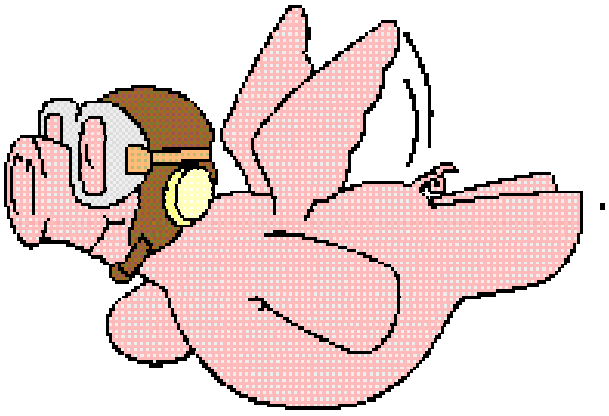
# The ATN SARPs



## Subvolume Six

## ATN Systems Management Provisions

## Third Edition
## (Final Editor's Draft)

Please note that this is the final editor's draft of the "Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN) – ICAO DOC 9705/AN956 - as circulated within the ATNP. This text will be passed to ICAO for publication. However, it should be noted that this text in no way replaces the ICAO version, nor can it be considered to be of equal status. The official definitive version is that published in hardcopy by ICAO and all claims of compliance must be made against that version.

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*Please check our web site regularly for updates to the draft SARPs*

# Errata and Disclaimer

Please note that this document has been prepared from a number of separate files and no attempt has been made to ensure continuity of page numbers. You may therefore find some overlap between page numbers.

This document has been prepared on a “best efforts” basis and no warrantee is offered as to its correctness.

## FOREWORD

The material contained in this document was originally developed as the detailed part of the first set of Standards and Recommended Practices (SARPs) for the aeronautical telecommunication network (ATN) which has commonly been referred to as the CNS/ATM-1 Package. It was intended to make the material an appendix to the new Chapter 3 of Annex 10, Volume III, Part I, containing broad, general, stable and mostly regulatory-type provisions (the core part of new ATN SARPs).

In December 1997, the Air Navigation Commission (ANC), while conducting the final review of draft ATN SARPs, agreed that the detailed part of ATN SARPs should be published as an ICAO manual (to be updated annually, if necessary), while retaining its SARPs-style language. The ANC has reviewed the status of the document in light of continuing worldwide ATN implementation. The Third Edition includes amendments from implementors and regulatory authorities, as well as four new Sub-Volumes to answer requirements for further standardization, in the interests of safety, regularity and efficiency of international civil aviation.

This document consists of nine Sub-Volumes:

Sub-Volume I — Introduction and System Level Requirements
Sub-Volume II — Air-Ground Applications
Sub-Volume III — Ground-Ground Applications
Sub-Volume IV — Upper Layer Communications Service (ULCS)
Sub-Volume V — Internet Communications Service (ICS)
Sub-Volume VI — System Management (SM)
Sub-Volume VII — Directory Services (DIR)
Sub-Volume VIII — Security (SEC)
Sub-Volume IX — Registration (REG)

Provisions contained in Sub-Volumes II, III, IV, V, VI, VII, VIII, and IX have been developed in accordance with system requirements specified in Sub-Volume I.

In line with the agreement by the ANC that the document should be updated on a yearly basis (if deemed necessary), the Third Edition has been published to incorporate changes necessitated by continuing validation and actual implementation activities.

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# 6. ATN SYSTEMS MANAGEMENT PROVISIONS

## 6.1. INTRODUCTION

*Note.— 6.1 contains introductory material and an overview of the Sub-Volume structure. There are no requirements or recommendations (shalls or shoulds) in this section.*

### 6.1.1 Scope and Objectives

6.1.1.1 The minimum requirements for ATN systems management are specified in this Sub-Volume.

6.1.1.2 ATN systems management is based on the ISO/IEC and ITU-T international standards for OSI management.

6.1.1.3 ATN systems management activities may be performed:

a) internally by ATN systems themselves (e.g. use of Echo within CLNP, delay monitoring within applications). Such activities are specified in the relevant Sub-Volume for the ATN element in question and are outside the scope of this Sub-Volume.

b) by local management / operator activity. Such activities are outside the scope of the ATN Technical Provisions.

c) by specified systems management operations external to the ATN systems themselves. The technical provisions specified in this Sub-Volume support such operations between different administrations. Within a domain, general recommendations for ATN management are made, but the details of intra-domain systems management are a local matter.

6.1.1.4 There are some fundamental systems management requirements which must be satisfied by all ATN systems if the ATN is to remain demonstrably within its defined operational parameters (see 6.3).

6.1.1.5 However, most of the technical provisions in this Sub-Volume are concerned with the standardisation of the formats and protocols necessary to support cross-domain systems management (CDSM), as illustrated in Figure 6.1-1. Thus they are mainly relevant to systems management systems at the boundary between management domains, referred to as “Boundary Management Systems”.

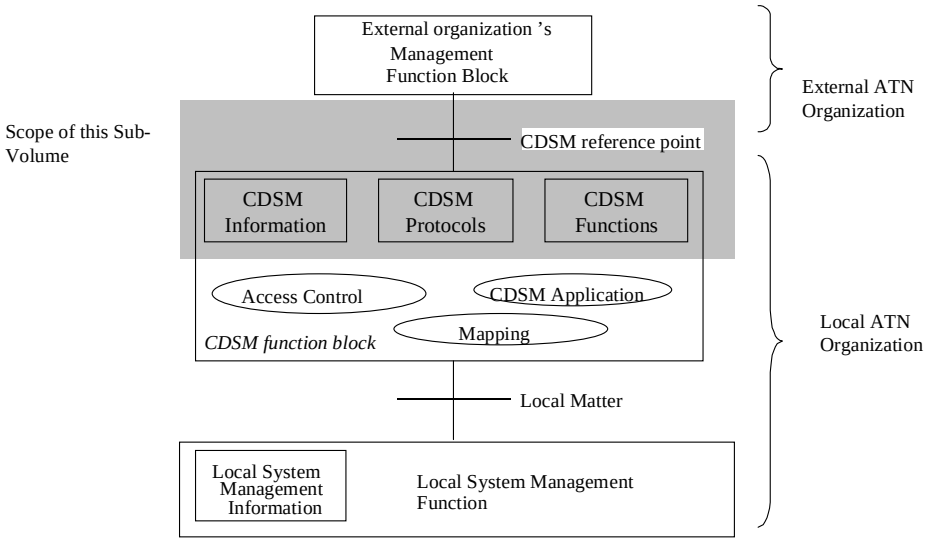


**Figure 6.1-1. Functional Architecture of Cross-Domain Systems Management (CDSM)**

6.1.1.6 Systems Management provisions broadly apply to two distinct areas: the definition of management information, and mechanisms for the interchange of such information.

6.1.1.7 Within a management domain, the detailed specification of systems management information is a local matter. Where such information is intended to cross domain boundaries, its format and encoding are subject to the technical provisions in this Sub-Volume.

6.1.1.8 Within a management domain, the mechanisms to convey systems management information between separate ATN systems are a local choice. Where there are exchanges of management information across domain boundaries, including over air-ground links, then the protocol requirements specified in this Sub-Volume apply.

6.1.1.9 Two distinct non-interoperable communication profiles are specified in this Sub-Volume:

a) There exist well-defined internationally standardised communication profiles for general systems management, and one such profile is specified in this Sub-Volume. This is the default systems management profile for general ground-ground inter-domain management communication.

b) For air-ground management communication, a lightweight efficient protocol mechanism is specified in order to optimise the use of the bandwidth-limited air-ground data links. This can also optionally be used for ground-ground management communication.

### 6.1.2 Structure of ATN Systems Management Specification

6.1.2.1 This specification is structured as follows:

a) Introduction (6.1) describes the purpose and structure of the ATN Systems Management provisions, and the background to the functionality defined herein.

b) Naming and Addressing Provisions (6.2) specifies the requirements for navigating the Management Information Base and identifying particular attributes within individual Managed Object (MO) instances, or groups of MOs.

c) ATN Systems Management General Requirements (6.3) specifies requirements to be satisfied by all ATN systems.

d) ATN Systems Management Communication (6.4) specifies provisions for data communications subsystems in boundary management systems to support ATN systems management exchanges between management domains. The scope includes secure systems management application exchanges and access control to systems management resources.

e) ATN Systems Management Function Profiles (6.5) specifies profile requirements for some common areas of systems management functionality, such as support for event reporting by means of the Event Forwarding Discriminator (EFD).

f) Cross-Domain Management Information Base (XMIB) (6.6) contains formal definitions of the systems management information which is made available between management domains by ATN entities.

*Note.— Managed Object (MO) specifications related to the intra-domain management of ATN resources are outside the scope of the technical provisions defined here.*

### 6.1.3 Systems Management Model

6.1.3.1 The ATN Systems Management model is based on the OSI model described in ISO/IEC 10040 | ITU-T Rec. X.701, Systems Management Overview. In this model, a system is made up of at least the following components:

a) The Managed Resources, which can include network devices such as ATN routers, as well as other equipment and applications (software) which require management.

b) A set of Managed Objects (MO). MOs are abstractions of the actual managed resources. These software abstractions provide the management interface to the real resources being managed. For example, a set of MOs can be defined for the management of ATN routers. Each ATN router MO represents specific data associated with the router “managed resource”.

c) A management database in the form of a Management Information Base (MIB). The MIB is composed of the MOs, organised in an efficient manner to allow ease of retrieval of the data contained in each object.

d) A systems management (SM) Agent. The SM Agent is an application which accesses management data from the managed device and converts this raw data into a MIB-compatible format. SM Agents respond to queries (from SM Managers) regarding management data. SM Agents may also notify SN Managers when significant events take place.

e) A SM Manager application, which is responsible for receiving and responding to event notifications, initiating queries to accomplish the retrieval of management data, and providing an interface (usually a graphical interface) to the personnel in the operations control centre.

6.1.3.2 To facilitate management communication between disparate managed systems, the Common Management Information Service (CMIS) and associated Common Management Information Protocol (CMIP) defined in ISO/IEC 9595 | ITU-T Rec. X.710 and ISO/IEC 9596-1 | ITU-T Rec. X.711, respectively are adopted for cross-boundary ATN management interchanges.

### 6.1.4 Ground-ground ATN Management Communications

6.1.4.1 Within the boundaries of an ATN portion managed by a single State or Organisation, there are no constraints on systems management mechanisms.

6.1.4.2 For management communications to be possible between separately managed domains of the global ATN, ATN domains support CMIP at the domain boundary.

6.1.4.3 To maximise the use of established management software solutions, an international standardised profile (ISP) is adopted for cross-domain ground-ground management communications using CMIP. This is adapted slightly for use over the ATN Transport Service rather than the standard OSI Transport Service.

6.1.4.4 The efficient ATN-specific CMIP profile for air-ground communications described in 6.1.5 may alternatively be used for ground-ground management communications.

### 6.1.5 Air-ground ATN Management Communications

6.1.5.1 For systems management communication between ground-based manager applications and airborne agent applications, or vice-versa, an efficient data encoding mechanism and minimal protocol overheads are specified.

6.1.5.2 Like the ATN air-ground applications in Sub-Volume 2, protocol overheads are minimised by application of the Packed Encoding Rules (PER) of ASN.1, and use of the ULCS Dialogue Service, which is defined in [ULCS] 4.2. The Dialogue Service hides the ACSE and Presentation services from the application

ASEs, and is provided by the control function (CF). The "Lower CF," which supports the Dialogue Service, is fully specified in the ULCS provisions.

6.1.5.3 The architecture, as applied to ATN air-ground management communication, is illustrated in Figure 6.1-2.

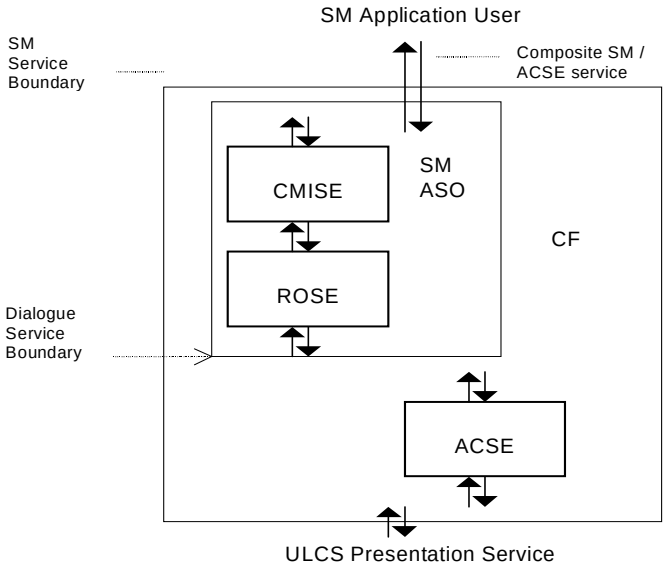


**Figure 6.1-2. Use of the Dialogue Service**

6.1.5.4 The CF provides a composite service to the SM Application User, allowing the SM Application User to invoke services offered by the Common Management Information Service Element (CMISE) and also to establish and release associations.

6.1.5.5 For modelling purposes, a "conceptual SM ASO" envelopes CMISE and the Remote Operations Service Element (ROSE) and invokes association establishment and termination services on behalf of the Application User. Thus, the Dialogue service is used to establish, release and abort the application-association with the peer Systems Management Application Entity (SMAE) and to exchange SM information when requested by CMISE and ROSE. The CMIS service is provided unchanged to the SM-users as part of the SM service.

