

**Oracle® Communications  
Diameter Signaling Router**

IDIH Alarm Forwarding Administrator's Guide

**E63646 Revision 02**

March 2017

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

# Table of Contents

<b>Chapter 1: Introduction.....</b>	<b>7</b>
Revision History.....	8
Overview.....	8
Scope and Audience.....	8
Manual Organization.....	8
Documentation Admonishments.....	8
Related Specifications.....	9
Locate Product Documentation on the Oracle Help Center Site.....	9
Customer Training.....	10
My Oracle Support (MOS).....	10
Emergency Response.....	10
 <b>Chapter 2: Introduction to Alarm Forwarding.....</b>	 <b>12</b>
Overview.....	13
Setting User Preferences on IDIH Dashboard.....	13
Alarm Forwarding Key Features.....	14
Alarm Forwarding Architecture.....	14
 <b>Chapter 3: Working in Alarm Forwarding.....</b>	 <b>16</b>
Accessing Alarm Forwarding.....	17
Alarm Forwarding Toolbar.....	17
Alarm Status Indicator.....	17
Using Alarm Forwarding.....	19
Creating a Filter.....	19
Editing a Filter.....	20
Alarm Forwarding Test Connection.....	21
Test Connection for SMTP.....	21
Test Connection for SNMP.....	22
 <b>Chapter 4: SNMP Agent.....</b>	 <b>23</b>
SNMP Overview.....	24
Alarm Forwarding MIB.....	24

<b>Glossary.....</b>	<b>35</b>
----------------------	-----------

# List of Figures

Figure 1: Alarm Forwarding Toolbar.....17

Figure 2: Alarm Status Indicator.....18

Figure 3: Alarm List.....19

Figure 4: Filter Creation Dialog.....20

Figure 5: Connection Test Dialog.....21

# List of Tables

Table 1: Admonishments.....9

Table 2: Alarm Forwarding Toolbar Icons.....17

# Chapter 1

## Introduction

---

### Topics:

- [\*Revision History.....8\*](#)
- [\*Overview.....8\*](#)
- [\*Scope and Audience.....8\*](#)
- [\*Manual Organization.....8\*](#)
- [\*Documentation Admonishments.....8\*](#)
- [\*Related Specifications.....9\*](#)
- [\*Locate Product Documentation on the Oracle Help Center Site.....9\*](#)
- [\*Customer Training.....10\*](#)
- [\*My Oracle Support \(MOS\).....10\*](#)
- [\*Emergency Response.....10\*](#)

This section contains an overview of the available information for the Integrated Diameter Intelligence Hub.

The contents include sections on the organization, scope, and audience of the documentation, as well how to receive customer support assistance.

## Revision History

Date	Description
August 2011	Initial Release
June 2016	Updated to include accessibility changes

## Overview

This documentation provides information about the functions of the Alarm Forwarding application of the Integrated Diameter Intelligence Hub (IDIH).

**Note:** The Alarm Forwarding application is only available to users logging into IDIH as **idihadmin**.

## Scope and Audience

This user's guide provides information about the Alarm Forwarding application. This guide provides definitions and instructions to help the user efficiently and effectively define conditions and destinations for forwarding Alarms.

## Manual Organization

[Introduction](#) contains general information about this document, how to contact [My Oracle Support \(MOS\)](#), and [Locate Product Documentation on the Oracle Help Center Site](#).

[Introduction to Alarm Forwarding](#) provides an introduction to the Alarm Forwarding application.

[Working in Alarm Forwarding](#) contains information about procedures used while using the Alarm Forwarding application.





[SNMP Agent](#) contains information about the SNMP Agent of the Alarm Forwarding application.

## Documentation Admonishments

Admonishments are icons and text throughout this manual that alert the reader to assure personal safety, to minimize possible service interruptions, and to warn of the potential for equipment damage.



Table 1: Admonishments

Icon	Description
 DANGER	Danger: (This icon and text indicate the possibility of <i>personal injury</i> .)
 WARNING	Warning: (This icon and text indicate the possibility of <i>equipment damage</i> .)
 CAUTION	Caution: (This icon and text indicate the possibility of <i>service interruption</i> .)
 TOPPLE	Topple: (This icon and text indicate the possibility of <i>personal injury and equipment damage</i> .)

## Related Specifications

For information about additional publications related to this document, refer to the Oracle Help Center site. See [Locate Product Documentation on the Oracle Help Center Site](#) for more information on related product publications.

## Locate Product Documentation on the Oracle Help Center Site

Oracle Communications customer documentation is available on the web at the Oracle Help Center (OHC) site, <http://docs.oracle.com>. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at <http://www.adobe.com>.

1. Access the Oracle Help Center site at <http://docs.oracle.com>.
2. Click **Industries**.
3. Under the Oracle Communications subheading, click the **Oracle Communications documentation** link.  
The Communications Documentation page appears. Most products covered by these documentation sets will appear under the headings "Network Session Delivery and Control Infrastructure" or "Platforms."
4. Click on your Product and then the Release Number.  
A list of the entire documentation set for the selected product and release appears.

5. To download a file to your location, right-click the **PDF** link, select **Save target as** (or similar command based on your browser), and save to a local folder.

## Customer Training

Oracle University offers training for service providers and enterprises. Visit our web site to view, and register for, Oracle Communications training:

<http://education.oracle.com/communication>

To obtain contact phone numbers for countries or regions, visit the Oracle University Education web site:

[www.oracle.com/education/contacts](http://www.oracle.com/education/contacts)

## 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 will be 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, 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 that the critical situation is resolved as rapidly as possible.

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

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

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

# Chapter 2

## Introduction to Alarm Forwarding

---

### Topics:

- [Overview.....13](#)
- [Alarm Forwarding Key Features.....14](#)
- [Alarm Forwarding Architecture.....14](#)

This chapter provides basic information about the Alarm Forwarding application.

## Overview

Alarm Forwarding enables the user to forward alarms to specified destinations. The user can create alarm forwarding rules using Filters.

