

# Oracle® Communications Network Charging and Control

## Messaging Firewall Technical Guide



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# Contents

About This Document .....	v
Document Conventions .....	vi
<b>Chapter 1</b>	
<b>System Overview .....</b>	<b>1</b>
Overview .....	1
What is Messaging Firewall? .....	1
About VLR Steering .....	1
About VLR Velocity .....	2
About VLR Validation .....	2
<b>Chapter 2</b>	
<b>Configuration.....</b>	<b>5</b>
Overview .....	5
Configuration Overview .....	5
SLEE.cfg Configuration .....	6
<b>Chapter 3</b>	
<b>Background Processes .....</b>	<b>7</b>
Overview .....	7
mfw .....	7
<b>Chapter 4</b>	
<b>Tools and Utilities .....</b>	<b>17</b>
Overview .....	17
Statistics .....	17



# About This Document

## Scope

The scope of this document includes all the information required to administer the Messaging Firewall application.

## Audience

This guide is written primarily for system administrators and other personnel who administer the Messaging Firewall application. However, the overview sections of the document are useful to anyone requiring an introduction to the application.

## Prerequisites

Although it is not a prerequisite to using this guide, familiarity with the target platform would be an advantage.

A solid understanding of Unix and a familiarity with IN concepts are an essential prerequisite for safely using the information contained in this technical guide. Attempting to install, remove, configure or otherwise alter the described system without the appropriate background skills, could cause damage to the system; including temporary or permanent incorrect operation, loss of service, and may render your system beyond recovery.

This manual describes system tasks that should only be carried out by suitably trained operators.

## Related Documents

The following documents are related to this document:

- *ACS User's Guide*
- *ACS Technical Guide*
- *MM Technical Guide*

# Document Conventions

## Typographical Conventions

The following terms and typographical conventions are used in the Oracle Communications Network Charging and Control (NCC) documentation.

Formatting Convention	Type of Information
<b>Special Bold</b>	Items you must select, such as names of tabs. Names of database tables and fields.
<i>Italics</i>	Name of a document, chapter, topic or other publication. Emphasis within text.
<b>Button</b>	The name of a button to click or a key to press. <b>Example:</b> To close the window, either click <b>Close</b> , or press <b>Esc</b> .
<b>Key+Key</b>	Key combinations for which the user must press and hold down one key and then press another. <b>Example:</b> <b>Ctrl+P</b> or <b>Alt+F4</b> .
<b>Monospace</b>	Examples of code or standard output.
<b>Monospace Bold</b>	Text that you must enter.
<i>variable</i>	Used to indicate variables or text that should be replaced with an actual value.
<b>menu option &gt; menu option &gt;</b>	Used to indicate the cascading menu option to be selected. <b>Example:</b> <b>Operator Functions &gt; Report Functions</b>
<a href="#">hypertext link</a>	Used to indicate a hypertext link.

Specialized terms and acronyms are defined in the glossary at the end of this guide.

# System Overview

## Overview

### Introduction

This chapter provides a high-level overview of the application. It explains the basic functionality of the system and lists the main components.

It is not intended to advise on any specific Oracle Communications Network Charging and Control (NCC) network or service implications of the product.

### In this Chapter

---

This chapter contains the following topics.

What is Messaging Firewall?.....	1
----------------------------------	---

## What is Messaging Firewall?

### Introduction

Messaging Firewall is a software-based IN solution that checks and handles native protocol messages within the defined protocol message flows. Messaging Firewall is protocol-aware, and checks and validates data to determine if the sender of a message is trusted or not.

Messaging Firewall performs the following functions, which are based on Visitor Location Register (VLR):

- VLR Steering
- VLR Velocity
- VLR Validation

## About VLR Steering

VLR Steering prevents a subscriber's mobile device from connecting to a roaming operator who is not in the preferred network. However, you can enable the connection to a non-preferred network by configuring the number of times to attempt a connection before determining that the preferred network is not available.

Messaging Firewall performs VLR steering only when an UpdateLocation message is received.

VLR Steering performs the following tasks:

- 1 Decodes the msisdnReference from mapOpen.
- 2 If the configuration item no\_of\_vlr\_steurs is equal to 0, performs VLR Velocity.
- 3 If msisdnReference is not in cache, adds msisdnReference to the cache and tests the value of the no\_of\_vlr\_steurs configuration item.
- 4 If no\_of\_vlr\_steurs is set to a value greater than 0, increments the cache entry noOfSteers and rejects the UpdateLocation message.

- 5 If msisdnReference is in the local cache, tests the cache entry noOfSteers against the no\_of\_vlr\_steer configuration item.
- 6 If noOfSteers is greater than the no\_of\_vlr\_steer configuration item, allows the message to move on to the VLR Velocity check. Otherwise, it increments the noOfSteers entry value and rejects the message. The cache flushes the entry after Time to live (TTL) expires.

## About VLR Velocity

VLR Velocity enables you to update the location that is geographically possible in the time since the last update. VLR Velocity compares the location of the message's global title calling party country code with the VMSC country code that is returned from the HLR. The HLR lookup is populated by the location message's IMSI.

Messaging Firewall performs VLR Velocity only when an UpdateLocation message is received.

