Oracle® Communications Diameter Signaling Router

IDIH Alarm Forwarding Administrator's Guide

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Oracle Communications Diameter Signaling Router IDIH Alarm Forwarding Administrator's Guide, Release 8.1

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Chapter 1

Introduction

Topics:

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: (This icon and text indicate the possibility of *personal injury*.)
	Warning: (This icon and text indicate the possibility of *equipment damage*.)
	Caution: (This icon and text indicate the possibility of *service interruption*.)
	Topple: (This icon and text indicate the possibility of *personal injury* and *equipment damage*.)

Related Publications

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

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:

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)

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

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:

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.

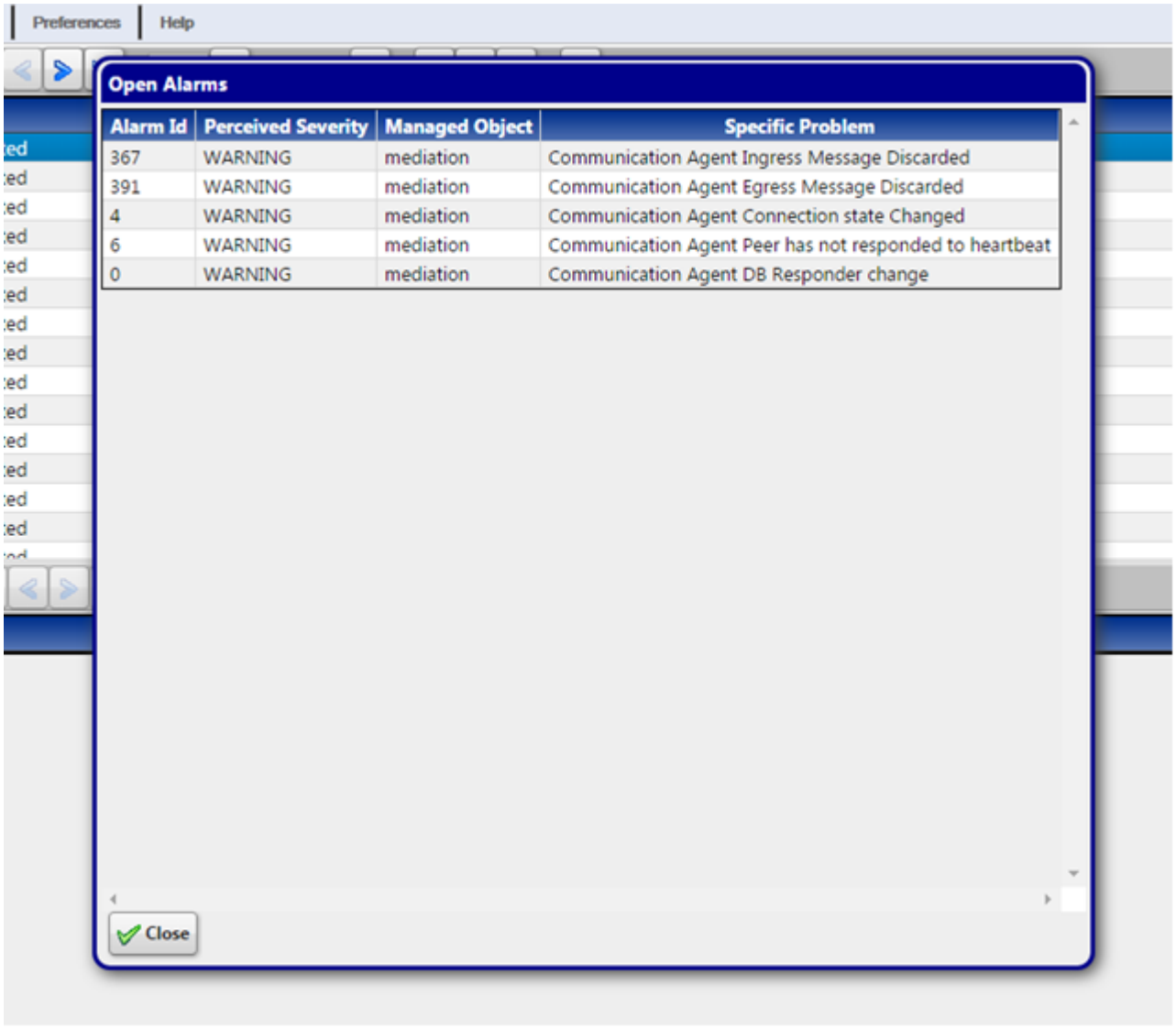

Figure 3: Alarm List

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.