This application handles several types of alarms, including those pertaining to

- Traffic supervision
- Quality of service
- System errors

## Setting User Preferences on IDIH Dashboard

Once inside IDIH, a user can set User Preferences. These include:

- Time specifications (such as date format, time zone)
- Enumeration values (numerals vs. text)
- Default alarm colors

### Setting Time Format

Follow these steps to set the time format:

1. Click **User Preferences** on the Application board.  
The User Preferences screen is displayed.
2. Click the **Date/Time** tab.  
The Date/Time screen is displayed. The red asterisk denotes a required field.  
**Note:** Use the tips on the screen to help configure the time format.
3. Enter the format for these time-related displays.
  - **Date format**
  - **Time format**
  - **Date and time fields**
4. Select the formats for these time-related displays by using the drop-down arrow.
  - **Duration fields** - how the hours, minutes, seconds, and milliseconds of the Time format is displayed
  - **Time zone**  
**Note:** The local time zone must be chosen to get local time.
5. To reset the time-related displays to default settings, click **Reset**.
6. Click **Apply** to save settings.

### Setting Mapping Preferences

The user can set the Mapping settings using the User Preferences feature.

Follow these steps to set Mapping preferences.

1. Click **User Preferences** in the Application board.  
The User Preferences screen is displayed.
2. Click the **Mapping** tab.  
The Mapping screen is displayed.
3. Check **Translate ENUM values** to display text instead of numerals.  
Enumeration is used by TDRs to display text values instead of numeric. Rather than showing the numeral for Alarm Severity, the user interface will show the actual word, such as Major or Critical.
4. Check **IP Address to Node Name** to translate an IP Address to a textual Node Name.
5. To reset the Mapping values to the default, click **Reset**.
6. Click **Apply** to save the changes.

## Alarm Forwarding Key Features

The key features of Alarm Forwarding include

- A Simple Network Management Protocol (SNMP) agent compliant with ITU x721, X733
- Acknowledge / Terminate capability from SNMP
- For an alarm event, only one email is sent to a selective list of email addresses. Alarm Forwarding allows a list of email addresses to be attached to a filter. It is possible to send a particular type of alarm to a list of email addresses and another type of alarm to a different list of email addresses. These multiple email address are set when Creating a Filter and Editing a Filter.

Each alarm is evaluated against each filter. The same alarm can pass different filter conditions and be sent to different destinations. If the same alarm passes different filters and is forwarded using SNMP in each of those filters, the alarm is sent only once since Alarm Forwarding detects this condition and SNMP has only one destination.

Refer to [Alarm Forwarding MIB](#) for additional information.

## Alarm Forwarding Architecture

Alarm Forwarding supports the forwarding of alarms to applications in an external system. It supports two protocols for alarm forwarding:

- Traps (SNMP)
- Mails (SMTP)

Alarm Forwarding supports the use of Filters. You can create, edit, and delete a Filter and a forwarding destination. A Filter List provides information for a Filter:

- Rec No - record number; a number given for indexing alarms in the Filter alarm list
- Rule - unique system-generated number that identifies the Filter
- Filter Name - name of the Filter
- Description - description of the Filter

- Destination Name - destination of the filtered alarm. It can be SNMP or SMTP or both.

You can set the forwarding criteria based on the Filters defined for fields such as:

- Ack State
- Alarm Cleared User
- Alarm ID
- Alarm Type
- Managed Object Class
- Managed Object ID
- Perceived Severity ID
- Probable Cause
- Specific Problem
- User Name

With Alarm Forwarding, parameters can be configured such as:

- Mail server name
- Return address, the "From" address in the mail
- SNMP agent (trap sender)
- Rules for alarm forwarding

**Note:** Destination configuration is part of platform configuration. These steps (SMTP server, SNMP version, and target IP) are described in *IDIH Installation Document*.

# Chapter 3

## Working in Alarm Forwarding

---

### Topics:

- *Accessing Alarm Forwarding.....17*
- *Alarm Forwarding Toolbar.....17*
- *Alarm Status Indicator.....17*
- *Using Alarm Forwarding.....19*
- *Alarm Forwarding Test Connection.....21*

This chapter provides information about procedures used when working in the Alarm Forwarding application.



## Accessing Alarm Forwarding

To open Alarm Forwarding, follow these steps:

1. Log in to IDIH .  
The IDIH Application board is displayed.
2. Click **Alarm Forwarding**.  
The Alarm Forwarding home page is displayed.

## Alarm Forwarding Toolbar



Figure 1: Alarm Forwarding Toolbar

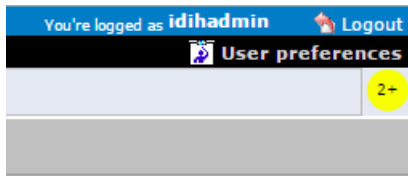
Table 2: Alarm Forwarding Toolbar Icons

Button	Explanation
Select Columns	Allows the user to select which columns are displayed
Navigation Arrows	Moves back and forth among the records.
Filters	Number of records to display on a page
Set Size	Sets the number of records to display per page
Refresh	Resets display to include the most current data
Add Filter	Adds a Filter, defining the types of alarms to be forwarded and their destination
Modify Filter	Edits an existing filter's definition
Delete Filter	Deletes a selected filter
Test Connection	Sends a test message to the destination SNMP and/or SMTP

## Alarm Status Indicator

When logged in to IDIH, either directly or from DSR launch, the portal header displays a count of current alarms, as shown in [Figure 2: Alarm Status Indicator](#). The alarm status indicator is a count of the highest severity of all open alarms and the alarm status indicator (circle) is the color (user defined, idihadmin) of the highest severity. For example, if there are zero critical, two major, one minor, and three warnings, then the alarm status indicator contains 2+ and the color is the user-defined color for major severity. The + is used to indicate that there are additional alarms at a lesser severity. The + does not appear if, for example, there are zero critical, two major, zero minor, and zero warnings.

