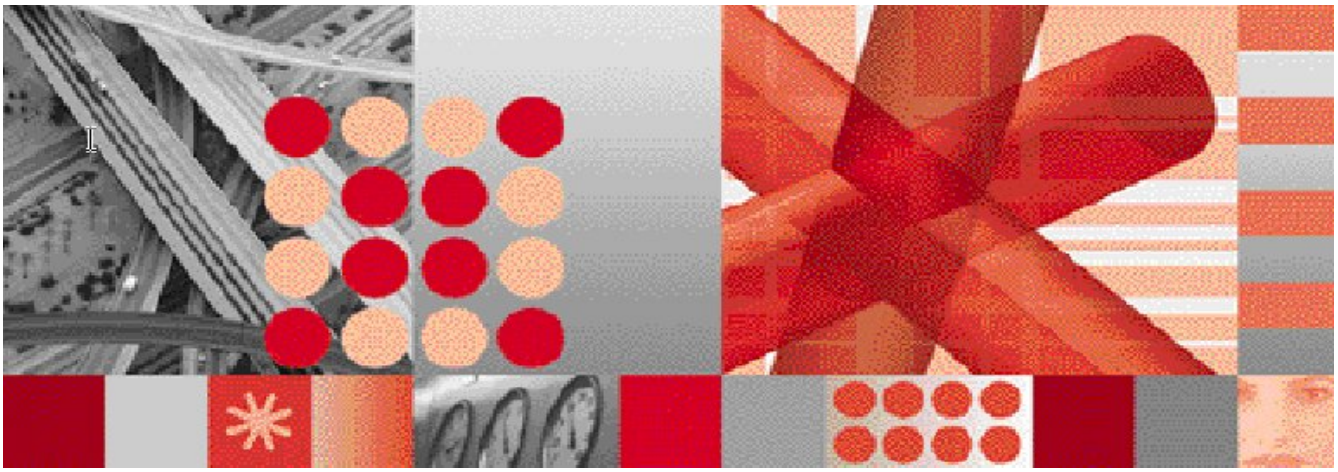
Tivoli

Netcool Service Quality Manager Roaming Probe Service Solution

IBM

Version 1.2.1.2



Interface Control Guide

Note: Before using this information and the product it supports, read the information in Appendix B Notices on page 34.

This edition applies to Version 1, release 2, modification 1.2 of IBM Tivoli Netcool Service Quality Manager Roaming Probe Service Solution and to all subsequent releases and modifications until otherwise indicated in new editions.

Table of Contents

1 About this Documentation

The *IBM® Tivoli® Netcool® Service Quality Manager Roaming Probe Service Solution Interface Control Guide* details the Roaming Probe Service Solution input interface i.e. CSV input files in terms of:

- File naming conventions
- Data file format, structure, and semantics
- Supported delivery/Collection mechanism
- Data file input and output directory
- File granularity
- File frequency
- Maximum latency tolerated

1.1 Audience

This guide is intended for parties wishing to provide mediated data to the IBM Tivoli Netcool Service Quality Manager Roaming Probe Service Solutions.

1.2 Required Skills and Knowledge

This guide assumes you are familiar with the following:

- General IT Principles
- IP Networking
- Unix® Operating Systems
- Roaming Service Solution

1.3 Document Conventions

The following command prompts can be seen throughout this document where the user has to enter commands at the command line:

- # (hash): This prompt will be displayed if the user is logged in as user root.
- $ (dollar): This prompt will be displayed if the user is logged in as either the saserver or oracle user.

Please note the above prompts are not part of commands. All commands must be entered after these prompts.

This document uses the typographical conventions shown in the following table:

Table 1: General Document Conventions

Format	*Examples*	*Description*
ALL UPPERCASE	GPS NULL MYWEBSERVER	Acronyms, device names, logical operators, registry keys, and some data structures.
Underscore	See Document Conventions	For links within a document or to the Internet. Note that TOC and index links are not underscored. Color of text is determined by browser settings.
Bold	**Note**: The busy hour determiner is...	Heading text for Notes, Tips, and Warnings.
SMALL CAPS	The STORED SQL dialog box... ...click VIEW... In the main GUI window, select the FILE menu, point to NEW, and then select TRAFFIC TEMPLATE.	Any text that appears on the GUI.
Italic	A *busy hour* is... A web server *must* be installed... See the *User Guide*	New terms, emphasis, and book titles.

