with IDR.

Changes to these tables or the new field require no LTE-HSS restart.

This table indicates the feature impact on the system:

New Alarms	New Error Messages	New Counters	New Hardware	New Configuration tables/attributes	New Subscriber Provisioning tables/attributes	New Network/Subscriber Provisioning interfaces
N	N	Y	N	Y/Y	N/N	N/N

For more information about this feature and its configuration, refer to the LTE-HSS features section of the Product Description included in your documentation set.

### 3G/4G Roaming Support

This feature facilitates device roaming between 3G and 4G networks.

When the feature is activated and the LTE-HSS receives an Update Location message from a 4G MME for a device that was previously attached via a 3G SGSN, then the LTE-HSS will generate a Cancel Location message through the Tekelec ngHLR and send it to the 3G SGSN. When the feature is deactivated, no Cancel Location message is sent to the 3G SGSN by the Tekelec ngHLR.

When the feature is activated and the Tekelec ngHLR receives an Update Location message from a 3G SGSN for a device that was previously attached via a 4G MME, then the Tekelec ngHLR will generate a Cancel Location message through the LTE-HSS and send it to the 4G MME. When the feature is deactivated, no Cancel Location message is sent to the 4G MME by the LTE-HSS.

The generation of Cancel Location messages is supported whether or not the LTE-HSS front-end signaling application is deployed on a separate physical server from the Tekelec ngHLR front-end signaling application in the SDM.

By default, the 3G/4G roaming support feature is available and activated. The network operator can dynamically activate or deactivate the feature.

This table indicates the feature impact on the system:

New Alarms	New Error Messages	New Counters	New Hardware	New Configuration tables/attributes	New Subscriber Provisioning tables/attributes
N	N	N	N	Y/Y	N/N

For more information about this feature, refer to 3G/4G Roaming Support in the Product Description of the SDM 9.2 documentation set.

### Support for LTE-HSS Roaming Templates

This feature creates roaming templates for LTE-HSS subscribers. These LTE-HSS Roaming Templates (LRT) are similar to those supported for HLR subscribers but are independent with their own distinct service functions.

**Note:** LTE-HSS and HLR templates cannot be combined because of operational complexity if subscribers within an existing IMSI range share the same 2G/3G roaming capabilities but have different capabilities for LTE.

Once the feature is activated, the HSS will find the LRT associated with the UE, conduct the checkings required and allow or reject the roaming or tune the content of the Update Location Answer (ULA) message accordingly.

The network operator can associate the LRT to IMSI ranges and to individual subscriber profiles.

Template entries are based on the PLMN ID (MCC/MNC).

When an incoming Update Location Request (ULR) is received, the HSS first checks to see if an LRT has been associated with the subscriber profile. If one is not found, then a check is made to see if the IMSI in the request is a part of an IMSI range that has been assigned an LRT. (The LRT associated with the subscriber's profile takes precedence over the LRT associated with the subscriber's IMSI range.) If an LRT is not found, then no additional screening is applied and the request is processed based on existing service logic.

This feature supports three states of activation: unavailable, deactivated, and activated. The default state of this feature is "unavailable". Contact the Tekelec Customer Care Center to make this feature available. The network operator can then activate this feature dynamically.

These independent services can be configured in any combination on an LRT:

- Access Restrictions
- APN Filtering
- VPLMN Address Allowed

The **Access Restriction** service restricts network access of roaming subscribers to one of the following allowed RAT type settings: 2G/3G, 2G/3G/4G, 4G only, or no access.

If the template is set to restrict access (lrt\_accessrestrictionname[RestrictAccess]), then roaming will be blocked for any PLMN not included in the list, which makes the template function like a whitelist. If the template does not restrict access, then roaming will be allowed to any PLMN not included in the list, which makes the template function like a blacklist.

If an LRT is retrieved, a check is made to see if the VPLMN from the UL has been configured in the template as a part of this service. Access will be blocked or allowed depending on the configuration of the template.

The **APN Filtering** service screens/mediates the APNs that are returned with the subscriber profile. For example, there may be APNs within the existing subscriber profile that should be removed before the profile is communicated to a visited network in roaming scenarios.

Each PLMN can be configured with a list of up to 255 APN IDs.

If an LRT is retrieved, a check is made to see if the VPLMN from the UL is listed in the template associated with this service. If it is, and if any APNs in the subscriber profile match the entries in the template, then those APNs are removed from the profile that is returned to the visited network.

The **VPLMN Address Allowed** service turns off the "VPLMN address allowed" setting on the APNs that are returned to a visited network.

If an LRT is retrieved, a check is made to see if the VPLMN from the UL is listed in the template associated with this service. If it is, then the "VPLMN address allowed" setting will be turned off for each APN that is returned in the profile to the visited network.

