

# Intel<sup>®</sup> NetStructure<sup>™</sup> SS7 Protocols M3UA Programmer's Manual

---

Document Reference: U02STN

## REVISION HISTORY

ISSUE	DATE	BY	CHANGES
1	28-Jun-02	IDP	Initial Release
2	19-Jun-03	HJM	Branding changed to Intel® NetStructure™. Description of module expanded.

### Disclaimer

The product may contain design defects or errors known as errata, which may cause the product to deviate from published specifications.

Information in this document is provided in connection with Intel® products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel's Terms and Conditions of Sale for such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty, relating to sale and/or use of Intel products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Intel products are not designed, intended or authorized for use in any medical, life saving, or life sustaining applications or for any other application in which the failure of the Intel product could create a situation where personal injury or death may occur. Intel may make changes to specifications and product descriptions at any time, without notice.

Intel and Intel NetStructure are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

\* Other names and brands may be claimed as the property of others.

Copyright © 1993-2003 Intel Corporation. All rights reserved. No part of this document may be copied, or reproduced in any form, or by any means without prior written consent of Intel.

## CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>5</b>
<b>2</b>	<b>ABBREVIATIONS .....</b>	<b>6</b>
<b>3</b>	<b>RELATED DOCUMENTATION .....</b>	<b>6</b>
<b>4</b>	<b>FEATURE OVERVIEW.....</b>	<b>7</b>
<b>5</b>	<b>GENERAL DESCRIPTION.....</b>	<b>8</b>
5.1	Module Overview.....	8
5.2	ASP .....	8
5.3	SGP.....	8
5.4	Module Configuration .....	9
<b>6</b>	<b>INTERNAL DATA STRUCTURES.....</b>	<b>10</b>
6.1	Global Data Structure.....	10
6.2	Server AS / SG.....	10
6.3	Server Process ASP / SGP .....	10
6.4	Routes.....	10
6.5	Networks .....	10
<b>7</b>	<b>INTERFACE TO SYSTEM SERVICES.....</b>	<b>11</b>
7.1	System Functions.....	11
7.2	Timer Operation .....	11
<b>8</b>	<b>INTERFACE TO SCTP.....</b>	<b>12</b>
<b>9</b>	<b>M3UA USER INTERFACE .....</b>	<b>13</b>
9.1	API_MSG_TX_REQ.....	13
9.2	API_MSG_RX_IND .....	15
9.3	MTP_MSG_MTP_PAUSE.....	17
9.4	MTP_MSG_MTP_RESUME.....	18
9.5	MTP_MSG_MTP_STATUS.....	19
9.6	TX_SERV Request .....	21
9.7	M3U_PAUSE Indication .....	23
9.8	M3U_RESUME Indication.....	24
9.9	M3U_STATUS Indication .....	25
9.10	M3UA RSP Status Indication .....	27
<b>10</b>	<b>MANAGEMENT INTERFACE .....</b>	<b>29</b>
10.1	ASP UP Request.....	30
10.2	ASP DOWN Request .....	31
10.3	ASP ACT Request .....	32
10.4	ASP INACT Request.....	34
10.5	SS7 Signalling Network Management Event Request .....	35
10.6	SS7 Network Congestion State.....	37
10.7	SS7 Network Destination User Part Unavailable.....	40

10.8	Activate Association .....	42
10.9	Deactivate Association .....	43
10.10	ASP UP Indication .....	45
10.11	ASP UP Confirmation .....	46
10.12	ASP DOWN Indication.....	47
10.13	ASP DOWN Confirmation.....	48
10.14	ASP ACT Indication.....	49
10.15	ASP ACT Confirmation.....	51
10.16	ASP INACT Indication .....	53
10.17	ASP INACT Confirmation .....	54
10.18	AS ACT Indication .....	55
10.19	AS INACT Indication.....	57
10.20	Association Status Indication.....	58
10.21	Route Status Indication .....	60
<b>11</b>	<b>NON-PRIMITIVE INTERFACE.....</b>	<b>62</b>
11.1	Configure M3UA Module .....	63
11.2	Configure M3UA Association .....	65
11.3	Configure M3UA Server .....	67
11.4	Configure M3UA Route .....	70
11.5	Configure Network ID .....	72
11.6	Add Server to an Association.....	74
11.7	Add Route to a Server.....	76
11.8	Map Network ID to Network Appearance .....	78
11.9	Remove M3UA Association.....	80
11.10	Remove M3UA Server.....	81
11.11	Remove M3UA Route.....	82
11.12	Remove Network ID.....	83
11.13	Remove Server from an Association .....	84
11.14	Remove Route from a Server .....	85
11.15	Remove Network ID to Network Appearance Mapping .....	86
11.16	Read Association Statistics .....	87
11.17	Read Server Statistics .....	93
11.18	Trace Mask Configuration Request .....	94
11.19	M3UA Application Server Process Status .....	97
11.20	M3UA Server Status .....	99
11.21	M3UA Route Status.....	101
11.22	M3UA Error.....	103
11.23	M3UA Event .....	106
11.24	M3UA Notify Indication .....	113
11.25	M3UA Audit Destination Indication .....	116
<b>12</b>	<b>EXAMPLE MESSAGE TRACES.....</b>	<b>118</b>
<b>13</b>	<b>APPENDIX 1 .....</b>	<b>119</b>
13.1	Message Type Table.....	119
<b>14</b>	<b>APPENDIX 2.....</b>	<b>121</b>
14.1	Timer Services .....	121
14.2	Keep Time.....	121
14.3	Timer Expiry .....	122

## 1 **INTRODUCTION**

The Intel® NetStructure™ SS7 Protocols M3UA module is a portable software implementation of the IETF SIGTRAN, SS7 MTP3 User Adaptation Layer (M3UA). This Programmer's Manual is intended for users developing their own application programs that will interface with and use the functionality provided by the M3UA module.

The module uses the services provided by the Stream Control Transmission Protocol (SCTP) to exchange signalling messages with a number of M3UA Signalling Gateway Processes (SGP) or M3UA Application Server Processes (ASP). It can as such be used as part of either an ASP or an SGP.

The M3UA module is event driven and uses standard structured message types. It is intended to be used in conjunction with other Intel® NetStructure™ SS7 Protocols SCTP and MTP User Parts (e.g. ISUP), either on Intel® hardware platforms or on user supplied hardware. However, the software is portable and the well-defined message structure and the independent nature of the module allows the M3UA module to be used with alternative SCTP and MTP3 User implementations if required. It is intended that ASPs making use of this software are relatively simple comprising of a single ASP and AS. This is sufficient to allow MTP User Part traffic to be exchanged with a Signalling Gateway.

This manual provides an overview of the internal operation of the M3UA module, defines the structure of all messages that can be sent to, or issued by, the module and also describes all the configuration parameters.

## **2 ABBREVIATIONS**

- AS                    Application Server
- ASP                    Application Server Process
- IETF                    The Internet Engineering Task Force
- ITU                    The International Telecommunication Union (Previously CCITT)
- M3UA                    SS7 MTP3 User Adaptation Layer
- MTP2                    Message Transfer Part Layer 2
- MTP3                    Message Transfer Part Layer 3
- DPC                    Destination Point Code
- OPC                    Originating Point Code
- SCTP                    Stream Control Transmission Protocol
- SG                    Signalling Gateway
- SGP                    Signalling Gateway Process
- SP                    Server Process
- SIGTRAN                The IETF Signalling Transport Group
- SS7                    Signalling System Number 7

## **3 RELATED DOCUMENTATION**

- [1] IETF RFC 3332 MTP3-User Adaptation Layer
- [2] IETF RFC 2960 Stream Control Transmission Protocol
- [3] SS7 Programmer's Manual for SPCI2S, SPCI4 and CPM8
- [4] SCTP Programmer's Manual
- [5] Software Environment Programmer's Manual

## **4 FEATURE OVERVIEW**

Key features of the M3UA module include:

- Implementation of IETF RFC 3332 MTP3-User Adaptation Layer [1].
- User interface common with other Intel<sup>®</sup> NetStructure<sup>™</sup> SS7 Protocols.
- Message oriented interface.
- May be used as part of a single ASP or SGP.
- May be used as part of a single AS or SG.
- Full user control of ASP / AS Registration and Activation.
- Supports 14, 16 and 24 bit Point Codes.
- Supports simultaneous connection to multiple networks.
- Supports Long Haul connections from SGP to SGP.
- Supports MTP3 User interface to route messages to SGPs based on DPC.
- Supports Routes via multiple SGs.
- SGP Supports connections from multiple ASs.
- SGP Provides interface to control generation of SS7 Signalling Network Management Messages (DUNA, DAVA) for ASPs.
- SGP Provides interface to control transfer of SS7 Message Signal Units to specific ASs.
- SGP Provides interface allowing M3UA indication of AS state.
- Debug tracing of messages exchanged with SCTP and MTP3 User

## **5 GENERAL DESCRIPTION**

### **5.1 Module Overview**

The M3UA module implements the SS7 MTP3-User Adaptation Layer as defined in the IETF RFC. The module interface is message based. The module reads messages from a single message input queue and sends responses and indications to the message input queues of the other modules in the system.

This implementation may be used on either an SGP or ASP. Different services are offered by the module accordingly.

Irrespective of whether it is used on an ASP or SGP the M3UA module interfaces with SCTP using the User Primitives defined in the Intel<sup>®</sup> NetStructure<sup>™</sup> SCTP Programmer's Manual. These Primitives may be used to interface to another SCTP implementation if required.

### **5.2 ASP**

When used as part of an ASP, M3UA offers an MTP3 Interface to its Users. It does not offer MTP3 services directly rather it offers connection to Signalling Gateways where these services are offered. Because the interface is based on the ITU-T recommended primitives it allows easy interfacing of the M3UA module to MTP User Parts. Furthermore the module will interface directly to other Intel<sup>®</sup> NetStructure<sup>™</sup> SS7 Protocol MTP User Parts. This allows existing applications running with a local MTP3 to be easily ported to running over M3UA.

The M3UA module allows MTP Tx Indications to be forwarded to SGPs running MTP3 which in turn route the messages to the SS7 network. When M3UA receives a Tx Ind it forwards it based on configured routes similar to MTP routes. M3UA can connect to a number of SGPs, each of these connections may carry traffic from different MTP networks as identified by the M3UA Network ID.

When the ASP connects to an SGP the ASP must first establish its SCTP association, following that M3UA must bring the ASP up and then before sending traffic it must activate the AS. The process of bringing the ASP up and activating the AS are controlled by the Management interface to M3UA.

M3UA distributes messages received from an SGP based on the Service Indicator in the MTP Routing Label.

### **5.3 SGP**

When used as part of an SGP, M3UA provides a superset of the MTP3 User interface. On an SGP the M3UA User is the Nodal Interworking Function (NIF). M3UA allows the NIF to forward MSUs to specific ASs identified by a logical AS id. The NIF is responsible for the selection of which AS to route messages to. M3UA also allows the NIF to send SS7 Signalling Network Management messages to ASs or other SGPs based on their logical id.

M3UA will allow connections to a number of ASPs or SGPs. Each ASP may support a number of ASs and each AS may be distributed over a number of ASPs. M3UA routes messages to an appropriate ASP based on the state of the AS and ASPs.

