Oracle® Communications

Performance Intelligence Center

Release Notice

Release 10.4.0

F26302-03

November 2020

ORACLE

Oracle Communications, Performance Intelligence Center Release Notice, Release 10.4.0

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This Release Notice includes information on new Features, Supported Hardware Baseline, Media and Documentation pack contents, and identifies Firmware and Supported Upgrade Paths for Release 10.4.0.0.0. This document also includes listing of both Resolved and Known Bugs for this Release.

Release Notice is included in the Documentation Pack and made available with every Software Release.

PIC Release 10.4 Introduction

Oracle Communications Performance Intelligence Center provides the tools that service providers need to capture network traffic data and convert it into useful Business Intelligence for troubleshooting and for managing traffic, roaming, and services, in addition to revenue. With its powerful and configurable filtering, operators can sort through the data to create comprehensive dashboards and key performance indicators (KPIs) for all departments within the service provider. They can also leverage a comprehensive array of performance management and service management capabilities based on network traffic.

Software Lifecycle

The section describes the content description of 10.4.0 including the updates done in the patch 10.4.0.1 and 10.4.0.2

- HTTP2 data frame Re-assembly support in MED-PROT
- Major Upgrade support without OS re-install
- Platform upgrade w.r.t TPD and COMCOL
- vSTP monitoring support in PIC
- Modern Browser Support(Chrome, Edge, Firefox)
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    - Databroker MAP builder enhancement
    - Feature List AVP support for LTE Diameter S6 TDR.
    - Addition of support for 4 new xDR field(CancellationType, TerminationCause, RequestCause, ServerAssignmentType) in the LteDiameterTdr builder
    - Session Code - Decode HEX to ASCII in xDR
    - NB-IoT Traffic RAT Type (1005) is missing currently in PIC on LTE s6a builder
    - TDR - Payload Protocol Identifier - (sctp payload protocol identifier)
    - Decoding the field TP-PID in the TDR format (SS7 MAP builder and RAN SMS builder)

- Security Fixes
  - PIC database potential security vulnerabilities
  - Cookies without Secure and HttpOnly flags
  - Missing HTTP relevant security headers
  - External LDAP user lock and unlocking
  - Password capability of more than 8characters and automatic reset every 30 days
  - Telnet package removal from the acquisition server
  - Telnet package removal from the mediation server

Chapter 2: Feature Descriptions

Topics:

This chapter provides a summary of important features released in PIC release 10.4.

5G UDM and AUSF Monitoring Support

PIC 10.4.0. Has a monitoring support for UDM and AUSF 5G NFs. The support has been added into the existing EVOLVED HTTP TDR BUILDER that is used to correlate HTTP2 frames in transaction mode. The correlation is done using the combination of IP Addresses, Ports and Stream ID. A single HTTP2 packet can contain multiple HTTP2 frames, however the evolved http tdr builder will work only on the individual frames, so each of the HTTP2 frame should be de-chunked from the packet before evolved http tdr builder can process it. The UDM and AUSF messages come into the payload of the HTTP2 messages, so the HTTP2 data frames reassembly and de-chunking is required. This de-chunking of HTTP2 frames shall be done on the PROBE and HTTP2 data frame reassembly shall be done on the EVOLVED HTTP TDR BUILDER itself. The EVOLVED HTTP TDR BUILDER can also perform the de-chunking of HTTP2 frames, but it is highly recommended to configure the de-chunking on the PROBE for better performance of the evolved http tdr builder.

Following enhancements have been done in PIC 10.4.0 components for 5G UDM and AUSF NFs monitoring.

- De-chunking of HTTP2 frames on PROBE and HTTP2 data frames reassembly on the EVOLVED HTTP TDR BUILDER.

- The builder “EvolvedHttpTdr” is enhanced further for JSON payload and 5G NFs decoding
    - JSON Payload decoding of HTTP2 Data frames
    - Transaction level correlation of AUSF and UDM messages on MEDPROT
    - The following fields have been added for AUSF:
        - IMSI, PATH, LOCATION, NAI, SUCI, AUTHRESULT, AUTHTYPE, ACCESSTECH, PGWADDRES, AUTHLINK, AUSFMAC,TRACEREF, MCC, MNC, PROBLEM DETAILS.
    - The following fields have been added for UDM:
        - IMSI, MSISDN, IMEI_SV, RATETYPE, NAI, ULMBR, DLMBR, NFINSTANCEID, CALLBACKURI, SERVICENAME, MCC, MNC, SUCI, PROBLEMDETAILS, SUBSCRIPTIONID, SMSFMAPADDRESS, IMSVOPS, DEREGREASON, EXTGROUPID, PGWADDRESS
- Prolib decoding support for HTTP2 frames on Mediation
- PCAP Export Support on MGMT for HTTP2 frames
- EPI Couplet for the HTTP2 messages in Troubleshooting

Configuration- HTTP2 Monitoring

- Create a Traffic Classification using one of the following allowed combinations
    - Protocol as ALL with Forwarding as TcpFlow & Chunks
    - Protocol as TCP with Forwarding as TcpFlow
- Create an IP Dataflow using one more TC created with suggested configuration above.

- Create a Data Flow Processing and select EVOLVED HTTP TDR BUILDER and create an XDR session.
- Refer EVOLVED HTTP TDR BUILDER builder content document to configure buider specific parameters.

Limitation of HTTP2 monitoring

- Deciphering of TLS messages is not supported in current delivery.
- Reassembly of HTTP2 extension frames is not supported in current delivery.

Observations and Troubleshooting steps

Important: None of these issues are impacting the XDR Builder Correlation.

- The decoding of the JSON data in the packet could get truncated in the 4th window in Troubleshooting Application if the size of incoming packet is more than the size mentioned by PmFrSize in LongParamTable in PROBE.The "PmFrSize" parameter value in LongParamTable in PROBE should be set to a value higher than incoming packet length for correct decoding of JSON data in prolib. The default value of PmFrSize is 2000. After increasing the value, the pmiaMonitor process needs to be restarted. Post this the JSON data should be correctly decoded.
- The decoding of Header Frames in the 4th Window is not displayed correctly. The workaround is to restart "dsapi" process on the IXP server where the build process is hosted or spawned. The decoding is correctly shown after the process restart. This is a random issue and occurs rarely.
- The HTTP2 Response status code 451 is mapped as "ID Error" in dictionary and thus it is showing "ID Error" in Troubleshooting Application. Whereas some specs indicate status code 451 should be "Unavailable For Legal Reasons"

PIC integration with Observability Server (Grafana)

The new observability feature in PIC will provide rich visualization by leveraging Grafana's dashboard capabilities. PIC will provide the integration with the Grafana Server, it will provide an option to the user to configure the data source for the Grafana server. The Grafana server will have the InfluxDB installed on it. The InfluxDB will store the KPIs exported from the PIC system and dashboards will be created using the Grafana. The mediation server will be enhanced to support writing into InfluxDB along with the Oracle database. The IxpStore process in the mediation server will use an HTTP interface to write into InfluxDB.

The configuration for the Grafana and InfluxDB data source shall be provided by a new Observability Application available on the PIC portal. The application additionally shall support the export of the custom KPIs and pre-packaged KPIs towards Grafana Server. The new Observability application shall be developed in OJET and Spring boot. The observability

Application shall be available inside the Configuration perspective on the Management application portal.

The following enhancements have been covered under this feature:

- New Observability Application available in NSP application portal. This will be only available to the NSP Admin users.
- Enhancement in mediation store process to write the KPIs into the InfluxDB.
- Datasource configuration for the Grafana and InfluxDB.
- API Key configuration for the Grafana Server.
- Support to export the already created PIC KPIs into the Observability Server.
- Support to export the Pre-Packaged KPIs into the Observability Server.

In PIC 10.4.0.1, the following enhancements are added into the Observability Application:

- Modification of Grafana Server
- Modification of InfluxDB and datasources
- Deletion of InfluxDB
- Auto scaling of Observability Configuration application

Configuration- Observability Server

The new Observability application developed in OJET shall be used to perform the configuration required for the Observability Server. It shall support the following configuration:

- Grafana API Key and Datasource Configuration
- InfluxDB Datasource Configuration
- Pre-Packaged Dashboard Configuration
- Custom KPI Export Configuration

The detailed configuration and work flows are available in the Observability Application Guide. The software and hardware requirements for the Observability server are also available in the Observability Application Guide.

Limitations- Observability

- At present only one Grafana organization can be added. The multi organization support shall be added in the later version of the application.
- The Pre-Packaged dashboard will work on the single reconstitution session and can’t be applied to the multiple sessions.

- The Pre-Packaged dashboard are created using generic KPIs and any specific customer specific rule or filter can't be applied. In case any specific filter is needed in the Pre-Packaged dashboard then Oracle consulting should be contacted for the support.
- The drill down feature is not available in the current release.