`Monospace`	`./wminstall`
	`$ cd /cdrom/cdrom0`
	`/xml/dict`
	`addmsc.sh`
	`core.spec`
	`Type OK to continue.`
		Code text, command line text, paths, scripts, and file names.
		Text written in the body of a paragraph that the user is expected to enter.

Monospace Bold	**[root] # pkginfo | grep -i perl** system Perl5 On-Line Manual Pages system Perl 5.005_03 (POD Documentation) system Perl 5.005_03	For contrast in a code example to show lines the user is expected to enter.
<Monospace italics>	# cd *<oracle_setup>*	Used in code examples: command-line variables that you replace with a real name or value. These are always marked with arrow brackets.
[square bracket]	log-archiver.sh [-i][-w][-t]	Used in code examples: indicates options.

1.4 Document Structure

This guide is organized into the following chapters:

Table 2: Document Structure

Chapter	*Description*
Interface Specifications	Provides interface specification and file naming conventions.
Enumerations and Definitions	Describes the call types.
Glossary	Glossary.

1.5 User Publications

The following user publications are provided with the Roaming Probe Service Quality Manager Service Solution:

Table 3: Roaming Probe Service Solution Documentation

Document	*Description*
Tivoli Netcool Service Quality Manager Service Solutions Installation Guide	Details the generic steps required to install any Service Quality Manager Service Solution including Roaming Probe.
Tivoli Netcool Service Quality Manager Roaming Probe Service Solution Overview Guide	Provides an overview of the Roaming Probe Service Solution product architecture.
Tivoli Netcool Service Quality Manager Roaming Probe Service Solution Interface Control Guide	Details the Roaming Probe Service Solution input interface.
Tivoli Netcool Service Quality Manager Roaming Service Solution Release Notes	Provides information on the Roaming Service Solution release contents, platform requirements, installation and upgrade procedures, and known issues.
Tivoli Netcool Service Quality Manager Roaming Service Solution Version 1.2.1 to 1.2.1.2 Upgrade Guide	Provides information on how to upgrade the Roaming Service Solution to Version 1.2.1.2 from Version 1.2.1.

The following user publications are provided with the Service Quality Manager software in Adobe® Portable Document Format (PDF) and HTML formats.

Table 4: Service Quality Manager User Documentation

Document	*Description*
Release Notes	Provides information on the Service Quality Manager 4.1.1 release contents, platform requirements, installation and upgrade procedures, and known issues.
Configuration Guide	Describes SLA Provisioning (Parties, SLAs, and SLA Templates applications) and SQM Provisioning (Services Resources, KQI Models and Service Models applications) in Service Quality Manager.
Monitoring Guide	Describes Monitoring (SLA Monitor, KQI Analyzer, Alarm Monitor, Audit Manager and SLA Web Monitor applications) in Service Quality Manager.

CEM Monitoring Guide	Describes how to use and monitor the CEM (Customer Experience Management) feature in Service Quality Manager.
CEM Provisioning Guide	Reference Guide containing information for provisioning the Customer Experience Management system.
Solaris Server Installation Guide	Describes how to install the Service Quality Manager Server system on Solaris 10g.
Client Installation Guide	Describes how to install the Service Quality Manager Client.
AIX Server Installation Guide	Describes how to install the Tivoli Netcool Service Quality Manager Server system on AIX 5.3L.
Solaris System Administration Guide	Provides an overview of the Service Quality Manager administrative tasks including instructions on how to complete the following tasks: - Starting and stopping Service Quality Manager. - Running batch processes such as archiving trace files and log files. - Backing up and restoring the system.
AIX System Administration Guide	Provides an overview of the AIX Service Quality Manager administrative tasks including instructions on how to complete the following tasks: - Starting and stopping Service Quality Manager. - Running batch processes such as archiving trace files and log files. - Backing up and restoring the system.
Upgrade Guide	Details how to upgrade from one Service Quality Manager from v3.1.3 to v 4.1.1.
BusinessObjects Installation & Configuration Guide	Provides information on the steps required to install and configure the BusinessObjects (v 6.5 or XI) Server and Client for use with Service Quality Manager.
Service Quality Manager Service Solution Installation Guide	Details the generic steps required to install any Service Quality Manager Service Solution including CEM GPRS.
CEM GPRS Service Solution Interface Control Guide	Details the CEM GPRS Service Solution input interface.
CEM GPRS Service Solution Overview Guide	Provides an overview of the CEM GPRS Service Solution product architecture.
Service Quality Manager Core Online Help	Provides information and procedures for using Service Quality Manager client applications.