6.1.5.6 The definition of the "conceptual SM ASO" is used only for modelling purposes. It avoids any need to modify the existing ULCS Provisions, which assume a one-to-one service mapping between the application ASE and the AE. The SM-User is provided with a composite service consisting of all the CMIS service primitives, plus the D-START, D-END and D-ABORT services. There is no requirement to implement any physical entity corresponding to the "conceptual SM ASO."

*Note.— A problem of the ULCS architecture as used by the ATN air-ground application specifications is the induced complexity of the App-ASE protocol, because the states of the underlying dialogue (e.g. pending establishment, established, pending release, collision) are handled by the ASE protocol itself. For the SMAE this problem is avoided, as CMISE and ROSE assume the association handling is performed elsewhere, and invoke only a data transfer primitive.*

6.1.5.7 The CMIS standard states that the user of the CMISE service uses ACSE services for the establishment and release of associations. The CF maps such ACSE service invocations by the CMISE user onto appropriate Dialogue Service requests. For example, when the CMISE user requests an association, the CF constructs the A-ASSOCIATE user information, adds the required D-START parameters, and invokes the D-START service. Thus, from the point of view of CMISE / ROSE, an "implicit start" service is provided.

6.1.5.8 The actions of the "conceptual SM ASO" are implicitly specified in the provisions of 6.4.3, in particular the actions to handle the primitive exchanges:

a) between the SM-users and CMISE,

b) between the SM-users and the Dialogue Service Provider, and

c) between ROSE and Dialogue Service Provider.

6.1.5.9 In particular, the specification in 6.4.3 is responsible for re-mapping the Presentation service primitives (P-DATA request and indication) used by ROSE at its lower interface to the Dialogue service interface, and also for mapping ACSE service invocations by the CMISE user onto appropriate Dialogue Service requests.

### 6.1.6 Terms and abbreviations

6.1.6.1 This Sub-Volume uses the terms and abbreviations defined in ISO/IEC 10040 | ITU-T Rec. X.701 (OSI Systems Management Overview). The following terms and abbreviations have special meaning when used in the Sub-Volume, as defined here.

6.1.6.1.1 *Systems Management (SM) Agent* - a software application designed to perform management operations on software or hardware resources that are modelled as Managed Objects (MOs), and to report significant events relating to those resources to a SM Manager by means of management notifications.

6.1.6.1.2 *Systems Management (SM) Manager* - a software application designed to perform management operations on, and receive management notifications from, an SM Agent process.

6.1.6.1.3 *Systems Management events*. A number of provisions in 6.3 refer to the "generation of a systems management event." This is a generic statement meaning that the entity in question should, by local means, make the event visible to the local systems management subsystem. This could be, for example, by setting a flag, changing the value of an attribute, generating a CMIP notification or an SNMP trap.

## 6.2. NAMING AND ADDRESSING PROVISIONS

*Note.— This section specifies Managed Object addressing and registration requirements and requirements for navigating the Management Information Base and identifying particular attributes within individual Managed Object (MO) instances, or groups of MOs. Presentation context identifiers are also assigned.*

### 6.2.1 Assignment of Object Identifiers

*Note 1.— ISO/IEC and ITU-T have standardised a scheme for the assignment of systems management object identifiers under the arc {joint-iso-ccitt ms(9) }. The ISO registration scheme does not apply for non-ISO defined objects. It is necessary for ICAO and organisations that require allocation of object identifier values in the course of the development of management standards and development of systems management products to establish their own allocation schemes under an appropriate registration authority.*

*Note 2.— The appropriate registration authority for objects defined in ICAO SARPs is ICAO. A specific arc for ATN systems management has been defined in Sub-Volume 9: { iso (1) identified-organisation (3) icao (27) atn-sm (4) }*

*Note 3.— The provisions defined here mirror the OSI Systems Management naming structure, to provide placeholders where additional objects specific to ATN systems management will be identified.*

6.2.1.1 ATN object identifiers for systems management shall be defined under one of the arcs defined in Table 6.2-1, which in turn are immediately subordinate to the ATN systems management root registered in Sub-Volume 9.

**Table 6.2-1. Registered Object Identifier arcs.**

| Registered Arc | Purpose |
|---|---|
| smo (0) | Identifies generic objects supporting the management of ATN systems. |
| cmip (1) | The optimised protocol option used for air-ground SM communications may require the definition of additional CMIP-related objects or the modification of existing OSI CMIP-related objects. |
| function (2) | Identifies objects related to additional systems management functions to support the ATN inter-domain administration, for instance the Trouble Ticket System (TTS) |
| smi (3) | Identifies inter-domain MIB MO Classes and MO Classes needed to administer the efficiency enhanced protocol. |
| validation (4) | Identifies project-specific or vendor-specific entities for validation purposes. |

6.2.1.2 Subordinate to the { validation (4) } arc, additional arcs as required to identify private organisations temporarily needing resources for object allocation shall be allocated.

*Note.— Regional or bilateral inter-domain MIBs as well as intra-domain MIBs are not subject to standardisation by ICAO. Within a management domain, the detailed specification of systems management information is a local matter. This information contained in these MIBs will be defined either by the administration authority (e.g. CAAs) which wants to administer the ATN systems located in its domain or by the vendors of the operated ATN systems which provide a specific administration interface to its systems. The form and the location of the ATN registration tree for these MIBs cannot be pre-defined, since:*

*a) the form will depend of the type of Systems Management communication protocols in place between SM Agent and SM Manager (e.g. CMIP or SNMP). For instance, if CMIP is used as the intra-domain SM communication protocol, the OSI registration tree can be used to identify Managed Object Classes (MOCs) in use in ATN and already defined by ISO. The ATN registration tree will contain arcs for non-ISO objects.*

*b) the location will depend of the level of visibility on the management information required: the registration tree could be inserted in a public arc under the responsibility of OSI, IETF or ICAO or under a private arc.*

*c) the location will depend on the pre-existence of an arc assigned to the administration authority or vendor. If an arc already exists, it will be more convenient to use it rather than obtaining a new one from a registration body.*

*As a consequence, there is no arc defined under the responsibility of ICAO for registering non-standardised objects. However, an arc is defined here for use by those ATN users or providers that do not have a private arc or that want to define temporary MOCs, for example for trials or the development of ATN SM products. This implies the existence of an ATN Registration Authority to which these authorities or vendors will be able to apply to assign them an arc value.*

6.2.1.3 Further arcs of the ATN Systems Management global naming tree shall be allocated as shown in Table 6.2-2.

**Table 6.2-2. Part of ATN Registration Tree**

| Object Identifier arcs (see Note 1) | | | Description |
|---|---|---|---|
| 5 | 6 | 7 | |
| | | | |
| smo (0) | | | ATN System Management Overview |
| cmip (1) | | | Common Management Information Protocol - Fast MIP option |
| function (2) | | | ATN Systems Management Functions |

| Object Identifier arcs (see Note 1) | | | Description |
|---|---|---|---|
| 5 | 6 | 7 | |
| smi (3) | | | ATN Structure of Management Information defined in ICAO Standards |
| | mibX (X) | | Objects defined in ATN SARPs |
| | | asn1Module (2) | ASN.1 Module Identifiers |
| | | managedObjectClass (3) | Managed Object Class Identifiers |
| | | package (4) | Package Identifiers |
| | | parameters (5) | Parameter Identifiers |
| | | nameBinding (6) | Name Binding Identifiers |
| | | attribute (7) | Attribute Identifiers |
| | | attributeGroup (8) | Attribute Group Identifiers |
| | | action (9) | Action Types |
| | | notification (10) | Notification Types |
| validation (4) | | | Vendor-specific Identifiers |
| | ABCD (n) | | Examples: projectX, CAA_Y, vendor_Z (n) |
| | | asn1Module (2) | ASN.1 Module Identifiers |
| | | managedObjectClass (3) | Managed Object Class Identifiers |
| | | package (4) | Package Identifiers |
| | | parameters (5) | Parameter Identifiers |
| | | nameBinding (6) | Name Binding Identifiers |
| | | attribute (7) | Attribute Identifiers |
| | | attributeGroup (8) | Attribute Group Identifiers |
| | | action (9) | Action Types |
| | | notification (10) | Notification Types |

*Note 1.— Object Identifier nodes 1 to 4 are defined in Sub-Volume 9.*

*Note 2.— The Naming Tree defined here allows for two extensibility mechanisms:*

*a) addition of new standard objects through the definitions of new versions of the ICAO inter-domain MIB, and*

*b) addition of widely-available, but non-standard, objects through the validation subtree.*

## 6.3. ATN SYSTEMS MANAGEMENT GENERAL REQUIREMENTS

*Note.— Since the ATN is dependent upon systems management procedures to monitor and maintain the provided quality of service, there is a minimum set of systems management requirements which applies to each type of ATN system (ES, BIS, IS, etc.). The general provisions in this section apply to all ATN systems, not just boundary management systems. They apply to intra-domain systems management as well as inter-domain, though details of the mechanisms used to satisfy the requirements within a given management domain are a local matter.*

### 6.3.1 General Provisions

*Note.— ATN systems are expected to support the general systems management capabilities specified in this and the following subsections as the minimum functionality available to a suitably authorised and authenticated local SM Manager.*

6.3.1.1 In general, for airborne systems, systems management events shall be logged locally for subsequent offline processing.

*Note.— This does not preclude the implementation of a local airborne SM Manager application, nor does it require such a SM Manager application.*

6.3.1.2 Ground systems shall have the capability of notifying relevant events to the local systems management subsystem.

*Note 1.— Such events may then be forwarded to a suitably authorised and authenticated local SM Manager, depending upon factors such as the current Event Forwarding Discriminator (EFD) attribute values.*

*Note 2.— Other strategies such as a polling mechanism could alternatively be used.*

6.3.1.3 **Recommendation.—** *It should be possible to selectively enable and disable event logging where a requirement to log an event is identified.*

6.3.1.4 **Recommendation.—** *It should be possible to selectively enable and disable event forwarding where a requirement to notify an event to a SM Manager is identified.*

6.3.1.5 **Recommendation.—** *ATN systems should provide for remote restart on command from a suitably authenticated and authorised SM Manager.*

6.3.1.6 **Recommendation.—** *ATN Routers should provide for remote isolation, i.e. graceful termination of the operational state and entry into a state where the router only responds to Systems Management requests.*

6.3.1.7 **Recommendation.—** *All ATN systems should keep local event logs for the recording of designated systems management events, and provide some mechanism to enable these logs to be transferred for off-line processing.*

6.3.1.8 **Recommendation.—** *The mean time between failures (MTBF) and mean time to repair (MTTR) metrics of all ATN systems and subnetworks should be actively monitored to ensure that they match theoretical expectations.*

*Note.— These metrics are used in the calculation of achieved continuity of service. The requirements for accuracy, precision and timeliness of these metrics will be subject to bi-lateral agreement between CDSM partners.*

6.3.1.9 **Recommendation.—** *ATN Routers should maintain synchronised clocks, as specified in Sub-Volume 1, for event logging purposes.*

6.3.1.10 **Recommendation.—** *System specific parameters that affect forwarding performance (e.g. memory utilisation) should be logged.*

6.3.1.11 A Systems Management Station shall support the basic functions of handling Notifications (e.g. by display to a human user) and supporting operations on Managed Objects (e.g. by means of a graphical user interface).

6.3.1.12 A Systems Management Agent shall support the basic functions of emitting Notifications and providing access to Managed Objects.

6.3.1.13 ATN systems shall support a general capability to allow them to be configured by a local SM Manager, and for configuration parameters to be accessible by a local SM Manager.

6.3.1.14 Manager-Agent operations shall be authenticated by the SM Agent, using the ATN security provisions specified in other Sub-Volumes.

*Note.— Since SM Managers can access SM Agents to retrieve and modify (where applicable) managed objects in the agent's management domain, authentication must be performed to protect against potential masquerade.*

6.3.1.15 Agent-Manager operations shall be authenticated by the SM Manager, using the ATN security provisions specified in other Sub-Volumes.