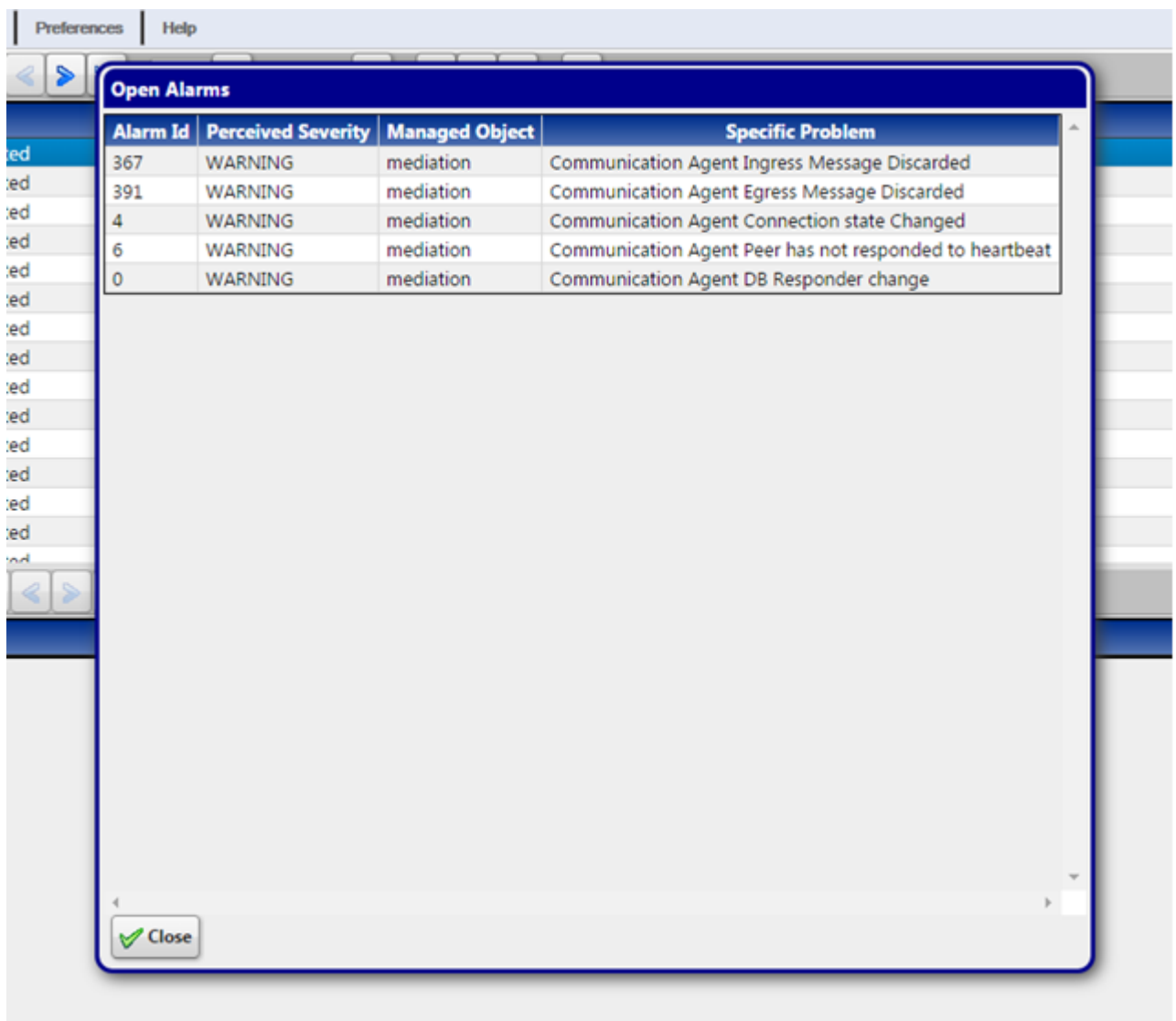
Initially, the alarm status is empty (non-visible). Then, after a short interval, the system queries for open alarms and updates the alarm status indicator. After the first update, the system updates the alarm status indicator every 30 seconds.



**Figure 2: Alarm Status Indicator**

Selecting the alarm status indicator shows a brief description of the open alarms. The system displays the list of open alarms in tabular form, as shown in [Figure 3: Alarm List](#). This list can be dismissed by pressing the **Close** on the **Open Alarm** dialog window.

**Note:** Only open alarms may be viewed. No other actions are provided such as clear or acknowledge.



Alarm Id	Perceived Severity	Managed Object	Specific Problem
367	WARNING	mediation	Communication Agent Ingress Message Discarded
391	WARNING	mediation	Communication Agent Egress Message Discarded
4	WARNING	mediation	Communication Agent Connection state Changed
6	WARNING	mediation	Communication Agent Peer has not responded to heartbeat
0	WARNING	mediation	Communication Agent DB Responder change

Figure 3: Alarm List

## Using Alarm Forwarding

This section explains how to set conditions and destinations for forwarding alarms.

### Creating a Filter

Filters define the types of alarms to be forwarded and their destination. Filters return True or False results depending upon whether the alarm should be forwarded or not. Each Filter that returns True is forwarded to its specified destination.

**Filter Creation Dialog**

General

Active

Filter Name:  Description:

Filter Configuration

Field	Operator	Value

Add Delete

Operator: ☒ AND ☐ OR ☐ Use parentheses

Expression:

**Figure 4: Filter Creation Dialog**

To create a Filter,

1. Click the **Add Filter** icon on the toolbar.  
The Create New Filter dialog is displayed.
2. Type in a **Filter Name** and **Description**.
3. Select Filter and click the **Add** icon.
4. Select a Field, Operator, and Value from the drop-down menus.
5. Enter an Expression.
6. Select **Next** to advance to the Destination display.
7. Select SNMP and/or SMTP.
8. Enter Email list (addresses) information.  
**Note:** Email list is only used when SMTP is selected.
9. To advance to the Filter Creation Dialog Summary display, select **Next**.
10. If this information on the Summary display is correct, select finish create this filter. If there are errors in this summary information, select the previous to return to the display to correct the errors.
11. To add another filter, repeat from [Step 1](#).

## Editing a Filter

To edit an existing Filter:

1. Select a Filter from the Filter table.
2. Click the **Modify Filter** icon on the toolbar.  
The Filter Creation Dialog is displayed.
3. Modify the appropriate field(s) as needed.  
For specific information on fields and options, see [Creating a Filter](#).
4. Click **Next**.  
The Select Forwarding Destination dialog is displayed.
5. Update Destination information as necessary.  
**Note:** For SNMP, only one trap destination can be defined. For SMTP, multiple email destinations are permitted.
6. Click **Finish** to save the record changes.