Customer Experience Management Online Help	Describes how to use and monitor the Customer Experience Management feature in the Service Quality Manager.
SLA Webview Online Help	Describes how to use and monitor the SLA Webview feature in the Service Quality Manager.

2 Interface Specifications

2.1 Overview

This document provides all the required information for parties intending to provide data from roaming service systems to IBM Tivoli Netcool Service Quality Manager Roaming Probe Service Solution.

The Service Solution expects to be supplied with data related to Roaming metrics and Roaming Public Land Mobile Networks in separate files which are detailed below.

2.2 Supported Version

This document refers to IBM Roaming Probe Service Solution 1.2.1.2.

2.3 Interface Definition

2.3.1 Metrics File Naming Convention

The file naming convention is as follows:

```
A<YYYYMMDD>.<hhmm>-<YYYYMMDD>.<hhmm>[_<UniqueID>].csv
```

Where:

`<YYYYMMDD>.<hhmm>` elements correspond to the file interval start time and end time respectively.

- `YYYY` is the year in four-digit notation.
- `MM` is the month in two digit notation (01 - 12).
- `DD` is the day in two-digit notation (01 - 31).
- `HH` is the two-digit hour of the day (local time), based on 24-hour clock (00 - 23).
- `MM` is the two digit minute of the hour 00-59 (local time).

`UniqueID` is an optional element that can be used to, for instance, uniquely identify the Roaming System. This element is recommended in situations where the deployed solution has multiple mediation points.

File Examples

The following are example files which show the naming convention:

- `Filename: A20080314.0000-20080314.0015.csv`
- `Filename: A20080314.0015-20080314.0030.csv`

2.3.2 PLMN File Naming Convention

The file naming convention for PLMN information is: `PLMN.map`

2.4 Data Specification

2.4.1 Roaming Probe Metrics CSV File Format

The data files must provide the fields in top down order as shown in the tables below. The files are expected to contain standard CSV header lines containing the field names shown below.

The Roaming Probe metrics file format is per the following table.

Table 5: Roaming Probe Metrics File Format

Field Name	*Field Description*	*Constraints*	*Example*
IMSI	The International Mobile Subscriber Identity of the subscriber. The format of the IMSI is MCC-MNC-MSIN where: MCC is the mobile country code. MNC is the mobile network code. MSIN is the mobile subscriber identity number. NOTE: Depending on input data granularity this column may not be filled, e.g., if input data will be aggregated per PLMN-PLMN and Transaction Type there won't be specific subscriber data. The purpose of this column is to prepare model to the CEM approach	Alphanumeric string, maximum length 15 characters	
MSISDN	The Mobile Station ISDN number. This is the subscriber phone number in ITU-T E.164 format. The format of the MSISDN is CC-NDC-SN where; CC is the country code of the country where the MS is registered.	Alphanumeric string, maximum length 64 characters	

	NDC is the national destination code. SN is the subscriber number. NOTE: Depends on the input data granularity this column may not be filled, e.g., if input data will be aggregated per PLMN-PLMN and Transaction Type there won't be specific subscriber data. The purpose of this column to prepare model to the CEM approach		
MSRN	The Mobile Subscriber Roaming Number NOTE: Depending on the input data granularity this column may not be filled, e.g., if input data will be aggregated per PLMN-PLMN and Transaction Type there won't be specific subscriber data. The purpose of this column to prepare model to the CEM approach	Alphanumeric string, maximum length 64 characters	
H_PLMN	The identification of Home PLMN which is the party (the operator) whom TNSQM roaming model will provide the metrics to. The PLMN is Operator Centric, i.e. Home PLMN is considered to be Home for the Operator perspective, i.e. the PLMN(s) that the Operator owns and controls are considered to be the HPLMN(s) HPLMN shall be identified by addresess of it's node (e.g HLRs or VLR/MSC) involved in the transactions call flow Depends on the measurement/transaction type - SCCP, ISUP - different addressing schemas exists. For the SCCP addressing is	Alphanumeric string, maximum length 16 characters	

