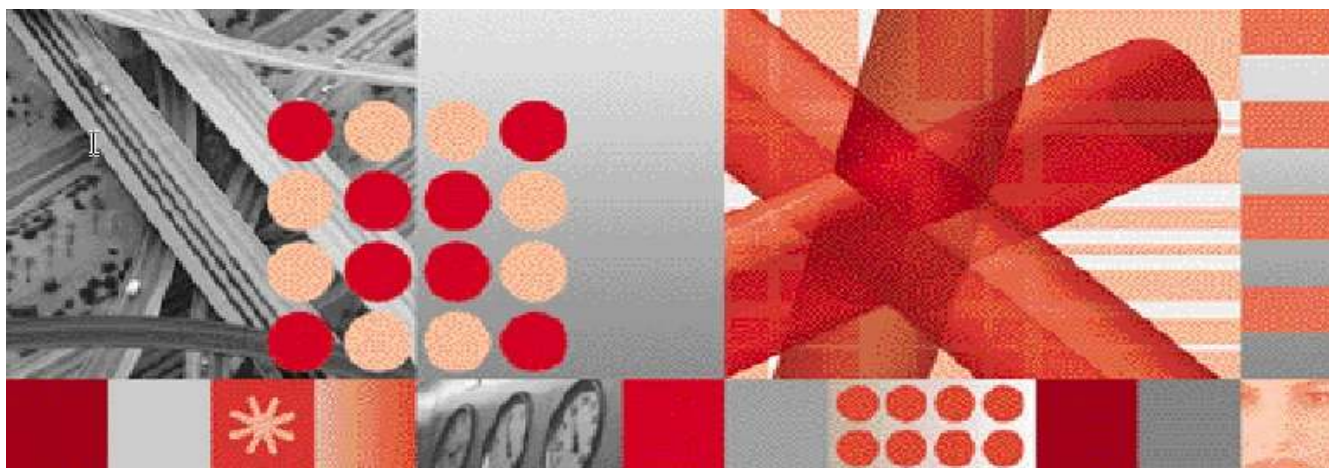**Tivoli.** **Netcool Service Quality Manager GSM SS7 Service Solution**

Version 1.4.3

IBM

Interface Control Guide

Note: Before using this information and the product it supports, read the information in "Notices" on page 25.

This edition applies to version 1, release 4, modification 3 of the IBM Tivoli Netcool Service Quality Manager GSM SS7 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 GSM SS7 Service Solutions Interface Control Guide* details the GSM (Global System for Mobile Communications) SS7 (Signaling System 7) service solution input interface, its CSV (Comma Separated Value) input files in terms of:

- File naming conventions

- Data file format, structure, and semantics

- Supported delivery and 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 GSM SS7 service solution.

1.2 Required skills and knowledge

This guide assumes you are familiar with the following:

- General IT (Information Technology) principles

- IP (Internet Protocol) networking

- UNIX® operating systems

- GSM service solution

1.3 Guide conventions

The following command prompts can be seen throughout this guide 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 guide uses the typographical conventions shown in the following table:

Table 1: General guide conventions

Format	*Examples*	*Description*
ALL UPPERCASE	GPS NULL MYWEBSERVER	Acronyms, device names, logical operators, registry keys, and some data structures.
Link	See www.ibm.com	For links within a document or to the Internet.
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`**	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   Guide structure

This guide is organized into the following chapters:

Table 2: Guide structure

Chapter	*Description*
Interface specifications	Provides interface specification and file naming conventions.
Enumerations and definitions	Describes the call types.
Appendix A Glossary	Provides a description of the product acronyms.

1.5   User publications

The following user publications are provided with the GSM SS7 Service Quality Manager service solution.

Table 3: GSM SS7 service solution user 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 GSM SS7.
Tivoli Netcool Service Quality Manager GSM RAN PM Service Solution Interface Control Guide	Details the GSM RAN PM service solution input interface.
Tivoli Netcool Service Quality Manager GSM End to End AT Service Solution Interface Control Guide	Details the GSM End to End AT service solution input interface.
Tivoli Netcool Service Quality Manager GSM MSC PM Service Solution Interface Control Guide	Details the GSM MSC PM service solution input interface.
Tivoli Netcool Service Quality Manager GSM SS7 Service Solution Interface Control Guide	Details the GSM SS7 service solution input interface.
Tivoli Netcool Service Quality Manager GSM RAN PM Service Solution Release Notes	Provides information on the GSM RAN PM Service Solution release contents, platform requirements, installation and upgrade procedures, and known issues.