*Note.— An SM Manager needs to authenticate an SM Agent to provide the protection that a third party may not masquerade as a legitimate SM Agent and provide false management information. This also applies to Manager-Manager communication, where one SM Manager acts as an SM Agent.*

6.3.1.16 **Recommendation.—** *Only security alarm notifications and audit trail notifications should be included in security related notifications to a SM Manager.*

6.3.1.17 **Recommendation.—** *Local access control policy should define the SM Manager(s) that are authorised to receive notifications.*

6.3.1.18 **Recommendation.—** *Local mechanisms should be provided to report physical access and application access control violations.*

6.3.1.19 A systems management event shall be generated when there is a security violation such as failed authentication.

6.3.1.20 The following security events, as a minimum, shall be logged:

a) Authentication failures at ATS applications or at the Boundary Intermediate Systems (BISs)

b) Unauthorised accesses to management information and ATN resources

c) Detection of replayed ATS application messages or router IDRP PDUs

*Note 1.— Confidentiality of user data by means of encryption, and consequent decryption failures, are not within the scope of ATN security.*

*Note 2.— Denial of service to ATN users due to security-related problems, such as inability to establish a session key, is reported via security audit trail reporting, so is not considered here.*

6.3.1.21 **Recommendation.—** *Air-ground ATN implementations should notify a SM Manager only for critical and major severity levels of security alarm event; ground-ground ATN implementations may choose to notify events at more levels of severity if necessary.*

6.3.1.22 **Recommendation.—** *ATN systems should maintain at least the following ATN security audit trail reports/logs:*

*a) Requests (both successful and failed) of cryptographic key certificates (where applicable)*

*b) Attempts (both successful and failed) to create, delete, revoke, and modify cryptographic key certificates (where applicable)*

*c) Denial of data link service or ATS application service*

6.3.1.23 **Recommendation.—** *In the ATN environment, the following service requests of event type serviceReport should be recorded: key creation, deletion, revocation, modification of key certificates, and X.500 service requests.*

### 6.3.2 General Management Provisions for ATN Upper Layers and Applications

6.3.2.1 **Recommendation.—** *Applications that implement compliancy checks on the operation of the Transport Service should generate a systems management event upon incorrect operation of the Transport Service.*

*Note.— Mis-sequencing, corruption and loss and/or mis-delivery of user messages may occur due to incorrect operation of the transport layer software. This could be due to incorrect assignment of TPDU sequence numbers, packet re-ordering errors by the receiving transport entity, or failure to detect*

*and handle network errors. ATN Applications assume a high availability, reliable transport service, and this can only be provided if the transport layer software can be relied upon. High quality design and implementation of the transport layer software and extensive testing are assumed. This type of fault is not an ATN Internet error but a software error in the End System.*

6.3.2.2 **Recommendation.—** *In order to allow percentage availability to be determined, the end-user application should record, for later analysis, each successful attempt and each failed attempt to use the service provided by the communications subsystem, including, for example, each unsuccessful attempt to establish an end-to-end connection.*

6.3.2.3 **Recommendation.—** *To allow the percentage availability of applications to be determined, ATN end systems should record, in a local log, each time a 'service unavailable' application message is received.*

6.3.2.4 **Recommendation.—** *When authentication is implemented by means of some transformation of the user data being appended to the user data itself, this should be used to verify data integrity, by logging all authentication failures, as well as numbers of messages successfully received.*

*Note.— Where a checksum or hash function is used as part of the authentication mechanism, reported authentication failures may in fact be the result of loss of data integrity e.g. through undetected network errors.*

6.3.2.5 **Recommendation.—** *Authentication or data integrity failure events should result in a systems management notification being generated.*

*Note.— Other strategies such as a polling mechanism could alternatively be used.*

6.3.2.6 **Recommendation.—** *To enable connection establishment delay metrics to be measured, the ACSE or Dialogue Service should record, in a local log, each connect request, and the time at which the connect request was issued, as well as the time of each successful connection establishment.*

6.3.2.7 **Recommendation.—** *To allow transit times and reliability metrics to be deduced, ATN systems should have the capability to log an event when a user message crosses the notional ASE service boundary, i.e. when a message is submitted to or received from the communications subsystem.*

*Note.— Such capability would not necessarily be utilised for every ASE service invocation; a sampling approach could be adopted for example.*

6.3.2.8 **Recommendation.—** *Use should be made of application time-stamps, where available, to log the end to end transfer delays of user messages.*

6.3.2.9 **Recommendation.—** *For each confirmed application service, the round trip delay between request and confirmation messages should be logged, and used to provide an estimate of the end-to-end transfer delay in one direction.*

6.3.2.10 **Recommendation.—** *The mean and maximum values of the measured time interval between request and confirmation primitives should be recorded, in a local log, for each confirmed applications service.*

*Note.— Measurements need to include transmission time of the request message, the message computation time by the remote system, the human response time and the transmission time of the corresponding response message. If no dialogue was in place, the delay includes the connection establishment delay and the transfer delay for the two messages. Otherwise, the delay includes the data transfer delay for the two messages only.*

6.3.2.11 **Recommendation.—** *Applications should generate a systems management event when the measured or deduced end-to-end transfer delay exceeds a specified threshold (typically application specific - e.g. based on ATSC Class). An unacceptably long transit delay should be reported both to the service user and (for Ground Systems) a SM Manager.*

6.3.2.12 The addressing and version information exchanged by the CM application shall be provided to any ATN SM Manager, on request.

6.3.2.13 **Recommendation.—** *ATN end systems should record, in a local log, protocol errors by reason.*

6.3.2.14 **Recommendation.—** *ATN end systems should have the ability to signal an event when version negotiation fails between peer systems.*

6.3.2.15 **Recommendation.—** *ATN end systems should have the ability to signal an event when an unrecoverable error exception leads to the shutdown of the application ASE.*

6.3.2.16 **Recommendation.—** *ATN systems should record, in a local log, each ASE provider abort by abort reason.*

6.3.2.17 **Recommendation.—** *ATN systems should signal an event when an ASE technical timer expires and results in the termination of the application.*

### 6.3.3 General Provisions for ATN Transport Layer

6.3.3.1 **Recommendation.—** *To enable connection establishment delay metrics to be measured, the transport layer should record, in a local log, each connect request, and the time at which the connect request was issued.*

6.3.3.2 **Recommendation.—** *To enable connection establishment delay metrics to be measured, the transport layer should record, in a local log, the time of each successful connection establishment.*

6.3.3.3 **Recommendation.—** *The Transport Provider should generate a systems management event when a Transport Connection fails to be established.*

6.3.3.4 **Recommendation.—** *The Transport Provider should generate a systems management event when an established Transport Connection is lost.*

6.3.3.5 **Recommendation.—** *To enable continuity to be measured, the transport layer should record, in a local log, each uncommanded transport connection loss and each corresponding resumption of service.*

6.3.3.6 **Recommendation.—** *To allow transit delay metrics to be calculated, the transport layer should record, on a per transport connection basis, the measured round trip delay between transmission of a TPDU and its acknowledgement, together with an indication of whether the TPDU marks the end of a TSDU.*

6.3.3.7 **Recommendation.—** *The CO Transport Layer should generate a systems management event when the end-to-end transit delay as measured by the transport provider and derived from the round trip delay, exceeds a specified threshold (typically application specific - e.g. based on ATSC Class). An unacceptably long transit delay should be reported both to the service user and (for Ground Systems) a SM Manager.*

6.3.3.8 **Recommendation.—** *The Transport Layer should generate a systems management event when the number of TPDU discards due to checksum validation failure exceeds a SM Manager specified threshold during a given reporting period.*

6.3.3.9 **Recommendation.—** *The transport entity should record and log the number of TPDUs and TPDU octets sent and received over each transport connection.*

6.3.3.10 **Recommendation.—** *To allow reliability and throughput metrics to be calculated, the transport layer should record, in a local log, the number and total size of user messages sent on each transport connection.*

6.3.3.11 **Recommendation.—** *To allow reliability and throughput metrics to be calculated, the transport layer should record in a local log, for each sender, the number and total size of user messages received, both with and without error, on each transport connection in a given time period.*

### 6.3.4 General Provisions for ATN Lower Layers

6.3.4.1 **Recommendation.—** *The connectionless network service provider should support the remote invocation of the Echo Request function and option selection.*

6.3.4.2 **Recommendation.—** *ATN systems should have the ability to emit a systems management notification when an ECHO Request (ERQ) NPDU is delivered to that system, and that system is the final destination of the NPDU. The notification should include information contained in the ERQ NPDU.*

6.3.4.3 **Recommendation.—** *Whenever an ECHO Response (ERP) or Error NPDU is received at its destination system, that system should emit a systems management notification, including information contained in the ERQ or Error NPDU.*

*Note 1.— The above three Recommendations are of major importance for fault and performance investigation by SM Managers. However, it is possible that not all ATN participants will allow a manager in another domain to initiate ERQs. This would be analogous to Internet systems that do not answer "ping" requests.*

*Note 2.— If these Recommendations are supported in each and every ATN Router for any SM Manager Station, then Fault Management would be facilitated. Safeguards would be required for local Agents to validate and/or prohibit access from external users (i.e. need to be able to monitor and identify the source of ECHO Requests in locally managed Routers, and be able to discard them if appropriate). A SM Manager could then be provided with tools to generate ECHO PDUs from any point in the ATN Internet, and to correlate the notifications of ECHO responses and Error Responses with ECHO requests. The generation and use of Test Data patterns as the payload of ECHO Request PDUs, including monitoring for inconsistencies between responses and requests, would also be useful.*

6.3.4.4 **Recommendation.—** *CLNP Header checksums should be used in all CLNP packets.*

6.3.4.5 **Recommendation.—** *All ATN Systems should keep a count of the number of packets received with a CLNP header checksum failure.*

*Note.— The detection of CLNP Header checksum failures supports the measurement of subnetwork integrity metrics, and facilitates detection of subnetwork problems at source.*

6.3.4.6 **Recommendation.—** *ATN systems should log CLNP packet discards by discard reason.*

6.3.4.7 **Recommendation.—** *The connectionless network service provider should generate a systems management event when the number of CLNP PDU discards for Header Checksum verification, lifetime expiry or routing problems exceeds a threshold counter specified for that discard reason.*

6.3.4.8 **Recommendation.—** *When the number of packet discards due to congestion exceeds a defined threshold during a given reporting period, then a notification should be sent to a SM Manager.*

6.3.4.9 **Recommendation.—** *A CLNP Error Report should be requested (by means of the CLNP Header "error" bit) for all Data PDUs addressed to airborne destinations.*

6.3.4.10 **Recommendation.—** *The number, average and maximum size of CLNP packets sent and received during a reporting period should be logged. These should be analysed by ATSC Class and priority, and by each data link.*

6.3.4.11 **Recommendation.—** *For capacity planning, ATN Routers should keep counts of packets forwarded and data volumes, analysed by priority and ATSC Class.*

6.3.4.12 **Recommendation.—** *The connectionless network service provider should provide read-only remote access to its Forwarding Information Base (FIB).*

6.3.4.13 **Recommendation.—** *The IS-SME should generate a systems management event when the number of "Failure to complete the Route Initiation procedures" events exceeds a SM Manager specified threshold during a given reporting period.*

6.3.4.14 **Recommendation.—** *The IS-SME or the ES-IS entity should record and log the number of ES-IS PDUs and ES-IS PDU octets exchanged with each adjacent system over each mobile subnetwork.*

6.3.4.15 **Recommendation.—** *The IDRP entity should record and log the number of IDRP PDUs and of IDRP PDU octets sent and received over each BIS-BIS adjacency.*

6.3.4.16 **Recommendation.—** *IDRP should provide read-only remote access to its Routing Information Base (RIB), permitting the download of the complete RIB by a suitably authorised and authenticated SM Manager.*

6.3.4.17 **Recommendation.—** *IDRP should generate a systems management event upon loss of an adjacency.*

6.3.4.18 **Recommendation.—** *IDRP should support remote start up and shutdown of Ground/Ground adjacencies with other Routers (for fault isolation).*

6.3.4.19 **Recommendation.—** *IDRP should support remote invocation of the RIB Refresh procedure, where this is available in ground Routers.*

6.3.4.20 **Recommendation.—** *When the IS-IS protocol is used, then read-only remote access should be provided to its Routing Information Base (RIB), permitting the download of the complete RIB by a SM Manager.*

6.3.4.21 **Recommendation.—** *When the IS-IS protocol is used, then the protocol entity should generate a systems management event upon loss of an adjacency.*

6.3.4.22 **Recommendation.—** *When ES-IS protocol is used (i.e. for all airborne and air-ground systems, and optionally for ground systems), then read-only remote access should be provided to its Routing Information Base (RIB), permitting the download of the complete RIB by a SM Manager.*

6.3.4.23 **Recommendation.—** *If available, the Deflate compression algorithm should be invoked on all air/ground data links, since the detection and reporting of Deflate checksum errors will facilitate early detection of ground station problems by SM Managers, and support the measurement of subnetwork integrity metrics.*

6.3.4.24 **Recommendation.—** *The Mobile SNDCF should generate a systems management event upon detecting packet level Deflate checksum failures (Air/Ground Routers only).*

6.3.4.25 **Recommendation.—** *When Deflate is implemented, ATN Systems should keep a count of the number of packets received with a Deflate checksum failure, and make the counter available to SM Managers .*

6.3.4.26 **Recommendation.—** *Connection Mode SNDCFs should generate a systems management event following unexpected subnetwork connection loss or subnetwork reset.*

6.3.4.27 **Recommendation.—** *To allow subnetwork service continuity metrics to be monitored, all ATN Systems should log the time of uncommanded loss of a subnetwork connection.*

6.3.4.28 **Recommendation.—** *SNDCFs should support remote start up and shutdown of data links.*

6.3.4.29 **Recommendation.—** *When subnetworks or subnetwork connections can be dynamically managed, Systems Management actions should be available to activate and deactivate them.*

6.3.4.30 **Recommendation.—** *To allow subnetwork service availability metrics to be monitored, all ATN Systems should log each successful and each unsuccessful attempt to use the subnetwork service, i.e. to establish a connection over a connection mode subnetwork, or to send a packet over a connectionless subnetwork.*

6.3.4.31 **Recommendation.—** *ATN Air/Ground Routers should log the establishment and termination of subnetwork connections with Airborne Routers, together with time stamps to allow the duration of each mobile subnetwork connection to be obtained.*

6.3.4.32 **Recommendation.—** *To allow subnetwork service connection establishment delay metrics to be monitored, on each connection mode subnetwork, an ATN system should log the time at which each connect request is sent and the time at which the connection is successfully established.*