	based on MGT (Mobile Global Title) and for ISUP addressing is based on SPC (Signalling Pint Codes). Network nodes identification shall have a distinction indicating the addressing schema (SCCP or ISUP). Expected format of HPLMN column: S8101 - for SCCP addressing WHERE: S - SCCP prefix 81 - Japan Country Code 01 - sample of NTTDoCoMo Network Code OR I40073 - sample of Signalling Point Code for Bharti Dlehi in India (ISUP addressing)		
V_PLMN	The identification of Visitor PLMN which normally is the foreign party during roaming transactions call flow. The PLMN is Operator Centric i.e. The VPLMN(s) are the PLMN(s) that do not belong or or under the control of the Home Operator (the Operator to whom the TN SQM roaming model is providing the metrics to). VPLMN shall be identified by any addresess of it's node (e.g HLRs or VLR/MSC) involved in the transactions call flow It depends on the measurement/transaction type - SCCP, ISUP - different addressing schemas exists. For the SCCP addressing is based on MGT (Mobile Global Title) and for ISUP addressing is based on SPC (Signalling Point Codes).	Alphanumeric string, maximum length 16 characters	

	Network nodes identification shall have a distinction indicating the addressing schema (SCCP or ISUP). Expected format of V_PLMN column: S8101 - for SCCP addressing WHERE: S-SCCP 81 - Japan Country Code 01 - sample NTTDoCoMo Network Code OR I40073 - sample Signalling Point Code for Bharti Delhi India (ISUP addressing)		
ORIG_NE_ID	The identification of Origination Network Element which is originating party during roaming transactions call flow. ORIG_NE_ID shall be identified by addresses of it's node (for example, HLRs or VLR/MSC) involved in the transactions call flow Depends on the measurement/transaction type - SCCP, ISUP - different addressing schemas exist. For the SCCP addressing is based on MGT (Mobile Global Title) and for ISUP addressing is based on SPC (Signaling Point Codes). Network nodes identification shall have distinction pointing addressing schema (SCCP or ISUP). Expected format of ORIG_NE_ID column: 810110 - for SCCP addressing WHERE: 81 - Japan Country Code 01 - sample NTTDoCoMo Network Code	Alphanumeric string, maximum length 64 characters	

	10 - sample Element ID OR 40073 - Sample Dest. Signaling Point Code for Bharti India (ISUP addressing		
DEST_NE_ID	The identification of Destination Network Element which is originating party during roaming transactions call flow. DEST_NE_ID shall be identified by addresses of it's node (for example, HLRs or VLR/MSC) involved in the transactions call flow Depends on the measurement/transaction type - SCCP, ISUP - different addressing schemas exist. For the SCCP addressing is based on MGT (Mobile Global Title) and for ISUP addressing is based on SPC (Signaling Point Codes). Network nodes identification shall have distinction pointing addressing schema (SCCP or ISUP). Expected format of DEST_NE_ID column: 810110 - for SCCP addressing WHERE: 81 - Japan Country Code 01 - sample NTTDoCoMo Network Code 10 - sample Element ID OR 40073 - Sample Dest. Signaling Point Code for Bharti India (ISUP addressing	Alphanumeric string, maximum length 64 characters	
ROAMING_TYPE	Enumeration 1..2: 1 = International 2 = National	Integer 1 or 2	1

ROAMING_DIRECTION	Roaming direction depends on location of the roamer. Inbound Roaming is when the foreign network subscriber is roaming in H_PLMN. Outbound Roaming is when H_PLMN subscriber is roaming in foreign V_PLMN. Enumeration 1..2: 1 = Inbound 2 = Outbound	Integer 1 or 2	2
TRANSACTION_TYPE	The type of transaction which the data set in this row applies to. There is a dependency between Transaction Type and addressing schema used in H_PLMN, V_PLMN, ORIG_NE_ID, DEST_NE_ID columns, see Roaming Transaction Types worksheet.	Integer	3020
CAUSE_TYPE	The protocol-specific cause code type that is required to interpret the transaction termination cause and/or transaction initiation cause fields correctly.	Integer	12
TRANSACTION_TERMINATION_CAUSE	The protocol-specific cause code for that identifies the reason for the termination of the transaction.	Integer	15
TRANSACTION_COUNT	The number of transactions associated with the unique combination of PLMN, Roaming Type, Roaming Direction, Cause Type, Transaction Type and Transaction Outcome and Transaction Termination Cause.	Integer	216

TOTAL_TRANSACTION_DURATION	The total transaction time observed during the sample period for the set of transactions reported on in this row (seconds).	Float	2320.31

2.4.2 Roaming Probe PLMN CSV File Format

The data file must provide the fields in top down order shown in the tables below. The file must NOT contain standard CSV header lines showing the field names.