The following user publications are provided with the Service Quality Manager core software as Adobe® PDFs (Portable Document Format). Online help is available in HTML format.

Table 4: Service Quality Manager user documentation

Guide title	*Description*
Release Notes	Provides information on the Service Quality Manager release contents, platform requirements, installation and upgrade procedures, and known issues.
Configuration Guide	Describes SLA (Service Level Agreement) provisioning (Parties, SLAs, and SLA templates applications) and Service Quality Manager provisioning (services resources, KQIs (Key Quality Indicators) 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.
Customer Experience Manager Monitoring Guide	Describes how to use and monitor the Customer Experience Manager feature in Service Quality Manager.
Customer Experience Manager Provisioning Guide	Reference guide containing information for provisioning the Customer Experience Manager 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 Installation Guide	Describes how to install the Tivoli Netcool Service Quality Manager server system on IBM AIX® 5.3L.
Solaris System Administration Guide	Provides an overview of the Service Quality Manager administrative tasks including instructions on how to complete these 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 these 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 version to another.
BusinessObjects Installation and 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 Core Online Help	Provides information and procedures for using Service Quality Manager client applications.

2 Interface specifications

2.1 Overview

This guide provides all the required information for parties intending to provide mediated GSM SS7 data from GSM SS7 service systems to Tivoli Netcool Service Quality Manager.

2.2 Supported version

This guide refers to GSM SS7 service solution v1.4.3.

2.3 Interface definition

2.3.1 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, based on 24-hour clock (00-23)
- `mm` is the two digit minute of the hour (00-59)

File names are expected to be adjusted to compensate for the difference between GMT (Greenwich Mean Time) and the local time of the host system where the GSM SS7 service solution is deployed. The mediator must clarify the appropriate time zone adjustment with the Tivoli Netcool Service Quality Manager customer.

`UniqueID` is an optional element that can be used, for example, to uniquely identify the GSM SS7 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: A20080314.0000-20080314.0030.csv`

- `Filename: A20080314.0030-20080314.0100.csv`

2.4   Metric CSV data specification

2.4.1   GSM SS7 metric CSV file format

The data file must provide the fields in the top down order as shown in the table below. The file is expected to contain a standard CSV header line containing the field names shown below.

Table 4: File format

Field name	*Field description*	*Constraints*	*Example*
IMSI	The IMSI (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.	Digits range = 0..9 Total length of IMSI is ≤ 15 digits. • MCC = 3 digits. • MNC = 2 or 3 digits. • MSIN = 9 or 10 digits.	123456789012345
CELL	The cell global identity for the current cell. The normal format of the cell global identifier is MCC-MNC-LAC-CI where: • MCC is the mobile country code. • MNC is the mobile network code. • LAC is the location area code. • CI is the cell identifier.	• MCC = 3 decimal digits • MNC = 2 or 3 decimal digits • LAC = 2 hexadecimal encoded octets • CI = 2 hexadecimal encoded octets	123456789
MSC	The name of the MSC.	Text String (64 characters).	MSCplatform-1
TransactionType	The type of transaction which the data set in this row applies to.	Transaction Type for value list. Expected types are: • Emergency Call. • Mobile Originating Call. • Mobile Terminating Call. • Location Update.	

Field name	Field description	Constraints	Example
CauseType	The protocol specific cause code type that is required to interpret the transaction termination cause field correctly.	Cause Type for value list. Expected types are: • Unrecognized Cause • RRCause • MMCause • CCCause	
TerminationCode	The protocol specific cause code that identifies the reason for the termination of the transaction.	See section 3.3 Termination codes, for details of the set of valid cause codes for each CauseType. The cause codes will be added to the GOM.	
TransactionCount	The number of transactions associated with the unique combination of IMSI, CELL MSC, Transaction Type, Cause Type and Termination Code.	≥ 0	1
AlertingCount	The number of transactions associated with the unique combination of IMSI, CGI, MSC, Transaction Type, Cause Type and Termination Code which reach the "alerting" (ringing) stage.	$>= 0$ Always 0 for the Location Update Transaction Type and any other transaction group which does not include the "CC ALERTING" message.	1
ConnectCount	The number of transactions associated with the unique combination of IMSI, CGI, MSC, Transaction Type, Cause Type and Termination Code which reach the "connect" (speech) stage.	$>= 0$ Always 0 for the Location Update Transaction Type and any other transaction group which does not include the "CC CONNECT" message.	0
AcceptCount	The number of Location Update transactions which are successfully accepted by the network.	$>= 0$ Only ever non-zero for the Location Update Transaction Type.	0
TotalSetupTime	The time in seconds between the initial message of the transaction group and the "CC ALERTING" message totaled over all of the transactions associated with the unique combination of IMSI, CGI, MSC, Transaction Type, Cause Type and Termination Code.	$>= 0.0$ seconds Always 0.0 for the Location Update Transaction Type and any other transaction group which does not include the "CC ALERTING" message.	0.0015