6.3.4.33 **Recommendation.—** *To allow subnetwork service continuity metrics to be monitored, when possible, ATN systems should log the time of each failure to transmit a packet over a connectionless subnetwork, and time of the next successful transmission attempt.*

6.3.4.34 **Recommendation.—** *All ATN Systems should log the number of packets sent and received over each subnetwork or subnetwork connection, and count the volume of data sent and received, analysed by priority and ATSC Class.*

*Note.— Implementing the above recommendation will allow the determination of subnetwork service Reliability (the probability that a packet is delivered without errors) and Throughput metrics. It will also be important for trend analysis and capacity planning.*

6.3.4.35 **Recommendation.—** *The mobile SNDCF entity should record, both before and after compression, the number of PDU octets sent and received over each mobile connection.*

6.3.4.36 **Recommendation.—** *To enable detection of capacity overloads, all ATN Systems should monitor average queue length analysed by priority during each sampling period, and generate a notification when the average queue length exceeds a set threshold (high watermark) or drops below another set threshold (low watermark).*

6.3.4.37 **Recommendation.—** *Changes to the number of entries in a Router's FIB should be logged.*

6.3.4.38 **Recommendation.—** *ATN Routers should log each route received and each route advertised to another router, recording the time received/advertised.*

6.3.4.39 **Recommendation.—** *ATN Air/Ground Routers should log the establishment and termination of adjacencies with Airborne Routers.*

6.3.4.40 **Recommendation.—** *If the performance assessment mechanism adopted requires that data flows are individually monitored ("microscopic" view), ATN Routers should meter each data flow, counting number of packets and data volumes for each identified data stream, where a data stream is identified by a unique combination of source, destination, priority and ATSC Class.*

6.3.4.41 **Recommendation.—** *If the performance assessment mechanism adopted requires only that the total data flow at each entry and exit point is monitored ("macroscopic" view), ATN Routers should meter, for each ATSC Class and priority, the number of packets and data volume received from each identified source and the number and volume sent to each identified destination, i.e. metering of aggregate values, rather than individual flows.*

### 6.3.5 General Provisions for ATN Subnetworks

6.3.5.1 **Recommendation.—** *Subnetworks should keep counts of packets sent and received, and of error counts where applicable, and provide remote access to such statistics.*

6.3.5.2 **Recommendation.—** *Subnetworks should generate a systems management event when error counts exceed a specified threshold during a set reporting period.*

6.3.5.3 **Recommendation.—** *Subnetworks should provide subnetwork specific diagnostics and test procedures, as appropriate for the subnetwork type, and support their remote use by a SM Manager.*

6.3.5.4 **Recommendation.—** *Subnetworks should make available to a SM Manager the set of existing subnetwork connections and the operational parameters for each such connection.*

6.3.5.5 **Recommendation.—** *Mobile Subnetworks should generate a systems management event when the number of "Failure to join a mobile subnetwork" events exceeds a SM Manager specified threshold during a given reporting period.*

6.3.5.6 **Recommendation.—** *Ground Systems should generate a systems management event on failure to establish a subnetwork connection, optionally with threshold counts for each diagnostic reason.*

6.3.5.7 **Recommendation.—** *Airborne Systems should maintain a local log of failures to establish a subnetwork connection, together with diagnostic reason codes.*

### 6.3.6 Accounting Meter Provisions

6.3.6.1 **Recommendation.—** *If the adopted charging model is based on usage-sensitive charging policies, ATN systems should implement a metering function that allows measurement of individual flows,*

*which are distinguished in the ICS traffic as a function of the value of certain parameters. The local charging policy determines the distinguishing parameters (e.g. traffic type, source/destination address).*

6.3.6.2 **Recommendation.—** *For usage-sensitive charging policies, the metering function should be configurable and provide for the following capabilities:*

*a) Filtering: to select based on certain criteria the subset of traffic for which accounting has to be performed*

*b) Segregation: to segregate the accountable traffic into individual flows that have to be accounted separately*

*c) Recording: to log for each of the individual flows the distinguishing parameters of the flows and the associated accounting data.*

6.3.6.3 **Recommendation.—** *For usage-sensitive charging policies, the metering function should support the selection of zero, one or several of the following filters :*

*a) Select for accounting, the packets exchanged over a particular subnetwork interface of the ATN system*

*b) Select for accounting, the packets exchanged with a particular adjacent system (i.e. packets received/sent from/to a particular remote SNPA address*

*c) Select for accounting, the packets whose source address in packets received and destination address in packets sent matches one particular NSAP address prefix*

*d) Select for accounting, the packets whose destination address in packets received and source address in packets sent matches one particular NSAP address prefix*

*e) Select for accounting, the packets whose source address in packets received and destination address in packets sent does not match one particular NSAP address prefix*

*f) Select for accounting, the packets whose destination address in packets received and source address in packets sent does not match one particular NSAP address prefix*

*g) Select for accounting, the packets exchanged between two particular zones of the ATN (i.e. whose source and destination NSAP addresses match a particular pair of NSAP address prefixes)*

*h) Select for accounting the packets that have a particular traffic type*

*i) Select for accounting the packets that have a particular priority.*

6.3.6.4 **Recommendation.—** *For usage-sensitive charging policies, the metering function should be able to segregate the traffic into individual flows, on the basis of:*

*a) The subnetwork interface over which the packets are exchanged (i.e. packets exchanged over different subnetwork interfaces, are considered to belong to different flows)*

*b) The remote SNPA address of the adjacent system with which the packets are exchanged (i.e. packets exchanged with different adjacent systems, are considered to belong to different flows)*

*c) The prefix of the source NSAP address in packets received and the destination NSAP address in packets sent (i.e. packets received from/sent to different zones of the ATN are considered to belong to different flows)*

*d) The prefix of the destination NSAP address in packets received and the source NSAP address in packets sent (i.e. packets received from/sent to different zones of the ATN are considered to belong to different flows)*

*e) The source and destination NSAP address prefixes (i.e. packets exchanged between two different zones of the ATN are considered to belong to different flows)*

*f) the traffic type (i.e. packets with different traffic types are considered to belong to different flows)*

*g) the priority (i.e. packets with different priority are considered to belong to different flows).*

6.3.6.5 **Recommendation.—** *For usage-sensitive charging policies, the metering function should be able to record the following information:*

*a) The start and stop time*

*b) The number of packets sent and received*

*c) The number of octets sent and received*

*d) The filters that were applied*

*e) The value of the distinguishing parameters of the flow.*

## 6.4. ATN SYSTEMS MANAGEMENT COMMUNICATION PROFILES

### 6.4.1 General Provisions

*Note 1.— Two distinct profiles for ATN inter-domain SM communications are defined in this chapter. The general requirements for SM communication are specified by reference to internationally standardised profiles (ISPs) to the extent possible. ISPs for OSI systems management contain profile specifications that are identified by the prefix "AOM." The communications functionality for both ATN profiles is defined in the profile identified as "AOM12 - Enhanced Management Communications profile."*

*Note 2.— The provisions in this chapter are solely to facilitate the use of Cross-Domain Systems Management (CDSM) and the Cross-Domain management information base (XMIB). Requirements on SM Managers are therefore only applicable to boundary management systems, i.e. those that will communicate with Agents in other management domains. Requirements on SM Agents are only applicable to SM Agents that will communicate with SM Managers in other management domains, and that provide access to the cross-domain MIB specified in 6.6.*

*Note 3.— There may also be requirements for a bulk transfer protocol, for example to transfer log files to a management application, or to download configuration files to a managed system. Such a protocol should be highly reliable, allow interruptions by users, and run in the background with priority such as not to interfere with other ATN usage (except in the case of management operations critical to the correct functioning of the ATN). AMHS might provide the only solution required. Alternatively, there are numerous standard bulk transfer mechanisms, including well-proven file transfer protocols such as FTAM and FTP. A profile to map one of these protocols to the ATN transport service could be developed. There are no plans to do this at present, and this is considered out of scope for the current specification.*

6.4.1.1 ATN Systems Management communication between administrative domains shall use the ISO/IEC 9595 | ITU-T Rec. X.710 and 9596-1 | ITU-T Rec. X.711 Common Management Information Service and Protocol (CMIS/CMIP), as profiled in this chapter.

6.4.1.2 The CMIP implementation shall be capable of being configured to establish an association for the purposes of ATN systems management.

*Note.— The above provision is necessary because the CMIP standards do not mandate the responsibility of establishing communication to either the manager role system or the agent role system but leave the particular style of management to be determined by the implementer or user. It is therefore necessary to ensure that all implementations are capable of establishing communications.*

6.4.1.3 Implementations acting in the agent role shall provide the event time parameter in all CMIP M-EVENT-REPORT PDUs sent.

6.4.1.4 Implementations acting in the agent role shall be capable of requesting confirmation of all CMIP M-EVENT-REPORT PDUs sent.

6.4.1.5 **Inter-domain Communication between SM Manager Applications**

*Note.— Information exchanged between SM Managers is likely to be limited to cross-domain statistical or aggregate information e.g. for accounting purposes. No special profile requirements for Manager to Manager communications are specified. The Cross-Domain CMIP profiles defined here will fulfil all requirements, with one of the SM Managers taking a "supra-manager" role and the other taking the SM Agent role for a given instance of communication.*

6.4.1.5.1 Manager-to-Manager communication shall be achieved by one of the SM Managers adopting the SM Agent role for a particular interchange.

6.4.1.5.2 Thus SM Manager implementations with Cross-Domain responsibilities, i.e. those supporting a Cross-Domain MIB, shall support both SM Manager and SM Agent roles.

### 6.4.2 ATN Management Communications Profile using Full OSI Stack

*Note.— The "full CMIP" profile referenced in this section is suitable for ground-ground management communications between management domains. It may also be used ground-ground within a local management domain if CMIP-based management is chosen, but this is a local matter.*

6.4.2.1 Where it is required to perform ATN systems management communication using a "full" CMIP protocol stack (i.e. BER-encoded CMIP and ACSE PDUs transferred using the full Session and Presentation protocols), then the communication profile shall be as specified for AOM12 in ISO/IEC ISP 11183-2, except as specified in 6.4.2.2.

6.4.2.2 **Mapping to the ATN Transport Service**

*Note.— The protocol profile includes Transport and lower layers, and this is required to be ICS compatible. ATN-specific transport layer parameters are specified (traffic type, communications class, transport priority and integrity requirements).*

6.4.2.2.1 The ATN systems management communication profile specified above shall make use of the connection mode ATN Transport Service as specified in 5.5.

6.4.2.2.2 The called and calling Transport Service Access Point (TSAP) address shall be provided to the TS-Provider on a per Transport Connection basis, using the called and calling Presentation Service Access Point (PSAP) addresses as provided to ACSE in the A-ASSOCIATE request, with null presentation and session selectors.

6.4.2.2.3 The TS-user shall indicate in all T-CONNECT requests that the transport expedited flow is not required.

6.4.2.2.4 Information on the use or non-use of the transport checksum shall be conveyed between the TS-User and TS-Provider via the "residual error rate" component of the T-CONNECT quality of service parameter.

*Note 1.— 5.5.1.2 requires that the TS-user specifies the required residual error rate to determine whether or not the transport checksum is required. In the ATN, the Quality of Service provided to applications is maintained using capacity planning techniques that are outside of the scope of this specification. Network administrators are responsible for designing and implementing a network that will meet the QOS requirements of the applications that use it.*

*Note 2.— If the TS-User requests the use of transport checksum the peer can only accept the use of checksum for this Transport Connection. If the TS-User proposes non-use of checksum the peer can either accept the non-use of checksum or force the use of checksum for this Transport Connection.*

6.4.2.2.5 The use or non-use of the transport checksum shall be negotiated by the TS-Provider on a per Transport Connection basis, based on TS-User requests in the T-CONNECT request and response primitives, as follows:

a) If the required residual error rate in the T-CONNECT request has the abstract value "low", then the TS-provider uses best endeavours to obtain the lowest available residual error rate, including the use of the transport checksum in all Transport Protocol Data Units (TPDUs). The residual error rate in the T-CONNECT indication is set to the abstract value "low", and the responder can only accept this value in the T-CONNECT response.

b) If the required residual error rate in the T-CONNECT request has the abstract value "high", then the TS-provider proposes non-use of the transport checksum. The residual error rate in the T-CONNECT indication is set to the abstract value "high", and the responder can either accept this value, or request "low" in the T-CONNECT response. In the former case, transport checksum is not used, and in the latter case the TS-provider uses the transport checksum for all TPDUs.

6.4.2.2.6 The Application Service Priority shall be provided to the TS-Provider for each Transport Connection, via the TC priority quality of service parameter, using the value for "Network / Systems Management" or "Network/Systems Administration" as appropriate, as specified in Table 1-2.

*Note.— Although transport priority and network priority are semantically independent of each other, it is required (in 5.5.1.2), that the TS-user specifies the Application Service Priority, which in turn is mapped into the resulting CLNP PDUs according to Table 1-2, which defines the fixed relationship between transport priority and the network priority.*

6.4.2.2.7 The ATN Security Label shall be provided to the TS-Provider per Transport Connection by local means, using the encoding specified in 5.6.2.2.2.

6.4.2.2.8 For systems management communications, the traffic type of "ATN Systems Management Communications" as specified in Table 5.6-1 shall be conveyed as the Security Tag field of the security tag set for Traffic Type and Associated Routing Policies within the ATN Security Label.