M3UA can also use the MTP User interface to connect to other SGPs allowing an STP like function to be developed. In this configuration M3UA must be configured with routing information to let M3UA know which SG to route messages to based on the DPC.

#### **5.4 Module Configuration**

The User configures the module for operation using the configuration messages in section 10. The first message sent to the module must be a global configuration message. This configures environment dependent parameters. In general, these parameters will be fixed for any single application.

The configuration commands may then be used as required.

It is recommended that lower layer protocols are configured first. E.g. configure SCTP before M3UA before ISUP.

## **6 INTERNAL DATA STRUCTURES**

This chapter describes the internal data structures used by the M3UA module. This description is intended to assist the user in understanding the operation of the module. It is not necessary to acquire detailed knowledge of these structures in order to use the module.

### **6.1 Global Data Structure**

The entire data storage used by the module is contained in a single contiguous data structure. This structure contains global configuration settings, per ASP, AS, SGP configuration, statistics and state. It also contains internal event queues, timer control structures and internal buffers for message processing.

### **6.2 Server AS / SG**

The M3UA implementation has a generic Server structure that can be used for an Application Server or Signalling Gateway. A Server offers a Service to the SS7 network. Signalling Gateways offer MTP services and an Application Server offers MTP User Part services.

### **6.3 Server Process ASP / SGP**

The M3UA implementation also has a generic Server Process structure that can be used for an Application Server Process or Signalling Gateway Process. These can be considered to be processing resources on which Services are offered by Logical Servers.

### **6.4 Routes**

The M3UA implementation supports Route Structures. In addition to their use on an ASP to route messages into the SS7 network via SGs, this implementation allows messages to be routed between Intel<sup>®</sup> NetStructure<sup>™</sup> SS7 Protocols M3UA based SGs allowing M3UA Long Haul applications.

In addition to the M3UA route structure itself there are structures that 'bind' routes to SGs.

### **6.5 Networks**

When used on an SGP M3UA can simultaneously support a number of different MTP Networks, these may have the same or different Point Code formats. These Networks have mappings to M3UA Network Appearances.

## 7 INTERFACE TO SYSTEM SERVICES

### 7.1 System Functions

In addition to the primitive interface and the management interface to the M3UA module (which are described in later sections) the module requires a few basic system services to be supplied by the underlying operating system. This functionality is usually supplied by the appropriate Development package.

The following functions are required for inter-task communication:

- |                    |   |
|--------------------|---|
| <b>GCT_send</b>    | Sends a message to another task.  |
| <b>GCT_receive</b> | Accept next message from input event queue, blocking the task if no message is ready. |
| <b>GCT_grab</b>    | As receive but not blocking if no message is ready.                                   |

The following functions are required for allocation of inter-task messages:

- |             |                     |
|-------------|---------------------|
| <b>getm</b> | Allocate a message. |
| <b>relm</b> | Release a message.  |

### 7.2 Timer Operation

In order to provide internal implementation of the M3UA protocol timers the module needs to receive a periodic timer tick message. This is usually achieved using either the Enhanced Driver Module or the Timer module in which case the following messages are used by the M3UA module:

- |                  |  |
|------------------|--|
| <b>KEEP_TIME</b> | Issued by M3UA module to initialise the timer services |
| <b>TM_EXP</b>    | Issued by the timer module to notify of time-out.      |

## 8 INTERFACE TO SCTP

The M3UA module is intended to interface to the SCTP module. However it can interface with any other implementation of SCTP which satisfies the SCTP / User interface defined in the SCTP Programmer's Manual. The following primitives are used:

Primitives from M3UA to SCTP:

SCTP Activate association	Servers wait for incoming assoc / Client attempt association
SCTP Shutdown association	Gracefully close down association
SCTP Data transfer request	Transmit a data packet

Primitives from SCTP to M3UA:

SCTP Status change	Association status change
SCTP Data transfer indication	Received data packet
SCTP Congestion status	Change in the congestion status of the association

## 9 M3UA USER INTERFACE

The interface to the user application is a superset of messages defined for the MTP3 User interface. These use information in the MTP Routing Label to route messages. Additional messages allow ASP or Server Ids to be specified for routing to specific ASPs or ASs.

### 9.1 API\_MSG\_TX\_REQ

#### Synopsis:

Message issued by the User Part to M3UA to invoke the Message Transfer Request service.

#### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	API_MSG_TX_REQ (0xcf00)	
id	0, (Network_ID)	
src	Sending module id	
dst	M3UA module id	
rsp_req	0	
hclass	0	
status	0	
err_info	0	
len	Number of octets in MSU	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	len	Data

#### Description:

This message is part of the MTP3 User interface. It is used to pass an MTP Tx Req to M3UA for routing to an SGP. The SGP the message is sent to will depend on the DPC in the MTP Routing Label and previously configured routes.

## **Parameter Description:**

### **Network\_ID**

On an SGP the ID field identifies which Network the message is associated with.

### **data**

MSU data in binary format commencing with the Service Indicator Octet (SIO)

## 9.2 API\_MSG\_RX\_IND

### Synopsis:

Message issued to the User Part by M3UA to indicate reception of a Message Signal Unit.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	API_MSG_RX_IND (0x8f01)	
<b>id</b>	Network_ID	
<b>src</b>	M3UA module id	
<b>dst</b>	User Part module id	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	0	
<b>err_info</b>	0	
<b>len</b>	Number of octets in MSU	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	len	data

### Description:

This message is sent to an M3UA User when a data packet has been received. It is locally distributed based on the MTP SI.

The Network\_ID infers the Point Code format of the message.

### Parameter Description:

#### Network\_ID

The ID field identifies which Network the message is associated with.

**data**

MSU data in binary format commencing with the Service Indicator Octet (SIO).

### 9.3 MTP\_MSG\_MTP\_PAUSE

#### Synopsis:

Message issued to the User Part by M3UA to indicate the total inability of providing MTP service to the specified destination.

#### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>MTP_MSG_MTP_PAUSE</b> (0x8403)	
<b>id</b>	Network_ID	
<b>src</b>	M3UA module id	
<b>dst</b>	User Part module id	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	0	
<b>err_info</b>	0	
<b>len</b>	4	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	4	DPC

#### Parameters:

##### Network\_ID

The ID field identifies which Network the message is associated with.

##### DPC

Destination Point Code of the affected signalling point.

## 9.4 MTP\_MSG\_MTP\_RESUME

### Synopsis:

Message issued to the User Part by M3UA to indicate to the user the ability of providing MTP service to the specified destination.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	MTP_MSG_MTP_RESUME (0x8404)	
<b>id</b>	Network_ID	
<b>src</b>	M3UA module id	
<b>dst</b>	User Part module id	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	0	
<b>err_info</b>	0	
<b>len</b>	4	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	4	DPC

### Parameters:

#### Network\_ID

The ID field identifies which Network the message is associated with.

#### DPC

Destination Point Code of the affected signalling point.

## 9.5 MTP\_MSG\_MTP\_STATUS

### Synopsis:

Message issued to the User Part by M3UA to indicate to the user the partial inability of providing MTP service to the specified destination.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>MTP_MSG_MTP_STATUS</b> (0x8405)	
<b>id</b>	Network_ID	
<b>src</b>	M3UA module id	
<b>dst</b>	User Part module id	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	1 Remote User Unavailable 2 Signalling Network Congestion	
<b>err_info</b>	0	
<b>len</b>	6	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	4	dpc
4	2	cong_status

### Parameters:

#### Network\_ID

The ID field identifies which Network the message is associated with.

#### DPC

Destination Point Code of the affected signalling point.

**cong\_status**

The congestion status of the affected signalling point. Only valid if status is set to 2.

## 9.6 TX\_SERV Request

### Synopsis:

This message is intended for use only on an SGP. It is used by the NIF to pass an MSU data to M3UA for routing to an AS or SG.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	M3U_MSG_TX_SERV (0xc2e4)	
<b>id</b>	Server ID	
<b>src</b>	NIF	
<b>dst</b>	M3UA	
<b>rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	Number of octets in MSU	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	Len	MSU data in binary format commencing with the Service Indicator Octet (SIO)

### Description:

This message is sent to M3UA from the user whenever an MTP3 data packet is to be sent to a peer and the user has knowledge of the network configuration and can thus determine the server to which the data must be sent.

If the user wishes to have the data routed to the destination point code within the MSU the API\_MSG\_TX\_REQ message must be used.

The confirmation message (if requested) will indicate success by a status of zero when the message has been queued for transmission to the specified server. The confirmation cannot therefore be used as an indication that the peer has successfully acknowledged the reception of the message.

**Parameter Description:**

Format and parameters of the message are identical to ASP\_MSG\_TX\_REQ except for the message ID field that specifies the server to which the message is destined.

## 9.7 M3U\_PAUSE Indication

### Synopsis:

This message is used only on an SGP. It is sent by M3UA to indicate to the NIF that Messages can no longer be routed to a specific server.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	<b>M3U_PAUSE</b> (0x82eb)
<b>Id</b>	Server ID
<b>src</b>	M3UA
<b>dst</b>	NIF
<b>rsp_req</b>	0
<b>hclass</b>	0
<b>status</b>	0
<b>err_info</b>	0
<b>len</b>	0

### Description:

This indication message can be used to track the availability of a specific server within the network.

## 9.8 M3U\_RESUME Indication

### Synopsis:

This message is used only on an SGP. It is sent by M3UA to indicate to the NIF that communication with a specific server has been achieved.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
Type	M3U_RESUME (0x82ec)
Id	Server ID
Src	M3UA
dst	NIF
rsp_req	0
hclass	0
status	0
err_info	0
len	0

### Description:

This indication message can be used to track the availability of a specific server within the network.

## 9.9 M3U\_STATUS Indication

### Synopsis:

This message is only used on an SGP. It is sent by M3UA to indicate to the NIF the partial inability of providing the MTP service to the specified server.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	M3U_STATUS (0x82ed)	
<b>Id</b>	Server ID	
<b>Src</b>	M3UA	
<b>dst</b>	NIF	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	1 - Remote User Unavailable 2 - Network Congestion	
<b>err_info</b>	0	
<b>len</b>	3	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	1	user_part (if status = 0x01)
1	2	cong_status (if status = 0x02)

### Description:

Used to indicate to the User the congestion Status of a Server or the state of a User Part.

### Parameters:

#### user\_part

The User Part that has become unavailable for the specified server.

## **cong\_status**

The congestion level of the link to the server.

<b>Value</b>	<b>Description</b>
M3U_CONG_LEVEL_0 (0x00)	No congestion or undefined
M3U_CONG_LEVEL_1 (0x01)	Congestion level 1
M3U_CONG_LEVEL_2 (0x02)	Congestion level 2
M3U_CONG_LEVEL_3 (0x03)	Congestion level 3

## 9.10 M3UA RSP Status Indication

### Synopsis:

This message is used only on an SGP. It indicates the change in state of a peer server process.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_RSP_STATUS_IND (0x02f2)	
Id	Assoc ID	
src	M3UA	
dst	NIF	
rsp_req	0	
hclass	0	
status	RSP status	
err_info	0	
len	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	reason

### Parameters:

#### RSP Status

Indicates the current status of the remote server process.