Field name	Field description	Constraints	Example
TotalSpeechTime	The time in seconds between the "CC CONNECT" message and the end of the call ("CC DISCONNECT" message) totaled over all of the transactions associated with the unique combination of IMSI, CGI, MSC, Transaction Type, Cause Type and Termination Code.	>= 0.0 seconds Always 0.0 for the Location Update Transaction Type and any other transaction group which does not include the "CC CONNECT" message.	0.00

Example data

The following is example data showing header and fields:

```
IMSI,CELL,MSCPLATFORM,TRANSACTIONTYPE,CAUSETYPE,TERMINATIONCODE,TRANSACTIONCOUNT,ALERTIN
GCOUNT,CONNECTCOUNT,ACCEPTCOUNT,TOTALSETUPTIME,TOTALSPEECHTIME
IMSI-00001,CELL-1-01,MSC-1-GSM-SS7,3,41,18,1,1,0,0,0.0015,0
IMSI-00002,CELL-1-01,MSC-1-GSM-SS7,2,41,19,1,1,0,0,0.0021,0
IMSI-00002,CELL-1-01,MSC-1-GSM-SS7,3,42,0,1,1,1,0,0.0057,39.13
IMSI-00003,CELL-1-01,MSC-1-GSM-SS7,4,40,0,1,0,0,1,0,0
```

Note: Headers can be uppercase (capitals) or lower case, for consistency and readability it is recommended that they be uppercase in the incoming CSV data files.

2.4.2   Metric CSV file granularity

The granularity of the file is expected to be such that one CSV row will be specified for all CSV fields which have a single set of the common values listed below:

- IMSI
- CELL
- MSC
- TRANSACTIONTYPE
- CAUSETYPE
- TERMINATIONCODE

2.4.3   Service Quality Manager delivery and collection mechanism

Transfer mechanism

The CSV data file is transferred by data push to the data directory on the Tivoli Netcool Service Quality Manager host platform where the adapter is configured.

Mediation systems *must* deliver the data files to that directory. The transfer mechanism should be agreed between the Tivoli Netcool Service Quality Manager customer and the data mediator, but could typically include methods such as FTP (File Transfer Protocol), SFTP (Secure File Transfer Protocol), SCP (Secure Copy), UUCP (UNIX to UNIX Copy Protocol) and local copy.

Data directory

The data directory is configurable by Tivoli Netcool Service Quality Manager customers. The default value is `/appl/sa/var/adapter/gsm_ss7_loader`. IBM Tivoli Netcool Service Quality Manager customers need to ensure that mediation can deliver files to the configured location.

File interval

The metric CSV file interval is 30 minutes and must be on 30 minute boundaries, for example: 1600 to 1630.

Transfer latency

The transfer latency of the CSV file is configurable by IBM Tivoli Netcool Service Quality Manager customers. The default value is 30 minutes. The value of this parameter represents the maximum delay allowed for data presentation at the data directory.

Files per interval

The service solution expects one metrics CSV file per mediation point per interval.

2.5   Custom Resource Mapping (CRM) interface specification

2.5.1   CRM file naming convention

The CRM file naming conventions are as follows:

```
gsm_ss7_ cellarea.map
gsm_ss7_imsienterprise.map
gsm_ss7_location.map
```

These are not configurable and are predefined in the adapter property files.

2.6   CRM data specification

2.6.1   GSM SS7 CRM file formats

The data file must provide the custom resource mapping file with fields in the top down order as shown in the tables below. These files do not contain CSV headers.