## Alarm Forwarding Test Connection

The user can send a test message to the destination SNMP and/or SMTP using the **Connection Test Dialog** screen after clicking **Test Connection**.

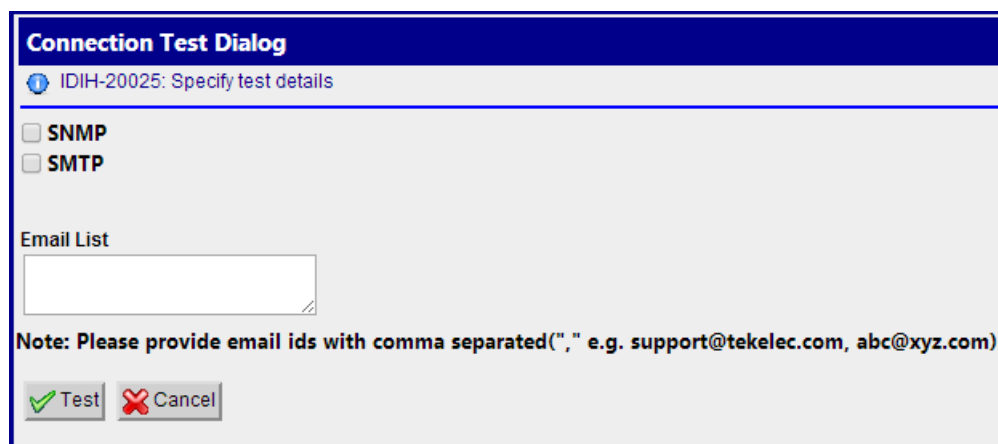


Figure 5: Connection Test Dialog

### Test Connection for SMTP

The configuring user should verify the SMTP address, SMTP availability thru firewalls, and SMTP access mode. Secured destinations require additional parameters be defined and are described in the Installation Document.

1. If the message was received in the targeted mail box, the test was successful. This procedure is complete.  
If the message is not in the targeted mail box, continue with this procedure.
2. Use the **Audit Viewer** application to verify if a mail sending error is logged.

3. Contact the [My Oracle Support \(MOS\)](#) to investigate and help determine the correct SMTP configuration.

## Test Connection for SNMP

The configuring user should verify the SNMP address and the SNMP availability thru firewalls. Secured destinations require additional parameters be defined and are described in the *IDIH Installation Document*.

1. Verify the test trap was received by the management system. If the test trap was received by the management system, the test was successful. This procedure is complete.

If the test trap was not received by the management system, continue with this procedure.

2. Contact the [My Oracle Support \(MOS\)](#) to investigate and help determine the correct SNMP configuration.

# Chapter 4

## SNMP Agent

---

### Topics:

- [SNMP Overview.....24](#)
- [Alarm Forwarding MIB.....24](#)

This chapter provides information about how the SNMP Agent functions in the Alarm Forwarding application.

## SNMP Overview

The main features of the Simple Network Management Protocol (SNMP) agent of Alarm Forwarding are:

### Overview

- The Management Information Base (MIB) contains Managed Object types, Managed Objects, and opened alarms in specific tables.
- The MIB is loaded at SNMP agent startup with metadata and opened alarms already forwarded.

### Validation of Traps Sent

- Traps contain a sequence number (since agent startup) that permits Telecommunications Management Network (TMN) to check that none were lost.
- In case of a gap (lost trap) or if the number is lower, the process is restarted and TNM can re-synchronize its database by querying the opened alarms table.

### Acknowledgment or Termination from SNMP

A dedicated Access Module for TeMIP is available to integrate easily with the NSP Forwarding SNMP agent.

**Note:** SNMP trap forwarding requires the system administrator to configure the destination address, please refer to *Configure SNMP Management Server* in the *IDIH Installation Document*.

## Alarm Forwarding MIB

Shown here is the Alarm Forwarding MIB , which is located on the NSP server at

```
/usr/TKLC/xIH/apps/forwarding/target/misc/NSP-FORWARDING-MIB

-- File Name : NSP-FORWARDING-MIB
-- Date      : Mon Nov 21 10:18:28 CET 2006
-- Author    : AdventNet Agent Toolkit Java Edition - MIB Editor 6

NSP-FORWARDING-MIB DEFINITIONS ::= BEGIN
    IMPORTS
        RowStatus, DisplayString
            FROM SNMPv2-TC
        NOTIFICATION-GROUP, OBJECT-GROUP
            FROM SNMPv2-CONF
        enterprises, MODULE-IDENTITY, OBJECT-TYPE, Integer32,
        NOTIFICATION-TYPE
            FROM SNMPv2-SMI ;

    steleus MODULE-IDENTITY
```



```

        LAST-UPDATED      200602131148Z
        ORGANIZATION      Tekelec
        CONTACT-INFO      ttprocessing@tekelec.com
        DESCRIPTION        Description
        REVISION            200602131148Z
        DESCRIPTION        NSP module
        ::= { enterprises 4404 }

nsp      OBJECT IDENTIFIER
        ::= { steleus 8 }

forwarding      OBJECT IDENTIFIER
        ::= { nsp 6 }

nspManagedObjectClassTable      OBJECT-TYPE
    SYNTAX      SEQUENCE OF NspManagedObjectClassEntry
    MAX-ACCESS      not-accessible
    STATUS      current
    DESCRIPTION      NSP managed object class table
    ::= { forwarding 1 }

nspManagedObjectClassEntry      OBJECT-TYPE
    SYNTAX      NspManagedObjectClassEntry
    MAX-ACCESS      not-accessible
    STATUS      current
    DESCRIPTION      NSP managed object class entry
    INDEX      { nspManagedObjectClassId }
    ::= { nspManagedObjectClassTable 1 }

NspManagedObjectClassEntry ::= SEQUENCE {
    nspManagedObjectClassId Integer32,
    nspManagedObjectClassName DisplayString,
    nspManagedObjectClassDescription DisplayString,
    nspManagedObjectClassRowStatus RowStatus
}

nspManagedObjectClassId OBJECT-TYPE
    SYNTAX      Integer32 ( -2147483648 .. 2147483647
)
    MAX-ACCESS      read-only
    STATUS      current
    DESCRIPTION      Value that defines an instance of managed
object class in the table
    ::= { nspManagedObjectClassEntry 1 }

nspManagedObjectClassName      OBJECT-TYPE
    SYNTAX      DisplayString
    MAX-ACCESS      read-only
    STATUS      current
    DESCRIPTION      NSP managed object class instance name
    ::= { nspManagedObjectClassEntry 2 }

nspManagedObjectClassDescription      OBJECT-TYPE
    SYNTAX      DisplayString
    MAX-ACCESS      read-only
    STATUS      current
    DESCRIPTION      NSP managed object class instance