Value	Description
M3U_RSP_STATUS_DOWN (0x00)	Peer server process has gone down
M3U_RSP_STATUS_NOT_DOWN (0x01)	Peer server process has left the down state

**reason**

Valid only if RSP state is M3U\_RSP\_STATUS\_DOWN.

Value	Description
M3U_RSP_STATUS_ASSOC_FAILURE (0x0000)	RSP down due to association failure
M3U_RSP_STATUS_PEER_MANAGEMENT (0x0001)	RSP down due to management blocking at peer

**Description:**

Optionally sent to the User Parts to indicate the failure / restoration of a peers server process.

## **10 MANAGEMENT INTERFACE**

All primitives at the M3UA / management interface are passed by sending messages between the modules. Primitives generated by the M3UA module are sent to the management module specified in the M3U\_MSG\_CONFIG message.

If the sending module's `rsp_req` bit is set then the M3UA module confirms receipt of the message by clearing the `REQUEST` bit in the message type and sending the message back to the module identified in the `src` field of the message header. Otherwise the M3UA module releases all the memory structures associated with the message.

The management module receiving a message from M3UA is responsible for releasing the memory associated with the message.

## 10.1 ASP UP Request

### Synopsis:

Sent by Layer Management on an ASP to make M3UA commence procedures to bring the ASP UP.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	<b>M3U_MSG_ASP_UP_REQ</b> (0x72d4)
<b>id</b>	Association ID
<b>src</b>	Management Entity
<b>dst</b>	M3U Module
<b>rsp_req</b>	Used to request a confirmation
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

### Description:

Used by the user to indicate to the peer signalling gateway that the ASP is available for the transport of management messages.

Success is indicated by M3UA issuing a M3U\_MSG\_ASP\_UP\_CON message to Layer Management.

Failure is indicated by M3UA issuing a M3U\_MSG\_ASP\_DOWN\_CON message to Layer Management.

## 10.2 ASP DOWN Request

### Synopsis:

Sent by Layer Management on an ASP to make M3UA initiate procedures to make the ASP DOWN.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	<b>M3U_MSG_ASP_DOWN_REQ</b> (0x72d7)
<b>id</b>	Association ID
<b>src</b>	Management Entity
<b>dst</b>	M3U Module
<b>rsp_req</b>	Used to request a confirmation
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

### Description:

Used by the Layer Management to indicate to an SGP that the ASP is unavailable for the transport of management messages.

Success is indicated by M3UA issuing a M3U\_MSG\_ASP\_DOWN\_CON message to Layer Management.

### 10.3 ASP ACT Request

#### Synopsis:

Sent by Layer Management on an ASP to make M3UA commence procedures to bring the AS into the active state on a particular SGP.

#### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>M3U_MSG_ASP_ACT_REQ</b> (0x72da)	
<b>Id</b>	Association ID	
<b>Src</b>	Management Entity	
<b>Dst</b>	M3U Module	
<b>Rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>Err_info</b>	0	
<b>Len</b>	134	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	tr_mode
2	132	Reserved, set to zero

#### Description:

Used by Layer Management to indicate to an SGP that the AS is available for the transport of data messages on this ASP.

Success is indicated by M3UA issuing a M3U\_MSG\_LM\_ASP\_ACT\_CON message to Layer Management.

Failure is indicated by M3UA issuing a M3U\_MSG\_LM\_ASP\_INACT\_CON message to Layer Management.

## Parameters:

### Association ID

The Association ID of the SGP to become Active on.

### tr\_mode

Traffic mode the AS will attempt to activate in.

If the traffic mode is set to M3U\_TRAFFIC\_DEFAULT, the ASP will attempt to activate in either the default mode of the server or in a mode compatible with the currently active ASPs within the server.

Value	Description
M3U_TRAFFIC_DEFAULT (0x0000)	Activate ASP in the servers currently active traffic mode
M3U_TRAFFIC_OVERRIDE (0x0001)	Over ride
M3U_TRAFFIC_LOADSHARE (0x0002)	Load share
M3U_TRAFFIC_BROADCAST (0x0003)	Broadcast

## 10.4 ASP INACT Request

### Synopsis:

Sent by Layer Management on an ASP to attempt to deactivate the ASP.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_ASP_INACT_REQ (0x72dd)	
id	Association ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	132	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	132	reserved

### Description:

If no routing contexts are supplied, M3UA inactivated all configured ASPs.

Not required when M3UA is used on a signalling gateway.

Success is indicated by M3UA issuing a M3U\_MSG\_LM\_ASP\_INACT\_CON message to Layer Management on a per ASP basis.

### Parameters:

#### Association ID

The ID of the association between the ASP and SGP.

## 10.5 SS7 Signalling Network Management Event Request

### Synopsis:

This message is only used on an SGP. It causes M3UA to generate an SS7 signalling network management message.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>M3U_MSG_SSNM_EVENT</b> (0xc2e5)	
<b>id</b>	Event type	
<b>src</b>	Management Entity	
<b>dst</b>	M3U Module	
<b>rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	74	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	options
2	2	serv_id
4	2	network_id
6	2	num_pc
8	64	pc_start
72	2	ass_id

### Description:

This message is sent from the NIF to M3UA causing an M3UA SSNM message to be generated. There MUST be at least 1 point code specified within the message and all point codes are supplied with an 8bit mask field as described in the M3UA RFC. The NIF can identify a specific ASP / SGP using the Association ID or an AS or SG using the Server ID.

## Parameters:

### Event type

Indicates the type of the event to send to the peer.

Value	Description
M3U_SSNM_EVT_DUNA (0x0000)	Destination Unavailable
M3U_SSNM_EVT_DAVA (0x0001)	Destination Available
M3U_SSNM_EVT_DAUD (0x0002)	Destination State Audit
M3U_SSNM_EVT_DRST (0x0003)	Destination Restricted

### Options

Optional parameters present bitmask (see below).

Value	Description
M3U_SSNM_OPT_SERV_ID_PRESENT (0x0001)	Server ID present
M3U_SSNM_OPT_ASS_ID_PRESENT (0x0008)	Association ID present

### serv\_id

Optional Server ID affected by the event.

### Network\_id

Network id of the following point codes.

### num\_pc

Number of valid point codes to follow.

### pc\_start

Upto 16 32bit point codes including the M3UA 'mask' field.

### ass\_id

Optional association ID affected by the event.

## 10.6 SS7 Network Congestion State

### Synopsis:

This message may be used on either an SGP or ASP. It causes M3UA to generate an SS7 network congestion state message.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
Type	M3U_MSG_SSNM_SCON (0xc2e6)	
Id	0	
Src	Management Entity	
Dst	M3U Module	
rsp_req	Used to request a confirmation	
Hclass	0	
Status	Non zero on error	
err_info	0	
Len	80	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	options
2	2	serv_id
4	2	Network_id
6	4	congestion
10	2	num_apc
12	64	apc_start
76	4	cpc

## Description:

This message results in a signalling congestion message (SCON) being sent from either an SGP or ASP. If used on an SGP and a server id is included then an SCON message is sent to all ASPs on which the AS is registered. If no server id is included then a message is sent to all ASPs. If used on an ASP then similarly messages are sent to either a specific SG or to all. The message can identify upto 16 Point Codes that are congested.

The affected point codes are all supplied with an 8 bit point code mask field as described in the M3UA RFC.

## Parameter Descriptions:

### options

Optional parameters present bitmask (see below).

Value	Description
M3U_SSNM_OPT_SERV_ID_PRES (0x0001)	Server ID present
M3U_SSNM_OPT_CONG_PRES (0x0002)	Congestion parameter present
M3U_SSNM_OPT_CPC_PRES (0x0004)	Concerned point codes present

### serv\_id

Server ID affected.

### Network\_id

Network id the affected Point Codes belong to.

### congestion

Network congestion level.

Value	Description
0	No congestion or undefined
1	Congestion Level 1
2	Congestion Level 2
3	Congestion Level 3

### num\_apc

Number of valid Affected Point Codes to follow.

**apc\_start**

Affected Point Code. This field identifies the Point Codes that have become congested. Upto 16 32bit point codes may be identified each including the M3UA 'mask' field.

**cpc**

Concerned Point Code. When sent from an ASP this identifies the Point Code of the originator of the event.

## 10.7 SS7 Network Destination User Part Unavailable

### Synopsis:

This message is only used on an SGP. It makes M3UA send an SS7 Destination User Part Unavailable message.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_SSNM_DUPU (0xc2e7)	
id	0	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
Hclass	0	
Status	Non zero on error	
err_info	0	
Len	14	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	options
2	2	serv_id
4	2	network_id
6	2	cause
8	2	user
10	4	cpc

### Description:

In response to receiving this message M3UA will issue a Destination User Part Unavailable message to concerned ASPs that a remote peer MTP3 User Part is unavailable.

Concerned point code is a single point code with a mask field set to zero.

## Parameter Description:

### Options

Optional parameters present bitmask (see below).

Value	Description
M3U_SSNM_OPT_SERV_ID_PRES (0x0001)	Server ID present
M3U_SSNM_OPT_CPC_PRES (0x0004)	Concerned point codes present

### serv\_id

Server ID affected. M3UA will send a DUPU message to each ASP the server is registered on.

### network\_id

Network id of the affected point code.

### cause

Value to be passed to the peer M3UA to indicate the cause of the unavailability of the User Part.

Value	Description
0	Unknown
1	Unequipped Remote User
2	Inaccessible Remote User

### user

The User Part identifier of the User Part that is unavailable.

Value	Description
0 to 2	Reserved
3	SCCP
4	TUP
5	ISUP
6 to 8	Reserved
9	Broadband ISUP
10	Satellite ISUP

### cpc

Concerned Point Code.

## 10.8 Activate Association

### Synopsis:

Sent to the M3UA module to start procedures to activate an association to a peer server process.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	M3U_MSG_ACT_ASSOC (0x72ce)
<b>id</b>	Association ID
<b>src</b>	Originating module
<b>dst</b>	M3U Module
<b>rsp_req</b>	Used to request a confirmation
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

### Description:

After activation is requested, Layer Management MUST wait until it has received a M3U\_MSG\_LM\_ASS\_ACT\_IND message before sending management messages and until receiving a M3U\_MSG\_LM\_ASS\_UP\_IND before data transfer is attempted. If the association activation attempt is unsuccessful, Layer Management will not be informed and M3UA will reattempt the activation after a period of time.

If an active association fails, Layer Management will receive a M3U\_MSG\_LM\_ASS\_DOWN\_IND message and after a period of time will reattempt the activation.

### Parameter Description:

#### Association ID

The logical ID of the concerned Association.

## 10.9 Deactivate Association

### Synopsis:

Sent to the M3UA module to shutdown an association.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	M3U_MSG_DEACT_ASSOC (0x72cf)	
<b>id</b>	Association ID	
<b>src</b>	Originating module	
<b>dst</b>	M3U Module	
<b>rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	options

### Description:

Causes the SCTP association to be closed down and to enter the deactivated state.