Table 6: File format – Cell to cell area mapping

Field name	Field description	Constraints	Example
CGI	The cell global identity for the current cell, logically consisting of MNC - Mobile Network Code MCC - Mobile Country Code LAC - Location Area Code	LAC values 0000 and FFFE are reserved.	78941084D7F99F

	CI - Cell identity The format of the CGI field is CCCNNNLLLLIIII where: CCC is the mobile country code (3 decimal digits). NNN is the mobile network code (2 or 3 decimal digits). LLLL is the location area code (4 hexadecimal digits) IIII is the cell identifier (4 hexadecimal digits)		
CELLAREA	The name of the CellArea. This is an arbitrary grouping of Cells obtained usually from a CRM system. It can be (a) groups of Cells from a marketing point of view or possibly (b) a group of Cells under the control of a BSC/RNC.	Text String (64 characters)	Cell Area 0
ADDITIONA LINFO	Not used		

Example data

The following is example data showing the mapping fields, please note there is no header.

```
78941084D7F99F,Cell Area 0,
78941007E43150,Cell Area 0,
78941007EF1600,Cell Area 2,
```

Note: In a scenario where there is a requirement to reassign a CGI to another Cell Area, this file must then be modified to reflect the change and the adapter will automatically reload the contents of the new map file when it processes the next batch of CSV data files.

Table 7: File format – IMSI to enterprise mapping

Field name	Field description	Constraints	Example
IMSI	The International Mobile Subscriber ID.	Text String (64 characters)	IMSI-00001
ENTERPRISE	The name of the Enterprise.	Text String (64 characters)	Enterprise-1
ADDITIONALINFO	Not used.		

Example data

The following is example data showing the mapping fields, please note there is no header.

```
IMSI-00001,Enterprise-1,
IMSI-00002,Enterprise-1,
IMSI-00003,Enterprise-1,
IMSI-00004,Enterprise-1,
```

Note: In a scenario where there is a requirement to reassign an IMSI to another enterprise, this file must then be modified to reflect the change and the adapter will automatically reload the contents of the new map file when it processes the next batch of CSV data files.

The data file must provide the custom resource mapping file with fields in the top down order as shown in the tables below. These files do not contain CSV headers.

Table 6: File format – Cell to Location area mapping

Field name	Field description	Constraints	Example
CGI	The cell global identity for the current cell, logically consisting of MNC - Mobile Network Code MCC - Mobile Country Code LAC - Location Area Code CI - Cell identity	LAC values 0000 and FFFE are reserved.	78941084D7F99F

	The format of the CGI field is CCCNNNLLLLIIII where: CCC is the mobile country code (3 decimal digits). NNN is the mobile network code (2 or 3 decimal digits). LLLL is the location area code (4 hexadecimal digits) IIII is the cell identifier (4 hexadecimal digits)		
AREA	The name of the Location Area. This is an arbitrary grouping of Cells obtained usually from a CRM system. It can be (a) groups of Cells from a marketing point of view or possibly (b) a group of Cells under the control of a BSC/RNC.	Text String (64 characters)	Location Area 0
ADDITIONALINFO	Not used		

Example data

The following is example data showing the mapping fields, please note there is no header.

```
78941084D7F99F,Location Area 0,
78941007E43150,Location Area 0,
78941007EF1600,Location Area 2,
```

Note: In a scenario where there is a requirement to reassign a CGI to another Cell Area, this file must then be modified to reflect the change and the adapter will automatically reload the contents of the new map file when it processes the next batch of CSV data files.

2.6.2 Service Quality Manager delivery and collection mechanism

The CRM mapping files are transferred by data push to the data directory on the IBM Tivoli Netcool Service Quality Manager host platform.

CRM data directory

The CRM directory is not configurable and the expected location is
`/appl/sa/var/adapter/mappings/resources`. IBM Tivoli Netcool Service Quality Manager customers need to ensure that mediation can deliver files to the configured location.

File interval

The CRM files are expected to be present at startup of the adapter. Subsequently, if there is a change in the CRM files (timestamp), the adapter will automatically reload the file before processing the next batch of incoming CSV data files.

Transfer latency

CRM files are expected to be present at startup of the adapter.

3 Enumerations and definitions

3.1 Cause types

The data file must use the following table to identify cause types.

Table 8: GSM SS7 CAUSE_TYPE type

Id	CAUSE_TYPE type
99	Unidentified Cause
41	CCCause
40	MMCause
42	RRCause

3.2 Transaction types

The data file must use the following table to identify transaction types.

Table 9: GSM SS7 TRANSACTION_TYPE type

Id	TRANSACTION_TYPE type
1	Emergency Call
2	Mobile Originating Call
3	Mobile Terminating Call
4	Location Update

3.3 Termination codes

The data file must use the following tables to identify termination types.