VLR Velocity performs the following tasks:

- 1 Checks if msisdnReference is in the country code prefix.
- 2 Performs a RIMS lookup to retrieve the vmsc.
- 3 Checks if the vmsc is in the visiting country code prefix.
- 4 Sends UpdateLocation back on the network.

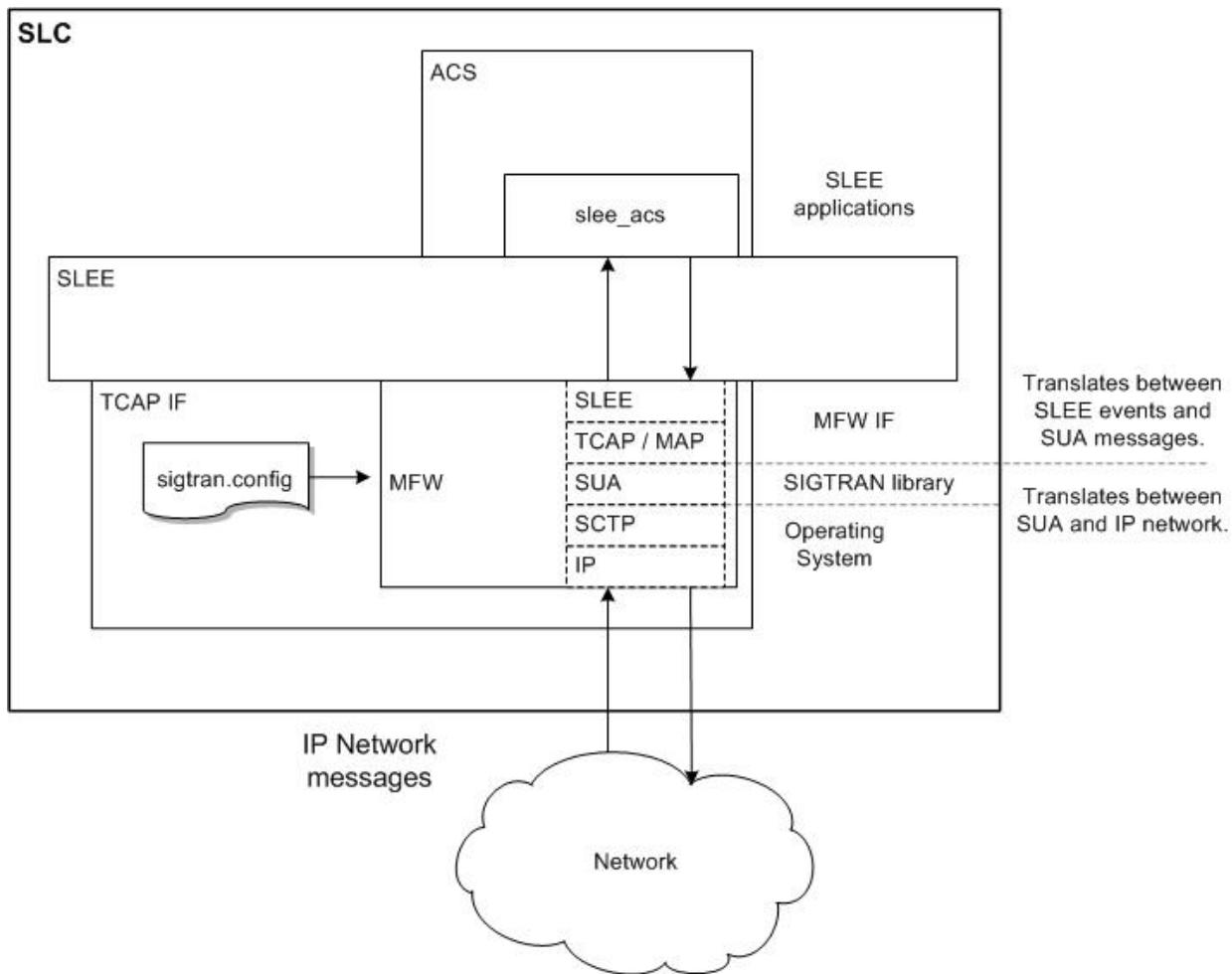
## About VLR Validation

VLR Validation confirms if a record in the VLR is available in the HLR. If the record is not available in the HLR, VLR Validation rejects the MAP message. Messaging Firewall performs VLR Validation for all message types, except for the UpdateLocation message.