Troubleshooting- Observability

- In case the dashboard panels are showing lag in the plotted points, the check the corresponding Operate and Storage DFPs on the mediation server. There should be no lag in the operate and storage DFPs on the mediation server, if the lag is there then the points will be delayed on the dashboards.
- The Observability Server should have the NTP server running, in case it is not running then dashboard shall not represent the correct plotting of the points.
- The retention period should be carefully selected during the InfluxDB datasource configuration. The retention period will define how long the KPIs will be stored in the InfluxDB and hence available in the Grafana Dashboards.

For more details, refer to *Observability Application Guide*.

Automatic Server Selection and Redistribution

The feature is a pre-cursor for the IXP auto load balancing. The current feature supports the auto-matic mediation server selection during the creation of dataflow processing (DFP) using either the assistant mode or the manual mode. The server selection algorithm runs on the Centralized Configuration Manager (CCM) application and depends on the Metrics provided by the mediation sub-system on which the dataflow processing is being created. The server selection service on the CCM works in on-demand mode and only queries the mediation sub-system for the required Metrics when a user initiates data flow processing creation action. In case the server selection algorithm fails, the manual selection mode is enabled. The feature is designed to prevent the skewed configuration in which only few servers are handling the load of the DFPs. The algorithm works on the average load on the servers during the last one hour.

The auto redistribution of the data flow processing is an extension of the auto-matic server selection feature. The auto redistribution feature rebalances the DFPs across all the servers in the mediation sub-system. The feature is available in the Distribution screen of the CCM application.

The auto server selection and redistribution features are controlled by system parameter in the CCM application and in case user wishes to turn off the feature, then this parameter can be turned off in the database.

The details of the feature is available in the Centralized Configuration Manager application guide.

Configuration- Auto server selection and redistribution

- The feature is enabled using a system parameter. The parameter is enabled by default.
- The auto server selection is available under DFP configuration in assistant and manual mode on CCM. It requires no special configuration step, however in case the algorithm fails then manual server selection is enabled.
- A timeout of 1min has been kept to fetch the Metrics from the mediation sub-system. In case the algorithm is not able complete in 1min then manual server selection is allowed.
- The auto redistribution feature is available under the Distribution screen on CCM. The auto redistribute is enabled by default and in this case user will not be allowed to manually select the server for the distribution of the DFPs. If the auto redistribute is unchecked then user can select the servers manually for the distribution.

Limitations- Auto server selection and redistribution

- The algorithm for the server selection and redistribution takes into account the server load over the period of 1hr. This can result in the skewed configuration if the system is fresh installed and the user creates many DFPs at one go.
- In the current version of the feature, the algorithm does not take into account all the Metrics for the server load e.g. Network bandwidth, Protocol mix. This will be improved later on.

Troubleshooting- Auto server selection and redistribution

- The auto server selection and redistribution depends on the key sharing between the NSP' "tekelec" user and mediation server's "cfguser". In case the auto server selection is failing then verify if the keys are exchanged, if not then execute the Sync Database credentials procedure from the maintenance guide.

xDR Field Reduction

The feature is provided to reduce the xDR storage requirements for the customer. The reconstitution sessions generally consists of many fields that many customers are not interested in storing, however since the fields are part of the dictionary so all the fields are stored in the xDR session. The compact mode for some of the builders are available but it requires separate configuration of DFPs. The xDR field reduction shall provide a mechanism to the user to store the lesser number of fields than the total available fields in the dictionary. The CCM dataflow creation will allow user to select the fields that user is interested in storing, the feature will work only for the new sessions that will be created. The dictionary of the builder will not be modified only the selected fields will be provided as the parameters to the Store process in mediation server and the store process will create the session with the selected fields only.

The feature is extended to the Troubleshooting, data feed and browser export applications, where the query on the sessions with reduced fields will work only if only the selected fields are part of the query.

Note: this feature should be only be used by the admin user and when the less data storage is needed. This will not modify the existing configuration, but new configuration should be required. The care should be taken in using the existing queries on the session with reduced fields as the queries may not work if the reduced fields do not contain the fields in the existing query. This is applicable to all such application that uses query filter e.g. Troubleshooting, Browser export, Data Feed etc.

Configuration- xDR field reduction

- The feature shall be available from the CCM application during the creation of data flow processing under assistant mode. The session creation screen will allow the user to select the fields from the total available fields in the dictionary.
- The mandatory fields for the selected dictionary are automatically selected.
- The query creation screen on the session with reduced fields will only allow the selected field for the query in Troubleshooting, DataFeed and xDR browser application.

The user guides of the CCM, Troubleshooting, Mediation Datafeed and xDR Browser export will have more details on the configuration steps.

Limitation- xDR field reduction

- The feature is not available in case a user is selecting the multiple builders during the DFP creation.
- Queries are associated with the dictionary, so the previously created queries on the reduced sessions will not work.
- The session view is currently not supported on the session with reduced fields.
- Historical KPIs are not supported for the session with reduced fields.

Troubleshooting- xDR field reduction

- In case the queries are not working on the reduced sessions then query should be modified to use only the selected fields.
- In case the PDUs are not loading in the session then verify if the FsuUnitLink field is available in the selected fields.

Chapter 3: Obsolescence

The following are the obsolescence for this release:

- HP G6 Bare metal servers are not supported.
- HP G8 Blades servers are not supported.
- Direct support of P2000 and attached D2700 is no more supported.
- Performance Intelligent Center is no longer compatible with
  - Neptune 3G Probe
  - PMF SS7
  - Cross-connect
- Web service to apply queries without connecting to UI
- Mediation Protocols End of Service Life for the following protocols:

Family	Builder	SKU	SW license name	Legacy Part Number
GPRS	Gn Gp Stats	L99462	OC Protocol Mediation I	950-0180-01MKT
SS7	IUP CDR Reconstitution	L99462	OC Protocol Mediation I	950-0214-01MKT
SS7	TUP CDR Reconstitution	L99462	OC Protocol Mediation I	950-0082-01MKT
VoIP	RTCP stats	L99462	OC Protocol Mediation I	950-0124-01MKT

Note: These are already part of 10.3.x release.

Chapter 4: Media and Documentation

Topics:

Oracle Communications software is available for electronic download on the Oracle Software Delivery Cloud (OSDC). Documentation is delivered electronically on the Oracle Help Center (OHC). Both the software Media Pack and Documentation Pack are listed in this chapter.

Media Pack

All components available for download from the Oracle Software Delivery Cloud (https://edelivery.oracle.com/) are in Load Line Up

Note: This list is accurate at the time of release but is subject to change. See the Oracle software delivery website for the latest information.

In addition, look for the latest patches for this release in the Knowledge Management note Information Center: Patches for Oracle Communications Performance Intelligence Center (Doc ID 1989320.2) in https://support.oracle.com

PIC Release 10.4.0

Oracle Communications Performance Intelligence Center 10.4.0.2.0	Tekelec
Tekelec Platform Distribution 7.6.2.0.0	Tekelec

Load Line Up

PIC 10.4.0.2.0	Software Version	Platform
Mediation Server – IXP Base (on Tekelec Platform Distribution)	10.4.0.2.0_1.8.0	Tekelec
Management – NSP (on Oracle Linux)	10.4.0.2_1.103.0	Tekelec*/OL
Probed and Integrated Acquisition – xMF(on Tekelec Platform Distribution)	10.4.0.2.0_1.6.0	Tekelec
Mediation Protocol - xDR Builder	10.4.0.2.0-1.10.0	Tekelec
Acquisition Data Feed - Tadapt(32bits)	10.3.0.0.0_1.1.0	Tekelec
Performance Intelligence Center MIBS	10.3.0.0.0	Tekelec
Compatible Software		
Tekelec Platform Distribution	7.6.2.0.0_88.58.0	Tekelec
Java 8	8U112 or later	Linux-x86-64
Oracle Linux 7	Update 7	Linux-x86-64
Oracle Database 12c Enterprise Edition Release 64bit	12.1.0.2.0 or later	Linux-x86-64
Oracle WebLogic Server enterprise Edition (FMW, WLS, WebLogic Server 12c) for platform Linux x86-64	12.2.1.4.0 or later	Linux-x86-64
Oracle WebLogic Server Plug-in from Oracle WebLogic Server Standard Edition 12.1.0.0.0 for Linux x86-64	12.1.3.0.0 or later	Linux-x86-64
Oracle ASMLib	2.0.8 or later	Linux-x86-64
KVM hypervisor	1.5.3 or later	Linux-x86-64
Open vSwitch	2.5.5 or later	Linux-x86-64
Compatible Products		

Eagle	46.5,46.6,46.7, 46.8	
Diameter Signaling Router	8.0, 8.1, 8.2,8.4	
Falco	Latest	
Oracle Database Appliance	Latest	
Oracle ZFS Storage Appliance	Latest	
Firmware		
HP Solutions Firmware Upgrade Pack	2.2.10 or later	
Oracle Firmware Upgrade Pack	3.1.6 or later	

Note: Management on TPD support is deprecated.