Graceful deactivation utilises the SCTP shutdown primitive so all outstanding data between the host and peer must be acknowledged before the association can be shutdown. Thus the notification of deactivation provided by the M3U\_ASS\_STATUS\_IND message with a status of deactivated, may be delayed due to network conditions.

Immediate deactivation utilises the SCTP abort primitive so all outstanding data between the host and peer is lost. The user **MUST** still wait for a status change message to be received before assuming the association has been deactivated.

Due to the underlying transport mechanism, between the time the user sends this message and the returning M3U\_ASS\_STATUS\_IND message, data from the peer may still be received.

### **Parameter Description:**

#### **Association ID**

The logical ID of the concerned Association.

#### **options**

<b>Value</b>	<b>Description</b>
M3UOP_DEACT_GRACEFULL (0x0000)	Shutdown association
M3UOP_DEACT_IMMEDIATE (0x0001)	Abort association

## 10.10 ASP UP Indication

### Synopsis:

Sent by the M3UA module to indicate the peer ASP is UP. When UP M3UA peers can exchange management messages.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	M3U_MSG_ASP_UP_IND (0x02d5)
<b>id</b>	Association ID
<b>src</b>	M3U Module
<b>dst</b>	Management Module
<b>rsp_req</b>	0
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

### Parameter Description:

#### Association ID

The logical ID of the concerned Association.

## 10.11 ASP UP Confirmation

### Synopsis:

Sent by the M3UA module to indicate the peer ASP has confirmed the local M3UAs change to the UP State.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	M3U_MSG_ASP_UP_CON (0x02d6)
<b>id</b>	Association ID
<b>src</b>	M3U Module
<b>dst</b>	Management Module
<b>rsp_req</b>	0
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

## 10.12 ASP DOWN Indication

### Synopsis:

Sent by the M3UA module to indicate the peer ASP is now DOWN.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	M3U_MSG_ASP_DOWN_IND (0x02d8)
<b>id</b>	Association ID
<b>src</b>	M3U Module
<b>dst</b>	Management Module
<b>rsp_req</b>	0
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

### 10.13 ASP DOWN Confirmation

#### Synopsis:

Sent by the M3UA module to indicate the peer ASP has confirmed the local M3UA is now DOWN.

#### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	M3U_MSG_ASP_DOWN_CON (0x02d9)
<b>id</b>	Association ID
<b>src</b>	M3U Module
<b>dst</b>	Management Module
<b>rsp_req</b>	0
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

## 10.14 ASP ACT Indication

### Synopsis:

This message is only for use on an SGP. It indicates a peer ASP has asked for an ASs to become active and that the AS is now available to receive Data.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_ASP_ACT_IND (0x02db)	
id	Association ID	
src	M3U Module	
dst	Management Module	
rsp_req	0	
hclass	0	
status	Non zero on error	
err_info	0	
len	4	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	server_id
2	2	tr_mode

### Description:

This message is sent once for every server ID that has become active.

### Parameters:

#### Association ID

The logical ID of the concerned Association.

#### server\_id

The Logical ID of the Server that has become Active.

**tr\_mode**

Indicates the traffic mode of the newly activated AS.

<b>Value</b>	<b>Description</b>
M3U_TRAFFIC_OVERRIDE (0x0001)	Override
M3U_TRAFFIC_LOADSHARE (0x0002)	Loadshare
M3U_TRAFFIC_BROADCAST (0x0004)	Broadcast

## 10.15 ASP ACT Confirmation

### Synopsis:

This message is used only on an ASP. It indicates the peer SGP has responded to our request for the application server process to be made active.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>M3U_MSG_ASP_ACT_CON</b> (0x02dc)	
<b>id</b>	Association ID	
<b>src</b>	M3U Module	
<b>dst</b>	Management Module	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	4	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	server_id
2	2	tr_mode

### Description:

This message is sent once for every server ID that has become active.

### Parameters:

#### Association ID

The logical ID of the concerned Association.

#### server\_id

Logical ID of the Server that has become active.

**tr\_mode**

Indicates the traffic mode of the newly activated ASP.

<b>Value</b>	<b>Description</b>
M3U_TRAFFIC_OVERRIDE (0x0001)	Override
M3U_TRAFFIC_LOADSHARE (0x0002)	Loadshare
M3U_TRAFFIC_BROADCAST (0x0004)	Broadcast

## 10.16 ASP INACT Indication

### Synopsis:

This message is only for use on an SGP. It indicates the peer ASP has asked for an Application Server to be made inactive.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_ASP_INACT_IND (0x02de)	
id	Association ID	
src	M3U Module	
dst	Management Module	
rsp_req	0	
hclass	0	
status	Non zero on error	
err_info	0	
len	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	server_id

### Description:

This message is sent once for every server ID that has become inactive.

### Parameters:

#### Association ID

The logical ID of the concerned Association.

#### server\_id

Server affected by the deactivation of the ASP.

## 10.17 ASP INACT Confirmation

### Synopsis:

This message is only used on an ASP. It indicates the peer has responded to the request for the Application Server to be made inactive.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	M3U_MSG_ASP_INACT_CON (0x02df)	
<b>id</b>	Association ID	
<b>src</b>	M3U Module	
<b>dst</b>	Management Module	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	server_id

### Description:

This message is sent once for every server that has become inactive.

### Parameters:

#### Association ID

The logical ID of the concerned Association.

#### server\_id

Server affected by the deactivation of the ASP.

## 10.18 AS ACT Indication

### Synopsis:

Indicates a server process has become Activate.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	M3U_MSG_AS_ACT_IND (0x02e0)	
<b>id</b>	Server ID	
<b>src</b>	M3U Module	
<b>dst</b>	Management Module	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	status	
<b>err_info</b>	0	
<b>len</b>	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	tr_mode

### Description:

Received by the management entity whenever the peer AS moves from the inactive to the active state.

### Parameters:

#### server ID

The logical ID of the Server.

#### status

Indicates the current status of the server with respect to the number of ASPs currently active within the server.

<b>Value</b>	<b>Description</b>
M3U_AS_STATUS_ACTIVE (0x00)	AS is active
M3U_AS_STATUS_ACTIVE_INSUFF_ASP (0x01)	AS has activated but has an insufficient number of ASPs currently available

### **tr\_mode**

Indicates the traffic mode that the server is currently working under.

<b>Value</b>	<b>Description</b>
M3U_TRAFFIC_OVERRIDE (0x0001)	Over ride
M3U_TRAFFIC_LOADSHARE (0x0002)	Load share
M3U_TRAFFIC_BROADCAST (0x0004)	Broadcast

## 10.19 AS INACT Indication

### Synopsis:

Only for use on an SGP. This message indicates a server process has become inactive.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	<b>M3U_MSG_AS_INACT_IND</b> (0x02e1)
<b>id</b>	Server ID
<b>src</b>	M3U Module
<b>dst</b>	Management Module
<b>rsp_req</b>	0
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

### Description:

Received by the management entity whenever the peer AS moves from the active to the inactive state.

## 10.20 Association Status Indication

### Synopsis:

Indicates the status of an Association has changed.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	<b>M3U_MSG_ASS_STATUS_IND</b> (0x02e2)
<b>id</b>	Association ID
<b>src</b>	M3U Module
<b>dst</b>	Management Module
<b>rsp_req</b>	0
<b>hclass</b>	0
<b>status</b>	Association status (see below)
<b>err_info</b>	0
<b>len</b>	0

### Description:

The user **MUST** wait for the reception of a status indication of deactivated after deactivation before removing the configuration of an association.

When the system starts to experience congestion, the user should reduce the rate at which data is sent to M3UA until the congestion has abated. If the congestion continues to increase and the DISCARD status is received, M3UA has started to discard all data packets sent from the user and will continue to do so until the congestion has abated.

### Parameters:

#### **status**

Current status of the association.

Value	Description
M3U_ASS_STATUS_DEACTIVATED (0x01)	Association is deactivated

M3U_ASS_STATUS_DOWN (0x02)	Association is down
M3U_ASS_STATUS_UP (0x03)	Association is up
M3U_ASS_STATUS_CONG_ABATE (0x04)	Association has stopped experiencing congestion
M3U_ASS_STATUS_CONG_ONSET (0x05)	Association is experiencing congestion
M3U_ASS_STATUS_CONG_DISCARD (0x06)	Association is experienced extreme congestion

## 10.21 Route Status Indication

### Synopsis:

Indicates the status of a Route has changed.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_ROUTE_STATUS_IND (0x02e3)	
id	Route ID	
src	M3U Module	
dst	Management Module	
rsp_req	0	
hclass	0	
status	Route status (see below)	
err_info	0	
len	6	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	network_id
2	4	point_code

### Parameters:

#### Status

Current status of the route.

Value	Description
M3U_ROUTE_UNAVAILABLE (0x00)	Association is deactivated
M3U_ROUTE_AVAILABLE (0x01)	Route is available
M3U_ROUTE_CONGESTED (0x02)	Route is available but currently congested

M3U_ROUTE_RESTRICTED (0x03)	Route is available but restricted
-----------------------------	-----------------------------------

**Network\_id**

The Logical Network ID that the Route belongs to.

**point\_code**

Destination Point Code for the status change.

## 11 NON-PRIMITIVE INTERFACE

In addition to the primitive interface for passing protocol messages and management messages between the M2PA module and the user modules, the M2PA module supports a non-primitive interface for implementation specific functionality.

The non-primitive interface is used to by the user for configuration and diagnostic purposes and to allow M2PA to report protocol based and software error events to the local system management module.

This section describes the formats of all the messages used in the non-primitive interface.

When the M2PA module returns a confirmation message containing a status value the status will be one of the following:

<b>Mnemonic</b>	<b>Value</b>	<b>Description</b>
none	0	Success
M2PE_BAD_ID	1	Inappropriate or invalid <b>id</b> in request message
M2PE_BAD_MSG	5	Inappropriate or unrecognised message <b>type</b> .
M2PE_BAD_PARAM	6	Invalid parameters contained in message.

## 11.1 Configure M3UA Module

### Synopsis:

Sent to the M3UA module to configure global parameters.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_CONFIG (0x72c0)	
id	0	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	9	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	1	mn_mod_id
1	1	trace_mod_id
2	1	maint_mod_id
3	2	max_assocs
5	2	max_servers
7	2	max_routes

### Description:

This message must be the first message sent to the module.

### Parameters:

#### mn\_mod\_id

Module ID for the Management Module.

**trace\_mod\_id**

Module ID for the Trace Module.

**maint\_mod\_id**

Module ID for the Maintenance Module.

**max\_assocs**

Maximum number of Associations the module will be required to handle.

**max\_servers**

Maximum number of Servers the module will be required to handle.

**max\_routes**

Maximum number of Routes the module will be required to handle.

## 11.2 Configure M3UA Association

### Synopsis:

Sent to the M3UA module to configure an ASP or SGP and information about the ASP / SGP itself.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>M3U_MSG_CNF_ASSOC</b> (0x72c1)	
<b>id</b>	Association ID	
<b>src</b>	Management Entity	
<b>dst</b>	M3U Module	
<b>rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	13	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	options
2	2	sctp_ass_id
4	2	sctp_ass_inst
6	1	sctp_mod_id
7	2	def_net_id
9	4	asp_id

### Description:

This message is used on either an ASP or SGP to configure an Adjacent ASP or SGP. Some information about the Adjacent ASP or SGP is configured and information about the SCTP Association used to reach the ASP or SGP.