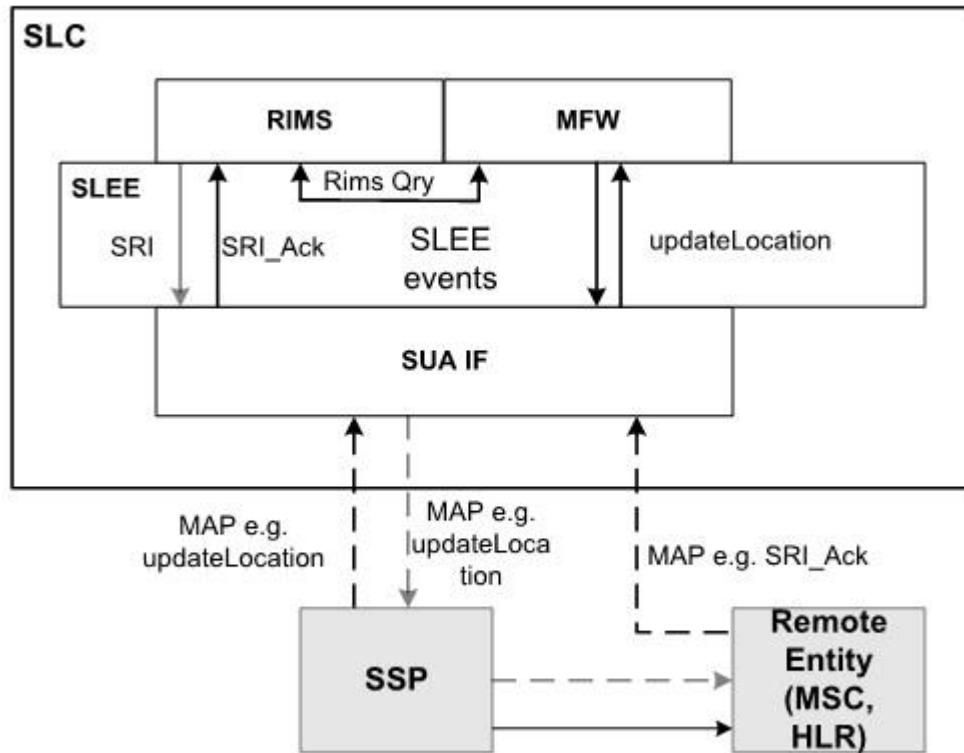
VLR Validation performs the following actions:

- 1 Decodes msisdnReference from mapOpen or from the actual message if no mapOpen is present.
- 2 Checks if msisdnReference is in the validation prefix code.
- 3 Performs a RIMS lookup to retrieve the vmsc.
- 4 If the RIMS vmsc and the MSISDN match, sends the message back on the network. If the RIMS vmsc and the MSISDN do not match, compares the MSISDN with "REJECT fail code". If a match is made, sends the REJECT message back on the network.
- 5 If no match is made with the "REJECT fail code" list, compares the MSISDN with the "DISCARD fail code". If a match is made, closes the dialog and returns an error message.
- 6 If no match is made with the "REJECT fail code" list or the "DISCARD fail code" list, closes the dialog and accepts the message.

The following diagram shows the SCCP SUA interface:



The following diagram illustrates the SLEE correlation ID:



# Chapter 2

# Configuration

## Overview

### Introduction

This chapter explains how to configure Messaging Firewall for the Oracle Communications Network Charging and Control (NCC) application.

### In this chapter

---

This chapter contains the following topics.

Configuration Overview .....	5
SLEE.cfg Configuration .....	6

## Configuration Overview

### Introduction

There are configuration options that are added to the configuration files that are not explained in this chapter. These configuration options are required by the system and should not be changed.

### Configuration Components

The following components form the configuration components for Messaging Firewall:

Component	Location	Description	Further Information
<b>mfw.cfg</b>	SLC	Configures the Messaging Firewall application.	<i>mfw</i> (on page 7)
<b>SLEE.cfg</b>	SLC	The SLEE _ac interface is configured to include the Messaging Firewall application, the MTA and the cdrIF interface.	SLEE.cfg Configuration and <i>SLEE Technical Guide</i> .

### Configuration Files Location

The Messaging Firewall configuration files are located in the `/IN/service_packages/MFW/etc` directory.

### Editing Configuration Files

To ensure that you have a working copy, before making any changes to the configuration files, backup your current configuration.

To edit configuration files, open the configuration file using a standard file editor. Do not use file editors such as Microsoft Word that attach Microsoft DOS or Windows line termination characters (for example, `^M`) at the end of each row, because this causes file errors when the application tries to read the configuration file.

## Loading Configuration Changes

If you change a configuration file, then you must send a signal (SIGHUP) to the relevant process, or restart the SLEE to enable the new options to take effect.

# SLEE.cfg Configuration

## Introduction

You must configure the **SLEE.cfg** file to enable Messaging Firewall to work.

During the installation of the Messaging Firewall application, the **SLEE.cfg** file is updated automatically to set up the platform to use MFW.

For more information, see:

- *SLEE Technical Guide* for information on SLEE configuration.
- *XML TCAP Interface Technical Guide* for information on SERVICEKEY format.

## MFW SLEE Configuration

After the installation of the Messaging Firewall application, verify that the following lines have been added to the **SLEE.cfg** file:

```
APPLICATION=mfwApplication mfw.sh /IN/service_packages/MFW/bin 1 1 # mfw
SERVICEKEY=INTEGER 0x1080000000a MFW # (GSM RegsiterSS)
SERVICEKEY=INTEGER 0x1080000000b MFW # (GSM EraseSS)
SERVICEKEY=INTEGER 0x1080000000c MFW # (GSM ActivateSS)
SERVICEKEY=INTEGER 0x1080000000d MFW # (GSM DeactivateSS)
SERVICEKEY=INTEGER 0x1080000000e MFW # (GSM InterrogateSS)
SERVICEKEY=INTEGER 0x108000000011 MFW # (GSM RegisterPassword)
SERVICEKEY=INTEGER 0x108000000002 MFW # (GSM UpdateLocation)
SERVICEKEY=INTEGER 0x108000000004 MFW # (GSM ProvideRoamingNumber)
SERVICEKEY=INTEGER 0x108000000043 MFW # (GSM purgeMS)
SERVICEKEY=INTEGER 0x108000000039 MFW # (GSM RestoreData)
SERVICEKEY=INTEGER 0x108000000036 MFW # (GSM BeginSubscriberActivity)
SERVICEKEY=INTEGER 0x108000000013 MFW # (GSM ProcessUSSData)
SERVICEKEY=INTEGER 0x10A00000002D MFW # (GSM SRI_SM)
SERVICEKEY=INTEGER 0x10A000000016 MFW # (GSM SRI)
SERVICEKEY=INTEGER 0x10A00000002E MFW # (GSM MO SM)
SERVICEKEY=INTEGER 0x10A00000002C MFW # (GSM MT SM)
SERVICE=MFW 1 mfwApplication MFW
```

During the installation, SERVICEKEY values are generated from the subsystem number and the specified base key and therefore may be different from those shown here.