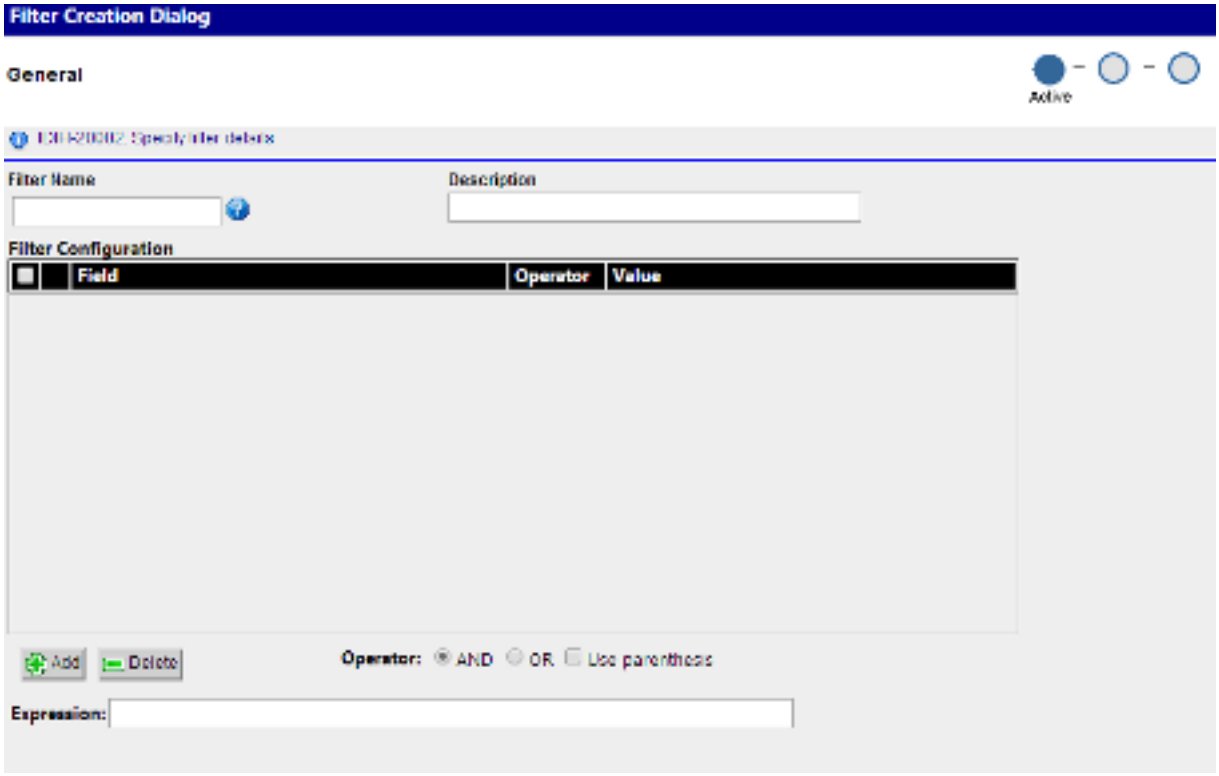

Figure 4: Filter Creation Dialog

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 ths 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.
3. Modify the appropriate field(s) as needed.

   For specific information on fields and options, see *Creating a Filter*.
4. Click **Next**.
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 sends a test message to the destination SNMP and/or SMTP using the **Connection Test Dialog** screen after clicking **Test Connection** .

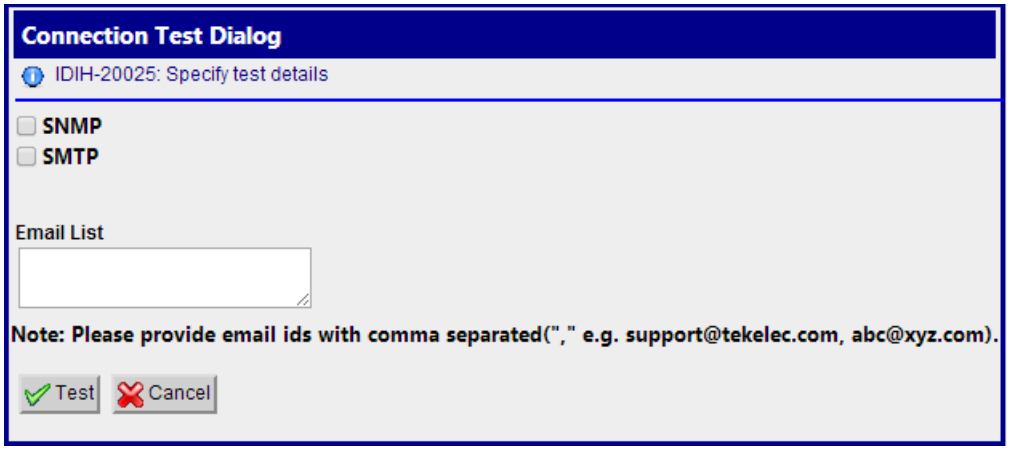

Figure 5: Connection Test Dialog

Test Connection for SMTP

The configuring user should verify the SMTP address, SMTP availability through 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:

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 ) , heatingVentCoolingSystemnspblem ( 21 ) ,
humidityUnacceptable ( 22 ) , inputOutputDeviceError ( 23 ) , inputDeviceError
( 24 ) , lanError ( 25 ) , leakDetected ( 26 ) , localNodeTransmissionError (
27 ) , lossOfFrame ( 28 ) , lossOfSignal ( 29 ) , materialSupplyExhausted ( 30
) , multiplexerproblem ( 31 ) , outOfMemory ( 32 ) , ouputDeviceError ( 33 ) ,
performanceDegraded ( 34 ) , powerproblem ( 35 ) , pressureUnacceptable ( 36 )
, processorproblem ( 37 ) , pumpFailure ( 38 ) , queueSizeExceeded ( 39 ) ,
receiveFailure ( 40 ) , receiverFailure ( 41 ) , remoteNodeTransmissionError (
42 ) , resourceAtOrNearingCapacity ( 43 ) , responseTimeExecessive ( 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	T**E**lephone **NU**mber **M**apping - 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	International Telecommunications Union 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.

M

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

S

SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol. 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

S

arranges managed objects into groups.