*Note.— The TS-User provides the complete ATN Security Label, although only security tag value is of relevance. The mechanism by which the transport connection initiator provides the appropriate ATN Security Label is a local matter. For example, it may be identified by an extension to the transport service interface, be implicit in the choice of a given TSAP, or be identified using a Systems Management function.*

### 6.4.3 ATN Management Communications Profile using ULCS

*Note 1.— The ATN-specific "efficiency-enhanced CMIP" profile defined in this section is suitable for air-ground management communications. It may also be used for ground-ground management communications, by bilateral agreement between communicating parties.*

*Note 2.— This section specifies requirements for an ATN-specific efficient CMIP profile for general ATN systems management (SM Manager to SM Agent) communications. It is not applicable to "full stack" applications such as ATSMHS, where a conventional full stack CMIP profile is more appropriate.*

*Note 3.— For efficient use of air-ground data links, and to avoid multiple protocol stacks in ATN systems, the "efficient" CMIP profile is based on the ULCS and ICS Provisions. The profile specified here references the international standardised profile (ISP) AOM12, modified to take account of the null-encoding session and presentation layer protocols, and ACSE APDUs encoded for transfer using the Packed Encoding Rules of ASN.1.*

6.4.3.1 Where it is required to perform ATN systems management communication using an "efficient" CMIP protocol stack (i.e. PER-encoded CMIP and ACSE PDUs transferred using the short-connect, null-encoding Session and Presentation protocol efficiency options), then the communication profile shall be as specified in this subsection.

6.4.3.2 The complementary communications interactions between CMISE-service-users within two end Management Information systems shall comply with the provisions specified here, with scope as specified in International Standardised Profile AOM12 and illustrated in Figure 6.4-1.

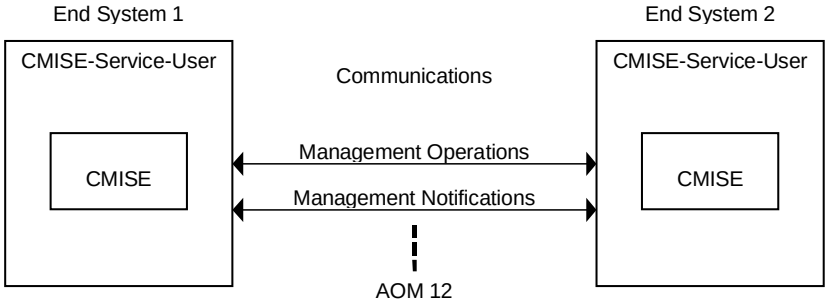


**Figure 6.4-1. Scope of the SM Communications Profile**

6.4.3.3 The supporting protocols for the efficient management communications profile shall be as specified in the standards indicated in Table 6.4-1, subject to the constraints and options specified in this profile.

**Table 6.4-1. Profile supporting stack**

| | |
|---|---|
| Application Layer | ISO 9595 \| Rec. X.710, 9596-1 \| Rec. X.711 (CMIS, CMIP v2)<br>ISO 9072-1 \| Rec. X.219, 9072-2 \| Rec. X.229 (ROSE)<br>ISO 8649 \| Rec. X.217, 8650-1 Amd.1 \| Rec. X.227/Amd 1 (ACSE ed.2)<br>ULCS (CF, encoding) |
| Presentation Layer | ISO 8822 \| Rec. X.216, 8823-1 Amd.1 \| Rec. X.226/Amd 1 (Service, "Fast Byte" protocol)<br>ISO 8824 \| Rec. X.680, 8825-2 \| Rec. X.691 (ASN.1, PER) |
| Session Layer | ISO 8326 \| Rec. X.215, 8327-1 Amd.1 \| Rec. X.725/Amd 1 (Service, "Fast Byte" protocol) |

*Note.— Table 6.4-1 supersedes Table 1 of ISO/IEC ISP 11183-2 for the purposes of the ATN-specific efficient CMIP profile.*

6.4.3.4 The profile requirements shall be as specified for profile AOM12 in ISO/IEC ISP 11183-2, except that the functions required from the supporting protocol stack of ACSE, Presentation and Session layers are specified in Sub-Volume 4, and not in part 1 of the multipart ISP AOM1n.

*Note.— The differences between the "efficient" ATN management communications profile and the standard AOM12 profile are listed in Table 6.4-2.*

**Table 6.4-2. Divergence from ISP 11183-2**

| *ISP 11183-2 clause* | *Modification for ATN Profile* |
|---|---|
| 1.5, Table 1 | Replace the table "Profile supporting stack" with Table 6.4-1 above. |
| 1.5 | Replace reference to part 1 of AOM1n with reference to the Dialogue Service in Sub-Volume 4. |
| 5 (Conformance to AOM12) | Replace reference to ISO/IEC ISP 11183-1 (which refers to ACSE, Presentation and Session layer requirements) with reference to the ULCS profile in Sub-Volume 4. |
| 5.1 | Delete reference to ISO/IEC ISP 11183-1. |
| 5.3 | Delete Note 2, "The complete association requirements are specified in ISO/IEC ISP 11183-1." |
| 5.4 | Replace "the application context of conforming implementations shall support the mapping of ROSE APDUs only onto the P-DATA Presentation service" with "the application context of conforming implementations shall support the mapping of ROSE APDUs only onto the D-DATA Dialogue service". |

| *ISP 11183-2 clause* | *Modification for ATN Profile* |
|---|---|
| A.1 | This clause allows non-conformant implementations to list the non-supported mandatory capabilities. For the SM provisions specified here, non-compliance is not permitted. Therefore the following provision is required: "All mandatory capabilities of ISO/IEC ISP 11183-2 as modified here shall be implemented." |
| A.2.1 | Replace "association" with "dialogue" throughout this clause, as the CMISE services are mapped to the ULCS Dialogue service, and not directly to ACSE. |
| A.2.3, Table A.3 caption | Replace "(in AARQapdu)" with "(in D-START Request and Indication User-Data)". |
| A.2.3, Table A.4 caption | Replace "(in AAREapdu)" with "(in D-START Response and Confirmation User-Data)". |
| A.2.3, Table A.3 and A.4 | Redefine profile support for userInfo parameter in CMIPUserInfo as "out of scope". |
| Clause A.2.4, Table A.5 | Profile support for userInfo parameter in CMIPAbortInfo is changed to "out of scope". |
| Clause A.3.2, Table A.13a and A.13b, index A.13a.1, A.13a.2, A.13b.1, A.13b.2 | Replace "See ISP 11183-1, 8.3" with "(3)", and insert new note after table: (3) A sender shall not encode values of greater than 2**31-1 or less than -2**31. A receiver shall be able to decode at least values in the range -2**31 to 2**31-1. |
| Clause A.3.2, Table A.13a, index A.13a.10, A.13a.11, A.13a.12 | Profile support of the INTEGER form of actionType, attributeId and eventType is changed from "i" to "m". |
| Table A.123 and A.124 | Delete note referring to ISP 11183-1. |

6.4.3.5 The CMIPUserInfo parameter shall be conveyed as the User-data of D-START primitives (rather than directly in AARQ and AARE apdus, as specified in ISP 11183-2).

6.4.3.6 Support for the CMIPUserInfo parameter shall be as specified in Tables 6.4-3 and 6.4-4 (which replace ISP 11183-2 Tables A.3 and A.4, respectively).

**Table 6.4-3. CMIPUserInfo parameter support (in D-START Request and Indication User-data)**

| | | *D-START req* | | | *D-START ind* | | |
|---|---|---|---|---|---|---|---|
| *Index* | *Parameter name* | *AOM12* | *ATN* | *Type, value(s) & range(s)* | *AOM12* | *ATN* | *Type, value(s) & range(s)* |
| A.3.1 | CMIPUserInfo | mm | mm | | mm | mm | |
| A.3.1.1 | protocolVersion | mm | mm | version 2 | mm | mm | version 2 |
| A.3.1.2 | functionalUnits | mo | mo | (1) | mo | mo | (1) |

| | | *D-START req* | | | *D-START ind* | | |
|---|---|---|---|---|---|---|---|
| *Index* | *Parameter name* | *AOM12* | *ATN* | *Type, value(s) & range(s)* | *AOM12* | *ATN* | *Type, value(s) & range(s)* |
| A.3.1.3 | accessControl | mo | mo | (2) | mo | mo | (2) |
| A.3.1.4 | userInfo | mo | i | -2 | mo | i | (2) |
| (1) The Initiator (combination of CMISE user and CMISE provider) is assumed to be capable of proposing functional units value "11101"B, given that the CMISE user requires them. The CMIP provider is assumed to be capable of supporting all functional units, except for "extended service". | | | | | | | |
| (2) In order to parse or process this, there must be an agreement as to what abstract syntax will be used in the EXTERNAL type. If this parameter is present in a user request, the CMIP machine includes it in the CMIP PDU sent. If this parameter is present on a received CMIP PDU, the CMIP machine passes the parameter to the CMISE user. The CMIP machine does not interpret this parameter. | | | | | | | |

**Table 6.4-4. CMIPUserInfo parameter support (in D-START Response and Confirmation User-data)**

| | | *D-START rsp* | | | *D-START cnf* | | |
|---|---|---|---|---|---|---|---|
| *Index* | *Parameter name* | *AOM12* | *ATN* | *Type, value(s) & range(s)* | *AOM12* | *ATN* | *Type, value(s) & range(s)* |
| A.4.1 | CMIPUserInfo | mm | mm | | mm | mm | |
| A.4.1.1 | protocolVersion | mm | mm | version 2 (3) | mm | mm | version 2 (3) |
| A.4.1.2 | functionalUnits | mo | mo | (1) | mo | mo | (1) |
| A.4.1.3 | accessControl | mo | mo | (2) | mo | mo | (2) |
| A.4.1.4 | userInfo | mo | io | -2 | mo | i | (2) |
| (1) The Responding CMISE provider may negotiate down from proposed functional units value "11111"B to "11101"B. The CMIP provider is assumed to be capable of supporting all functional units, except for "extended service". | | | | | | | |
| (2) In order to parse or process this, there must be an agreement as to what abstract syntax will be used in the EXTERNAL type. If this parameter is present in a user request, the CMIP machine includes it in the CMIP PDU sent. If this parameter is present on a received CMIP PDU, the CMIP machine passes the parameter to the CMISE user. The CMIP machine does not interpret this parameter. | | | | | | | |
| (3) The system may negotiate away Version 1. | | | | | | | |

6.4.3.7 Support for the CMIPAbortInfo parameter shall be as specified in Table 6.4-5 (which replaces ISP 11183-2 Table A.5).

**Table 6.4-5. CMIPAbortInfo parameter support**

| | | *Sender* | | | *Receiver* | | |
|---|---|---|---|---|---|---|---|
| *Index* | *Parameter name* | *AOM12* | *ATN* | *Type, value(s) & range(s)* | *AOM12* | *ATN* | *Type, value(s) & range(s)* |
| A.5.1 | CMIPUserInfo | mm | mm | | mm | mm | |
| A.5.1.1 | abortSource | mm | mm | | mm | mm | |
| A.5.1.2 | userInfo | mo | i | -1 | mo | i | -1 |

(1) In order to parse or process this, there must be an agreement as to what abstract syntax will be used in the EXTERNAL type. If this parameter is present in a user request, the CMIP machine includes it in the CMIP PDU sent. If this parameter is present on a received CMIP PDU, the CMIP machine passes the parameter to the CMISE user. The CMIP machine does not interpret this parameter.

6.4.3.8 Static support for common protocol parameters shall be as specified in Table 6.4-6 (which replaces Tables A.13a and A.13b in ISP 11183-2).

**Table 6.4-6. Common CMIP APDU parameter support.**

| *Index* | *Parameter name* | *Syntax* | *Sending* | | *Receiving* | | *Type, value(s) & range(s)* |
|---|---|---|---|---|---|---|---|
| | | | *AOM12* | *ATN* | *AOM12* | *ATN* | |
| A.13.1 | invokeID | INTEGER | m | m | m | m | -3 |
| A.13.2 | linked-ID | INTEGER | m | m | m | m | -3 |
| A.13.3 | baseManagedObjectClass | OBJECT IDENTIFIERINTEGER | mi | mi | mm | mm | |
| A.13.4 | baseManagedObjectInstance | DistinguishedName OCTET STRINGRDNSequence | mim | mim | mmm | mmm | |
| A.13.5 | accessControl | EXTERNAL | m | m | m | m | -2 |
| A.13.6 | synchronization | ENUMERATED | m | m | m | m | 0 to 1 |
| A.13.7 | managedObjectClass | OBJECT IDENTIFIERINTEGER | m | m | m | m | |
| A.13.8 | managedObjectInstance | DistinguishedName OCTET STRINGRDNSequence | mim | mim | mmm | mmm | |
| A.13.9 | currentTime | GeneralizedTime | m | m | m | m | |

| *Index* | *Parameter name* | *Syntax* | *Sending* | | *Receiving* | | *Type, value(s) & range(s)* |
|---|---|---|---|---|---|---|---|
| | | | *AOM12* | *ATN* | *AOM12* | *ATN* | |
| A.13.10 | actionType | OBJECT IDENTIFIERINTEGER | mi | mm | mm | mm | |
| A.13.11 | attributeId | OBJECT IDENTIFIERINTEGER | mi | mm | mm | mm | |
| A.13.12 | eventType | OBJECT IDENTIFIERINTEGER | mi | mm | mm | mm | |
| (1) The values for the Sending and receiving columns in this table apply consistently across all PDU parameter tables in AOM12, which use the corresponding common parameter. | | | | | | | |
| (2) In order to parse or process this, there must be an agreement as to what abstract syntax will be used in the EXTERNAL type. If this parameter is present in a user request, the CMIP machine includes it in the CMIP PDU sent. If this parameter is present on a received CMIP PDU, the CMIP machine passes the parameter to the CMISE user. The CMIP machine does not interpret this parameter. | | | | | | | |
| (3) See provisions for range of values below. | | | | | | | |

6.4.3.9 For the CMIP parameters invokeID and linked-ID, a sender shall not encode values of greater than $2^{(31)}$-1 or less than $-2^{31}$.