```

```

description
    ::= { nspManagedObjectClassEntry 3 }

nspManagedObjectClassRowStatus OBJECT-TYPE
    SYNTAX          RowStatus { active ( 1 ) , notInService
( 2 ) , notReady ( 3 ) , createAndGo ( 4 ) , createAndWait ( 5 ) , destroy ( 6
) }
    MAX-ACCESS      read-create
    STATUS           current
    DESCRIPTION      SMI v2 required attribute
    ::= { nspManagedObjectClassEntry 50 }

nspManagedObjectTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF NspManagedObjectEntry
    MAX-ACCESS      not-accessible
    STATUS           current
    DESCRIPTION      Description
    ::= { forwarding 2 }

nspManagedObjectEntry OBJECT-TYPE
    SYNTAX          NspManagedObjectEntry
    MAX-ACCESS      not-accessible
    STATUS           current
    DESCRIPTION      Row Description
    INDEX           { nspManagedObjectId}
    ::= { nspManagedObjectTable 1 }

NspManagedObjectEntry ::= SEQUENCE {
    nspManagedObjectId Integer32,
    nspManagedObjectName DisplayString,
    nspManagedObjectClassIdRef Integer32,
    nspManagedObjectParent Integer32,
    nspManagedObjectRowStatus RowStatus
}

nspManagedObjectId OBJECT-TYPE
    SYNTAX          Integer32 ( -2147483648 .. 2147483647
)
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION      Value that defines an instance of managed
object in the table
    ::= { nspManagedObjectEntry 1 }

nspManagedObjectName OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION      Column Description
    ::= { nspManagedObjectEntry 2 }

nspManagedObjectClassIdRef OBJECT-TYPE
    SYNTAX          Integer32 ( -2147483648 .. 2147483647
)
    MAX-ACCESS      read-only

```

```

        STATUS          current
DESCRIPTION            Value that defines an instance of managed
object class          ::= { nspManagedObjectEntry 10 }

nspManagedObjectParent OBJECT-TYPE
    SYNTAX              Integer32
    MAX-ACCESS          read-only
    STATUS              current
DESCRIPTION            Value that defines an instance of parent
managed object        ::= { nspManagedObjectEntry 20 }

nspManagedObjectRowStatus OBJECT-TYPE
    SYNTAX              RowStatus
    MAX-ACCESS          read-create
    STATUS              current
DESCRIPTION            SMI v2 required attribute
    ::= { nspManagedObjectEntry 50 }

nspAlarmsTable OBJECT-TYPE
    SYNTAX              SEQUENCE OF NspAlarmsEntry
    MAX-ACCESS          not-accessible
    STATUS              current
DESCRIPTION            NSP forwarded opened alarms table
    ::= { forwarding 3 }

nspAlarmsEntry OBJECT-TYPE
    SYNTAX              NspAlarmsEntry
    MAX-ACCESS          not-accessible
    STATUS              current
DESCRIPTION            NSP forwarded opened alarms entry
    INDEX              { nspAlarmId }
    ::= { nspAlarmsTable 1 }

NspAlarmsEntry ::= SEQUENCE {
    nspManagedObjectIdRef Integer32,
    nspAlarmId Integer32,
    nspAlarmRowStatus RowStatus,
    nspManagedObjectDN DisplayString,
    nspAlarmLastEventTime DisplayString,
    nspAlarmEventType INTEGER,
    nspAlarmProbableCause INTEGER,
    nspAlarmPerceivedSeverity INTEGER,
    nspAlarmTrendIndication INTEGER,
    nspAlarmThresholdLevel DisplayString,
    nspAlarmObservedValue DisplayString,
    nspAlarmAdditionalText DisplayString,
    nspAlarmSpecificProblem DisplayString,
    nspAlarmFirstDate OCTET STRING,
    nspAlarmClearDate OCTET STRING,
    nspAlarmCriticalCount Integer32,
    nspAlarmMajorCount Integer32,
    nspAlarmMinorCount Integer32,
    nspAlarmWarningCount Integer32,
    nspAlarmAcknowledged INTEGER
}

```

```

        nspManagedObjectIdRef    OBJECT-TYPE
            SYNTAX                  Integer32 ( -2147483648 .. 2147483647
        )
            MAX-ACCESS              read-only
            STATUS                  current
            DESCRIPTION              Value that refers to managed object
involved in the forwarded alarm
            ::= { nspAlarmsEntry 1 }

        nspAlarmId                OBJECT-TYPE
            SYNTAX                  Integer32 ( -2147483648 .. 2147483647
        )
            MAX-ACCESS              read-only
            STATUS                  current
            DESCRIPTION              Value that defines an instance of
forwarded alarm
            ::= { nspAlarmsEntry 2 }

        nspAlarmRowStatus          OBJECT-TYPE
            SYNTAX                  RowStatus { active ( 1 ) , notInService
( 2 ) , notReady ( 3 ) , createAndGo ( 4 ) , createAndWait ( 5 ) , destroy ( 6
) }
            MAX-ACCESS              read-create
            STATUS                  current
            DESCRIPTION              SMI v2 required attribute
            ::= { nspAlarmsEntry 50 }

        nspManagedObjectDN        OBJECT-TYPE
            SYNTAX                  DisplayString
            MAX-ACCESS              read-only
            STATUS                  current
            DESCRIPTION              Distinguished name that refers to managed
object involved in the forwarded alarm
            ::= { nspAlarmsEntry 100 }

        nspAlarmLastEventTime      OBJECT-TYPE
            SYNTAX                  DisplayString
            MAX-ACCESS              read-only
            STATUS                  current
            DESCRIPTION              Last event time in ASN.1 format
                                for the last event of the NSP forwarded alarm
on the managed object
            ::= { nspAlarmsEntry 1000 }

        nspAlarmProbableCause      OBJECT-TYPE
            SYNTAX                  INTEGER { adapterError ( 1 ) ,
applicationSubsystemFailure ( 2 ) , bandwidthReduced ( 3 ) ,
callEstablishmentError ( 4 ) , communicationsprotocolError ( 5 ) ,
communicationsSubsystemFailure ( 6 ) , configurationOrCustomizationError ( 7 )
, congestion ( 8 ) , corruptData ( 9 ) , cpuCyclesLimitExceeded ( 10 ) ,
dataSetOrModemError ( 11 ) , degradedSignal ( 12 ) , dteDceInterfaceError ( 13
) , enclosureDoorOpen ( 14 ) , equipmentMalfunction ( 15 ) , excessiveVibration
( 16 ) , fileError ( 17 ) , fireDetected ( 18 ) , floodDetected ( 19 ) ,
framingError ( 20 ) , heatingVentCoolingSystemnsplem ( 21 ) ,