PIC is tested with the above versions of Compatible Software. For the latest versions:

- Java 8 refer to My Oracle Support Information Center: Installation & Configuration for Oracle Java SE (Doc ID 1412103.2)
- HP Firmware refer to Oracle Help Center https://docs.oracle.com/en/industries/communications/tekelec-platform/index.html
- Oracle Firmware refer to Oracle Help Center https://docs.oracle.com/en/industries/communications/tekelec-platform/index.html
- Oracle Linux refer to Oracle Software Delivery Cloud https://edelivery.oracle.com/
- Oracle Database and related patches refer to Oracle Software Delivery Cloud https://edelivery.oracle.com/ and My Oracle Support https://support.oracle.com/
- Oracle WebLogic Server and Proxy Plugins refer to Oracle Software Delivery Cloud https://edelivery.oracle.com/
- Oracle ASMLib refer to Oracle Technology Network http://www.oracle.com/technetwork/server-storage/linux/asmlib/ol7-2352094.html

Documentation Pack

PIC customer documentation and online help are created whenever significant changes are made that affect system operation or configuration. Revised editions of the documentation and online help are distributed and installed on the customer system. Consult your Installation Manual for details on how to update user documentation. Additionally, all customer documentation is available on the Oracle Help Center. Release Notes are available on Oracle Help Center with each new release of software. The Release Notes list the bugs that have been resolved in the current release and the bugs that are known to exist in the current release.

All documents available for download from the Oracle Help Center (OHC) site.

Release Notices and Licensing Information User Manuals Document Set
PIC 10.4.0 Release Notice

PIC 10.4 Licensing Information User Manual
Installation, Upgrade, Configuration, and Maintenance Document Set
Installation Guide
Configuration Files
Upgrade Guide
Patch Installation Guide
Maintenance Guide
Acquisition Data Feed Installation and Configuration Guide
Feature Guide
Planning Guide
Security Guide
Hardware Installation Guidelines
Core Documents Set
Quick Start Guide
Alarm Forwarding Administration Guide
Audit Viewer Administration Guide
Centralized Configuration Guide
On Demand UP Guide
Data Feed Configuration Guide
Browser Export Guide
Management Security User's Guide
Alarm Configuration User's Guide
Alarm Application User's Guide
SS7 Surveillance Guide
Dashboard Configuration User's Guide
Dashboard Application User's Guide
Troubleshooting Application User's Guide
KPI Configuration User's Guide
Browser Export Scheduler Guide
SIGTRAN Surveillance Guide
System Alarms Guide
Observability Application Guide

Chapter 5: Supported Hardware Baseline

Topics:

Supported Hardware Baseline

Refer to the Hardware Installation Guidelines F26306-01 for the hardware and server versions that have been verified with this release.

Chapter 6: Supported Upgrade Paths

Topics:

Supported Upgrade Paths

This release has been tested for upgrade from specific prior releases. This chapter contains the exact paths for upgrade. Please verify your current installed release is listed on a valid upgrade path.

Supported Upgrade Paths

Upgrade/Installation are supported with the software distributions described in these Release Notes.

All documents are available on Oracle Help Center.

Major Upgrade

The possible upgrade paths to Performance Intelligent Center 10.4.0.1.0 are listed in the following table.

From	To
Performance Intelligent Center 10.2.1	Performance Intelligent Center 10.4.0.2.0
Performance Intelligent Center 10.3.x	Performance Intelligent Center 10.4.0.2.0

Patch Install Support:

The patch install is supported for any subsequent PIC MR of 10.4.x.
For example: Performance Intelligent Center 10.4.0.2.0

Fresh Install Support:

Fresh installation is supported on the Performance Intelligent Center 10.4.0.2.0 release.

Disaster Recovery:

Disaster Recovery is supported for the Performance Intelligent Center 10.4.0.2.0 release.

Disaster Recovery (HW failure) shall replace existing supported server with the same HW if available. If not possible, a fresh install of the new hardware shall be done in PIC 10.4.0.2.0

Chapter 7: Resolved and Known Bugs

Topics:

This chapter lists the resolved and known bugs for PIC release 10.4.

These lists are distributed to customers with a new software release at the time of General Availability (GA) and are updated for each maintenance release.

Severity Definitions

The following sections refer to Bug severity levels. Definitions of these levels can be found in the following publication: *TL9000 Quality Management System – R 5.5*

Resolved Bug List

Fixed in 10.4.0.2 Patch

Bug	Components	Title	Severity
32073497	MEDPROT	HTTP2 traffic parser errors due to index of compressed header blocks not matching impacting correlation	2
31893212	MGMT	Changes in RESP_CODE values after upgrade	3
31692431	PROBED	SR: IMF-1e high increase in data at Same time kPmiaMem_40 jumped in bytes	3
31509797	MGMT	Start trace in Troubleshooting application does not contain all the related xDRs.	2
31484975	MGMT	One extra xDR is exported in pcap export in multi protocol tracing.	3
31398751	PROBED	PMIA Kernel panic BUG: unable to handle kernel paging request	2
31389213	MEDPROT	[SIP] some scenarios which should have been Closed with OK status on receipt of BYE/200OK and invalid Conversation calculation	3
31357388	MGMT	Store processes are not providing the correct Date Format on CSV files	3
31320884	MEDPROT	[SIP] some CANCEL scenarios closed after 2h with Timer Expiry and displaying <error> in Conversation field	3
31019051	PROBED	Improve or Remove TCP and SCTP truncation limit of 4000 bytes	3
31018835	PROBED	Document the TCP and SCTP truncation parameters and behavior	4
30379560	MGMT	Pie chart taking only default colour orange	4

27778763	MGMT	System asks to delete Association from MGMT before re-discovering it	3
25427413	PROBED	Unable to apply changes on IMF DbAssociation Data truncation: Incorrect datetime	3
32005739	MGMT	Import KPI configuration not working	3
31903136	MGMT	Users assigned to the APP_ORAPIC_PROD_OPS profile cannot see or unlock locked accounts	2
31898886	MGMT	Observability: Apply change fails after deleting influxdb datasource.	3
31903101	MEDPROT	OpCode support in INAP/Camel TDR Builder	2
30689091	MEDPROT	TCAP message encapsulation	2
31351496	INT_OPS	New interface (subnet) in IMF/IXP for PIC	2
31697367	MGMT	ProTrace is unable to sort xDRs by Begin Time	3
31707943	MGMT	Unable to add Grafana in Observability where the NSP is installed with new WebLogic Version 12.2.1.4.0	3
31708002	MGMT	Influxdb cannot be added in Observability if the Influxdb IP is same as NSP server IP	3
31720687	MEDPROT	Modify RAT Type field in PIC CSV feed for 5G NSA Transactions	2
31989517	MEDPROT	Bad XDR builder reordering observed in SS7 MAP SM TDR	3
31437587	MGMT	Major upgrade with OS installation is failing for upgrade from 10.3.x to 10.4.0	2
31456363	MGMT	NSP pic_global_backup is not generating properly	2
31829060	MEDPROT	Add S6t Application ID to OCPIC Release 10.4.0.2	2
31720597	MGMT	PCAP export of specific traces	2
30860810	PROBED	IMF not syncing time in DbAssociation table	3
31904604	MGMT	Confirmation Dialog and Message on Grafana server deletion is not available	3
31461244	MGMT	The apply change notification is not consistent across browser and across users.	3
31412344	MGMT	Incorrect message for failed apply change in Observavility	3

Fixed in 10.4.0.1 Patch

Bug	Components	Title	Severity
30725711	MEDPROT	SR: IMSI missing from S1_MME sessions xDRs	3
30677621	MEDSRV	Unable to read data warehouse configuration	3
30673538	MEDPROT	SIP call terminated with status code 487. Unexpected dr status and duration calculation	3
30560231	MGMT	SR:Count of exported data is less compared to real data present	3
30528053	MEDPROT	KPI store processes are not providing the correct output as configured since upgrade	3
30056013	MGMT	SR: Popup window not opening for Link details	3
29638808	MGMT	Troubleshooting: number of simultaneous queries per user does not work properly for Mozilla	3
29034849	MGMT	Troubleshooting: number of simultaneous queries per user does not work properly	3
31058650	MGMT	The Selected and Available fields are blank while creating E2E for builder "SS7 L2L3 STATS 8.0.0.2"	2
31118785	MGMT	Output session name accepts all the special characters	3
30898778	MGMT	Deprecated ENUM Field Value in Builders are not getting removed after builder upgrade	3
30894550	MGMT	Datafeed configuration details popup is not opening	4
30894473	MGMT	Tool tip for OPC/DPC filter option is not loading in Query Dialog	4
30950494	MGMT	Multiprotocol Call Tracing Error	3
31428354	MEDSRV	After upgrade to 10.3.0.1, PDU not loading issue for Gp_GPRS and Gn_GPRS sessions	2
31313570	MEDSRV	Script ViewSessionFlow.sh hangs on IXP server where Influx DB is discovered	3
31307440	MGMT	Datafeed configuration do not allow to modify once created	3