This table indicates the feature impact on the system:

New Alarms	New Error Messages	New Counters	New Hardware	New Configuration tables/attributes	New Subscriber Provisioning tables/attributes	New Network/Subscriber Provisioning interfaces
N	N	N	N	Y/Y	N/Y	N/N

## Remove IMS APN with HLR Service Screening Template

The Service Screening template for HLR Roaming Controls has been enhanced to support:

- The removal of the IMS APN (Access Point Name) , if present, in the Insert Subscriber Data (ISD) message part of the Update Location (UL) GPRS request.
- Switch off the VPLMN Address Allowed setting on the Access Point Names (APN) that are returned to a visited network.

The Service Screening Template uses the RemoveIMSAPN parameter to turn this function On and Off. The default is Off. When the RemoveIMSAPN parameter is set to Off, no additional screening is performed. When the RemoveIMSAPN parameter is set to On, then both of the following screening functions are performed:

- The Tekelec ngHLR will not send the PDP Context with the Access Point Name that contains the keyword 'ims'.
- The Tekelec ngHLR will set the VPLMN Address Allowed to Off for all the PDP Contexts of the subscribers.

This table indicates the feature impact on the system:

New Alarms	New Error Messages	New Counters	New Hardware	New Configuration tables/attributes	New Subscriber Provisioning tables/attributes	New Network/Subscriber Provisioning interfaces
N	N	N	N	N/Y	N/N	N/N

# Tekelec Resources and Services

Tekelec provides a number of resources for SDM family. These include the availability of product documentation online, customer training, and access to the Customer Care Center.

## Customer Care Center

The Tekelec Customer Care Center is your initial point of contact for all product support needs. A representative takes your call or email, creates a Customer Service Request (CSR) and directs your requests to the Tekelec Technical Assistance Center (TAC). Each CSR includes an individual tracking number. Together with TAC Engineers, the representative will help you resolve your request.

The Customer Care Center is available 24 hours a day, 7 days a week, 365 days a year, and is linked to TAC Engineers around the globe.

Tekelec TAC Engineers are available to provide solutions to your technical questions and issues 7 days a week, 24 hours a day. After a CSR is issued, the TAC Engineer determines the classification of the trouble. If a critical problem exists, emergency procedures are initiated. If the problem is not critical, normal support procedures apply. A primary Technical Engineer is assigned to work on the CSR and provide a solution to the problem. The CSR is closed when the problem is resolved.

Tekelec Technical Assistance Centers are located around the globe in the following locations:

### Tekelec - Global

Email (All Regions): [support@tekelec.com](mailto:support@tekelec.com)

- **USA and Canada**

Phone:

1-888-FOR-TKLC or 1-888-367-8552 (toll-free, within continental USA and Canada)

1-919-460-2150 (outside continental USA and Canada)

TAC Regional Support Office Hours:

8:00 a.m. through 5:00 p.m. (GMT minus 5 hours), Monday through Friday, excluding holidays

- **Caribbean and Latin America (CALA)**

Phone:

+1-919-460-2150

TAC Regional Support Office Hours (except Brazil):

10:00 a.m. through 7:00 p.m. (GMT minus 6 hours), Monday through Friday, excluding holidays

- **Argentina**

Phone:

0-800-555-5246 (toll-free)

- **Brazil**

Phone:

0-800-891-4341 (toll-free)

TAC Regional Support Office Hours:

8:00 a.m. through 5:48 p.m. (GMT minus 3 hours), Monday through Friday, excluding holidays

- **Chile**

Phone:

1230-020-555-5468

- **Colombia**

Phone:

01-800-912-0537

- **Dominican Republic**

Phone:

1-888-367-8552

- **Mexico**

Phone:

001-888-367-8552

- **Peru**

Phone:

0800-53-087

- **Puerto Rico**

Phone:

1-888-367-8552 (1-888-FOR-TKLC)

- **Venezuela**

Phone:

0800-176-6497

- **Europe, Middle East, and Africa**

Regional Office Hours:

8:30 a.m. through 5:00 p.m. (GMT), Monday through Friday, excluding holidays

- **Signaling**

Phone:

+44 1784 467 804 (within UK)

- **Software Solutions**

Phone:

+33 3 89 33 54 00

- **Asia**

- **India**

Phone:

+91-124-465-5098 or +1-919-460-2150

TAC Regional Support Office Hours:

10:00 a.m. through 7:00 p.m. (GMT plus 5 1/2 hours), Monday through Saturday, excluding holidays

- **Singapore**

Phone:

+65 6796 2288

TAC Regional Support Office Hours:

9:00 a.m. through 6:00 p.m. (GMT plus 8 hours), Monday through Friday, excluding holidays

## Emergency Response

In the event of a critical service situation, emergency response is offered by the Tekelec Customer Care Center 24 hours a day, 7 days a week. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

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

- A total system failure that results in loss of all transaction processing capability
- Significant reduction in system capacity or traffic handling capability
- Loss of the system's ability to perform automatic system reconfiguration
- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

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

## Customer Training

Tekelec offers a variety of technical training courses designed to provide the knowledge and experience required to properly provision, administer, operate, and maintain Tekelec products. To enroll in any of the courses or for schedule information, contact the Tekelec Training Center at (919) 460-3064 or E-mail [training@tekelec.com](mailto:training@tekelec.com).