6.4.3.10 For the CMIP parameters invokeID and linked-ID, a receiver shall be able to decode at least values in the range $-2^{31}$ to $2^{(31)}$-1.

6.4.3.11 If the parameters userInfo and/or accessControl are present in a user request, the CMIP machine shall include them in the CMIP PDU sent.

6.4.3.12 If the parameters userInfo and/or accessControl are present on a received CMIP PDU, the CMIP machine shall pass the parameter(s) to the CMISE user.

6.4.3.13 Presentation and Session layer functional unit support shall be as specified in Sub-Volume 4, and not as specified in ISP 11183-2 Tables A.123 and A.124.

6.4.3.14 **Encoding Requirements for the "efficient" ATN management profile**

6.4.3.14.1 The abstract syntax of the management information conveyed in CMIP PDUs shall be as defined in the MIB specification using ASN.1.

6.4.3.14.2 The encoding of management information for interchange shall be realised using the basic, unaligned variant ASN.1 Packed Encoding Rules (PER).

6.4.3.14.3 Implementations shall support the transfer syntax derived from the encoding rules specified in ISO/IEC 8825-2 | ITU-T Rec. X.691 and named { joint-iso-itu-t asn1 (1) packed-encoding (3) basic (0)

unaligned (1) } for the purpose of generating and interpreting CMIP PDUs as defined in ISO/IEC 9596-1 | ITU-T Rec. X.711 by the abstract syntax "CMIP-PCI".

*Note.— The above requirement is equivalent to specifying that all CMISE and ROSE APDUs are encoded using the basic, unaligned variant ASN.1 Packed Encoding Rules. It replaces the requirement in clause 8.1 of ISO/IEC 9596-1 | ITU-T Rec. X.711 (CMIP) that "the implementation shall support the transfer syntax derived from the encoding rules specified in ISO/IEC 8825-1 | ITU-T Rec. X.690 (BER) and named { joint-iso-ccitt asn1(1) basic-encoding(1) } for the purpose of generating and interpreting CMIP PDUs as defined by the abstract syntax "CMIP-PCI"."*

### 6.4.3.15 **Mapping to Dialogue Service for the "efficient" ATN management profile**

6.4.3.15.1 ROSE service primitives shall map to the D-DATA request / indication primitives of the Dialogue Service defined in the ULCS Provisions.

*Note.— The above requirement replaces the ISO/IEC 9072-2 | ITU-T Rec. X.229 mapping to P-DATA request / indication primitives.*

6.4.3.15.2 When a CMISE-service-user requires to open an association for the exchange of CMISE / ROSE APDUs, the following sequence of events shall occur:

a) A connection is established using the D-START service (and not the A-ASSOCIATE service as specified in ISO/IEC 9596-1 | ITU-T Rec. X.711). The CMIPUserInfo maps to the D-START request User Data.

b) On receiving a D-START indication containing User Data, the peer CMIPM and CMISE-service-user analyse the CMIPUserInfo as specified in ISO/IEC 9596-1 | ITU-T Rec. X.711, clause A.2.2.

c) If the dialogue parameters are acceptable, the receiving CMISE-service-user and CMIPM construct the CMIPUserInfo required for the response and invoke a positive D-START response primitive, with the CMIPUserInfo as User-Data.

d) If the dialogue parameters are not acceptable, the receiving CMISE-service-user and/or CMIPM invoke a negative D-START response primitive, with the constructed CMIPUserInfo, if any, as User-Data.

e) If the initiating CMISE-service-user receives a negative D-START confirmation, no association has been established.

f) If the initiating CMISE-service-user receives a positive D-START confirmation, an association has been established and the peer CMISE-service-users can exchange management protocol data units.

6.4.3.15.3 When a CMISE-service-user requires the orderly termination of an association between peer application entities, the following sequence of events shall occur:

a) A D-END request primitive is invoked by the release initiator.

b) On receiving a D-END indication, the release responder invokes a positive D-END response, which will close the connection.

c) On receiving a positive D-END confirmation, the association ceases to exist.

6.4.3.15.4 When a CMISE-service-user requires the abrupt termination of the association between peer application entities, the following sequence of events shall occur:

a) A D-ABORT request primitive is invoked by the release initiator, with the Originator parameter set to “User” and no User Data parameter.

b) On receiving a D-ABORT indication, the Abort indication with Originator parameter is passed to the CMISE-User.

c) The association ceases to exist.

6.4.3.15.5 When the association between peer application entities is terminated by the loss of the underlying communications connection, the following sequence of events shall occur:

a) On receiving a D-P-ABORT indication, the Abort indication is passed to the CMISE-User.

b) The association ceases to exist.

6.4.3.16 **Mapping to Dialogue Service Parameters**

6.4.3.16.1 When a CMISE-service-user requires to open an association for the exchange of CMISE / ROSE APDUs, this shall be mapped to the D-START request primitive defined in 4.2.3.2 with parameter values as indicated in Table 6.4-7.

**Table 6.4-7**

| *D-START Request parameter* | *Value* |
|---|---|
| Called Peer ID | (Optional) Location of peer SMAE (24-bit aircraft identifier or ground Facility Designator) |
| Called Sys-ID | (Optional) System identifier (LOC+SYS) from address to distinguish between multiple peer SMAEs at the given location, if required. |
| Called Presentation Address | (Optional) PSAP address of peer SMAE. Must be supplied if, and only if, Called Peer ID is not specified) |
| Calling Peer ID | Not used |

| *D-START Request parameter* | *Value* |
|---|---|
| Calling Sys-ID | Not used |
| Calling Presentation Address | Not used |
| DS-User Version Number | 1 |
| Security Requirements | For further study |
| Quality of Service: Routing Class | "ATN Systems Management Communications" (value 60 Hex) |
| Quality of Service: Priority | "Network /Systems Management" (value 0), or "Network/Systems Administration" (value 8 Decimal) |
| Quality of Service: Residual Error Rate | "low" |
| User Data | CMIPUserInfo (see Table 6.4-3) |

6.4.3.16.2 When a CMISE-service-user requires to respond to a request from a peer to open an association for the exchange of CMISE / ROSE APDUs, this shall be mapped to the D-START response primitive defined in 4.2.3.2 with parameter values as indicated in Table 6.4-8.

**Table 6.4-8**

| *D-START Response parameter* | *Value* |
|---|---|
| DS-User Version Number | 1 |
| Security Requirements | For further study |
| Quality of Service: Routing Class | "ATN Systems Management Communications" (Value 60 Hex) |
| Quality of Service: Priority | "Network /Systems Management" (value 0), or "Network/Systems Administration" (value 8 Decimal) |
| Quality of Service: Residual Error Rate | "low" |
| Result | "accepted" or "rejected (transient)" or "rejected (permanent)" as selected by the CMISE-service-user. |
| User Data | CMIPUserInfo (see Table 6.4-4), if any |

6.4.3.17 **Mapping to the ATN Transport Service**

*Note.— For this ATN Management Communications profile, the use of the ATN connection-oriented Transport Service is specified in Sub-Volume 4.*

## 6.5. ATN SYSTEMS MANAGEMENT FUNCTION PROFILE

*Note 1.— In addition to the SM communication capabilities specified in 6.4, the basic level of SM functionality specified in the ISPs for profiles AOM211, AOM221 and AOM231 is required. These profiles in turn refer to AOM12, so their specification automatically invokes the relevant parts of AOM12.*

*Note 2.— AOM211 specifies a combination of standards, which collectively provide a set of "General Management Capabilities". It supports the capabilities to create and delete any MO instance, retrieve and modify any attribute, report any event and initiate any action. These capabilities further include a specific set of: Reporting Services (for object creation, object deletion, attribute value change, relationship change and alarms); and Attribute Modification and Retrieval Services (for a specific set of state and relationship attributes and attribute groups). A system implementing this profile can interwork with: a system implementing the same profile in a complementary role, or a system implementing profiles AOM212 (alarm reporting and state management capabilities) and/or AOM213 (alarm reporting capabilities) in a complementary role in the mode of operation specified by those profiles.*

*Note 3.— AOM221 specifies a combination of standards, which collectively provide "General Event Report Management". It provides a means for selecting which notifications (generated by MOs) are sent by a managed system, and where they are sent to. This process of selection is referred to as "discrimination", and the criteria for selection are specified in the Event Forwarding Discriminator (EFD) support MO. The profile also provides a means for initiating, terminating, suspending and resuming the sending of event reports as well as modification of the selection criteria. These capabilities are achieved by a set of operations upon, and a set of notifications generated by, the EFD MO. This profile also specifies use of a combination of standards that collectively provide the subset of CMIS required for General Event Management. It does not include any specification of the notifications that are discriminated upon, nor the MOs generating them. A system implementing this profile can interwork with a system implementing the same profile in a complementary role. A system implementing the AOM12 profile will be compatible with the communications aspects of this profile.*

*Note 4.— AOM231 specifies a combination of standards, which collectively provide "General Log Control". This provides a means for selecting which notifications (generated by MOs) or incoming event reports are logged within a managed system, and the criteria for selection are specified in the Log support MO. The profile also provides a means for initiating, terminating, suspending and resuming the logging process as well as modification of the logging selection criteria and retrieving information from the logs. These capabilities are achieved by a set of operations upon, and a set of notifications generated by, the Log MO. This profile also specifies use of a combination of standards that collectively provide the subset of CMIS required for General Log Control. A system implementing this profile in the Agent role must support a mechanism to ensure that the notifications emitted by the log can be sent to a system implementing the same profile in a complementary role. A system implementing the AOM12 profile will be compatible with the communications aspects of this profile.*

*Note 5.— The provisions in this chapter are solely to facilitate the use of Cross-Domain Systems Management (CDSM) and the Cross-Domain management information base (XMIB). Requirements on SM Managers are therefore only applicable to boundary management systems, i.e. those that will communicate with Agents in other management domains. Requirements on SM Agents are only applicable to SM Agents that will communicate with SM Managers in other management domains, and that provide access to the cross-domain MIB specified in 6.6.*

### 6.5.1 Basic Systems Management Functionality

6.5.1.1 For inter-domain communication, SM Manager implementations shall satisfy all the mandatory requirements for the manager role of profiles AOM211, AOM221 and AOM231 as specified by ISO/IEC ISP 12060-1, 12060-4 and 12060-5 respectively, except as explicitly stated otherwise in 6.5.

6.5.1.2 For inter-domain communication, Agent implementations shall conform to all the mandatory requirements for the agent role of profiles AOM211 and AOM221 as specified by ISO/IEC ISP 12060-1 and 12060-4 respectively, except as explicitly stated otherwise in 6.5.

6.5.1.3 Managed systems with sufficient resources to support a log shall conform to all the mandatory requirements for the agent role of profile AOM231 as specified by ISO/IEC ISP 12060-5, except as explicitly stated otherwise in 6.5.

6.5.1.4 In all cases where reference is made to a management function profile specified by a part of the multi-part standard ISO/IEC ISP 12060, the supporting communications profile for ATN Upper Layers (Session, Presentation, ACSE and CMISE/ROSE) shall be as specified in 6.4, rather than as defined in the referenced ISP.

### 6.5.2 Peer entity authentication at time of association establishment

6.5.2.1 Implementations shall conform to all the requirements for the peer entity authentication option in agent role or manager role (as appropriate) of profile AOM211 as specified by ISO/IEC ISP 11183-1 as referenced from ISO/IEC ISP 12060-1.

### 6.5.3 Systems Management functional unit negotiation

6.5.3.1 Implementations shall conform to all the requirements for Systems Management Functional Unit negotiation of profile AOM211 as specified by ISO/IEC ISP 12060-1.

### 6.5.4 Access Control

6.5.4.1 Implementations shall support appropriate access control to Management Information at the level of granularity of individual attributes.