Fixed in 10.4.0 Release

Bug	Components	Title	Severity
30113480	MGMT	Export fails and gets aborted if it crosses 30 minutes	3
29899110	PROBED	CS: incorrect header version being set by the fcMonitor	3
29813984	MEDSRV	After Upgrade to PIC R10.3.0.1, All the Diameter AVP Values are Decoded as "UNKNOWN"	3
29813519	MEDPROT	SS7 MAP2 TDR decoding issue, the PDUs decoded as message type =202	3
29681139	MGMT	CS: GUI Display issue in PIC 10.3	3
29550117	MGMT	SR: Limit the size of alart_NSP.log	3
29004774	PROBED	CS: E_NOMEM error in IMF leads to input traffic loss	2
25427413	PROBED	Unable to apply changes on IMF DbAssociation Data truncation: Incorrect date time	3
28429367	INT_OPS	SR: COR_LOG purge not working	3
28861858	INT_OPS	SR:ITU-SLS value under MAP session "SS7 MAP2 TDR_1.4.0" not decoding properly	3
29238480	PROBED	Integrated OCDSR PMF is not capturing traffic after installation	4
29538865	MGMT	SR: Alarm events have Hex values even if User preference is Decimal	3
28838701	INT_OPS	SR: Escape characters incorrectly added to the query.	3
29440514	MGMT	SR: Disable SQL Tuning Advisor from the NSP server	3
30808988	MEDPROT	SS7 MAP Data Broker TDR 7.2.4 holds Incorrect operation resolution value	2
25221791	MGMT	SS7 Surveillance application is filling up application.log and COR_LOG	3
30209251	MEDPROT	Typo in the xDR field 'TCAP ERROR' value	4

30208521	MEDPROT	MAP Multileg builder continuously restarting	4
30088115	MEDPROT	SR: add correlation for erroneous frames	4
30677621	MEDSRV	Unable to read data warehouse configuration	3
30528053	MGMT	KPI store processes are not providing the correct output as configured since	3
30056013	MGMT	SR: Popup window not opening for Link details	3

Customer Known Bug List

Bug	Component	Title	Severity	Customer Impact	Workaround
27506656	MGMT	sync credentials on MGMT with other components does not work	3	This issue occurs only when Mgmt. is using Oracle 12c version 12.2.0.The acquisition and mediation servers are using oracle instant client version 12.1.0. This results in wallet being copied into the directory which is not present on acquisition and mediation servers.	The following workaround should be applied on all the acquisition and mediation servers. 1. Login to the affected acquisition/mediation server as root user 2. Create following symlink in the directory "/usr/lib/oracle" 12.2 -> /usr/lib/oracle/12.1/ 3. Verify that symlinks is created. 4. Sync the wallet from the mgmt. server by ruuning "Wallet Sync" procedure again. 5. Verify on acquisition/mediation server that wallet is copied successfully. Verify that database connection is working fine using wallet. Execute sqlplus /@nsp as cfguser
27347747	PROBED	E_NOMEM error in IMF leads to input traffic drop	3	The issue has an impact on the IMFs with less memory e.g. E5-APP-B with 8GB RAM. The	When E_NOMEM, error is observed in fcMonitor or eagleMonitor process traces and shl.op is showing Deny counts increasing continuously in its

				fcMonitor hogs upto 60% of physical memory and during failover the system might get into in No Memory state and drops MSUs.	output, then perform the following steps: 1. Login as cfguser on IMF server 2. Run command pm.set off fcMonitor 3. Run command pm.set on fcMonitor 4. Execute shl.op command to verify that Deny count in the output is not increasing. 5. Apart from the above work around, it is recommended that FC links and associations are distributed across other spare servers if available in IMF sub-system.
27340452	MGMT	Unable to execute Historical Protraq sessions	3	In case the issue is encountered then concerned historical KPI does not work and also the running historical KPI can't be stopped.	If the status goes to cancelled instead of idle when you click on Stop then 1. Click the stop button again. 2. The status will be changed back to idle. Now check and verify that the session can be started.
29680982	MEDSRV	PIC 10.3.0.1 Max value of all Unsigned Datatype is not available in first window	3	The max value of all unsigned datatypes of the dictionary fields is not displayed in 1st window of the XDR session in Troubleshooting Application.	Not Available.
30400051	MGMT	The PIC System generating TKPIC00001 alarms continuously	4	The PIC System generating TKPIC00001 alarms continuously	Work Around. 1. Edit the file "/opt/TKLCjmxagent/in/agent.properties" on xMF which is reporting the alarms and update the parameter "Heartbeat=300" to 120 2. Restart jmxAgent process.
30278288	MEDSRV	Datafeed issue due to IxpStore restart(RT 20158)	3	No records are fetched in the exported file.	Below is the WA to add the record in StreamHistory table: 1) Get the newly added stream details from the server where the

					operate process is located with the below command. [cfguser@ixp0005-1d ~]$ iqt -p StreamSubpart | grep KPI_datafeed_Test 55 K_KPI_datafeed_Test_151482 102 12/31/1969 18:00:00.000000000 [cfguser@ixp0005-1d ~]$ From here we need. stream details "K_KPI_datafeed_Test_151482" subpart "102" and server "ixp0005-1d" 2) Connect to Master server 3) ivi the StreamHistory table 4) Search and Copy the entry of any one stream related to the problematic session(this is to add the new entry in the same format) example : 732|K_KPI_datafeed_Test_151120|31|ixp0005-1a|1672694126031667200|0 5) Go to end of the StreamHistory table 6) Add a new entry with an increment to the last line number of the StreamHistory table. Example. The last entry in the table was 767 764|K_UM_IS_ISUP_v3_3152|5|ixp0005-1d|1668887088495329280|0 765|K_UM_IS_ISUP_v3_3137|43|ixp0005-1d|1668887088495329280|0 766|K_UM_IS_ISUP_v3_3245|192|ixp0005-1d|1668887088495329280|0 767|K_UM_IS_AIN_CLG_PA_v3_150838|113|ixp0005-1d|1668887088495329280|0!!!! Now add a new entry with 768, with new stream details "K_KPI_datafeed_Test_151482" subpart "102" and server "ixp0005-1d" captured in step 1) Example :

					766|K_UM_IS_ISUP_v3_3245|192|ixp0005-1d|1668887088495329280|0 768|K_KPI_datafeed_Test_151482|102|ixp0005-1d|1672697669379686400|0 !!!! Note: All the steps needs to be opted with respect to the configurations of problematic session.
29532884	MEDSRV	SR: Pool Connection Error in IXP servers	3	IxpStore process restart during the nightly job	Not Available
30460437	MGMT	ORA-00001: unique constraint (NSP.AK1_COR_MANAGED_OBJECT) violated	3	The managed object ID is not generated uniquely if the names of the KPI session are similar e.g. KPI session name 'xx_yy_zz_v3' to a new KPI session name 'xx_yy_zz_v4'	Work Around: Use the new KPI session name with multiple characters/digits (added or changed) in the existing name.
31433054	MGMT	Apply change banner for DWS server when a live filter is modified	4	Incorrect message to the user.	Work Around: Edit the DWH server details from CCM Mediation > Sites > Setup1 > DWH > DWS_Pool > Servers > List Modify any non-effecting parameter like the 'Version' for example from 12.0 to 12.2 Complete the apply changes.
31210952	MGMT	Session created and associated during Historical KPI scenario cannot be deleted from CCM	3	Historical KPI session cannot be cleaned up from the centralized configuration manager application.	Work Around: The session entries needs to be cleaned from following tables in NSP DB. Connect using sqlplus /@NSP Execute delete queries for the affected session from the

					following tables: CFG_STATISTICS_LINE CFG_XDR_STATISTICS_SESSION CFG_XDR_SESSION Commit the changes.
32151662	MGMT	The JMX agent is not started on NSP after the upgrade or when the server reboots	3	The issue comes only when the nspservice is also starting at the same time. If the jmx agent remains stop then builder installation will fail	Work Around: Start the jmx agent service on the management server. As root user, execute the following command: # service jmxd start
32151713	PROBED	Duplicate entries observed on PMF after upgrade or Disaster Recovery	4	User can get confused about the link/route status.	Work Around: 1. Edit the corresponding IDB table using ivi <table_name> 2. Remove the duplicate entry against which the NodeId is 0 instead of the hostname 3. Save the table : Apply the change [y]
31414421	MGMT	SR: Troubleshooting Session query results in ZIP format is failing to load while trying to load through "Browser Export"	3	Additional user intervention is required for the browser export.	Work Around: Create new dictionary with different name. (Provide name of new dictionary when prompted during import of the zip file). Once a new dictionary is created , any number of session can be imported for same type of dictionary
32175465	MGMT	Global Configuration Backup Restore is failing due to Observability configurations	3	Configuration backup from CCM application cannot be restored in case there is some configuration created by the Observability application.	NA
32175498	MGMT	Unable to delete Datasource from Observability, when there are two sessions in KPI with the same	3	The influx datasource on the Observability application will not be deleted.	NA

32178457	MGMT	Unexpected PDU dataflow deletion from IMF	3	The dataflow deletion will lead to the no data in the session.	Workaround: The missing configuration has to be created manually, or recover it with NSP db backup. Configurations that would need to recreate: 1) PDU dataflow on Acquisition(IMF) 2) Modifying the dfp at Mediation and attaching the new PDU dataflow, so that the new stream destination are created **Note**: Recommendation is to keep the CCM actions like during Sync/Apply change in close monitoring for any such deletion, and keep the configurations/NSP db backup regularly.