A complete list and schedule of open enrollment can be found at [www.tekelec.com](http://www.tekelec.com).

## Locate Product Documentation on the Customer Support Site

Access to Tekelec's Customer Support site is restricted to current Tekelec customers only. This section describes how to log into the Tekelec Customer Support site and locate a document. Viewing the document requires Adobe Acrobat Reader, which can be downloaded at [www.adobe.com](http://www.adobe.com).

1. Log into the [Tekelec Customer Support](#) site.

**Note:** If you have not registered for this new site, click the **Register Here** link. Have your customer number available. The response time for registration requests is 24 to 48 hours.

2. Click the **Product Support** tab.
3. Use the Search field to locate a document by its part number, release number, document name, or document type. The Search field accepts both full and partial entries.
4. Click a subject folder to browse through a list of related files.
5. To download a file to your location, right-click the file name and select **Save Target As**.

# Glossary

## #

3GPP  
3rd Generation Partnership Project.  
The standards body for wireless communications.

## A

AAA  
Authentication, Authorization, and Accounting (Rx Diameter command)

AS  
Application Server  
A logical entity serving a specific Routing Key. An example of an Application Server is a virtual switch element handling all call processing for a unique range of PSTN trunks, identified by an SS7 DPC/OPC/CIC\_range. Another example is a virtual database element, handling all HLR transactions for a particular SS7 DPC/OPC/SCCP\_SSN combination. The AS contains a set of one or more unique Application Server Processes, of which one or more normally is actively processing traffic.

AuC  
Authentication Center

## E

EIR  
Equipment Identity Register  
A network entity used in GSM networks, as defined in the 3GPP Specifications for mobile networks. The entity stores lists of International Mobile Equipment Identity (IMEI) numbers, which

**E**

correspond to physical handsets (not subscribers). Use of the EIR can prevent the use of stolen handsets because the network operator can enter the IMEI of these handsets into a 'blacklist' and prevent them from being registered on the network, thus making them useless.

## ENUM

**TElephone NUmber Mapping**

A technology for unifying various communications and telephone addresses for private and business numbers, facsimile and mobile phone numbers, SMS services, Instant Messaging and email. ENUM integrates legacy phone numbers with the Domain Name System (DNS). Users can access and maintain a directory that supports all forms of wired communication, mobile communications networks, and the Internet. ENUM allows for an end user to be reached on multiple devices via one phone number and allows the end user to determine which device to contact first or multiple devices simultaneously.

**G**

## GSM

**Global System for Mobile Communications**

A second generation digital PCS mobile phone standard used in many parts of the world.

**H**

## HSS

**Home Subscriber Server**

A central database for subscriber information.

**I**

**I**

IMS

IP Multimedia Subsystem

These are central integration platforms for controlling mobile communications services, customer management and accounting for mobile communications services based on IP. The IMS concept is supported by 3GPP and the UMTS Forum and is designed to provide a wide range of application scenarios for individual and group communication.

**L**

LTE

Long Term Evolution

The next-generation network beyond 3G. In addition to enabling fixed to mobile migrations of Internet applications such as Voice over IP (VoIP), video streaming, music downloading, mobile TV, and many others, LTE networks will also provide the capacity to support an explosion in demand for connectivity from a new generation of consumer devices tailored to those new mobile applications.

**M**

MNP

Mobile Number Portability

Allows a user to keep his or her mobile phone number despite changing provider. The subscriber also keeps the network carrier code.

**S**

SBC

Single-board computer

SDM

Subscriber Data Management

**S**

SIP

Session Initiation Protocol

A peer-to-peer protocol used for voice and video communications.

SPR

Subscriber Profile Repository

A logical entity that may be a standalone database or integrated into an existing subscriber database such as a Home Subscriber Server (HSS). It includes information such as entitlements, rate plans, etc. The PCRF and SPR functionality is provided through an ecosystem of partnerships.

**U**

UMTS

Universal Mobile  
Telecommunications System

The standard for 3G used by GSM service providers. UMTS includes voice and audio services, for fast data, graphic and text transmissions, along with transmission of moving images and video.