The Roaming Probe PLMN file format is per the following table:

Table 6: Roaming Probe PLMN File Format

Field Name	*CSV Field Number*	*Field Description*	*Constraints*	*Example*
SPC or MGT	1	For SCCP, the Signaling Point Code represented by the concatenation of: "I" - prefix, ISUP addressing prefix, (for this model's purposes SCPs are considered ISUP addresses - but normally in an SS7 protocol stack an SCP is an MTP layer address) SPC - Signaling Point Code Example: I40073 Where: I - ISUP addressing prefix 40074 - example of SPC of BhartiDelhi For ISUP: The SCCP Mobile Global Title address represented by concatenation of: "S" - prefix, SCCP addressing distinguisher - MGT address Example: S9198 Where:	Alphanumeric string, maximum length 16 characters	I40073 S9198

		S - SCCP addressing prefix 91 - India Country Code (CC) 98 - Bharti Network Code (NC)		
PLMN	2	The name of the PLMN represented by the concatenation of country name abbreviation and PLMN name. Example: JPNTTDoCoMo Where: JP – Japan NTTDoCoMo – network name	Alphanumeric string, maximum length 64 characters	JPNTTDoCoMo IE02
ADDITIONAL INFORMATION	3	Not used for Roaming Probe	Alphanumeric string	Not used

Example Data

The following are examples of data showing headers (where applicable) and fields:

Roaming Probe Metrics:

```
IMSI,MSISDN,MSRN,H_PLMN,V_PLMN,ORIG_NE_ID,DEST_NE_ID,ROAMING_TYPE,ROAMING_DIRECTION,TR
ANSACTION_TYPE,CAUSE_TYPE,TRANSACTION_TERMINATION_CAUSE,TRANSACTION_COUNT,TOTAL_TRANSA
CTION_DURATION
,,,S9198,S8101,810110,919810,1,1,3010,11,-2,431,0
,,,S9198,S8101,810110,919810,1,1,3010,11,27,15,0
,,,S9198,S8101,810110,919810,1,1,3010,11,39,23,0
,,,S9198,S8101,919810,810110,1,2,3010,11,-2,122,0
,,,S9198,S8101,919810,810110,1,2,3010,11,27,2,0
,,,S9198,S8101,919810,810110,1,2,3010,11,39,4,0
,,,S9198,S8101,919810,810110,1,1,3020,11,-2,554,0
,,,S9198,S8101,919810,810110,1,1,3020,11,1,2,0
,,,S9198,S8101,919810,810110,1,2,3020,11,-2,156,0
,,,S9198,S8101,919810,810110,1,2,3020,11,8,3,0
,,,S9198,S8101,919810,810110,1,2,3030,11,-2,321,0
,,,S9198,S8101,919810,810110,1,2,3030,11,27,2,0
,,,S9198,S8101,919810,810110,1,2,3030,11,1,3,0
,,,S9198,S6107,610790,919810,1,2,3030,11,-2,190,0
```

Roaming Probe PLMNs:

```
S9198,INSampleNetwork1,
```

```
I40073,INSampleNetwork1,
I50160,AUSampleNetwork2,
S9199,INSampleNetwork5,
```

2.4.3 CSV File Granularity

The granularity of the Roaming Probe metrics file is expected to be such that only 1 CSV row is specified per grouping of columns as follows:

- TRANSACTION_TERMINATION_CAUSE
- CAUSE_TYPE
- TRANSACTION_TYPE
- ROAMING_DIRECTION
- ROAMING_TYPE
- H_PLMN
- V_PLMN

The columns below are expected to contain the following data in each row based on the above grouping:

- TRANSACTION_COUNT
- TOTAL_TRANSACTION_DURATION

2.4.4 SQM Delivery/Collection Mechanism

Transfer Mechanism

The data files are transferred by Data Push to the data directory on the IBM Tivoli Netcool Service Quality Manager host platform.

Data Directory

The data directory is configurable by the IBM Tivoli Netcool Service Quality Manager customer. The default value for the roaming probe metrics file is `/appl/sa/var/adapter/roaming_probe_loader`. The IBM Tivoli Netcool Service Quality Manager customer needs to ensure that mediation can deliver files to the configured location.

The default value for the roaming probe PLMN file is `${SAVARDIR}/adapter/mappings/resources/PLMN.map`. The IBM Tivoli Netcool Service Quality Manager customer needs to ensure that mediation can deliver files to the configured location.