## Parameters:

### options

Options for the server process.

Option	Description
M3UOP_ASSOC_SGP_TO_ASP (0x0001)	Association is on a SGP connect to an ASP.
M3UOP_ASSOC_ASP_TO_SGP (0x0002)	Association is on an ASP connected to an SGP.
M3UOP_ASSOC_RSP_STATUS (0x0004)	User parts require RSP Status messages
M3UOP_ASSOC_INT_NA_PRES (0x0008)	Default Network ID present
M3UOP_ASSOC_ASP_ID (0x0010)	Optional ASP ID present

### sctp\_ass\_id

Logical ID of the Association used by this ASP or SGP.

### sctp\_ass\_inst

SCTP instance number for the association used by the ASP or SGP.

### sctp\_mod\_id

SCTP module ID for the association used by the ASP or SGP.

### def\_net\_id

Default Network ID to pass to the user if a Data Message is received from a peer without explicitly stating to which Server it belongs.

### asp\_id

Optional ASP identifier.

## 11.3 Configure M3UA Server

### Synopsis:

Sent to the M3UA module to configure an Adjacent Application Server or Signalling Gateway.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	M3U_MSG_CNF_SERVER (0x72c2)	
<b>id</b>	Server ID	
<b>src</b>	Management Entity	
<b>dst</b>	M3U Module	
<b>rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	30	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	options
2	2	Network id
4	4	pc
8	2	def_tr_mode
10	2	tr_mode
12	2	num_asp
14	16	user_mod_ids

**Description:**

This command configures M3UA with an Application Server running on an Adjacent ASP. The AS will service SS7 messages for a single Point Code or for a subset of a Point Code. The range of traffic is fully defined later but the Point Code they are for must be included here.

This command may also be used to configure an Adjacent SG for LongHaul configurations. In this case the Routing Context field is not used.

**Parameters:****options**

Options for the server.

Option	Description
M3UOP_SERVER_SG_TO_AS (0x0001)	Server is on a SGW connected to an ASP
M3UOP_SERVER_AS_TO_SG (0x0002)	Server is on an ASP connected to a SGW
M3UOP_SERVER_AS_STATUS (0x0004)	Server requires M3U_PAUSE / RESUME messages
M3UOP_SERVER_SPMC_ALL (0x0008)	SPMC is marked down if any ASP is inactive
M3UOP_SERVER_MULTIPLE_USERS (0x0010)	Server routes data based on SI

**route\_ctxt**

Routing Context for the server. This value must also be used on the ASP.

**Network\_id**

Logical Network ID for the server.

**PC**

Point Code for the server.

**def\_tr\_mode**

Default traffic mode for the server.

### **tr\_mode**

The Traffic mode the Server runs in is controlled by the ASP when it registers the AS as active. This field is for use on an SGP to decide what modes to permit a particular AS to operate in.

<b>Value</b>	<b>Description</b>
M3U_TRAFFIC_OVERRIDE (0x0001)	Over ride
M3U_TRAFFIC_LOADSHARE (0x0002)	Load share
M3U_TRAFFIC_BROADCAST (0x0004)	Broadcast

### **num\_asp**

Number of ASPs the AS must be simultaneously registered as Active on for normal operation. If the number of ASPs falls below this number an SGP will Notify all ASPs for this AS, Active or otherwise.

### **user\_mod\_ids**

User Part module IDs. If multiple User Parts are not required, all data is sent to the User Part identified by the first user module ID.

## 11.4 Configure M3UA Route

### Synopsis:

Sent to the M3UA module to configure a Destination Point Code that messages will be routed to.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_CNF_ROUTE (0x72c3)	
id	Route ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	8	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	options
2	4	dpc
6	2	network_ID

### Description:

Issued by the management entity to configure a route to a specific point code. The format of the point code is inferred by the Network ID.

Once the route has been configured with a Point Code it can be added to a SGW server to indicate messages for the point code can be reached via the server.

**Parameters:**

**options**

Options for the route.

Option	Description
M3UOP_ROUTE_ASSUME_AVAIL (0x0001)	Route is assumed to be available
M3UOP_ROUTE_LOADSHARE (0x0002)	Route loadshares between all server in the route

**dpc**

Destination point code associated with the route.

**network\_id**

Logical Network ID the Destination Point Code is in.

## 11.5 Configure Network ID

### Synopsis:

Declares a new Network with Network ID and Point Code format.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_CNF_INT_NA (0x72c4)	
Id	Network_ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	pc_format

### Description:

Message used to declare an MTP Network to which M3UA will be interfacing.

### Parameters:

#### Network\_ID

Logical Identifier used in other messages to identify this Network.

#### pc\_format

Point code format.

<b>Option</b>	<b>Description</b>
M3U_ITU_14 (0x0000)	ITU-14 format routing label
M3U_ANSI_24 (0x0001)	ANSI-24 format routing label
M3U_ITU_24 (0x0002)	ITU-24 format routing label
M3U_ITU_16 (0x0003)	ITU-16 format routing label

## 11.6 Add Server to an Association

### Synopsis:

Declares an ASP or SGP that an AS or SG can run on.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_ADD_SERV_ASSOC (0x72c5)	
id	Association ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	6	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	srv_id
2	4	route_ctxt

### Description:

This message may be used on an SGP to configure which ASs can run on which ASPs. It can also be used on either ASP or SGPs to configure which SGPs belong to which SGs.

Once an AS has been logically added to an ASP the ASP may send an Activate message to the SGP to register that AS as active on the ASP.

Before this message can be used both the Server and Server Process must have been successfully configured.

**Parameters:****Association ID**

The Logical ID of the Association used to communicate with the ASP or SGP.

**srv\_id**

The Logical ID of the AS or SG that will run on the ASP or SGP.

**route\_ctxt**

M3UA Routing Context used by M3UA peers to identify a particular AS.

## 11.7 Add Route to a Server.

### Synopsis:

Identify an SG that a previously configured Route may use to forward messages.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_ADD_ROUTE_SERV (0x72c6)	
Id	Server ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	route_id

### Description:

Send to the M3UA module by the management entity to add a Signalling Gateway to the list of SGs that can be used to routing messages to a particular Destination Point Code.

The Route identified by the route ID must have previously been configured.

### Parameters:

#### server\_id

The Logical ID of the SG that is to be added to the route.

**route\_id**

The Logical ID of the Route that is to have the SG added to the list of SGs it can use.

## 11.8 Map Network ID to Network Appearance

### Synopsis:

Create a mapping between Network ID and M3UA Network Appearance.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>M3U_MSG_MAP_NA</b> (0x72c7)	
<b>id</b>	<b>Association ID</b>	
<b>src</b>	Management Entity	
<b>dst</b>	M3U Module	
<b>rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	6	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	Network ID
2	4	NA

### Description:

M3UA can use SCTP Associations to carry messages for multiple Networks. Peer M3UAs communicate which Network a message pertains to by using the Network Appearance (NA) Parameter. The scope of a NA does not extend beyond a particular Association.

This message is used by Layer Management to configure a mapping between a Network ID and a Network Appearance to be used on a particular Association.

If an Association only handles messages for one Network then the use of NAs is optional and M3UA peers can be configured with a default Network ID to use with messages from this Association. If M3UA is unable to find an appropriate mapping for a message then no Network Appearance parameter is used

**Parameters:****Association ID**

Logical ID of the Association this mapping applies to.

**Network ID**

Logical ID of the Network to be mapped.

**Network Appearance**

Network Appearance used between ASP and SGP to refer to the Network.

## 11.9 Remove M3UA Association

### Synopsis:

Sent to the M3UA module to remove the configuration of an association.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
Type	M3U_MSG_REM_ASSOC (0x72c8)
Id	Association ID
Src	Management Entity
Dst	M3U Module
Rsp_req	Used to request a confirmation
Hclass	0
Status	Non zero on error
Err_info	0
Len	0

### Description:

Association MUST be removed from all connections to servers before it can be removed.

Association must be in the deactivated state before it can be removed.

## 11.10 Remove M3UA Server

### Synopsis:

Sent to the M3UA module to remove the configuration of a server.

### Message Format:

MESSAGE HEADER	
field name	MEANING
Type	M3U_MSG_REM_SERVER (0x72c9)
Id	Server ID
Src	Management Entity
Dst	M3U Module
Rsp_req	Used to request a confirmation
Hclass	0
Status	Non zero on error
Err_info	0
Len	0

### Description:

Server MUST be removed from all associations before it can be removed.

## 11.11 Remove M3UA Route

### Synopsis:

Sent to the M3UA module to remove the configuration of a route.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	<b>M3U_MSG_REM_ROUTE (0x72ca)</b>
<b>id</b>	<b>Route ID</b>
<b>src</b>	Management Entity
<b>dst</b>	M3U Module
<b>rsp_req</b>	Used to request a confirmation
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

### Description:

Route MUST be removed from all connections to servers before it can be removed.

## 11.12 Remove Network ID

### Synopsis:

Sent to the M3UA module to request the removal of a Network ID and its associated Point Code format.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	<b>M3U_MSG_REM_INT_NA</b> (0x72f1)
<b>id</b>	<b>Network ID</b>
<b>src</b>	Management Entity
<b>dst</b>	M3U Module
<b>rsp_req</b>	Used to request a confirmation
<b>hclass</b>	0
<b>status</b>	Non zero on error
<b>err_info</b>	0
<b>len</b>	0

### Description:

Before the Network ID can be removed, all references to it must be removed including moving any associations that use the Network ID.

### 11.13 Remove Server from an Association

#### Synopsis:

Sent to the M3UA module to remove a Server from an Association.

#### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_REM_SERV_ASSOC (0x72cb)	
id	Association ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	srv_id

#### Parameters:

##### srv\_id

Identifier of the server to remove from the association.

## 11.14 Remove Route from a Server

### Synopsis:

Sent to the M3UA module to remove an SG from a Route.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_REM_ROUTE_SERV (0x72cc)	
id	Server ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	route_id

### Description:

Removes the SG from the list of possible SGs that form the Route.

If the server was the only server through whom the route could be reached and the server is currently available, the user will be informed of the unavailability of the routes destination point code.

### Parameters:

#### route\_id

Identifier of the route to remove from the server.

## 11.15 Remove Network ID to Network Appearance Mapping

### Synopsis:

Used to remove the mapping between a Network ID and Network Appearance used on a particular link.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_UNMAP_NA (0x72cd)	
id	Association ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	2	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	Network ID

### Description:

Removes the M3UA Network Appearance mapping for the specified Association.

### Parameters:

#### Association ID

Association ID of mapping to remove.

#### Network ID

Network ID of mapping to remove.