Chapter 8: Oracle References and Services

Topics:

My Oracle Support (MOS)
Emergency Response

This chapter describes how to obtain help, where to find related documentation, and provides other general information.

My Oracle Support (MOS)

MOS (https://support.oracle.com) is your initial point of contact for all product support and training needs. A representative at Customer Access Support (CAS) can assist you with MOS registration.

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

1. Select 2 for new service request.
2. Select 3 for hardware, networking, and Solaris operating system support.
3. Select one of the following options:
    - For technical issues such as creating a new Service Request (SR), select 1.
    - For non-technical issues such as registration or assistance with MOS, select 2.

You are connected to a live agent who can assist you with MOS registration and opening a support ticket.

MOS is available 24 hours a day, 7 days a week, and 365 days a year.

Emergency Response

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

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

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

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

Appendix A: List of Supported protocols and Builders

The following table identifies the protocols supported by PIC and the version of the protocol specification implemented based on the protocol family.

SS7 Protocols

Protocol	Organization	Complete Reference	PIC 10.2 standards	Final builder
ISUP V1	ITU-T			see ISUP V3
ISUP V2	ITU-T			see ISUP V3
ISUP V3	ITU-T	Signaling system N°7 - ISDN user part formats and codes	Q.763 / Sept_97 (Q.761 to Q.764, Q.766 and Q.767)	SS7IsupEtsiCdr SS7IsupEtsiSudrAccounting Ss7IsupEtsiSuperCdr SS7UMSudr
BT NUP (UK)	National UK BT	BT Network Requirement	BTNR 167 *Jul-87*	SS7BtnupCdr
ISUP ANSI	ANSI	Signaling System N°7 (SS7) - Integrated Services Digital Network (ISDN) User Part	T1.113-1995 *Jun-05*	SS7IsupAnsiCdr Ss7IsupAnsiSentinelCdr SS7UMSudr
Party Information Parameter (PIP)		Calling Party Name Convention Facility Specification	TICO076E *Feb-98*	
ISUP Chinese		ETSI ISUP support with 24 bits OPC/DPC		see ISUP V3
ISUP Russian Variant (Sovintel)	National	CIS ISUP - Functional Description	CIS ISUP - Functional Description	see ISUP V3
ISUP Portuguese Variant (NOVIS)	National Portugal PT	ESPECIFICAÇÃO DE INTERFACE COM A REDE PÚBLICA INTERFACE DE COMUTADOR (2 Mbit/s) Sinalização Canal Comum SS#7 - Procedimento de taxação em ISUP	Spécifications PT - Procedimento de taxação em ISUP *Apr-99*	see ISUP V3
ISUP Brasilian Variant	TELEBRAS	#7 Common Channel Signaling System ISDN User part - ISUP, Issue 3	TB 220-250-732 *Apr-98*	see ISUP V3

ISUP Colombian Variant	Ministerio des Comunicaciones	Norma Nacional de Señalizacion por Canal Comun N.°7 - SCC7	Norma Nacional *Apr-98*	see ISUP V3
ISUP Mexican Variant	Telmex	E-801.04 Sepcification - Integrated Services Digital Network user Part (ISUP), Edition "C-3"	E-801.04 *Dec-97*	see ISUP V3
ISUP Argentina variant	Telefonica Argentina	RDSI User Part Specification Signaling System N°7	General Specification AR.EG.s1.002 Ed 1 corrected	see ISUP V3
Cisco E-ISUP	Cisco	EISUP Specification - Cisco Systems	Cisco ENG-46168 Release 44	SS7_EISUP_CDR
	IETF	Reliable UDP Protocol	draft-ietf-sigtran-reliable-udp-00.txt *Feb-1999*	
LSSU	ITU-T	Signaling link	Q.703 *Jul-96*	
MTP ITU-T Level 2 & 3	ITU-T	Functional description of the Message Transfer Part (MTP) of Signaling System No. 7	Q.701 *Mar-93*	SS7L2L3EtsiSudr SS7Q752EtsiStats
		Signaling link	Q.703 / Q.704 *Jul-96*	
MTP ANSI Level 2 & 3	ANSI	Signaling System N°7 - Message Transfer Part (MTP)	T1.111-1996 *Mar-96*	SS7L2L3AnsiSudr
SCCP ITU-T	ITU-T	Signaling connection control part formats and codes	Q.713 *Jul-96*	Ss7SccpSuaSudr
SCCP ANSI	ANSI	Signaling System Number 7 - Signaling Connection Control Part (SCCP)	T1.112-1996 *Jan-96*	Ss7SccpSuaSudr
TCAP (MAP & INAP support)	ITU-T	Transaction capabilities formats and encoding	Q.773 *Jun-97*	
TCAP (IS-41 support)	ANSI	Signaling System Number 7 (SS7) - Transaction Capabilities Application Part (TCAP)	T1.114-1996 *Mar-96*	
	ANSI	Signaling System Number 7 (SS7) - Transaction Capabilities Application Part (TCAP)	T1.114-2000 *Jun-00*	
INAP Siemens	Specific: Siemens	Siemens Core INAP	P30308-A7128-A120-01-7659 *May-98*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
INAP CS1	ETSI	Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network	ETS 300 374-1 *Sep-94*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR

		Application Protocol (INAP);		
	ITU-T	Introduction to intelligent network capability set 1	ITU-T Q.1211 *Mar-93*	
	ITU-T	Distributed functional plane for intelligent network CS-1	ITU-T Q.1214 *Oct-95*	
	ITU-T	Interface Recommendation for intelligent network CS-1	ITU-T Q.1218 *Oct-95*	
INAP CS2	ITU-T	Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2)	ETS 301 140-1 *Jun-96*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
INAP Ericsson CS1	Ericsson	ERICSSON SUPPORT OF ETSI CORE INAP CS1 Ericsson Support of ETSI Core INAP CS1	87/155-CRT 249 12 Uen *May-98*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
INAP Ericsson CS1+	Ericsson	Ericsson INAP CS1+, Services assumed from TCAP, revision A	4/155 17-CRT 249 09 Uen *Aug-96*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
		Ericsson INAP CS1+, Abstract Synthax, revision B	171/155 17-CRT 249 12 Uen *Jun-03*	
INAP Ericsson V2 / V3 / V4	Ericsson	Ericsson's Protocol for Intelligent Networks, version 4, Formats and Codes	2/155 17-CRT 249 01 Uen D (V2) *Jan-96*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
			7/155 17-CRT 249 01 Uen B (V3) *Jan-97*	
			12/155 17-CRT 249 01 Uen A (V4) *Jan-98*	
INAP Alcatel V3	Alcatel	INAP for E10 Version 3	ALCATEL E10 Version 3 *Sep-96*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
INAP Alcatel V4	Alcatel	INAP for E10 Version 5	ALCATEL E10 Version 5 *Jan-99*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
INAP Alcatel CS1	Alcatel	INAP Alcatel CS1	ALCATEL INAP CS1	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
CAMEL Phase 2	ETSI	Digital cellular telecommunications system (Phase 2+); Customised Applications for Mobile network Enhanced Logic (CAMEL); CAMEL Application Part (CAP) specification - **GSM 09.78**	TS 101 046 V7.0.0 (Release 98) *Aug-99*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR

CAMEL Phase 3	ETSI	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Customized Applications for Mobile network Enhanced Logic (CAMEL); CAMEL Application Part (CAP) specification - **GSM 29.78**	TS 129 078 V5.9.0 (Release 5) *Sep-04*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
CAMEL Phase 4	ETSI	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Customized Applications for Mobile network Enhanced Logic (CAMEL); CAMEL Application Part (CAP) specification - **GSM 29.78**	TS 129 078 V6.5.0 (Release 6) *Jun-06*	SS7InapSudrAccounting SS7InapTdr SS7_INAP_Compact_TDR
BSSAP (Phase 2+) **BSSMAP**	ETSI	Digital cellular telecommunications system (Phase 2+); Mobile-services Switching Centre – Base Station Systel (MSC – BSS) interface; Layer 3 specification - **3GPP TS 08.08**	TS 48.008 V12.0.0 (Release 12) Sept-14	RanCC2Cdr RanMMTdr RanSMSTdr RanUSSD SS7BssapTdr
DTAP		Digital cellular telecommunications system (Phase 2+); Mobile Radio Interface;Layer 3 specification - **3GPP TS 04.08**	TS 24.008 V12.7.0 (Release 12) Sept-14	
SMS		Digital cellular telecommunications system (Phase 2+); Point-to-Point (PP) Short message Service support on mobile radio interface - **3GPP TS 04.11**	TS 24.011 V12.0.0 (Release 12) Sept-14	
SMS SM-TP		Digital cellular telecommunications system (Phase 2+); Technical realization of the short Message Service (SMS) - **3GPP TS 03.40**	TS 23.040 V12.2.0 (Release 12) Dec-14	
Supplementary Services		Digital cellular telecommunications system (Phase 2+); Mobile Radio interface layer 3 supplementary service specification; Formats and Coding - **3GPP TS 04.80**	TS 24.080 V12.0.0 (Release 12) Sept-14	
BSSAP+ (Gs Interface)	ETSI	Digital Cellular Telecommunications System (Phase 2+);	TS 29.018 V6.5.0	Ss7GsInterfaceTdr

		Universal Mobile Telecommunications System (UMTS); general Packet radio Service (GPRS); Serving GPRS Support Node (SGSN) - Visitor Location register (VLR); Gs Interface layer 3 Specification - **3GPP TS 29.018**	(Release 6) *Dec-06*	
GSM MAP	ETSI	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile Application Part (MAP) specification - **3GPP TS 29.002**	TS 29.002 V12.6.0 (Release 12) Sept-14	Ss7HLRVTdr SS7MapTdr SS7MapSudrAccounting SS7MapSmTdr SS7MapMultiLegTdr SS7MapDB SS7Smdr SS7_MAP_Compact_TDR
IS-41 Révisions B, C, D & E (MAP)	ANSI	Cellular Radiotelecommunications Intersystem Operations	ANSI/TIA/EIA-41-D-1997 *Nov-97*	SS7IS41DB SS7IS41DE SS7IS41Tdr
MEID	3GPP2	3G Mobile Equipment identifier (MEID) - Stage 1	3GPP2 S.R0048-A Ver 4.0 *Jun-05*	
	Telecommunications Industry Association	MEID Standards Update, version 1.8.4	TIA-MEID *Apr-06*	
IS-41-P	Lucent	ANSI -41 Protocol Extensions for Interfaces C and D (HLR - VLR/MSC) - Issue 2.0	IS-41-P *Nov-04*	
IS-41-EE	Ericsson	IS-41 Intersystem Call delivery Signaling	IS-41-EE *Jan-99*	
ISDN over IUA	ITU-T	ISDN user-network interface layer 3 specification for basic call control	Q.931 *May-98*	VoIP_Q_931_Cdr
AIN				SS7AinTdr
MTP ANSI Level 2 & 3	ANSI	Signaling System N°7 - Message Transfer Part (MTP)	T1.111-1996 *Mar-96*	
SCCP ANSI	ANSI	Signaling System Number 7 - Signaling Connection Control Part (SCCP)	T1.112-1996 *Jan-96*	
TCAP (IS-41 support)	ANSI	Signaling System Number 7 (SS7) - Transaction Capabilities Application Part (TCAP)	T1.114-2000 *Jun-00*	
Services - CNAM - ATF - NS 800 - LNP - Flexible Number Routing	Telcordia	Telcordia Technologies Generic Requirements, GR-1188-CORE: Calling Name Delivery Generic Requirements, Issue 2	GR-1188-CORE *Dec-00*	
	Telcordia	Telcordia Technologies Generic Requirements, GR-533-CORE: Databases Services Service Switching Points - Toll-Free Service	GR-533-CORE *Jun-01*	

		Generic Requirements, Issue 2		
	Telcordia	Telcordia Technologies Generic Requirements, GR-1299-CORE: Switch - Service Control Point (SCP) / Adjunct Interface Generic requirements, Issue 6	GR-1299-CORE *Nov-00*	
	Telcordia	Telcordia Technologies Generic Requirements, GR-1519-CORE: CCS Network Interface Specification (CCSNIS) Supporting TR-NWT-001188 Calling Name Delivery Generic Requirements, Issue 1A	GR-1519-CORE *Oct-94*	
	Telcordia	Telcordia Technologies Generic Requirements, GR-2982-CORE: Local Number LNP Capability, Issue 1	GR-2982-CORE *Dec-97*	
	Telcordia	Telcordia Technologies Generic Requirements, GR-246-CORE: Specification of Signaling System Number 7, Issue 5	GR-246-CORE *Dec-00*	
	Telcordia	Telcordia Technologies Generic Requirements, GR-2892-CORE: Switching and Signaling Generic Requirements for Toll-Free Service using AIN, Issue 1	GR-2892-CORE *Apr-95*	
LIDB	Telcordia	Telcordia Technologies Generic Requirements, GR-1158-CORE : OSSGR Section 22.3: Line Information Database, Issue 4	GR-1158-CORE *Dec-00*	SS7LidbTdr
		Telcordia Technologies Generic Requirements, GR-1149-CORE - OSSGR Section 10: System Interfaces, Issue 6	GR-1149-CORE *Sep-06*	
CLASS	Telcordia	Telcordia Technologies Generic Requirements, GR-1188-CORE: Calling Name Delivery Generic Requirements, Issue 2	GR-1188-CORE *Dec-00*	SS7ClassTdr
		Telcordia Technologies Generic Requirements, GR-215-CORE: LSSGR: CLASS Feature: Automatic Callback (FSD 01-02-1250), Issue 2	GR-215-CORE *Apr-02*	
		Telcordia Technologies Generic Requirements, GR-220-CORE: LSSGR: CLASS Feature:	GR-220-CORE *Apr-02*	

		Screening List Editing (FSD 30-28-0000), Issue 2		
		Telcordia Technologies Generic Requirements, GR-227-CORE: LSSGR: CLASS Feature: Automatic Recall (FSD 01-02-1260), Issue 2	GR-227-CORE *Apr-02*	
WIN Services	Telcordia	Wireless Intelligent Network	EIA/TIA IS-771 *Jul-99*	SS7WinServiceTdr
IS-771	Telcordia	Wireless Intelligent Network - Addendum 1	EIA/TIA IS-771 *Aug-01*	
	Telcordia	Cellular Radio telecommunications ntersystem Operations, Revision B to E	EIS/TIA IS-41 *Nov-97*	
	3GPP2	Win Phase 1, Version 1.0	3GPP2 N.S0013-0 *Dec-98*	
	3GPP2	Win Phase 2, Version 1.0	3GPP2 N.S0004-0 *Apr-01*	
	3GPP2	ANSI -41-D Miscellaneous Enhancements, Version 1.0.0, Revision 0	3GPP2 N.S0015 *Jan-00*	
IS-826	Telcordia	Wireless Intelligent Network Capabilities for pre-paid Charging	TIA/EIA/IS-826 (1 to 7) *Aug-00*	
J-STD-036B	ANSI	Enhanced Wireless SP-3-3890-RV2 9-1-1 Phase II	J-STD-036-B *Jan-08*	
IS-843	Telecommunications Industry Association	Wireless Intelligent network Support for Location Based Services	TIA-843 *Aug-04*	
IS-801	Telecommunications Industry Association	Position Determination Service for cdma2000 Spread Spectrum Systems	TIA-801-A *Apr-04*	
IS-881	Telecommunications Industry Association	TIA/EIA-41-D Location Services Enhancements	TIA-881 *Mar-04*	
IS-725	Nortel	TIA/EIA-41-D Enhancements for Over-The-Air Service Provisioning (OTASP) & Parameter Administration (OTAPA), Version 1	TIA/EIA/IS-725-A *Mar-99*	
IS-764	Telecommunications Industry Association	TIA/EIA-41-D Enhancements for Wireless Calling Name - Feature Descriptions	TIA-764 *Jan-02*	
IS-756	Telcordia	TIA/EIA-41-D Enhancements for Wireless Number Portability Phase II	TIA/EIA/IS-756-A *Dec-98*	