File Interval

The interval for the metrics file is 15 minutes and must be on 15 minute boundaries, for example: 1615 to 1630.

Changes to the PLMN file are presented on an as-needed basis. The PLMN mapping file is used by the adapter until a new file is presented.

Note: A PLMN mapping file must be present for the adapter to process metrics correctly. If metrics are presented with an unmapped H_PLMN or V_PLMN, they will not be processed correctly by the adapter, and errors will be created in the adapter log.

Transfer Latency

The transfer latency is configurable by the IBM Tivoli Netcool Service Quality Manager customer. The default value is 60 minutes. The value of this parameter represents the maximum delay allowed in data presentation at the data directory.

Files per Interval

The service solution expects 1 file per Roaming Probe system per interval.

3 Enumerations and Definitions

3.1 Roaming Type

The data file must use the following table to identify ROAMING_TYPE.type.

Table 7: Roaming Probe ROAMING_TYPE Type

Id	*ROAMING_TYPE Type*
1	International
2	National

3.2 Roaming Direction

The data file must use the following table to identify ROAMING_DIRECTION.type.

Table 8: Roaming Probe ROAMING_DIRECTION Type

Id	*ROAMING_DIRECTION Type*
1	Inbound
2	Outbound

3.3 Transaction Type

The data file must use the following table to identify TRANSACTION_TYPE.type.

Table 9: Roaming Probe TRANSACTION_TYPE Type

Id	*TRANSACTION_TYPE Type*
3010	PRN
3020	LU
3030	SRISM
3040	MT_FSM

3050	MO_FSM
3060	SAI
3070	GPRS_LU
3080	CS
3090	CA

3.4 Cause Type

The data file must use the following table to identify CAUSE_TYPE.type.

Table 10: Roaming Probe CAUSE_TYPE Type

Id	*CAUSE_TYPE Type*
9	Protocol Violation
10	Timeout
11	MAPCause
12	ISUPCause
13	SCCPReturnCause
14	SCCPResetCause
15	SCCPReleaseCause
16	SCCPRefusalCause
253	TCAPCustomCause
254	ISUPCustomCause

3.5 Transaction Termination Cause

The data file must use the following tables to identify TRANSACTION_TERMINATION_CAUSE type.

Table 11: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, Protocol Violation Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success

-1	Unrecognised termination cause

Table 12: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, Timeout Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause

Table 13: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, MAP Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause
1	UnknownSubscriber
2	UnknownBaseStation
3	UnknownMSC
4	UnknownLocalArea
5	UnidentifiedSubscriber
6	UnallocatedRoamingNumber
7	UnknownEquipment
8	RoamingNotAlloowed
9	IllegalMS
10	BearerServiceNotProvisioned
11	TeleServiceNotProvisioned
12	InsufficientBearerCapabilities
13	CallBarred
14	ForwardingViolation
15	CUG-Reject

16	IllegalSS-Operation
17	SS-ErrorStatus
18	SS-NotAvailable
19	SS-SubscriptionViolation
20	SS-Incompatibility
21	FacilityNotSupported
23	InvalidTargetBaseStation
24	NoRadioResourcesAvailable
25	NoHandoverNumberAvailable
26	SubsequentHandoverFailure
27	AbsentSubscriber
28	BusySubscriber
29	NoSubscriberReply
30	RadioCongestion
31	ImpossibleCallCompletion
32	SM-DeliveryFailure
33	MessageWaitingListFull
34	SystemFailure
35	DataMissing
36	UnexpectedDataValue
37	PasswordRegistrationFailure
38	NegativePasswordCheck
39	NoRoamingNumberAvailable
40	TracingBufferFull

Table 14: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, ISUP Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause
1	Unallocated (unassigned) number
3	No route to destination
4	Send special information tone
16	Normal call clearing
17	User busy
18	No user responding
19	No answer from user (user alerted)
20	Subscriber absent
21	Call rejected
22	Number changed
27	Destination out of order
28	Invalid number format (address incomplete)
29	Facility rejected
31	Normal, unspecified
34	No circuit/channel available
38	Network out of order
41	Temporary failure
42	Switching equipment congestion
43	Access information discarded
44	Requested circuit/channel not available
46	Precedence call blocked
47	Resource unavailable, unspecified