```

```

humidityUnacceptable ( 22 ) , inputOutputDeviceError ( 23 ) , inputDeviceError
( 24 ) , lanError ( 25 ) , leakDetected ( 26 ) , localNodeTransmissionError (
27 ) , lossOfFrame ( 28 ) , lossOfSignal ( 29 ) , materialSupplyExhausted ( 30
) , multiplexerproblem ( 31 ) , outOfMemory ( 32 ) , outputDeviceError ( 33 ) ,
performanceDegraded ( 34 ) , powerproblem ( 35 ) , pressureUnacceptable ( 36 )
, processorproblem ( 37 ) , pumpFailure ( 38 ) , queueSizeExceeded ( 39 ) ,
receiveFailure ( 40 ) , receiverFailure ( 41 ) , remoteNodeTransmissionError (
42 ) , resourceAtOrNearingCapacity ( 43 ) , responseTimeExcessive ( 44 ) ,
retransmissionRateExcessive ( 45 ) , softwareError ( 46 ) ,
softwareprogramAbnormallyTerminated ( 47 ) , softwareprogramError ( 48 ) ,
storageCapacityproblem ( 49 ) , temperatureUnacceptable ( 50 ) , thresholdCrossed
( 51 ) , timingproblem ( 52 ) , toxicLeakDetected ( 53 ) , transmitFailure (
54 ) , transmitterFailure ( 55 ) , underlyingResourceUnavailable ( 56 ) ,
versionMismatch ( 57 ) , authenticationFailure ( 58 ) , breachOfConfidentiality
( 59 ) , cableTamper ( 60 ) , delayedInformation ( 61 ) , denialOfService ( 62
) , duplicateInformation ( 63 ) , informationMissing ( 64 ) ,
informationModificationDetected ( 65 ) , informationOutOfSequence ( 66 ) ,
intrusionDetection ( 67 ) , keyExpired ( 68 ) , nonRepudiationFailure ( 69 ) ,
outOfHoursActivity ( 70 ) , outOfService ( 71 ) , proceduralError ( 72 ) ,
unauthorizedAccessAttempt ( 73 ) , unexpectedInformation ( 74 ) }

```

```

MAX-ACCESS      read-only
STATUS          current
DESCRIPTION     Represents the probable cause values for
the alarms as per [X.721], [X.733] and [X.736]

```

for the NSP forwarded alarm on the managed object

```
 ::= { nspAlarmsEntry 1001 }
```

```

nspAlarmPerceivedSeverity OBJECT-TYPE
SYNTAX          INTEGER { indeterminate ( 0 ) , critical
( 1 ) , major ( 2 ) , minor ( 3 ) , warning ( 4 ) , cleared ( 5 ) }

```

```

MAX-ACCESS      read-write
STATUS          current
DESCRIPTION     Represents the perceived severity values
for the alarms as per [X.733] and [X.721]

```

for the NSP forwarded alarm on the managed object

```
 ::= { nspAlarmsEntry 1002 }
```

```

nspAlarmTrendIndication OBJECT-TYPE
SYNTAX          INTEGER { lessSevere ( 0 ) , noChange
( 1 ) , moreSevere ( 2 ) }

```

```

MAX-ACCESS      read-only
STATUS          current
DESCRIPTION     Represents the trend indication values
for the alarms as per [X.733]

```

for the NSP forwarded alarm on the managed object

```
 ::= { nspAlarmsEntry 1003 }
```

```

nspAlarmThresholdLevel OBJECT-TYPE
SYNTAX          DisplayString
MAX-ACCESS      read-only
STATUS          current

```

```

        DESCRIPTION          Represents the threshold level indication
        values (real) for the alarms as per [X.733]

                                for the last event of the NSP forwarded alarm
on the managed object
        ::= { nspAlarmsEntry 1004 }

nspAlarmObservedValue OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     Represents the threshold observed values
        (real) for the alarms as per [X.733]
                                for the last event of the NSP forwarded alarm
on the managed object
        ::= { nspAlarmsEntry 1005 }

nspAlarmAdditionalText OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     Represents the additional text field for
        the alarm as per [X.733]
                                for the last event of the NSP forwarded alarm
on the managed object
        ::= { nspAlarmsEntry 1006 }

nspAlarmEventType OBJECT-TYPE
    SYNTAX          INTEGER { otherAlarm ( 1 ) ,
communicationAlarm ( 2 ) , environmentalAlarm ( 3 ) , equipmentAlarm ( 4 ) ,
integrityViolation ( 5 ) , processingErrorAlarm ( 10 ) , qualityOfServiceAlarm
( 11 ) }
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     Represents the ITU event type value for
        the alarms as per [X.721], [X.733] and [X.736]
                                for the NSP forwarded alarm on the managed object
        ::= { nspAlarmsEntry 1007 }

nspAlarmSpecificProblem OBJECT-TYPE
    SYNTAX          DisplayString
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     Represents the specific problem name
        for the NSP forwarded alarm on the managed object
        ::= { nspAlarmsEntry 1008 }

nspAlarmFirstDate OBJECT-TYPE
    SYNTAX          OCTET STRING
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     Represents the raised date in ASN.1
format
                                for the NSP forwarded alarm on the managed object