## 11.16 Read Association Statistics

### Synopsis:

Retrieve the statistics kept on a per association basis.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_R_ASSOC_STATS (0x62d0)	
id	Association ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	152	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	4	data_tx
4	4	asp_up_tx
8	4	asp_up_ack_tx
12	4	asp_dn_tx
16	4	asp_dn_ack_tx
20	4	asp_ac_tx
24	4	asp_ac_ack_tx
28	4	asp_ia_tx
32	4	asp_ia_ack_tx
36	4	error_tx
40	4	notify_tx
44	4	duna_tx
48	4	dava_tx

OFFSET	SIZE	NAME
52	4	daud_tx
56	4	scon_tx
60	4	dupu_tx
64	4	drst_tx
68	4	beat_tx
72	4	beat_act_tx
76	4	data_rx
80	4	asp_up_rx
84	4	asp_up_ack_rx
88	4	asp_dn_rx
92	4	asp_dn_ack_rx
96	4	asp_ac_rx
100	4	asp_ac_ack_rx
104	4	asp_ia_rx
108	4	asp_ia_ack_rx
112	4	error_rx
116	4	notify_rx
120	4	duna_rx
124	4	dava_rx
128	4	daud_rx
132	4	scon_rx
136	4	dupu_rx
140	4	drst_rx
144	4	beat_rx
148	4	beat_act_rx

**Description:**

Allows the user to retrieve statistics on the traffic carried on a per association basis.

Counts supplied are unsigned incrementing counters that wrap after 32bits.

**Parameters:**

**data\_tx**

Number of data packets transmitted through this association.

**asp\_up\_tx**

Number of ASP UP messages transmitted through this association.

**asp\_up\_ack\_tx**

Number of ASP UP ACK messages transmitted through this association.

**asp\_dn\_tx**

Number of ASP DOWN messages transmitted through this association.

**asp\_dn\_ack\_tx**

Number of ASP DOWN ACK messages transmitted through this association.

**asp\_ac\_tx**

Number of ASP ACTIVE messages transmitted through this association.

**asp\_ac\_ack\_tx**

Number of ASP ACTIVE ACK messages transmitted through this association.

**asp\_ia\_tx**

Number of ASP INACTIVE messages transmitted through this association.

**asp\_ia\_ack\_tx**

Number of ASP INACTIVE ACK messages transmitted through this association.

**error\_tx**

Number of ERROR messages transmitted through this association.

**notify\_tx**

Number of NOTIFY messages transmitted through this association.

**duna\_tx**

Number of DUNA messages transmitted through this association.

**dava\_tx**

Number of DAVA messages transmitted through this association.

**daud\_tx**

Number of DAUD messages transmitted through this association.

**scon\_tx**

Number of SCON messages transmitted through this association.

**dupu\_tx**

Number of DUPU messages transmitted through this association.

**drst\_tx**

Number of DRST messages transmitted through this association.

**beat\_tx**

Number of BEAT messages transmitted through this association.

**beat\_ack\_tx**

Number of BEAT ACK messages transmitted through this association.

**data\_rx**

Number of data packets received through this association.

**asp\_up\_rx**

Number of ASP UP messages received through this association.

**asp\_up\_ack\_rx**

Number of ASP UP ACK messages received through this association.

**asp\_dn\_rx**

Number of ASP DOWN messages received through this association.

**asp\_dn\_ack\_rx**

Number of ASP DOWN ACK messages received through this association.

**asp\_ac\_rx**

Number of ASP ACTIVE messages received through this association.

**asp\_ac\_ack\_rx**

Number of ASP ACTIVE ACK messages received through this association.

**asp\_ia\_rx**

Number of ASP INACTIVE messages received through this association.

**asp\_ia\_ack\_rx**

Number of ASP INACTIVE ACK messages received through this association.

**error\_rx**

Number of ERROR messages received through this association.

**notify\_rx**

Number of NOTIFY messages received through this association.

**duna\_rx**

Number of DUNA messages received through this association.

**dava\_rx**

Number of DAVA messages received through this association.

**daud\_rx**

Number of DAUD messages received through this association.

**scon\_rx**

Number of SCON messages received through this association.

**dupu\_rx**

Number of DUPU messages received through this association.

**drst\_rx**

Number of DRST messages received through this association.

**beat\_rx**

Number of BEAT messages received through this association.

**beat\_ack\_rx**

Number of BEAT ACK messages received through this association.

## 11.17 Read Server Statistics

### Synopsis:

Retrieve the statistics kept for a specific Server.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_R_SERVER_STATS (0x62d1)	
id	Server ID	
src	Management Entity	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Non zero on error	
err_info	0	
len	0	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	4	data_tx

### Description:

Allows the user to retrieve statistics on the traffic experienced on a per server basis.

### Parameters:

#### data\_tx

Number of data packets transmitted through this server.

## 11.18 Trace Mask Configuration Request

### Synopsis:

Configure M3UA to trace the specified messages and events.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	M3U_MSG_TRACE_MASK (0x52d3)	
<b>id</b>	Association ID	
<b>src</b>	Management Entity	
<b>dst</b>	M3U Module	
<b>rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Non zero on error	
<b>err_info</b>	0	
<b>len</b>	8	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	4	op_evt_mask
4	4	ip_evt_mask

### Parameters:

See below

## op\_evt\_mask

The output event mask. This is a 32bit value with bits set to 1 to cause a trace message to be sent to the system management module whenever a message is issued by M3UA for the event indicated.

Bit Number	Mnemonic	Description
0	M3U_EVTO_ASP_UP_IND	ASP up indication
1	M3U_EVTO_ASP_UP_CON	ASP up confirmation
2	M3U_EVTO_ASP_DOWN_IND	ASP down indication
3	M3U_EVTO_ASP_DOWN_CON	ASP down confirmation
4	M3U_EVTO_ASP_INACT_IND	ASP inactive indication
5	M3U_EVTO_ASP_INACT_CON	ASP inactive confirmation
6	M3U_EVTO_ASP_ACT_IND	ASP active indication
7	M3U_EVTO_ASP_ACT_CON	ASP active confirmation
8	M3U_EVTO_AS_ACT_IND	AS active indication
9	M3U_EVTO_AS_INACT_IND	AS inactive indication
10	M3U_EVTO_ASS_STATUS_IND	Association status indication
11	M3U_EVTO_ROUTE_STATUS_IND	Route status indication
12-15	Reserved	Should be set to zero
16	M3U_EVTO_SS7_RX_IND	SS7 Data Transfer Indication
17	M3U_EVTO_MTP_PAUSE	SS7 Point code unavailable
18	M3U_EVTO_MTP_RESUME	SS7 Point code available
19	M3U_EVTO_MTP_STATUS	SS7 point code status change
20	M3U_EVTO_M3U_PAUSE	M3UA server unavailable
21	M3U_EVTO_M3U_RESUME	M3UA server available
22	M3U_EVTO_M3U_STATUS	Change in M3UA server status
23	M3U_EVTO_NOTIFY_IND	M3UA notify message received
24-27	Reserved	Should be set to zero
28	M3U_EVTO_ACTIVATE_REQ	SCTP activation request
29	M3U_EVTO_SHUTDOWN_REQ	SCTP shutdown request
30	M3U_EVTO_ABORT_REQ	SCTP abort request
31	M3U_DATA_REQ	User requested data transmit

## ip\_evt\_mask

The input event mask. This is a 32bit value with bits set to 1 to cause a trace message to be sent to the system management module whenever a message is received by M3UA for the event indicated.

Bit Number	Mnemonic	Description
0	M3U_EVTI_ASP_UP_REQ	ASP up request
1	M3U_EVTI_ASP_DOWN_REQ	ASP down request
2	M3U_EVTI_ASP_ACT_REQ	ASP activate request
3	M3U_EVTI_ASP_INACT_REQ	ASP inactivate request
4	M3U_EVTI_ACT_ASSOC	Association request
5	M3U_EVTI_DEACT_ASSOC	Association deactivation request
6-27	Reserved	Should be set to zero
28	M3U_EVTI_NETWORK_STATUS	SCTP network status change
29	M3U_EVTI_STATUS_CHANGE	SCTP association status change
30	M3U_EVTI_CONG_STATUS	SCTP congestion status change
31	M3U_EVTI_DATA_IND	SCTP data transfer indication

## 11.19 M3UA Application Server Process Status

### Synopsis:

Returns the current status of the specified ASP / SGP.

### Message Format:

MESSAGE HEADER	
FIELD NAME	MEANING
<b>type</b>	<b>M3U_MSG_R_RSP_STATUS</b> (0x62e8)
<b>id</b>	<b>Association ID</b>
<b>src</b>	User module
<b>dst</b>	M3U Module
<b>rsp_req</b>	Used to request a confirmation
<b>hclass</b>	0
<b>status</b>	Status
<b>err_info</b>	0
<b>len</b>	0

### Description:

Allows the user to poll the status of a particular remote ASP or SGP.

This allows modules, to keep track of the status of the various remote signal processes in the system.

### Parameters:

#### Association ID

The Logical ID of Association identifying the ASP or SGP.

#### status

Current status of the remote server process.

Value	Description
M3U_STATE_RSP_UNCONFIGURED (0x00)	RSP is unconfigured

M3U_STATE_RSP_DEACTIVATED (0x01)	RSP is configured but not active
M3U_STATE_RSP_ASS_UNAVAILABLE (0x02)	RSP is attempting to activate association
M3U_STATE_RSP_WAIT_UP (0x03)	RSP is awaiting UP signal from peer
M3U_STATE_RSP_AVAILABLE (0x04)	RSP is available for data transfer
M3U_STATE_RSP_WAIT_CLOSED (0x05)	RSP is closing association

## 11.20 M3UA Server Status

### Synopsis:

Returns the status of the specified AS or SG. Includes overall status and status on a specific ASP or SGP.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_R_RS_STATUS (0x62e9)	
id	Server ID	
src	User module	
dst	M3U Module	
rsp_req	Used to request a confirmation	
hclass	0	
status	Server status (see below)	
err_info	0	
len	6	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	ass_id (input)
2	2	ass_status
4	2	tr_mode

### Description:

The Status field of the returned message holds the status of the complete server and the ass\_status field holds the status of the server on a particular ASP or SGP.

If an Invalid ass\_id is passed to M3UA it returns an ass\_status of M3U\_STATE\_RS\_UNCONFIGURED.

In addition to the Server status, if the Server is available the Traffic Mode is also returned.

## Parameters:

### status

Current status of the remote server.

Value	Description
M3U_STATE_RS_UNCONFIGURED (0x00)	The server is not being configured
M3U_STATE_RS_UNAVAILABLE (0x01)	The server is currently unavailable
M3U_STATE_RS_AVAILABLE (0x02)	The server is currently available
M3U_STATE_RS_AVAILABLE_INSUFF_RS P (0x03)	The server is available but has an insufficient number of RSPs active.

### ass\_id

Association ID status is requested for.

### ass\_status

Status of server with respect to a specific association ID.

Value	Description
M3U_ASP_STATUS_UNCONNECTED (0x00)	The SCTP layer to the server process is currently unavailable
M3U_ASP_STATUS_DOWN (0x01)	The server process is marked as unavailable
M3U_ASP_STATUS_INACTIVE (0x02)	The server process is available but has not been activated
M3U_ASP_STATUS_ACTIVE (0x03)	The server process is active
M3U_ASP_STATUS_STANDBY (0x04)	The server process is in standby

### tr\_mode

Traffic mode the server process is currently active in.