# Background Processes

## Overview

### Introduction

This chapter explains the processes that are started automatically by Service Logic Execution Environment (SLEE).

**Note:** This chapter also includes some plug-ins to background processes which do not run independently.

### In this chapter

---

This chapter contains the following topics.

mfw ..... 7

## mfw

### Purpose

Messaging Firewall receives a MAP message from the TCAP Interface and performs VLR validation, VLR steering, or VLR roaming depending on the message type. An appropriate alarm is raised if there is a problem processing the message.

### Startup

mfw is started automatically by SLEE. The following lines must be included in **SLEE.cfg** to start mfw:

```
APPLICATION=mfwApplication mfw.sh /IN/service_packages/MFW/bin 1 1
SERVICEKEY=INTEGER 0x10800000002 MFW
SERVICEKEY=INTEGER 0x10800000006 MFW
SERVICE=MFW 1 mfwApplication MFW
```

**Note:** The service key details are generated automatically during installation and therefore may be different from this example.

For more information, see SLEE.cfg Configuration.

### Location

mfw is located on the SLC.

### mfw.cfg configuration file

The configuration file for mfw is **mfw.cfg**.

The following text shows the default configuration for Messaging Firewall in the **mfw.cfg** file:

```
mfw = {
    # Cache tuning options
```

```

cache = {
    # Maximum number of HLR responses to cache at any one time
    # default size = 1000000

    # Time to live
    # default = 3600 seconds
    # ttl = 3600
}

# OPTIONAL
# VLR Steering - number of times to Roam/Steer UpdateLocation
# messages, before accepting the message.
# default is 3
# no_of_vlr_steers = 3

# OPTIONAL
# VLR Velocity Visiting Country Code
# The Visiting Country code and the minimum time allowed to travel there.
# AF (93), SV (503)
#
# Example :
# VisitingCCodes = [
#                     { code="93" }
#                     { code="503" }
#                 ]
#
VisitingCCodes = [
    { code="93" }
    { code="503" }
]

# OPTIONAL
# VLR Velocity Country Codes
# ie UK (44), FR (33)
#
# Where the VLR Velocity Visiting Country code prefixes
# the VLR Velocity Country Codes.
#
# Example :
#             UK --> AF&SV
# CountryCodes = [
#                     { min_allowed_time="0030", visiting_and_country_code="9344" }
# ie AFUK
#                     { min_allowed_time="0120", visiting_and_country_code="50344" }
# ie SVUK
#                     { min_allowed_time="0030", visiting_and_country_code="9333" }
# ie AFFR
#                     { min_allowed_time="0120", visiting_and_country_code="50333" }
# ie SVFR
#                     ]
#
CountryCodes = [
    { min_allowed_time="0030", visiting_and_country_code="9344" }
    { min_allowed_time="0120", visiting_and_country_code="50344" }

    { min_allowed_time="0030", visiting_and_country_code="9333" }
    { min_allowed_time="0120", visiting_and_country_code="50333" }
]
#
# OPTIONAL

```

```

# VLR Validation Prefix Codes
# Validates the initial message prefix
# e.g ActivateSS, DeactivateSS etc Global Title
# calling party number prefix.
#
# Example :
# ValidationPrefixCodes = [ { validation_prefix_code="441273" }
#                           { validation_prefix_code="2711473" }
#                           ]
#
# ValidationPrefixCodes = [ { validation_prefix_code="441273" }
#                           { validation_prefix_code="2711473" }
#                           ]

# OPTIONAL
# VLR Validation Reject Fail Codes
# If the VLR validation fails and the gt cgpn prefix
# is found within this prefix list, and having failed
# the VLR Validation check the resultant message sent
# will be a TCAP abort
#
# Example :
# RejectFailCodes = [ { reject_fail_code="441273" }
#                      { reject_fail_code="2711473" }
#                      ]
#
# RejectFailCodes = [ { reject_fail_code="441273" }
#                      { reject_fail_code="2711473" }
#                      ]

# OPTIONAL
# VLR Validation Discard Fail Codes
# If the VLR validation fails and the gt cgpn prefix
# is found within this prefix list, and having failed
# the VLR Validation check and the "Reject fail prefix" check
# the mfw program will generate a system error message.
#
# Note if the "Reject Fail prefix" check and the
# "Discard fail prefix" return no results then the
# message will be Accepted silently but not relayed
# back to the STP.
#
# Example :
# DiscardFailCodes = [ { discard_fail_code="441273" }
#                      { discard_fail_code="2711473" }
#                      ]
#
# DiscardFailCodes = [ { discard_fail_code="441273" }
#                      { discard_fail_code="2711473" }
#                      ]

# OPTIONAL
# rims_if
# The Rims interface handle
# rims_if = "rimsIf"

# OPTIONAL
# vmsc_if
# The VMSC interface handle
# vmsc_if = "vmscIf"

# OPTIONAL
# Specify the Point-Code standard used in configuration (ITU-TS or ANSI).