```

```

::= { nspAlarmsEntry 1010 }

nspAlarmClearDate      OBJECT-TYPE
    SYNTAX               OCTET STRING
    MAX-ACCESS           read-only
    STATUS               current
    DESCRIPTION          Represents the clear date in ASN.1 format
                        for the NSP forwarded alarm on the managed object
::= { nspAlarmsEntry 1011 }

nspAlarmCriticalCount  OBJECT-TYPE
    SYNTAX               Integer32
    MAX-ACCESS           read-only
    STATUS               current
    DESCRIPTION          Represents the number of critical events
                        for the NSP forwarded alarm on the managed object
::= { nspAlarmsEntry 1012 }

nspAlarmMajorCount     OBJECT-TYPE
    SYNTAX               Integer32
    MAX-ACCESS           read-only
    STATUS               current
    DESCRIPTION          Represents the number of major events
                        for the NSP forwarded alarm on the managed object
::= { nspAlarmsEntry 1013 }

nspAlarmMinorCount     OBJECT-TYPE
    SYNTAX               Integer32
    MAX-ACCESS           read-only
    STATUS               current
    DESCRIPTION          Represents the number of minor events
                        for the NSP forwarded alarm on the managed object
::= { nspAlarmsEntry 1014 }

nspAlarmWarningCount   OBJECT-TYPE
    SYNTAX               Integer32
    MAX-ACCESS           read-only
    STATUS               current
    DESCRIPTION          Represents the number of warning events
                        for the NSP forwarded alarm on the managed object
::= { nspAlarmsEntry 1015 }

nspAlarmAcknowledged    OBJECT-TYPE

```

```

        SYNTAX                INTEGER { false ( 0 ) , true ( 1 ) }
        MAX-ACCESS             read-write
        STATUS                 current
        DESCRIPTION            Represents the acknowledged status
                                for the NSP forwarded alarm of the managed object

        ::= { nspAlarmsEntry 1016 }

    fwdVersion                OBJECT-TYPE
        SYNTAX                OCTET STRING
        MAX-ACCESS             read-only
        STATUS                 current
        DESCRIPTION            Current version of the NSP Forwarding
SNMP sub-agent
        ::= { forwarding 10 }

    fwdStatus                OBJECT-TYPE
        SYNTAX                INTEGER { allGood ( 0 ) , failure ( 1
) }
        MAX-ACCESS             read-only
        STATUS                 current
        DESCRIPTION            Global state of the NSP Forwarding SNMP
sub-agent
        ::= { forwarding 11 }

    ituAlarmEvent            OBJECT IDENTIFIER
        ::= { forwarding 733 }

    otherAlarm                NOTIFICATION-TYPE
        OBJECTS                { nspAlarmId, nspManagedObjectId,
nspAlarmLastEventTime, nspAlarmProbableCause, nspAlarmPerceivedSeverity,
nspAlarmTrendIndication, nspAlarmThresholdLevel, nspAlarmObservedValue,
nspAlarmAdditionalText, nspAlarmSpecificProblem, nspAlarmFirstDate,
nspAlarmClearDate, nspAlarmCriticalCount, nspAlarmMajorCount, nspAlarmMinorCount,
nspAlarmWarningCount, nspAlarmAcknowledged, nspManagedObjectName,
nspManagedObjectDN }

        STATUS                 current
        DESCRIPTION            Represents the event type for other
alarms as per [X.721],[X.733] and [X.736]
        ::= { ituAlarmEvent 1 }

    communicationAlarm        NOTIFICATION-TYPE
        OBJECTS                { nspAlarmId, nspManagedObjectId,
nspAlarmLastEventTime, nspAlarmProbableCause, nspAlarmPerceivedSeverity,
nspAlarmTrendIndication, nspAlarmThresholdLevel, nspAlarmObservedValue,
nspAlarmAdditionalText, nspAlarmSpecificProblem, nspAlarmFirstDate,
nspAlarmClearDate, nspAlarmCriticalCount, nspAlarmMajorCount, nspAlarmMinorCount,
nspAlarmWarningCount, nspAlarmAcknowledged, nspManagedObjectName,
nspManagedObjectDN }

        STATUS                 current
        DESCRIPTION            Represents the event type for the
communication alarms as per [X.721],[X.733] and [X.736]

        ::= { ituAlarmEvent 2 }

    environmentalAlarm        NOTIFICATION-TYPE
        OBJECTS                { nspAlarmId, nspManagedObjectId,
nspAlarmLastEventTime, nspAlarmProbableCause, nspAlarmPerceivedSeverity,
nspAlarmTrendIndication, nspAlarmThresholdLevel, nspAlarmObservedValue,
nspAlarmAdditionalText, nspAlarmSpecificProblem, nspAlarmFirstDate,
nspAlarmClearDate, nspAlarmCriticalCount, nspAlarmMajorCount, nspAlarmMinorCount,
nspAlarmWarningCount, nspAlarmAcknowledged, nspManagedObjectName,