Value	Description
M3U_TRAFFIC_OVERRIDE (0x0001)	Over ride
M3U_TRAFFIC_LOADSHARE (0x0002)	Load share
M3U_TRAFFIC_BROADCAST (0x0004)	Broad cast

## 11.21 M3UA Route Status

### Synopsis:

Returns the current overall status of the specified route.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>M3U_MSG_R_ROUTE_STATUS</b> (0x62ea)	
<b>id</b>	<b>Route ID</b>	
<b>src</b>	User module	
<b>dst</b>	M3U Module	
<b>rsp_req</b>	Used to request a confirmation	
<b>hclass</b>	0	
<b>status</b>	Server status (see below)	
<b>err_info</b>	0	
<b>len</b>	6	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	Network ID
2	4	point_code

### Description:

Sent by a user module to retrieve the status of a route and configuration information. The Route ID is passed to M3UA and the Network ID, Point Code and status are returned.

### Parameters:

#### status

Value	Description
M3U_ROUTE_UNAVAILABLE (0x00)	Route is unavailable for transfer of traffic

M3U_ROUTE_AVAILABLE (0x01)	Route is available for transfer of traffic
M3U_ROUTE_CONGESTED (0x02)	Route is available but currently congested
M3U_ROUTE_RESTRICTED (0x03)	Route is available but restricted

**Network ID**

Logical ID of the Network the route is in.

**Point Code**

Destination Point Code for the route.

## 11.22 M3UA Error

### Synopsis:

Signals an internal error warning to management.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>M3U_MSG_M3U_ERROR</b> (0x02ef)	
<b>id</b>	<b>error_id</b>	
<b>src</b>	M3U Module	
<b>dst</b>	Management Module	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	<b>error_type</b>	
<b>err_info</b>	0	
<b>len</b>	9	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	1	instance
1	4	err_val1
5	4	err_val2

### Description:

Indicates to management that an error has occurred within the M3UA module.

### Parameters:

#### **error\_id**

Identifier connected with error.

#### **error\_type**

Error number.

Error_type	Value	Description
M3Ue_BAD_STATE	0	A message has been received by an RSP/server that is invalid for its current state
M3Ue_CONFIG	1	The action cannot be performed with the current configuration.
M3Ue_RESOURCE	2	Request cannot be satisfied due to a lack of internal resources.
M3Ue_TIMER_TICK	3	An internal timer has expired in an invalid state

### instance

Error instance.

### err\_val1

Error value depending on error\_id, defined in the table below.

### err\_val2

Error value depending on error\_id, defined in the table below.

Error_type	Error_id	Instance	err_val1	err_val2	
0					
1	Network Appearance	0			Pointcode format cannot be determined for the network appearance
1		1	Network Appearance	Point code	Route cannot be found to point code
1	Server ID	2			Data cannot be routed to the required peer as no route has been defined
1	Server ID	3			Data cannot be routed to the required peer as the network appearance is invalid.
1	Network Appearance	4			Pointcode format cannot be determined for the

Error_type	Error_id	Instance	err_val1	err_val2	
					network appearance
2		0			Internal SDL error
2		1			Internal SDL error
2		2			Internal SDL error
2		3			Internal SDL error
2	Server ID	4			Server marked down due to excess message backlog
2	Timer ID	5			Internal timer conflict
2		7			No RSPs available to handle traffic
3		x			Internal timer error

## 11.23 M3UA Event

### Synopsis:

Signals an internal event warning to management.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	M3U_MSG_M3U_EVENT (0x02ee)	
<b>id</b>	error_id	
<b>src</b>	M3U Module	
<b>dst</b>	Management Module	
<b>rsp_req</b>	0	
<b>hclass</b>	0	
<b>status</b>	error_type	
<b>err_info</b>	0	
<b>len</b>	9	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	1	instance
1	4	err_val1
5	4	err_val2

### Description:

Signals an unusual event has occurred in the operation of M3UA. These events include errors with the incoming M3UA data stream.

### Parameters:

#### **error\_id**

Identifier connected with error.

#### **error\_type**

Error number.

Error_type	Value	Description
M3Uv_PROTOCOL	0	An M3UA protocol violation has occurred.
M3Uv_M3UA_ERROR	1	Reception of M3UA ERROR message

### instance

Error instance.

### err\_val1

Error value depending on error\_id.

### err\_val2

Error value depending on error\_id.

Error_type	Error_id	Instance	err_val1	err_val2	
0	Assoc ID	2	TLV type	TLV length	Invalid TLV for ASPSM down
0	Assoc ID	6	TLV type	TLV length	Invalid TLV for ASPSM down ack
0	Assoc ID	8	TLV type	TLV length	Runt TLV
0	Assoc ID	9	TLV type	TLV length	Duplicate tag in ASPSM heartbeat
0	Assoc ID	10	TLV type	TLV length	Invalid TLV in ASPSM heartbeat
0	Assoc ID	12	TLV type	TLV length	Invalid TLV
0	Assoc ID	13	TLV type	Error code	Invalid Error code TLV
0	Assoc ID	14	TLV type	TLV length	Invalid TLV in management error
0	Assoc ID	15	TLV type	TLV length	Missing error code TLV in management error
0	Assoc ID	16	TLV type	TLV length	Invalid TLV
0	Assoc ID	17	TLV type	TLV length	Duplicate tag in management notify

Error_type	Error_id	Instance	err_val1	err_val2	
0	Assoc ID	18	TLV type	TLV length	Runt TLV
0	Assoc ID	19	TLV type	TLV length	Duplicate tag in management notify
0	Assoc ID	20	TLV type	TLV length	Oversized TLV
0	Assoc ID	21	TLV type	TLV length	Invalid tag in management notify
0	Assoc ID	22	TLV type	TLV length	Missing status type TLV in management notify
0	Assoc ID	23	TLV type	TLV length	Invalid TLV
0	Assoc ID	24	TLV type	TLV length	Duplicate network appearance TLV in M3UA data message
0	Assoc ID	25	TLV type	TLV length	Runt protocol data TLV
0	Assoc ID	26	TLV type	TLV length	Duplicate data section in M3UA data message
0	Assoc ID	27	Network Appearance		Invalid network appearance TLV in M3UA data
0	Assoc ID	28			Missing default network appearance for association
0	Assoc ID	29	TLV type	TLV length	Invalid TLV in M3UA data
0	Assoc ID	30	TLV type	TLV length	Missing TLV in M3UA data
0	Assoc ID	32	TLV type	TLV length	Duplicate TLV in ASPTM active
0	Assoc ID	34	TLV type	TLV length	Duplicate routing context TLV in M3UA data message

Error_type	Error_id	Instance	err_val1	err_val2	
0	Assoc ID	36	TLV type	TLV length	Invalid TLV for ASPTM active
0	Assoc ID	39	TLV type	TLV length	Duplicate TLV found in ASPTM inactive
0	Assoc ID	41	TLV type	TLV length	Invalid TLV for ASPTM inactive
0	Assoc ID	42			Unhandled RKM registration request
0	Assoc ID	43			Unhandled RKM registration response
0	Assoc ID	44			Unhandled RKM deregistration request
0	Assoc ID	45			Unhandled RKM deregistration response
0	Assoc ID	46	Length		Runt packet
0	Assoc ID	47	Version		Invalid M3UA header version
0	Assoc ID	48	TLV type	TLV length	Invalid M3UA TLV
0	Assoc ID	49	Class	Type	Invalid message Class
0	Assoc ID	50	Class	Type	Invalid message type
0	Assoc ID	51			DUNA received in invalid state
0	Assoc ID	53	TLV type	TLV length	Duplicate NA TLV in SSNM destination unavailable
0	Assoc ID	54	TLV type	TLV length	Duplicate affected point code TLV in SSNM destination

Error_type	Error_id	Instance	err_val1	err_val2	
					unavailable
0	Assoc ID	57	TLV type	TLV length	Invalid TLV in SSNM destination unavailable
0	Assoc ID	58	TLV type	0	Missing affected point code TLV for SSNM destination unavailable
0	Assoc ID	60	TLV type	TLV length	Duplicate NA TLV in SSNM congestion
0	Assoc ID	61	TLV type	TLV length	Duplicate affected point code TLV in SSNM congestion
0	Assoc ID	65	TLV type	TLV length	Invalid TLV
0	Assoc ID	66	TLV type	TLV length	Invalid TLV
0	Assoc ID	67	TLV type	TLV length	Duplicate congestion indication TLV in SSNM SCOM
0	Assoc ID	68	TLV type	TLV length	Invalid TLV in SSNM congestion
0	Assoc ID	69	TLV type	TLV length	Missing affected point code TLV in SSNM SCOM
0	Assoc ID	70	TLV type	TLV length	Invalid NA TLV in SSNM SCOM
0	Assoc ID	71	TLV type	TLV length	No default NA for association in SSNM SCOM
0	Assoc ID	72	TLV type	TLV length	Duplicate TLV in SSNM DUPU
0	Assoc ID	73	TLV type	TLV length	Duplicate TLV in SSNM DUPU

Error_type	Error_id	Instance	err_val1	err_val2	
0	Assoc ID	76	TLV type	TLV length	Duplicate TLV in SSNM DUPU
0	Assoc ID	77	TLV type	TLV length	Invalid TLV in SSNM DUPU
0	Assoc ID	78	TLV type		Missing TLV in SSNM DUPU
0	Assoc ID	79	Network Appearance		Invalid Network appearance TLV in SSNM DUPU
0	Assoc ID	80			Missing default network appearance in SSNM DUPU
0	Assoc ID	81	TLV type	TLV length	Duplicate TLV in SSNM DAVA
0	Assoc ID	82	TLV type	TLV length	Duplicate TLV in SSNM DAVA
0	Assoc ID	85	TLV type	TLV length	Unexpected TLV in SSNM DAVA
0	Assoc ID	86	Network appearance		Invalid network appearance TLV in SSNM DAVA
0	Assoc ID	87	TLV type	TLV length	Invalid TLV
0	Assoc ID	88			ASPTM active received whilst ASP down
0	Assoc ID	89			ASPTM received in incorrect ASP state
0	Assoc ID	90			M3UA data message received in invalid state
0	Assoc ID	91			No default network appearance for SSNM DAVA
0	Assoc ID	92	TLV type	TLV length	Invalid TLV for ASPSM up
0	Assoc ID	93	TLV type	TLV length	Invalid TLV for ASPSM up ack

Error_type	Error_id	Instance	err_val1	err_val2	
0	Assoc ID	94	TLV type	TLV length	Duplicate tag in management error
0	Assoc ID	95	TLV type	Traffic mode	Invalid traffic mode
0	Assoc ID	97	TLV type	TLV length	Duplicate TLV in ASPTM inactive ack
0	Assoc ID	98	TLV type	TLV length	Invalid TLV in ASPTM inactive ack
0	Assoc ID	99	cause	user	Invalid cause/user TLV

## 11.24 M3UA Notify Indication

### Synopsis:

Indicates the change in state of a peer server.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_NOTIFY_IND (0x02f0)	
id	Association ID	
src	M3U Module	
dst	Management Module	
rsp_req	0	
hclass	0	
status	0	
err_info	0	
len	140	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	options
2	2	status_type
4	2	status_info
6	4	asp_id
10	2	num_rc
12	128	Routing contexts

### Description:

The management module on an ASP host should decode the notify messages to track the current state of the peer server and react to state changes as required. For example activating an inactive server process when the peer server moves into the pending state. This action may be taken unilaterally by each ASP host or after communication with other ASP hosts present within the network. The communication method between ASP hosts is host specific and not covered by this document.