```

```
# The default will be ITU-TS if not defined.
# ITU-TS point codes will be encoded as a 14-bit structure consisting of
# a 3-bit zone identification, and 8-bit area/network identification and
# a 3-bit signaling point identification. ANSI point codes will be encoded
# in a 24-bit structure consisting of an 8-bit network identification, an
# 8-bit cluster identification and an 8-bit member identification.
# Allowed values: "ITU-TS", "ANSI"
#
# Example:
# pc_format = "ITU-TS"

# MANDATORY Not currently used.
# Maps the SCCP calling party number in the original MAP message (if present)
# to an IMSI value that will be present in any MAP responses sent by the MFW.
#
# prefix (MANDATORY)
# The rule containing the longest prefix match will be fired. Prefix matching
is
# performed on the SCCP calling party number in the original MAP message (if
present).
# A default prefix of "*" will match any SCCP CgPN and will also match a
message
# which does not have an SCCP CgPN defined. Only one default prefix can be
defined.
# Example:
# prefix = "44"
#
# imsi (MANDATORY)
# The imsi value to use in any generated MAP responses.
# Example:
# imsi = "441473123456"
#map_response_imsi = [ { prefix="44", imsi="441473123456" }
#                      { prefix="*", imsi="441473000000" }
#                    ]
#
# OPTIONAL
# Maps the abort code number returned by the Map Trigger Node to a
# alarm message and severity.
#
# code (OPTIONAL)
# The alarm code to match. If the code is not defined the rule will match any
alarm if
# a match is not found in other rules.
# Example:
# code = 10
#
# message (MANDATORY)
# The message to print in the alarm
# Example:
# message = "An Error Occurred"
#
# severity (MANDATORY)
# The severity of the Alarm. Allowed values (in order of increasing severity)
are:
# "NOTICE", "WARNING", "ERROR", "CRITICAL"
#
# abort_code_mapping = [ { code = 10, message = "A Critical Error Occurred",
severity = "CRITICAL" }
#                      { code = 11, message = "An error occurred", severity
= "ERROR" }
#                      { message = "A minor error occurred", severity =
"WARNING" }
#                    ]
```

```

# OPTIONAL
# Set the default MAP version (1, 2 or 3). This is only relevant
# if messages are received without an application context.
map_version = 1

}

```

## Parameters

mfw accepts the following parameters:

### abort\_code\_mapping

**Syntax:** `abort_code_mapping = [ { code = "alarm_code", message = "alarm_message", severity = "severity_level" } ]`

**Description:** List of abort code number mappings (returned by the Map Trigger Node) to alarm messages and severity levels.

**Type:** Parameter array.

**Optionality:** Optional.

**Allowed:**

**Default:**

**Notes:**

- `code` - The alarm code to match. If the code is not defined, then the rule will match any alarm. A range of values can also be specified.
- `message` (mandatory) - The message to print in the alarm.
- `severity` (mandatory) - The severity of the alarm. Valid values are: NOTICE, WARNING, ERROR, and CRITICAL.

**Example:**

```
abort_code_mapping = [
{ code = "0-10", message = "A critical error occurred",
severity = "CRITICAL" }
]
```

### VisitingCCodes

**Syntax:** `VisitingCCodes = The number of the visiting country code.`

**Description:** When processing a MAP message that requires Velocity checking, the prefix of the MSISDN must match with one of the VisitingCCodes prefix entries. For example, if the MSISDN has the number 5031273289900, in order to pass the VisitingCCode prefix check, 503 will need to be matched against the VisitingCCode prefixes.

**Type:** numeric.

**Optionality:** Optional.

**Allowed:** `code = numeric`

**Default:** `code = "93" (AF), "503" (SV)`

**Notes:** VisitingCCodes is used in conjunction with CountryCodes prefix

**Example:**

```
VisitingCCodes = [ {code="93" }
{code="503" }
]
```

## Chapter 3

### CountryCodes

<b>Syntax:</b>	CountryCodes = A number of visitingCCode prefixes plus country code prefixes combined together and the minimum time allowed to move between countries (in minutes, a maximum of 4 digits must include leading zeros).
<b>Description:</b>	When processing a RIMS query result message as part of velocity checking, the VMSC and the VMSC digits will have the Velocity VisitingCCode prefix prepended. The resultant number must then match with the country code prefix list in order to continue. For example, if the original MSISDN has the number 5031273289900, in order to pass the VisitingCCode prefix check, the first three digits (503) in the number will be matched against the VisitingCCode prefixes. In order to pass the Country Code prefix test, the VMSC number returned from the RIMS query (441273289900) will have 503 pre-pended (50344127328900) and then be matched with Country code prefix (50344).
<b>Type:</b>	numeric.
<b>Optionality:</b>	Optional.
<b>Allowed:</b>	
<b>Default:</b>	time is "0030", "0120" and visiting country code is "9344" AFUK "50344" SVUK
<b>Notes:</b>	The VLR Velocity prefixes act as a parent list followed by a child list that is associated with the parent list. The association of the parent with the child is obtained by pre-pending the parent prefix to the child prefix. For example, if 503 is the parent prefix and 44 is the child prefix, then the County Code prefix must equal 50344.
<b>Example:</b>	CountryCodes = [ { min_allowed_time="0030", visiting_and_country_code="50344" } ]