*Note 1.— An example of an appropriate access control profile is AOM24322 as specified by ISO/IEC ISP 12060-9. This profile specifies a combination of OSI standards, which collectively provide capabilities to apply an Access Control List scheme to initiators attempting to access a specific set of targets.*

*Access is granted or denied based on initiator identity and constraints applicable to the operations and the targets in the request.*

*Note 2.— Details of Access Control mechanisms to be applied are currently left as a local issue, to be determined by the Access Control Policy of an ATN Management Domain and agreed bilaterally with adjacent domain SM Managers.*

## 6.6. CROSS-DOMAIN MANAGEMENT INFORMATION BASE (XMIB)

### 6.6.1 General Provisions

*Note 1.— ATN Management Information is defined by specifying:*

*a) the managed object class (MOC) definition of ATN MOs, using the formal notation specified in ISO/IEC 10165-4 | ITU-T Rec. X.722 Guidelines for the Definition of Managed Objects (GDMO);*

*b) the action type operations on the attributes of ATN MOs that are available to ATN Systems Management.*

*Note 2.— The details of the format and content of the management information to be exchanged are likely to evolve over time. The requirement is therefore for a flexible, general-purpose information structure and interchange mechanism, which will allow manager applications to identify the information content and take appropriate action depending upon procedures which will be defined as required.*

6.6.1.1 **Recommendation.—** *All Managed Objects defined for use in ATN systems management, whether standardised or not, should be defined in accordance with ISO/IEC 10165-1 | ITU-T Rec. X.720 (the Management Information Model), use the tools specified in ISO/IEC 10165-4 | ITU-T Rec. X.722 (Guidelines for the Definition of Managed Objects), and include Implementation Conformance Statements as required by ISO/IEC 10165-6 | ITU-T Rec. X.724 (Requirements and Guidelines for ICS Proformas related to OSI Management).*

6.6.1.2 Implementations of the cross-domain MIB (XMIB) shall support the capability to query the current operational status of the ATN systems (ES or IS) operated by other organisations, that directly provide an ATN ICS or application service to the local organisation (i.e. the failure of which would inevitably affect the provided service).

6.6.1.3 The cross-domain MIB shall support the capability to allow a SM Manager to be warned (via a notification) as soon as an error occurs in an adjacent domain that affects the ATN service provision.

6.6.1.4 The cross-domain MIB shall include the ISO/IEC 10165-2 | ITU-T Rec. X.721 log managed object class for the support of the standard ISO/IEC 10164-6 | ITU-T Rec. X.735 log control function across administrative boundaries.

6.6.1.5 The cross-domain MIB shall include the ISO/IEC 10165-2 | ITU-T Rec. X.721 eventForwardingDiscriminator managed object class for the support of the standard ISO/IEC 10164-5 | ITU-T Rec. X.734 event report management function across administrative boundaries.

### 6.6.2 Summary of requirements for cross-domain exchange of management information

6.6.2.1 Management Information available between ATN Management Domains shall include:

a) Subnetwork send, receive and error counts in Boundary Routers;

b) Routing Information Base /Forwarding Information Base (RIB/FIB) information in Boundary Routers.

6.6.2.2 The following Notifications shall be capable of being sent between ATN Management Domains, subject to discriminator settings:

a) CLNP ECHO Request Received Notification issued by the ATN ES or IS which was the target for the ERQ NPDU;

b) CLNP Error Report Received Notification issued by the ATN ES or IS which was the target for the Error NPDU.

c) CLNP ECHO Response Received Notification issued by the ATN ES or IS which was the target for the ERP NPDU.

6.6.2.3 ATN systems shall support the generation of a CLNP ECHO request as the result of a Systems Management action available between ATN Management Domains.

6.6.2.4 The XMIB Agent on aircraft shall maintain two managed objects, discriminator and eventForwardingDiscriminator as defined in ISO 10165-2 | ITU-T Rec. X.721, in order to filter out unnecessary information.

*Note.— These two MOs also determine the interval at which reports are sent to SM Managers.*

6.6.2.5 **Recommendation.—** *The discriminator should comply with the minimum mandatory ATN security alarm reports and audit trail reports.*

6.6.2.6 The Presentation Addresses of CM Application Entities within the local management domain shall be made available to XMIB-Users.

6.6.2.7 The XMIB shall contain summary information to allow end-to-end round trip delays to be monitored for all confirmed application services.

*Note.— Analysis of Performance Management requirements has identified a potential requirement for the exchange of performance statistics between ISPs, on the overall service provided to ATN end users. However, the analysis assumed that this will be co-ordinated through industry forums. This is therefore perceived as an off-line requirement that will be satisfied by the exchange of periodic (e.g. monthly) reports on ISPs network performance. Hence, this requirement is assumed to have no consequence for the XMIB specification.*

6.6.2.8 **Information required for cross-domain management of the AMHS**

6.6.2.8.1 MOs contained in the XMIB in support of cross-domain management of AMHS Message Servers and Gateways shall be as follows:

a) AMHS Summary MTA (derived from standard),

b) AMHS Summary Adjacent MTA (derived from standard),

c) association (standard),

d) AMHS Gateway (specific),

e) MTCU (specific).

*Note.— These MOs are partly derived from the standard MOs defined in Rec. X.467 | ISO/IEC 11588-8, with modifications specifically for the AMHS and the ATN.*

### 6.6.3 Management Information Containment Structure

6.6.3.1 **Top level structure of the XMIB containment tree**

*Note 1.— Cross-domain management information is defined based on XMIB users' concerns and XMIB access providers' security. Information elements provided to XMIB users may be limited due to security reasons.*

*Note 2.— The XMIB MOs are defined as generic MO classes and they may be refined by adding specific features to extend services by each XMIB access provider.*

*Note 3.— Which MOs may be accessed by an XMIB user, and which conditional packages are offered, is based on agreements between the XMIB access provider and the user.*

6.6.3.1.1 The upper levels of the XMIB containment tree shall be as illustrated in Figure 6.6-1, where shadowed boxes represent Managed Object Classes which can have multiple instances.

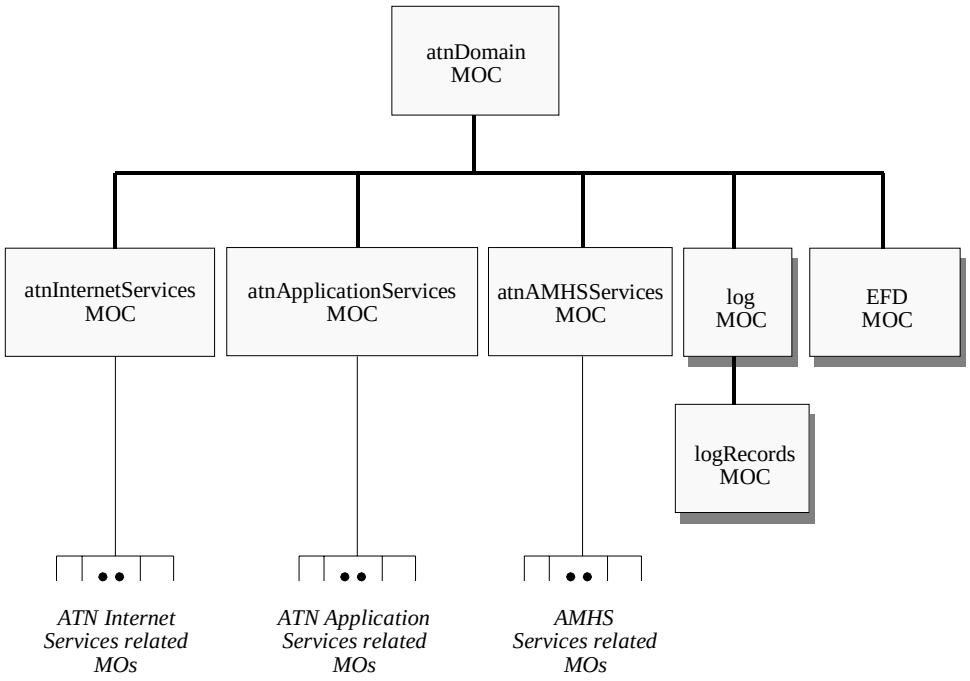


**Figure 6.6-1. Top level structure of the XMIB containment tree**

### 6.6.3.2 Management Information Structure for ATN Internet Services

6.6.3.2.1 Where a domain offers ATN Internet services, the XMIB containment subtree for ATN Internet Services MO Classes shall be as illustrated in Figure 6.6-2, where shadowed boxes represent Managed Object Classes that can have multiple instances.

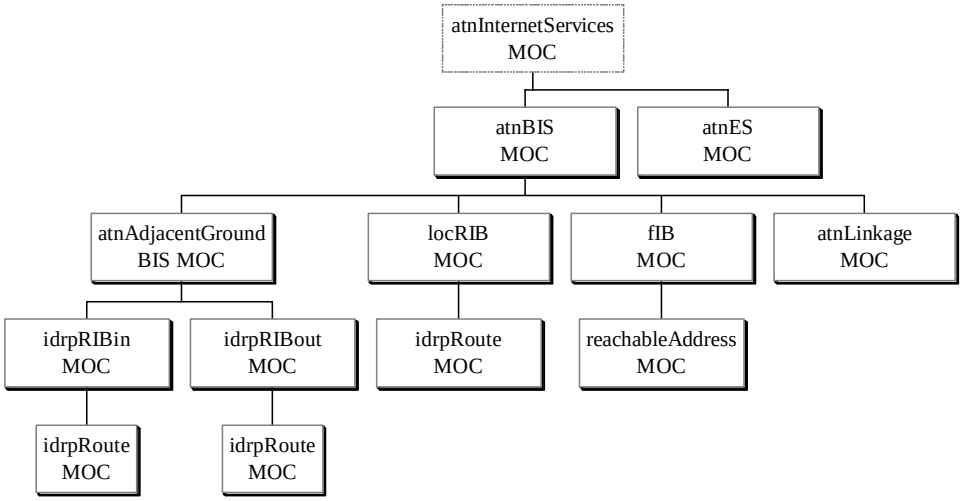


**Figure 6.6-2. XMIB naming hierarchy for ATN Internet Services**

### 6.6.3.3 Management Information Structure for ATN Application Services

6.6.3.3.1 Where a domain contains ATN application services, the XMIB containment subtree for ATN Application Services MO Classes shall be as illustrated in Figure 6.6-3, where shadowed boxes represent Managed Object Classes that can have multiple instances.

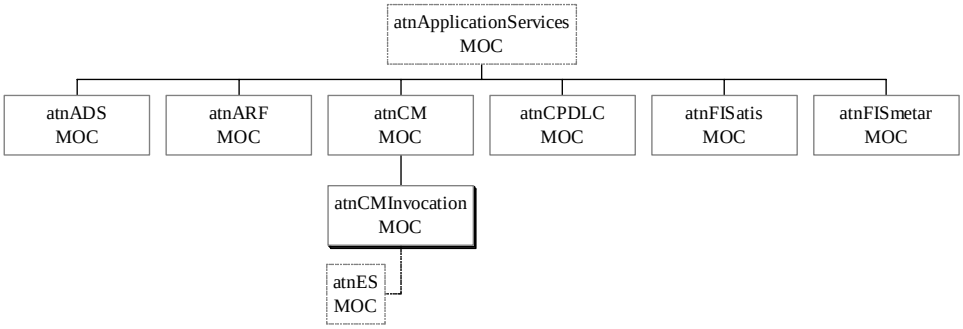


**Figure 6.6-3. XMIB naming hierarchy for ATN Application Services**

### 6.6.3.4 Management Information Structure for AMHS Services

6.6.3.4.1 Where a domain supports the AMHS service, the XMIB containment subtree for AMHS MO Classes shall be as illustrated in Figure 6.6-4, where shadowed boxes represent Managed Object Classes that can have multiple instances.

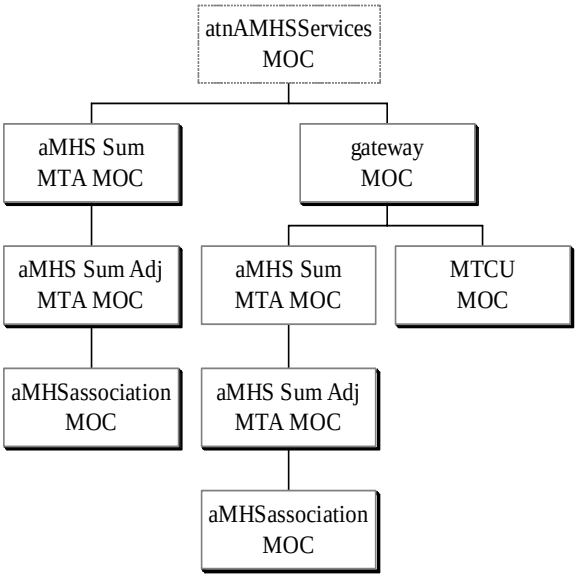


**Figure 6.6-4. XMIB naming hierarchy for AMHS Services**

### 6.6.4 Managed Object Class Definitions

6.6.4.1 The following "support" MO classes, for which the abstract syntax is specified in ISO/IEC 10165-2 | ITU-T Rec. X.721 (DMI - Definition of Management Information), shall be supported by XMIB implementations:

a) top,

*Note.— The generic attributes "objectClass", "nameBinding" and "packages" (inherited from "top") are implicitly included in every object class; thus they are not shown in other MO classes.*

b) log,

*Note.— This MO is exactly as defined in ISO/IEC 10165-2 | ITU-T Rec. X.721 (DMI). It is included in the ATN MIB by the invocation of the ISP for AOM231.*

c) eventLogRecord

d) system

*Note.— This MO class is exactly as defined in ISO/IEC 10165-2 | ITU-T Rec. X.721 (DMI). It is a superclass of the ATN-specific atnSystem MO class, which in turn is a superclass of the atnBIS and atnES MO classes.*

e) eventForwardingDiscriminator

*Note.— This MO is exactly as defined in ISO/IEC 10165-2 | ITU-T Rec. X.721 (DMI). It is included in the ATN MIB by the invocation of the ISP for AOM221.*

f) logRecord

*Note.— This MO is exactly as defined in ISO/IEC 10165-2 | ITU-T Rec. X.721(DMI). It is included in the ATN MIB by the invocation of the ISP for AOM231.*

6.6.4.2 The following "support" MO class, for which the abstract syntax is specified in ITU-T Recommendation M.3100 (Generic Network Information Model), shall be supported by XMIB implementations in domains which contain one or more AMHS MTAs :

a) equipment

*Note.— This MO class is exactly as defined in ITU-T Rec. M.3100. It is a superclass of the ATN-specific aMHSSumMTA and aMHSgateway MO classes.*

6.6.4.3 **The atnDomain MO Class**

6.6.4.3.1 The atnDomain MO class shall be used to represent an entire ATN management domain.

6.6.4.3.2 At the top level of the containment hierarchy, a single instance of this MOC shall be used in the XMIB to identify the management domain itself.