BICC ETSI	ITU-T	Bearer Independent Call Control protocol	Q.1901 *Apr-02*	Ss7BICCEtsiCdr
		Signaling System N°7 - ISDN User Part	Q.763 *Sep-97* (Q.761 to Q.764, Q.766 and Q.767)	
BICC ANSI	ANSI	Specifications of the Bearer Independent Call Control	ANSI T1.BICC.1-2000 to ANSI T1.BICC.7-2000 *Jan-00*	Ss7BICCAnsiCdr
SIGTRAN	IETF	**Support only for ISUP Family Planned for MAP, INAP and IS-41**		IPSctpStats IPSctpSudr SS7M2paStats SS7M2PaSudr Ss7M2uaStats Ss7M2uaSudr SS7M3uaStats Ss7M3uaSudr Ss7SccpSuaSudr Ss7SuaStats SS7_SIGTRAN_Transport_SUDR
SCTP		Stream Control Transmission Protocol . Used as support for SIGTRAN	RFC 2960 *Oct-00*	
M3UA		Signaling System 7 (SS7) Message Transfer Part 3 (MTP3) - User Adaptation Layer (M3UA). SUDR & Statistics	RFC 4666 *Sep-06*	
M2UA		Signaling System 7 (SS7) Message Transfer Part 2 (MTP2) - User Adaptation Layer	RFC 3331 *Sep-02*	
SUA		Signaling Connection Control Part User Adaptation Layer (SUA)	RFC 3868 *Oct-04*	
M2PA		Signaling System 7 (SS7) Message Transfer Part 2 (MTP2) - User Peer-to-Peer Adaptation Layer (M2PA). SUDR & Statistics	RFC 4165 *Sep-05*	

GPRS/IP Protocols

Protocol	Organization	Complete Reference	PIC 10.2 Standards	Final Builder
GPRS Gn & Gp	ETSI	Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS);GPRS Tunneling Protocol (GTP) across the Gn and Gp Interface - **3GPP TS 09.60**	TS 101 347 V7.8.0 (Release 98) *Sep-01*	GprsGnGpCdr GprsGnGpTdr IP_Sessions_summary_TDR

		Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); General Packet Radio Service (GPRS);GPRS Tunneling Protocol (GTP) across the Gn and Gp Interface - **3GPP TS 09.60**	TS 29.060 V12.6.0 (Release 12) Sept-14	

GPRS Protocols

Protocol	Organization	Complete Reference	PIC 10.2 Standards	Final Builder
GPRS Gb				GprsGbTdr
Network Service (NS)	ETSI	Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) Interface; Network Service **- 3GPP TS 48.016**	TS 48.016 V7.4.0 (Release 7) *Mar-08*	
BSS GPRS Protocol (BSSGP)	ETSI	Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) Interface; BSS GPRS Protocol (BSSGP) - **3GPP TS 48.018**	TS 48.018 V7.13.0 (Release 7) *Dec-09*	
Logical Link Control (LLC)	ETSI	Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station - Serving GPRS Support Node (MS - SGSN) Logical Link Control Layer (LLC) - **3GPP TS 04.64**	TS 44.064 V7.3.0 (Release 7) *Mar-08*	
GPRS Mobility Management (GMM) GPRS Session Management (GSM)	ETSI	Digital cellular telecommunications system (Phase 2+)(GSM); Mobile Radio Interface; Layer 3 Specification - **3GPP TS 04.08**	TS 24.008 V7.12.0 (Release 7) *Jun-08*	

SNDCP	ETSI	Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Mobile Station - Serving GPRS Support Node (MS - SGSN); Subnetwork Dependent Convergence Protocol (SNDCP) - **3GPP TS 04.65**	TS 24.065 V7.0.0 (Release 7) *Dec-06*	
Short Message Service (SMS)	ETSI	Digital cellular telecommunications system (Phase 2+); Point-to-Point (PP) Short Message service (SMS) Support on Mobile Radio Interface - **3GPP TS 04.11** Digital cellular telecommunications system (Phase 2+); Technical realization of Short Message Service (SMS) Point-to-Point (PP) - **3GPP TS 03.40**	TS 24.011 V7.1.0 (Release 7) *Jun-09* TS 23.040 V7.2.0 (Release 7) *Mar-09*	
GPRS Gr & Gd	ETSI	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile Application Part (MAP) specification - **3GPP TS 29.002**	TS 29.002 V12.6.0 (Release 12) Sept-14	SS7MapTdr SS7_MAP_Compact_TDR

IP Protocol

Protocol	Organization	Complete Reference	PIC 10.2 Standards	Final Builder
DNS	IETF	Domain Names - Concepts and Facilities	RFC 1034 *Nov-87* Not relevant or supported: RFC1101, RFC1183, RFC1348, RFC1876, RFC1982, RFC2065, RFC2181, RFC2308, RFC2535, RFC4033, RFC4034, RFC4035, RFC4343, RFC4035, RFC4592, RFC5936	IpDnsTdr

		Domain Names - Implementation and Specification	RFC 1035 *Nov-87* Not relevant or supported: RFC1101, RFC1183, RFC1348, RFC1876, RFC1982, RFC1995, RFC1996, RFC2065, RFC2136, RFC2181, RFC2137, RFC2308, RFC2535, RFC2845, RFC3425, RFC3658, RFC4033, RFC4034, RFC4035, RFC4343, RFC5936, RFC5966	
DNS ENUM	IETF	E.164 Number and DNS	RFC 2916 *Sep-00*	IpDnsEnumTdr
RADIUS	IETF	Remote Authentication Dial In User Service (RADIUS)	RFC 2865 *Jun-00* RFC2866 *Jun-00* Not relevant or supported: RFC2868, RFC3575, RFC5080	IpRadius
DHCP				IpDhcpTdr
BOOTP	IETF	Bootstrap protocol (BOOTP)	RFC 951 *Sep-85* Not relevant or supported: RFC1395, RFC1497, RFC1532, RFC1542, RFC5494	
DHCP	IETF	Dynamic Host Configuration Protocol	RFC 2131 *May-97* Not relevant or supported: RFC3396, RFC4361, RFC5494	
WAP				IpWapv1Tdr
WTP	WAP Forum / OMA	Wireless Transaction protocol	WAP-224-WTP-20010710-a *Jul-01*	
WSP	WAP Forum / OMA	WAP - Wireless Session Protocol Specification	WAP-230-WSP-20010705-p *Jul-01*	
MMS	OMA	Multimedia Messaging Service Encapsulation Protocol Version 1.1	OMA-MMS-ENC-v1_1-20021030-C *Oct-02*	IpMmsWapv1Tdr IpMmsWapv2Tdr
HTTP	IETF	Hypertext Transfer Protocol - HTTP/1.1	RFC 2616 *Jun-99* Not relevant or supported: RFC2817, RFC5785, RFC6266	IpHttpTdr

HTTP2	IETF	Hypertext Transfer Protocol - HTTP/2	RFC 7540, 7541	EvolvedHttpTdr
WAP2	IETF	Hypertext Transfer Protocol - HTTP/1.1	RFC 2616 *Jun-99* Not relevant or supported: RFC2817, RFC5785, RFC6266	IpWapv2Tdr
	WAP Forum / OMA	WAP Architecture	WAP-210-WAPArch-20010712 *Jul-01*	
POP3	IETF	Post Office protocol - Version 3	RFC 1460 *Jun-93*	IpPop3Tdr
SMTP	IETF	Simple Mail Transfer Protocol	RFC 2821 *Apr-01*	IpSmtpTdr
IMAP4	IETF	Internet Message Access Protocol - Version 4rev1	RFC 2060 *Mar-03*	IpImap4Tdr
FTP	IETF	File Transfer Protocol	RFC 959 *Oct-85* Not relevant or supported: RFC2228, RFC2640, RFC2773, RFC3659, RFC5797	IpFtpTdr
TCP	IETF	Transmission Control Protocol	RFC 793 *Sep-81* Not relevant or supported: RFC1122, RFC3168, RFC6093	IpTcpCdr
RTSP	IETF	Real Time Streaming Protocol (RTSP)	RFC 2326 *Apr-98*	IpRtspTdr
	IETF	SDP:Session Description Protocol	RFC 2327 *Apr-98*	
SMPP	SMS Forum	Short Message Peer-to-Peer protocol Specification, Version 5.0	SMPP v5.0 *Feb-03*	IpSmppTdr
UCP	Logica CMG	Short Message Service center; EMI - UCP Interface 4.6	EMI UCP Interface *May-05*	IpUcpTdr

UMTS Protocol

Protocol	Organization	Complete Reference	PIC 10.2 Standards	Final Builder
UMTS				
Iu-CS Control Plane over IP **Iu-PS Control Plane over IP**		Universal Mobile Telecommunications System (UMTS); UTRAN Iu interface Radio Access Network	TS 25.413 V12.3.0 (Release 12) Dec-14	Ran_CC2_Cdr Ran_MM_Tdr Ran_SMS_Tdr Ran_USSD UMTS_Iu_C_TDR