### RejectFailCodes

<b>Syntax:</b>	ValidationPrefixCodes = A number of area prefix codes
<b>Description:</b>	If the VLR validation fails and the gt cgpn prefix is found within this prefix list, the resultant message sent back will be a TCAP abort.
<b>Type:</b>	numeric.
<b>Optionality:</b>	Optional.
<b>Allowed:</b>	
<b>Default:</b>	441273, 2711473
<b>Notes:</b>	
<b>Example:</b>	RejectFailCodes = [ { reject_fail_code="441273" } { reject_fail_code="2711473" } ]

### DiscardFailCodes

<b>Syntax:</b>	ValidationPrefixCodes = A number of area prefix codes
<b>Description:</b>	If the VLR validation fails, the gt cgpn prefix is compared with the RejectFailCodes prefix list. If not found, it is then compared with the DiscardFailCodes prefix list. If found, a system error message (alarm) is generated.
<b>Type:</b>	numeric.
<b>Optionality:</b>	Optional.
<b>Allowed:</b>	
<b>Default:</b>	441255,2711455

**Notes:** If the "Reject Fail codes" prefix check and the "Discard fail codes" prefix check fail, the message is accepted but not relayed back to the STP.

**Example:**

```
DiscardFailCodes = [ { discard_fail_code="441255" }
                     { discard_fail_code="2711455" }
                 ]
```

### map\_version

**Syntax:** map\_version = *map\_version\_number*

**Description:** Sets the MAP version to be used if a message is received with no application context.

**Type:** Integer

**Optionality:** Optional (default used if not set).

**Allowed:** 1, 2, or 3

**Default:** 1

**Notes:**

**Example:** map\_version = 1

### pc\_format

**Syntax:** pc\_format = "Point\_Code\_standard"

**Description:** The point code standard used in the configuration

**Type:** String

**Optionality:** Optional (default used if not set).

**Allowed:** ITU-TS or ANSI

**Default:** ITU-TS

**Notes:** ITU-TS point codes are encoded as a 14-bit structure consisting of a:

- 3-bit zone identification, and 8-bit area/network identification
- 3-bit signaling point identification.

ANSI point codes are encoded in a 24-bit structure consisting of an:

- 8-bit network identification
- 8-bit cluster identification, and
- 8-bit member identification.

**Example:** pc\_format = "ITU-TS"

### ValidationPrefixCodes

**Syntax:** ValidationPrefixCodes = A number of area prefix codes

**Description:** When processing VLR validation messages (for example, ActivateSS), the MSISDN digits must match the prefix within the ValidationPrefixCodes prefix list in order for VLR Validation to continue.

**Type:** numeric.

**Optionality:** Optional.

**Allowed:**

**Default:** 441273, 2711473

**Notes:**

**Example:**

```
ValidationPrefixCodes = [ { validation_prefix_code="441273" }
                           { validation_prefix_code="2711473" }
                       ]
```

]

size

**Syntax:** size = [number of MSISDN requests to cache]  
**Description:** Maximum number of MSISDN requests to cache at any one time  
**Type:** numeric.  
**Optionality:** Optional.  
**Allowed:**  
**Default:** 1000000  
**Notes:**  
**Example:** size = 1000000

ttl

**Syntax:** ttl = [number of seconds that MSISDN remains in the cache]  
**Description:** Number of seconds that an MSISDN remains in the cache.  
**Type:** numeric.  
**Optionality:** Optional.  
**Allowed:**  
**Default:** 3600  
**Notes:**  
**Example:** ttl = 3600

rims\_if

**Syntax:** rims\_if = [Name of the messaging manager navigator interface]  
**Description:** Name of the configured Messaging Manager Navigator interface.  
**Type:** string.  
**Optionality:** Optional.  
**Allowed:**  
**Default:** rimsIf  
**Notes:** This must match the interface name in /IN/service\_packages/SLEE/etc/SLEE.cfg.  
**Example:** rims\_if = "rimsIf"

vmsc\_if

**Syntax:** vmsc\_if = [Name of the sua\_if interface]  
**Description:** Name of the configured sua\_if interface to talk to the VMSC.  
**Type:** string.  
**Optionality:** Optional.  
**Allowed:**  
**Default:** vmscIf  
**Notes:** This must match the interface name in /IN/service\_packages/SLEE/etc/SLEE.cfg.  
**Example:** vmsc\_if = "vmscIf"

## **Failure**

If mfw fails, alarms are raised to syslog.

## **Output**

mfw writes error messages to the system messages file and writes additional output to **/IN/service\_packages/MFW/tmp/mfw.log**.



# Chapter 4

# Tools and Utilities

## Overview

### Introduction

This chapter explains the tools and utilities that are available.

### In this chapter

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This chapter contains the following topics.

Statistics .....	17
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## Statistics

### Introduction

Messaging Firewall collects statistics using the standard SMS statistic mechanism and stores them to the SMF database. For more information about how the statistics are collected, see *SMS Technical Guide*.