## Parameters:

### options

Optional fields present

Value	Description
M3U_NOTIFY_OPT_ASP_ID_PRESENT (0x0001)	ASP identifier is present in the message

### status\_type

Type of notify message.

Value	Description
1	Application Server State Change
2	Other

### status\_info

More detailed information for the notification (dependant on the status\_type).

Application Server State Change

Value	Description
1	Reserved
2	Application Server Inactive
3	Application Server Active
4	Application Server Pending

Other

Value	Description
1	Insufficient ASP Resources Active in AS
2	Alternate ASP Active

### num\_rc

Number of routing contexts affected.

### asp\_id

Optional identifier of the ASP causing the notify to be issued.

## **routing\_contexts**

Routing contexts.

## 11.25 M3UA Audit Destination Indication

### Synopsis:

Indicates the peer requires the status of a destination.

### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
type	M3U_MSG_AUDIT_DEST_IND (0x02f3)	
id	Server ID	
src	M3U Module	
dst	Management Module	
rsp_req	0	
hclass	0	
status	0	
err_info	0	
len	132	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	2	Network_ID
2	2	num_pc
4	128	apc

### Description:

Sent by m3ua to Layer Management in response to the reception of a DAUD request from the peer. Will be used during initialisation procedures to allow the peer to determine the status of point code availability from the view point of a signalling gateway.

### Parameters:

#### Network ID

The Logical ID of the Network of the Point Codes to audit.

**num\_pc**

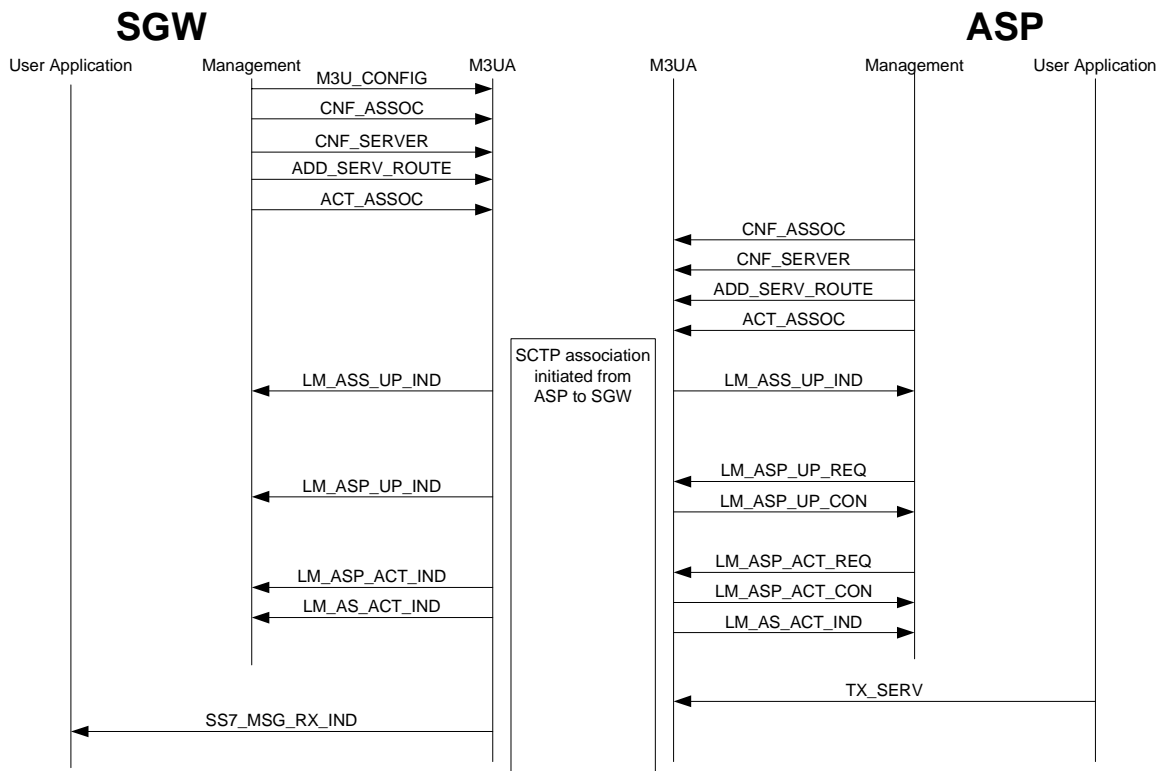
Number of Point Codes to audit.

**apc**

Array of point codes requiring an audit.

## 12 EXAMPLE MESSAGE TRACES

Connection traces for a single SG and ASP connection.



## 13 APPENDIX 1

### 13.1 Message Type Table

The following table lists, by message type, all the messages described in this manual.

Message Type	Mnemonic	Description
0x02d5	M3U_MSG_ASP_UP_IND	ASPUP indication
0x02d6	M3U_MSG_ASP_UP_CON	ASPUP confirmation
0x02d8	M3U_MSG_ASP_DOWN_IND	ASPDOWN indication
0x02d9	M3U_MSG_ASP_DOWN_CON	ASPDOWN confirmation
0x02db	M3U_MSG_ASP_ACT_IND	ASP ACT indication
0x02dc	M3U_MSG_ASP_ACT_CON	ASP ACT confirmation
0x02de	M3U_MSG_ASP_INACT_IND	ASP INACT indication
0x02df	M3U_MSG_ASP_INACT_CON	ASP INACT confirmation
0x02e0	M3U_MSG_AS_ACT_IND	Remote server activation indication
0x02e1	M3U_MSG_AS_INACT_IND	Remote server deactivation indication
0x02e2	M3U_MSG_ASS_STATUS_IND	Change in state of a remote server process.
0x02e3	M3U_MSG_ROUTE_STATUS_IND	Change in state of a route.
0x02ee	M3U_MSG_M3U_EVENT	M3UA event indication
0x02ef	M3U_MSG_M3U_ERROR	M3UA error indication
0x02f0	M3U_MSG_NOTIFY_IND	M3UA notify indication
0x02f2	M3U_MSG_RSP_STATUS_IND	Change in state of a remote server process indicator.
0x02f3	M3U_MSG_AUDIT_DEST_IND	Request for the status of a destination.
0x52d3	M3U_MSG_TRACE_MASK	Set message trace masks
0x62d0	M3U_MSG_R_ASSOC_STATS	Read statistics on a per server process basis.
0x62d1	M3U_MSG_R_SERVER_STATS	Read statistics on a per server basis.
0x62d2	M3U_MSG_R_ROUTE_STATS	Read statistics on a per route basis.
0x62e8	M3U_MSG_R_RSP_STATUS	Read remote server process status
0x62e9	M3U_MSG_R_RS_STATUS	Read remote server status
0x62ea	M3U_MSG_R_ROUTE_STATUS	Read route status
0x72c0	M3U_MSG_CONFIG	Configure the M3UA module
0x72c1	M3U_MSG_CNF_ASSOC	Configure a link to a remote server process

Message Type	Mnemonic	Description
0x72c2	M3U_MSG_CNF_SERVER	Configure a remote server
0x72c3	M3U_MSG_CNF_ROUTE	Configure a route to a point code
0x72c4	M3U_MSG_CNF_INT_NA	Configure a Network ID
0x72c5	M3U_MSG_ADD_SERV_ASSOC	Add a server to the list of those available via the server process
0x72c6	M3U_MSG_ADD_ROUTE_SERV	Add a route to the list of those available via the server
0x72c7	M3U_MSG_MAP_NA	Map a Network ID to a M3UA Network Appearance.
0x72c8	M3U_MSG_REM_ASSOC	Remove the configuration of a remote server process link.
0x72c9	M3U_MSG_REM_SERVER	Remove the configuration of a remote server.
0x72ca	M3U_MSG_REM_ROUTE	Remove the configuration of a route
0x72cb	M3U_MSG_REM_SERV_ASSOC	Remove a server from the list of those served by the server process.
0x72cc	M3U_MSG_REM_ROUTE_SERV	Remove a route from those accessible via a server.
0x72cd	M3U_MSG_UNMAP_NA	Remove the mapping from Network ID and the M3UA Network Appearance parameter.
0x72ce	M3U_MSG_ACT_ASSOC	Activate an association
0x72cf	M3U_MSG_DEACT_ASSOC	Deactivate an association
0x72d4	M3U_MSG_ASP_UP_REQ	ASPUP request
0x72d7	M3U_MSG_ASP_DOWN_REQ	ASPDOWN request
0x72da	M3U_MSG_ASP_ACT_REQ	ASP ACT request
0x72dd	M3U_MSG_ASP_INACT_REQ	ASP INACT request
0x72f1	M3U_MSG_REM_INT_NA	Remove the configuration of a Network ID.
0x82eb	M3U_MSG_M3U_PAUSE	Server pause indication
0x82ec	M3U_MSG_M3U_RESUME	Server resume indication
0x82ed	M3U_MSG_M3U_STATUS	Server status indication
0xc2e4	M3U_MSG_TX_SERV	Transmit data to a specified remote server.
0xc2e5	M3U_MSG_SSNM_EVENT	Generate SSNM event
0xc2e6	M3U_MSG_SSNM_SCON	Generate SCON event
0xc2e7	M3U_MSG_SSNM_DUPU	Generate DUPU event

## 14 APPENDIX 2

### 14.1 Timer Services

The notion of time in the M3UA module is based on a periodic timer tick received from the timer module every 100ms. This 'tick' is used to run all M3UA protocol timers. This appendix details the messages format which are used by the M3UA module to control timer services.

### 14.2 Keep Time

#### Synopsis:

Message sent to request the timer module to issue a periodic timer tick (TM\_EXP) message to the M3UA module.

#### Message Format:

MESSAGE HEADER		
FIELD NAME		MEANING
type		KEEP_TIME (0x7006)
id		0
src		Sending module's ID
dst		Timer module ID
rsp_req		0
class		0
status		0
err_info		0
len		6
PARAMETER AREA		
OFFSET	SIZE	NAME
0	4	Reserved, should be set to zero if issued by the user and are discarded when received by the timer module
4	2	<b>resolution</b>

#### Parameter Description :

##### resolution

The number of operating system ticks between timer expiry messages being issued to the M3UA module. This parameter is set from the **timer\_res** parameter in the M3UA module configuration message.

### 14.3 Timer Expiry

#### Synopsis:

Periodic timer tick message issued by the timer module.

#### Message Format:

MESSAGE HEADER		
FIELD NAME	MEANING	
<b>type</b>	<b>TM_EXP</b> (0xc002)	
<b>id</b>	index of timer in table	
<b>src</b>	Timer module ID	
<b>dst</b>	Destination module ID	
<b>rsp_req</b>	0	
<b>class</b>	0	
<b>status</b>	0	
<b>err_info</b>	0	
<b>len</b>	4	
PARAMETER AREA		
OFFSET	SIZE	NAME
0	4	reserved – must be set to zero