		Application Part (RANAP) signaling - **3GPP TS 25.413**		UMTS_Iu_P_GMM_TDR UMTS_Iu_P_TDR UMTS_Iu_P_SM_TDR
		Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile radio interface layer 3 specification; Radio Resource Control (RRC) protocol - **3GPP TS 44.018**	TS 44.018 V12.3.0 (Release 12) Sept-14	
		Digital cellular telecommunications system (Phase 2+); Mobile Radio interface layer 3 supplementary service specification; Formats and Coding - **3GPP TS 04.80**	TS 24.080 V12.0.0 (Release 12) Sept-14	
		Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Technical realization of Short Message Service (SMS) Point-to-Point (PP) - **3GPP TS 24.011**	TS 24.011 V12.0.0 (Release 12) Sept-14	
		Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile radio interface Layer 3 specification; Core network protocols; Stage 3 - **3GPP TS 24.008**	TS 24.008 V12.7.0 (Release 12) Sept-14	
Iu-PS User Plane over IP	ETSI	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); General Packet Radio Service (GPRS);GPRS Tunneling Protocol (GTP) across the Gn and Gp Interface - **3GPP TS 09.60**	TS 29.060 V12.6.0 (Release 12) Sept-14	

VoIP Protocol

Protocol	Organization	Complete Reference	PIC 10.2 Standards	Final Builder
VoIP SIP / SIP-T / SIP-I	IETF	**SIP** Session Initiation Protocol	RFC 3261 *Jun-02* Not relevant or supported: RFC3853, RFC4320, RFC4916, RFC5393, RFC5621, RFC5626, RFC5630, RFC5922, RFC5954, RFC6026, RFC6141	VoipSipCdr VoipSiptAnsiCdr VoipSiptItuCdr
	IETF	Reliability of Provisional Responses in the Session Initiation Protocol (SIP)	RFC 3262 *Jun-02*	
	IETF	Session Initiation Protocol (SIP) - Specific Event Notification	RFC 3265 *Jun-02* Not relevant or supported: RFC5367, RFC5727, RFC6446	
	IETF	The Session Initiation Protocol (SIP) UPDATE Method	RFC 3311 *Sep-02*	
	IETF	The Session Initiation Protocol (SIP) Refer Method	RFC 3515 *Apr-03*	
	IETF	The SIP INFO Method	RFC 2976 *Oct-00*	
	IETF	Session Initiation Protocol for Telephones (**SIP-T**): Context and Architectures	RFC 3372 *Sep-02*	
	IETF	SDP:Session Description Protocol	RFC 2327 *Apr-98*	
	IETF	Session Description Protocol (SDP) Simple Capability Declaration	RFC 3407	
	ITU-T	Interworking between Session Initiation Protocol (SIP) and Bearer Independent Call Control Protocol or ISDN User Part.	Q.1912-5 *Mar-04*	
	Nortel	CS2000 SIP/SIP-T Interoperability Specification (Issue 0.82) System Requirement Document	Nortel CS2000 *01/10/2003* *RFC5057*	

		Multiple Dialog Usages in the Session Initiation Protocol		
VoIP H.225/Q.931	ITU-T	Series H: Audiovisual and Multimedia Systems - Call Signaling protocols and media stream packetisation for packet-based multimedia communication systems	H.225.0 *Jul-03*	VoipQ931Cdr
	ITU-T	ISDN user-network interface layer 3 specification for basic call control	Q.931 *Dec-99*	
VoIP H.225/RAS	ITU-T	Call Signaling protocols and media stream packetisation for packet-based multimedia communication systems	H.225.1 *Jul-03*	VoipRasTdr
VoIP H.245	ITU-T	Control Protocol for multimrdia communication	H.245 *Jul-03*	VoipH245Tdr
VoIP RTP	IETF	RTP: A Transport Protocol for Real-Time Application	RFC 3550, *Jul-03* RFC3551 *Jul-03* Not relevant or supported: RFC5506, RFC5761, RFC6051, RFC6222	VoipSipCdr
MGCP	IETF	Media Gateway Control Protocol (MGCP) version 1.0	RFC 3435 *Jan-03* Not relevant or supported: RFC3661	VoipMgcpCdr VoipMgcpTdr
	IETF	Media Gateway Control Protocol (MGCP) Return Code Usage	RFC 3661 *Dec-03*	
	IETF	Media Gateway Control Protocol (MGCP) Packages	RFC 3660 *Dec-03*	
MEGACO	IETF	Gateway Control Protocol Version 1.0	RFC 3525 *Jun-03*	VoipMEGACOTdr
H.248	ITU-T	Gateway Control Protocol: Version 2	H.248.1 *May-02* Supported packages H.248.2 until H.248.31	VoipH248Tdr

IMS Protocols

Protocol	Organization	Complete Reference	PIC 10.2 Standards	Final Builder
Diameter	IETF	Diameter Base Protocol	RFC 3588 *Sep-03*	ImsDiameterCcTdr ImsDiameterCxTdr ImsDiameterGqTdr ImsDiameterShTdr ImsDiameterTdr LTE_Diameter-TDR
Diameter Credit-Control (Cc, Ro, Rf, Gy, Ga)	IETF	Diameter Credit-Control Application	RFC 4006 *Aug-05*	
	ETSI / 3GPP	3rd Generation Partnership Project; Technical Specification Group Service and System Aspects; Telecommunication management; Charging management; Diameter charging applications	TS 32.299 V12.6.0 (Release 12) Sept-14	
Diameter Gq	ETSI	Universal Mobile Telecommunications System (UMTS); Policy control over Gq interface (3GPP TS 29.209 version 6.5.0 Release 6). Replaced by Rx in LTE	TS 29.209 V6.5.0 (Release 6) *Jun-06*	
Diameter Cx/Dx	ETSI	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signaling flows and message contents **3GPP TS 29.228**	TS 29.228 V12.3.0 (Release 12) Sept-14	
	ETSI	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Cx and Dx interfaces based on the Diameter protocol **3GPP TS 29.229**	TS 29.229 V12.3.0 (Release 12) Sept-14	
	ETSI	Digital cellular telecommunications system (Phase 2+);	TS 29.230 V12.6.0 (Release 12)	

		Universal Mobile Telecommunications System (UMTS); Diameter applications; 3GPP specific codes and identifiers **3GPP TS 29.230**	Sept-14	
Diameter Sh	ETSI	Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Sh interface based on the Diameter protocol; **3GPP TS 29.329**	TS 29.329 V12.4.0 (Release 12) Sept-14	

LTE Protocols

Protocol	Organization	Complete Reference	PIC 10.2 Standards	Final Builder
Diameter S6	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Evolved Packet System (EPS); Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol (Release 9)	TS 29.272 V12.6.0 (Release 12) Sept-14	LTE_Diameter_S6_TDR LTE_Diameter_SUDR_Accounting LTE_Diameter-TDR
Diameter Gx/S7	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Policy and Charging Control over Gx reference point (Release 9)	TS 29.212 V12.6.0 (Release 12) Sept-14	LTE_Diameter_Gx_TDR LTE_Diameter-TDR
Diameter Rx	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Policy and Charging Control over Rx reference point (Release 9)	TS 29.214 V12.5.0 (Release 12) Sept-14	LTE_Diameter_Rx_TDR LTE_Diameter-TDR

Diameter Gy	3GPP	3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; Charging management; Diameter charging applications	TS 32.299 V12.6.0 (Release 12) Sept-14	LTE_DIAMETER_Gy_TDR LTE_Diameter-TDR
Diameter S9	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Policy and Charging Control (PCC) over S9 reference point; Stage 3	TS 29.215 V12.5.0 (Release 12) Sept-14	LTE_DIAMETER_S9_TDR LTE_Diameter-TDR
Diameter AAA	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Evolved Packet System (EPS); 3GPP EPS AAA interfaces	TS 29.273 V12.5.0 (Release 12) Sept-14	LTE_Diameter_AAA_TDR
Diameter LCS	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Location Services (LCS); Evolved Packet Core (EPC) LCS Protocol (ELP) between the Gateway Mobile Location Centre (GMLC) and the Mobile Management Entity (MME); SLg interface	TS 29.172 V12.4.0 (Release 12) Mar-14	LTE_Diameter_LCS_TDR
		3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Location Services (LCS); Diameter-based SLh	TS 29.173 V12.2.0 (Release 12) Sept-14	

		interface for Control Plane LCS		
GTPv2	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; 3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3 (Release 9)	TS 29.274 V12.6.0 (Release 12) Sept-14	LTE_GTP_v2_Tunnel_Management_TDR LTE_GTP_v2_Mobility_Management_TDR LTE_GTP_v2_Sv_TDR
S1-AP	3GPP	3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP) (Release 9)	TS 36.413 V12.3.0 (Release 12) Sept-14	LTE_S1AP_TDR RAN_ESM_TDR RAN_EMM_TDR
	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3 (Release 9)	TS 24.301 V12.6.0 (Release 12) (Release 12)Sept-14	
SGs	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Mobility Management Entity (MME) – Visitor Location Register (VLR) SGs interface specification (Release 9)	TS 29.118 V12.6.0 (Release 12) Sept-14	LTE_SGsAP_TDR
LTE User Plane (S5-U, S8-U, S1-U, S12-U)	3GPP	3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; General Packet Radio System	TS 29.281 V11.6.0 (Release 11) Mar-13	LTE_GTP_User_Plane_Capture

		(GPRS) Tunnelling Protocol User Plane (GTPv1-U) (Release 9)		