### VLR Steering Statistics

The following table describes the statistics that VLR Steering uses.

Statistic	Description
MFW_MAP2_UPDATE_LOCATION_TOTAL	Total UPDATE_LOCATION Map2 TOTAL messages. TOTAL equals the total number of updateLocation messages received.
MFW_MAP2_UPDATE_LOCATION_ALLOW	Total UPDATE_LOCATION Map2 ALLOW messages. ALLOW equals the total number of updateLocation messages successfully processed.
MFW_MAP2_UPDATE_LOCATION_REJECT	Total UPDATE_LOCATION Map2 REJECT messages. REJECT equals the total number of updateLocation messages steered away from the platform, sent a TCAP reject.
MFW_MAP2_UPDATE_LOCATION_DISCARD	Total UPDATE_LOCATION Map2 DISCARD messages. DISCARD equals the total number of updateLocation messages that failed the Visiting Country code / Country code prefix checks or there is a match but updateLocation has been sent within a time period shorter than the minimum time allowed.

## VLR Validation Statistics

The following table describes the statistics that VLR Validation uses.

Statistic	Description
MFW_MAP2_REGISTER_SS_TOTAL	Total REGISTER_SS Map2 TOTAL messages
MFW_MAP2_REGISTER_SS_ALLOW	Total REGISTER_SS Map2 ALLOW messages
MFW_MAP2_REGISTER_SS_ACCEPT	Total REGISTER_SS Map2 ACCEPT messages
MFW_MAP2_REGISTER_SS_REJECT	Total REGISTER_SS Map2 REJECT messages
MFW_MAP2_REGISTER_SS_DISCARD	Total REGISTER_SS Map2 DISCARD messages
MFW_MAP2_ERASE_SS_TOTAL	Total ERASE_SS Map2 TOTAL messages
MFW_MAP2_ERASE_SS_ALLOW	Total ERASE_SS Map2 ALLOW messages
MFW_MAP2_ERASE_SS_ACCEPT	Total ERASE_SS Map2 ACCEPT messages
MFW_MAP2_ERASE_SS_REJECT	Total ERASE_SS Map2 REJECT messages
MFW_MAP2_ERASE_SS_DISCARD	Total ERASE_SS Map2 DISCARD messages
MFW_MAP2_ACTIVATE_SS_TOTAL	Total ACTIVATE_SS Map2 TOTAL messages
MFW_MAP2_ACTIVATE_SS_ALLOW	Total ACTIVATE_SS Map2 ALLOW messages
MFW_MAP2_ACTIVATE_SS_ACCEPT	Total ACTIVATE_SS Map2 ACCEPT messages
MFW_MAP2_ACTIVATE_SS_REJECT	Total ACTIVATE_SS Map2 REJECT messages
MFW_MAP2_ACTIVATE_SS_DISCARD	Total ACTIVATE_SS Map2 DISCARD messages
MFW_MAP2_DEACTIVATE_SS_TOTAL	Total DEACTIVATE_SS Map2 TOTAL messages
MFW_MAP2_DEACTIVATE_SS_ALLOW	Total DEACTIVATE_SS Map2 ALLOW messages
MFW_MAP2_DEACTIVATE_SS_ACCEPT	Total DEACTIVATE_SS Map2 ACCEPT messages
MFW_MAP2_DEACTIVATE_SS_REJECT	Total DEACTIVATE_SS Map2 REJECT messages
MFW_MAP2_DEACTIVATE_SS_DISCARD	Total DEACTIVATE_SS Map2 DISCARD messages
MFW_MAP2_INTERROGATE_SS_TOTAL	Total INTERROGATE_SS Map2 TOTAL messages
MFW_MAP2_INTERROGATE_SS_ALLOW	Total INTERROGATE_SS Map2 ALLOW messages
MFW_MAP2_INTERROGATE_SS_ACCEPT	Total INTERROGATE_SS Map2 ACCEPT messages
MFW_MAP2_INTERROGATE_SS_REJECT	Total INTERROGATE_SS Map2 REJECT messages
MFW_MAP2_INTERROGATE_SS_DISCARD	Total INTERROGATE_SS Map2 DISCARD messages
MFW_MAP2_REGISTER_PASSWORD_TOTAL	Total REGISTER_PASSWORD Map2 TOTAL messages
MFW_MAP2_REGISTER_PASSWORD_ALLOW	Total REGISTER_PASSWORD Map2 ALLOW messages
MFW_MAP2_REGISTER_PASSWORD_ACCEPT	Total REGISTER_PASSWORD Map2 ACCEPT messages
MFW_MAP2_REGISTER_PASSWORD_REJECT	Total REGISTER_PASSWORD Map2 REJECT messages
MFW_MAP2_REGISTER_PASSWORD_DISCARD	Total REGISTER_PASSWORD Map2 DISCARD messages
MFW_MAP2_PURGE_MS_TOTAL	Total PURGE_MS Map2 TOTAL messages
MFW_MAP2_PURGE_MS_ALLOW	Total PURGE_MS Map2 ALLOW messages
MFW_MAP2_PURGE_MS_ACCEPT	Total PURGE_MS Map2 ACCEPT messages
MFW_MAP2_PURGE_MS_REJECT	Total PURGE_MS Map2 REJECT messages
MFW_MAP2_PURGE_MS_DISCARD	Total PURGE_MS Map2 DISCARD messages