Table 10: GSM SS7 TERMINATION_CODE type, CC causes

Id	TRANSACTION_TERMINATION_CAUSE type
1	unassigned (unallocated) number
3	no route to destination

Id	TRANSACTION_TERMINATION_CAUSE type
6	channel unacceptable
8	operator determined barring
16	normal call clearing
17	user busy
18	no user responding
19	user alerting, no answer
21	call rejected
22	number changed
25	pre-emption
26	non-selected user clearing
27	destination out of order
28	invalid number format (incomplete number)
29	facility rejected
30	response to STATUS ENQUIRY
31	normal, unspecified
34	no circuitchannel available
38	network out of order
41	temporary failure
42	switching equipment congestion
43	access information discarded
44	requested circuitchannel not available
47	resource unavailable, unspecified
49	quality of service unavailable
50	requested facility not subscribed
55	Incoming calls barred within the CUG
57	bearer capability not authorized
58	bearer capability not presently available
63	service or option not available, unspecified
68	ACM equal to or greater than ACMmax
65	bearer service not implemented

Id	TRANSACTION_TERMINATION_CAUSE type
69	requested facility not implemented
70	only restricted digital information bearer capability is available
79	service or option not implemented, unspecified
81	invalid transaction identifier value
87	user not member of CUG
88	incompatible destination
91	invalid transit network selection
95	semantically incorrect message
96	invalid mandatory information
97	message type non-existent or not implemented
98	message type not compatible with protocol state
99	information element non-existent or not implemented
100	conditional IE error
101	message not compatible with protocol state
102	recovery on timer expiry
111	protocol error, unspecified

Table 11: GSM SS7 TRANSACTION_TERMINATION_CAUSE type, MM causes

Id	TRANSACTION_TERMINATION_CAUSE type
0	MM activity success
2	IMSI unknown in HLR
3	Illegal MS
4	IMSI unknown in VLR
5	IMEI not accepted
6	Illegal ME
11	PLMN not allowed
12	Location Area not allowed
13	Roaming not allowed in this location area
15	No Suitable Cells In Location Area

Id	TRANSACTION_TERMINATION_CAUSE type
20	MAC failure
21	Synch failure
17	Network failure
22	Congestion
23	GSM authentication unacceptable
32	Service option not supported
33	Requested service option not subscribed
34	Service option temporarily out of order
38	Call cannot be identified
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message not compatible with protocol state
99	Information element non-existent or not implemented
100	Conditional IE error
101	Message not compatible with protocol state
111	Protocol error, unspecified

Table 12: GSM SS7 TRANSACTION_TERMINATION_CAUSE type, RR causes

Id	TRANSACTION_TERMINATION_CAUSE Type
0	Normal event
1	Abnormal release, unspecified
2	Abnormal release, channel unacceptable
3	Abnormal release, timer expired
4	Abnormal release, no activity on the radio path
5	Pre-emptive release
8	Handover impossible, timing advance out of range
9	Channel mode unacceptable
10	Frequency not implemented

Id	TRANSACTION_TERMINATION_CAUSE Type
11	Originator or talker leaving group call area
12	Lower layer failure
65	Call already cleared
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message type not compatible with protocol state
100	Conditional IE error
101	No cell allocation available
111	Protocol error unspecified

Appendix A Glossary

Table 13: Description of product acronyms

Acronym	Description
AIX	Advanced Interactive eXecutive
CGI	Cell Global Identity
CI	Cell Identifier
CRM	Custom Resource Mapping
CSV	Comma Separated Values
DBCS	Double Byte Character Set
FTP	File Transfer Protocol
GMT	Greenwich Mean Time
GPS	Global Positioning Satellite
GSM	Groupe Speciale Mobile (or, more commonly, Global System for Mobile communications)
GUI	Graphical User Interface
HLR	Home Location Register
HTML	Hyper Text Markup Language
IBM	International Business Machines
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
IT	Information Technology
KQI	Key Quality Indicator
LAC	Location Area Code
MCC	Mobile Country Code
MNC	Mobile Network Code
MSC	Mobile Switching Center
MSIN	Mobile Subscriber International Number

Acronym	Description
PLMN	Public Land Mobile Network
SCP	Secure Copy
SFTP	Secure File Transfer Protocol
SLA	Service Level Agreement
SQL	Structured Query Language
SQM	Service Quality Manager
SS7	Signaling System 7
TCAP	Transaction Capabilities Application Part
UUCP	Unix to Unix Copy Protocol
VLR	Visitor Location Register
XML	Extensible Markup Language

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