50	Requested facility not subscribed
53	Outgoing calls barred within CUG
55	Incoming calls barred within CUG
57	Bearer capability not authorized
58	Bearer capability not presently available
62	Inconsistency in designated outgoing access information and subscriber class
63	Service or option not available, unspecified
65	Bearer capability not implemented
69	Requested facility not implemented
79	Service or option not implemented, unspecified
87	User not member of CUG
88	Incompatible destination
90	Non-existent CUG
95	Invalid message, unspecified
96	Mandatory information element is missing
97	Message type non-existent or not implemented
98	Message not compatible with call state or message type non-existent or not implemented
99	Information element /parameter nonexistent or not implemented
100	Invalid information element contents
101	Message not compatible with call state
102	Recovery on timer expiry
103	Parameter non-existent or not implemented, passed on
110	Message with unrecognized parameter, discarded
111	Protocol error, unspecified

127	Interworking, unspecified
99	Information element /parameter nonexistent or not implemented
100	Invalid information element contents
101	Message not compatible with call state
102	Recovery on timer expiry
103	Parameter non-existent or not implemented, passed on
110	Message with unrecognized parameter, discarded
111	Protocol error, unspecified
127	Interworking, unspecified

Table 15: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, SCCP Return Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause
0	no translation for an address of such nature
1	no translation for this specific address
2	subsystem congestion
3	subsystem failure
4	unequipped user
5	MTP failure
6	network congestion
7	unqualified
8	error in message transport (Note)
9	error in local processing (Note)
10	destination cannot perform reassembly (Note)
11	SCCP failure

12	hop counter violation
13	segmentation not supported
14	segmentation failure

Table 16: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, SCCP Reset Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause
0	end user originated
1	SCCP user originated
2	message out of order – incorrect P(S)
3	message out of order – incorrect P(R)
4	remote procedure error – message out of window
5	remote procedure error – incorrect P(S) after (re)initialization
6	remote procedure error – general
7	remote end user operational
8	network operational
9	access operational
10	network congestion
11	reserved
12	unqualified

Table 17: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, SCCP Release Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause
0	end user originated

1	SCCP user originated
2	message out of order – incorrect P(S)
3	message out of order – incorrect P(R)
4	remote procedure error – message out of window
5	remote procedure error – incorrect P(S) after (re)initialization
6	remote procedure error – general
7	remote end user operational
8	network operational
9	access operational
10	network congestion
11	reserved
12	unqualified

Table 18: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, SCCP Refusal Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause
0	end user originated
1	end user congestion
2	end user failure
3	SCCP user originated
4	destination address unknown
5	destination inaccessible
6	network resource – QoS not available/non-transient
7	network resource – QoS not available/transient
8	access failure

9	access congestion
10	subsystemfailure
11	subsystemcongestion
12	expiration of the connection establishment timer
13	incompatible user data
14	reserved
15	unqualified
16	hop counter violation
17	SCCP failure
18	no translation for an address of such nature
19	unequipped user

Table 19: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, TCAP Custom Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause
0	TCAP_Err_V1
1	TCAP_Err_V2
2	TCAP_Err_V3
3	TCAP_Err_ACN_Not_Spp

Table 20: Roaming Probe TRANSACTION_TERMINATION_CAUSE Type, ISUP Custom Causes

Id	*TRANSACTION_TERMINATION_CAUSE Type*
-2	Success
-1	Unrecognised termination cause
1	Number of call seizure attempts

4 Appendix A Glossary

Table 19: Glossary of Terms

Acronym	*Description*
CEM	Customer Experience Management
CSV	Comma Separated Values
HTML	Hyper Text Markup Language
HLR	Home Location Register
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ISDN	Integrated Services Digital Network
IT	Information Technology
ISUP	Integrated Service User Part
KQI	Key Quality Indicator
MCC	Mobile Country Code
MGT	Mobile Global Title
MNC	Mobile Network Code
MSC	Mobile Switching Center
MSIN	Mobile Subscriber International Number
MSISDN	Mobile Subscriber International ISDN Number
MSRN	Mobile Subscriber Roaming Number
NDC	National Destination Code
PLMN	Public Land Mobile Network

QoS	Quality of Service
SCCP	Signaling Connection Control Part
SPC	Signaling Point Code
SLA	Service Level Agreement
TCAP	Transaction Capabilities Application Part
TNSQM	Tivoli Netcool Service Quality Manager
VLR	Visitor Location Register

5 Appendix B Notices

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