Statistic	Description
MFW_MAP1_BEG_SUB_ACTIVTY_TOTAL	Total BEG_SUB_ACTIVTY Map1 TOTAL messages
MFW_MAP1_BEG_SUB_ACTIVTY_ALLOW	Total BEG_SUB_ACTIVTY Map1 ALLOW messages
MFW_MAP1_BEG_SUB_ACTIVTY_ACCEPT	Total BEG_SUB_ACTIVTY Map1 ACCEPT messages
MFW_MAP1_BEG_SUB_ACTIVTY_REJECT	Total BEG_SUB_ACTIVTY Map1 REJECT messages
MFW_MAP1_BEG_SUB_ACTIVTY_DISCARD	Total BEG_SUB_ACTIVTY Map1 DISCARD messages
MFW_MAP1_PROCESS_USS_DATA_TOTAL	Total PROCESS_USS_DATA Map1 TOTAL messages
MFW_MAP1_PROCESS_USS_DATA_ALLOW	Total PROCESS_USS_DATA Map1 ALLOW messages
MFW_MAP1_PROCESS_USS_DATA_ACCEPT	Total PROCESS_USS_DATA Map1 ACCEPT messages
MFW_MAP1_PROCESS_USS_DATA_REJECT	Total PROCESS_USS_DATA Map1 REJECT messages
MFW_MAP1_PROCESS_USS_DATA_DISCARD	Total PROCESS_USS_DATA Map1 DISCARD messages
MFW_MAP2_RESTORE_DATA_TOTAL	Total RESTORE_DATA Map2 TOTAL messages
MFW_MAP2_RESTORE_DATA_ALLOW	Total RESTORE_DATA Map2 ALLOW messages
MFW_MAP2_RESTORE_DATA_ACCEPT	Total RESTORE_DATA Map2 ACCEPT messages
MFW_MAP2_RESTORE_DATA_REJECT	Total RESTORE_DATA Map2 REJECT messages
MFW_MAP2_RESTORE_DATA_DISCARD	Total RESTORE_DATA Map2 DISCARD messages
MFW_MAP1_SM_TOTAL	Total MAP1 Map 1 TOTAL messages
MFW_MAP1_SM_ALLOW	Total MAP1 Map 1 ALLOW messages
MFW_MAP1_SM_ACCEPT	Total SM Map 1 ACCEPT messages
MFW_MAP1_SM_REJECT	Total SM Map 1 REJECT messages
MFW_MAP1_SM_DISCARD	Total SM Map 1 DISCARD messages
MFW_MAP2_SM_MO_TOTAL	Total SM_MO Map 2 TOTAL messages
MFW_MAP2_SM_MO_ALLOW	Total SM_MO Map 2 ALLOW messages
MFW_MAP2_SM_MO_ACCEPT	Total SM_MO Map 2 ACCEPT messages
MFW_MAP2_SM_MO_REJECT	Total SM_MO Map 2 REJECT messages
MFW_MAP2_SM_MO_DISCARD	Total SM_MO Map 2 DISCARD messages
MFW_MAP2_SM_MT_TOTAL	Total SM_MT Map 2 TOTAL messages
MFW_MAP2_SM_MT_ALLOW	Total SM_MT Map 2 ALLOW messages
MFW_MAP2_SM_MT_ACCEPT	Total SM_MT Map 2 ACCEPT messages
MFW_MAP2_SM_MT_REJECT	Total SM_MT Map 2 REJECT messages
MFW_MAP2_SM_MT_DISCARD	Total SM_MT Map 2 DISCARD messages
MFW_MAP3_SM_MT_TOTAL	Total SM_MT Map 3 TOTAL messages
MFW_MAP3_SM_MT_ALLOW	Total SM_MT Map 3 ALLOW messages
MFW_MAP3_SM_MT_ACCEPT	Total SM_MT Map 3 ACCEPT messages
MFW_MAP3_SM_MT_REJECT	Total SM_MT Map 3 REJECT messages
MFW_MAP3_SM_MT_DISCARD	Total SM_MT Map 3 DISCARD messages
MFW_MAP_SRI_TOTAL	Total SRI TOTAL messages

Statistic	Description
MFW_MAP_SRI_ALLOW	Total SRI ALLOW messages
MFW_MAP_SRI_ACCEPT	Total SRI ACCEPT messages
MFW_MAP_SRI_REJECT	Total SRI REJECT messages
MFW_MAP_SRI_DISCARD	Total SRI DISCARD messages
MFW_MAP_SRI_SM_TOTAL	Total SRI SM TOTAL messages
MFW_MAP_SRI_SM_ALLOW	Total SRI SM ALLOW messages
MFW_MAP_SRI_SM_ACCEPT	Total SRI SM ACCEPT messages
MFW_MAP_SRI_SM_REJECT	Total SRI SM REJECT messages
MFW_MAP_SRI_SM_DISCARD	Total SRI SM DISCARD messages

where:

- TOTAL is the total number of messages received.
- ALLOW is the total number of successful messages.
- ACCEPT is the total number of messages that have been silently accepted after failing VLR validation.
- REJECT is the total number of messages that have been rejected after failing VLR validation.
- DISCARD is the total number of messages that have been discarded after failing VLR validation.