```



```

nspManagedObjectDN }

        STATUS                      current
        DESCRIPTION                  Represents the event type for the
environment alarms as per [X.721],[X.733] and [X.736]

        ::= { ituAlarmEvent 3 }

equipmentAlarm NOTIFICATION-TYPE
OBJECTS { nspAlarmId, nspManagedObjectId,
nspAlarmLastEventTime, nspAlarmProbableCause, nspAlarmPerceivedSeverity,
nspAlarmTrendIndication, nspAlarmThresholdLevel, nspAlarmObservedValue,
nspAlarmAdditionalText, nspAlarmSpecificProblem, nspAlarmFirstDate,
nspAlarmCriticalCount, nspAlarmMajorCount, nspAlarmMinorCount,
nspAlarmWarningCount, nspAlarmAcknowledged, nspManagedObjectName,
nspManagedObjectDN }

        STATUS                      current
        DESCRIPTION                  Represents the event type for the
equipment alarms as per [X.721],[X.733] and [X.736]

        ::= { ituAlarmEvent 4 }

integrityViolation NOTIFICATION-TYPE
OBJECTS { nspAlarmId, nspManagedObjectId,
nspAlarmLastEventTime, nspAlarmProbableCause, nspAlarmPerceivedSeverity,
nspAlarmTrendIndication, nspAlarmThresholdLevel, nspAlarmObservedValue,
nspAlarmAdditionalText, nspAlarmSpecificProblem, nspAlarmFirstDate,
nspAlarmCriticalCount, nspAlarmMajorCount, nspAlarmMinorCount,
nspAlarmWarningCount, nspAlarmAcknowledged, nspManagedObjectName,
nspManagedObjectDN }

        STATUS                      current
        DESCRIPTION                  Represents the event type for the
integrity violation as per [X.721],[X.733] and [X.736]

        ::= { ituAlarmEvent 5 }

processingErrorAlarm NOTIFICATION-TYPE
OBJECTS { nspAlarmId, nspManagedObjectId,
nspAlarmLastEventTime, nspAlarmProbableCause, nspAlarmPerceivedSeverity,
nspAlarmTrendIndication, nspAlarmThresholdLevel, nspAlarmObservedValue,
nspAlarmAdditionalText, nspAlarmSpecificProblem, nspAlarmFirstDate,
nspAlarmCriticalCount, nspAlarmMajorCount, nspAlarmMinorCount,
nspAlarmWarningCount, nspAlarmAcknowledged, nspManagedObjectName,
nspManagedObjectDN }

        STATUS                      current
        DESCRIPTION                  Represents the event type for the
processing error alarms as per [X.721],[X.733] and [X.736]

        ::= { ituAlarmEvent 10 }

qualityOfServiceAlarm NOTIFICATION-TYPE
OBJECTS { nspAlarmId, nspManagedObjectId,
nspAlarmLastEventTime, nspAlarmProbableCause, nspAlarmPerceivedSeverity,
nspAlarmTrendIndication, nspAlarmThresholdLevel, nspAlarmObservedValue,
nspAlarmAdditionalText, nspAlarmSpecificProblem, nspAlarmFirstDate,
nspAlarmCriticalCount, nspAlarmMajorCount, nspAlarmMinorCount,
nspAlarmWarningCount, nspAlarmAcknowledged, nspManagedObjectName,
nspManagedObjectDN }

        STATUS                      current
        DESCRIPTION                  Represents the event type for the quality

```

```

of service alarms as per [X.721],[X.733] and [X.736]

        ::= { ituAlarmEvent 11 }

        ituAlarmEventGroup      NOTIFICATION-GROUP
        NOTIFICATIONS { communicationAlarm, environmentalAlarm,
equipmentAlarm, integrityViolation, otherAlarm, processingErrorAlarm,
qualityOfServiceAlarm }

        STATUS                  current
        DESCRIPTION              ITU alarm Event notifications
        ::= { forwarding 500 }

        managedObject OBJECT-GROUP
        OBJECTS { nspManagedObjectClassDescription,
nspManagedObjectClassId, nspManagedObjectClassIdRef, nspManagedObjectClassName,
nspManagedObjectClassRowStatus, nspManagedObjectId, nspManagedObjectIdRef,
nspManagedObjectName, nspManagedObjectParent, nspManagedObjectRowStatus,
nspManagedObjectDN }

        STATUS                  current
        DESCRIPTION              Data related to NSP managed objects
        ::= { forwarding 200 }

        alarm OBJECT-GROUP
        OBJECTS { nspAlarmAcknowledged,
nspAlarmAdditionalText, nspAlarmClearDate, nspAlarmCriticalCount,
nspAlarmFirstDate, nspAlarmId, nspAlarmLastEventTime, nspAlarmMajorCount,
nspAlarmMinorCount, nspAlarmObservedValue, nspAlarmPerceivedSeverity,
nspAlarmProbableCause, nspAlarmEventType, nspAlarmRowStatus,
nspAlarmSpecificProblem, nspAlarmThresholdLevel, nspAlarmTrendIndication,
nspAlarmWarningCount }

        STATUS                  current
        DESCRIPTION              Data related to NSP alarms
        ::= { forwarding 300 }

        forward OBJECT-GROUP
        OBJECTS { fwdVersion, fwdStatus}
        STATUS                  current
        DESCRIPTION              Data related to NSP forwarding module
        ::= { forwarding 100 }

END

```

### D

DSR

Diameter Signaling Router

A set of co-located Message Processors which share common Diameter routing tables and are supported by a pair of OAM servers. A DSR Network Element may consist of one or more Diameter nodes.

### E

ENUM

**Telephone NUmber Mapping** - A technology for unifying various communications and telephone addresses for private and business numbers, facsimile and mobile phone numbers, SMS services, Instant Messaging and email. ENUM integrates legacy phone numbers with the Domain Name System (DNS). Users can access and maintain a directory that supports all forms of wired communication, mobile communications networks, and the Internet. ENUM allows for an end user to be reached on multiple devices via one phone number and allows the end user to determine which device to contact first or multiple devices simultaneously.  
E.164 Number Mapping

### F

Filter

A value consisting of FNAI, FPFx, FDL, used to filter called party digits.

### I

**I**

ID	Identifier
IDIH	Integrated Diameter Intelligence Hub
ITU	<p>International Telecommunications Union</p> <p>An organization that operates worldwide to allow governments and the private telecommunications sector to coordinate the deployment and operating of telecommunications networks and services. The ITU is responsible for regulating, coordinating and developing international telecommunications, and for harmonizing national political interests.</p>

**M**

MIB	<p>Management Information Database</p> <p>A database of network management information that is used and maintained by the SNMP protocol.</p>
-----	----------------------------------------------------------------------------------------------------------------------------------------------

**S**

SMTP	Simple Mail Transfer Protocol
SNMP	<p>Simple Network Management Protocol.</p> <p>An industry-wide standard protocol used for network management. The SNMP agent maintains data variables that represent aspects of the network. These variables are called managed objects and are stored in a management information base (MIB). The SNMP protocol</p>

**S**

arranges managed objects into groups.