6.6.4.3.3 Instantiations of this MOC shall conform to the formal specification of atnDomain defined below using GDMO notation.

6.6.4.3.4 The attribute atnInternetServicesFlag shall be set TRUE if the XMIB contains an instantiation of the atnInternetServices MOC, and FALSE otherwise.

6.6.4.3.5 The attribute atnApplicationServicesFlag shall be set TRUE if the XMIB contains an instantiation of the atnApplicationServices MOC, and FALSE otherwise.

6.6.4.3.6 The attribute atnAMHSServicesFlag shall be set TRUE if the XMIB contains an instantiation of the atnAMHSServices MOC, and FALSE otherwise.

6.6.4.4 **The atnInternetServices MO Class**

6.6.4.4.1 The atnInternetServices MO class shall be instantiated in the XMIB to represent the subset of the ATN Internet services within an ATN management domain that is visible for cross-domain systems management purposes.

6.6.4.4.2 The XMIB shall support a single instance of this MOC to identify the ATN Internet services within the management domain.

6.6.4.4.3 Instantiations of this MOC shall conform to the formal specification of atnInternetServices defined below using GDMO notation.

6.6.4.4.4 The attribute numberBISinstances shall be set to indicate the number of atnBIS MO instantiations in the XMIB.

6.6.4.4.5 The attribute numberESinstances shall be set to indicate the number of atnES MO instantiations in the XMIB.

### 6.6.4.5 The atnApplicationServices MO Class

6.6.4.5.1 The atnApplicationServices MO class shall be used to represent the subset of the ATN application services within an ATN management domain that is visible for cross-domain systems management purposes.

6.6.4.5.2 The XMIB shall support a single instance of this MOC to identify the ATN application services within the management domain, if any.

6.6.4.5.3 Instantiations of this MOC shall conform to the formal specification of atnApplicationServices defined below using GDMO notation.

### 6.6.4.6 The atnAMHSServices MO Class

6.6.4.6.1 The atnAMHSServices MO class shall be used to represent the subset of the AMHS services within an ATN management domain that is visible for cross-domain systems management purposes.

6.6.4.6.2 The XMIB shall support a single instance of this MOC to identify the AMHS services within the management domain, if any.

6.6.4.6.3 Instantiations of this MOC shall conform to the formal specification of atnAMHSServices defined below using GDMO notation.

### 6.6.4.7 The atnSystem MO class

6.6.4.7.1 The atnSystem MO class as defined here shall be used to represent a generic ATN system.

*Note.— The atnSystem MO class is a generic MO class used in the construction of the atnBIS MO class and atnES MO class. It is never explicitly instantiated.*

6.6.4.7.2 When a CLNP Echo Request NPDU is received by the destination ATN system, a communicationsInformation notification shall be generated by MOs that are subclasses of atnSystem, with attributes as follows:

a) The value CDSM.echoRequestReceived as the informationType attribute.

b) The Echo Request PDU as a parameter in the informationData attribute of the communicationsInformation, using the pDU parameter.

c) The source NSAP address of the Echo Request PDU as a parameter in the informationData attribute of the communicationsInformation, using the sourceNSAP parameter.

6.6.4.7.3 When a CLNP Echo Response NPDU is received by the destination ATN system, a communicationsInformation notification shall be generated by MOs that are subclasses of atnSystem, with attributes as follows:

a) The value CDSM.echoResponseReceived as the informationType attribute.

b) The Echo Response PDU as a parameter in the informationData attribute of the communicationsInformation, using the pDU parameter.

c) The source NSAP address of the Echo Response PDU as a parameter in the informationData attribute of the communicationsInformation, using the sourceNSAP parameter.

6.6.4.7.4 When a CLNP Error NPDU is received by the destination ATN system, a communicationsInformation notification shall be generated by MOs that are subclasses of atnSystem, with attributes as follows:

a) The value CDSM.errorReportReceived as the informationType attribute.

b) The Error Report PDU as a parameter in the informationData attribute of the communicationsInformation, using the pDU parameter.

c) The source NSAP address of the Error Report PDU as a parameter in the informationData attribute of the communicationsInformation, using the sourceNSAP parameter.

### 6.6.4.8 **The atnApplicationEntity MO Class**

6.6.4.8.1 The atnApplicationEntity MO class as defined here shall be used to represent a generic ATN application entity.

*Note.— The atnApplicationEntity MO class is a generic MO class used in the construction of other MO classes. It is never explicitly instantiated.*

### 6.6.4.9 **The atnBIS MO Class**

6.6.4.9.1 The atnBIS MO class shall be used to represent one Boundary Intermediate System of the local organisation.

6.6.4.9.2 Where a domain contains one or more BISs, the XMIB shall support multiple MO instances of this class.

6.6.4.9.3 Instantiations of this MOC shall conform to the formal specification of atnBIS defined below using GDMO notation.

6.6.4.10 **The atnES MO Class**

6.6.4.10.1 The atnES MO class shall be used to represent one ATN End System of the local organisation.

6.6.4.10.2 Where a domain contains one or more ESs, the XMIB shall support multiple MO instances of this class.

6.6.4.10.3 Instantiations of this MOC shall conform to the formal specification of atnES defined below using GDMO notation.

6.6.4.11 **The atnAdjacentGroundBIS MO Class**

6.6.4.11.1 The atnAdjacentGroundBIS MO class shall be used to represent a BIS to BIS IDRP connection between the local BIS represented by the superior atnBIS MOs and an adjacent ground or air/ground BIS.

6.6.4.11.2 Instantiations of this MOC shall conform to the formal specification of atnAdjacentGroundBIS defined below using GDMO notation.

6.6.4.12 **The fIB MO Class**

6.6.4.12.1 The fIB MO class shall be used as a container MO of all reachableAddress MOs created as a result of a fibDump action on an atnBIS MO.

6.6.4.12.2 Instantiations of this MOC shall conform to the formal specification of fIB defined below using GDMO notation.

6.6.4.13 **The reachableAddress MO Class**

6.6.4.13.1 The reachableAddress MO class shall be used to represent one entry in the Forwarding Information Base (FIB) of the BIS.

6.6.4.13.2 Instantiations of this MOC shall conform to the formal specification of reachableAddress defined below using GDMO notation.

6.6.4.14 **The idrpRIB MO Class**

6.6.4.14.1 The idrpRIB MO class as defined here shall be used to represent a generic IDRP Routing Information Base.

*Note.— The idrpRIB MO class is a generic MO class used in the construction of the idrpRIBin, idrpRIBout and locRIB MO classes. It is never explicitly instantiated.*

6.6.4.15 **The idrpRIBin MO Class**

6.6.4.15.1 When created by a ribDump action on an atnBIS MO, the idrpRIBin MO class shall be used as a container MO of idrpRoute MOs.

*Note.— Instances are created as a result of a ribDump action on an atnBIS MO. The idrpRIBin MO represents one instance of the IDRP adjRIBin in the Local BIS that is associated with the BIS to BIS connection established with the adjacent BIS represented by the superior atnAdjacentGroundBIS MO.*

6.6.4.15.2 Instantiations of this MOC shall conform to the formal specification of idrpRIBin defined below using GDMO notation.

6.6.4.16 **The idrpRIBout MO Class**

6.6.4.16.1 When created by a ribDump action on an atnBIS MO, the idrpRIBout MO class shall be used as a container MO of idrpRoute MOs.

*Note.— Instances are created as a result of a ribDump action on an atnBIS MO. The idrpRIBout MO represents one instance of the IDRP adjRIBout in the Local BIS that is associated with the BIS to BIS connection established with the adjacent BIS represented by the superior atnAdjacentGroundBIS MO.*

6.6.4.16.2 Instantiations of this MOC shall conform to the formal specification of idrpRIBout defined below using GDMO notation.

6.6.4.17 **The locRIB MO Class**

6.6.4.17.1 When created by a ribDump action on an atnBIS MO, the locRIB MO class shall be used as a container MO of idrpRoute MOs.

*Note.— Instances are created as a result of a ribDump action on an atnBIS MO. The locRIB MO represents one instance of the IDRP locRIB in the Local BIS represented by the superior atnBIS MO.*

6.6.4.17.2 Instantiations of this MOC shall conform to the formal specification of locRIB defined below using GDMO notation.

6.6.4.18 **The idrpRoute MO Class**

6.6.4.18.1 The idrpRoute MO class shall be used in the XMIB to represent one entry in an adjRIBin, adjRIBout, or locRIB of a BIS.

6.6.4.18.2 Instantiations of this MOC shall conform to the formal specification of idrpRoute defined below using GDMO notation.

6.6.4.19 **The atnLinkage MO Class**

6.6.4.19.1 The atnLinkage MO class shall be used to represent the attachment of the BIS represented by the superior atnBIS MO to one subnetwork.

6.6.4.19.2 Instantiations of this MOC shall conform to the formal specification of atnLinkage defined below using GDMO notation.

6.6.4.20 **The atnSumAGapp MO Class**

6.6.4.20.1 The atnSumAGapp MO class as defined here shall be used to represent generically the aggregation of management information relating to an Air-Ground Application Entity type within a management domain.

*Note.— This MO class is a generic class used in the construction of the atnCM, atnCPDLC, atnADS, atnARF, atnFISatis and atnFISmetar MO classes. It is never explicitly instantiated.*

6.6.4.21 **The atnCM MO Class**

6.6.4.21.1 When a domain contains instances of the CM Application Entity, a single instantiation of the atnCM MO class shall be used as a container MO for individual CM entities, and also as a repository of statistical information relating to all CM entities within the domain.

6.6.4.21.2 Instantiations of this MOC shall conform to the formal specification of atnCM defined below using GDMO notation.

6.6.4.22 **The atnCMInvocation MO Class**

6.6.4.22.1 Instantiations of the atnCMInvocation MO class shall be used to support the cross-domain requirement to communicate CM addresses (not air-ground), and to provide a link between CM entities and the ATN End Systems which host them.

6.6.4.22.2 Instantiations of this MOC shall conform to the formal specification of atnCMInvocation defined below using GDMO notation. .

6.6.4.23 **The atnADS MO Class**

6.6.4.23.1 When a domain contains instances of the ADS Application Entity, a single instantiation of the atnADS MO class shall be used as a container MO for individual ADS entities, if required, and also as a repository of statistical information relating to all ADS entities within the domain.

6.6.4.23.2 Instantiations of this MOC shall conform to the formal specification of atnADS defined below using GDMO notation.

6.6.4.24 **The atnARF MO Class**

6.6.4.24.1 When a domain contains instances of the ADS Report Forwarding (ARF) Application Entity, a single instantiation of the atnARF MO class shall be used as a container MO of individual ARF entities, if required, and also as a repository of statistical information relating to all ARF entities within the domain.

6.6.4.24.2 Instantiations of this MOC shall conform to the formal specification of atnARF defined below using GDMO notation.

6.6.4.25 **The atnCPDLC MO Class**

6.6.4.25.1 When a domain contains instances of the CPDLC Application Entity, a single instantiation of the atnCPDLC MO class shall be used as a container MO for individual CPDLC entities, if required, and also as a repository of statistical information relating to all CPDLC entities within the domain.

6.6.4.25.2 Instantiations of this MOC shall conform to the formal specification of atnCPDLC defined below using GDMO notation.

6.6.4.26 **The atnFIS (atis and metar) MO Classes**

6.6.4.26.1 When a domain contains instances of the FIS Application Entity, a single instantiation of the atnFISatis and/or atnFISmetar MO class shall be used as a container MO for each of the individual FIS ATIS and METAR entities, if required, and also as a repository of statistical information relating to all FIS entities within the domain.

6.6.4.26.2 Instantiations of this MOC shall conform to the formal specification of atnFISatis / atnFISmetar defined below using GDMO notation.

6.6.4.27 **The aMHSgateway MO Class**

6.6.4.27.1 When a domain supports the AMHS gateway service, the aMHSgateway MO class shall be used to represent one (AFTN or CIDIN) AMHS Gateway.

6.6.4.27.2 When a domain supports the AMHS gateway service, the XMIB shall support multiple MO instances of this class.

*Note.— Attributes of this class include: Administrative State, Operational State, more generally the attributes and packages specified in ITU-T Rec. M.3100 for state change notification, the gateway name, addressing information related to the gateway (the MF-address (O/R) of the control position, the AF-address of the control position, the Ae/Ax-address (CIDIN) of the gateway), and the COM Centre to which the gateway is attached (or with which it is co-located).*

6.6.4.27.3 Instantiations of this MOC shall conform to the formal specification of aMHSgateway defined below using GDMO notation.

6.6.4.28 **The MTCU MO Class**

6.6.4.28.1 When a domain supports the AMHS gateway service, the MTCU MO Class shall be used to represent the AFTN and/or CIDIN MTCUs of an AMHS Gateway.

6.6.4.28.2 When a domain supports the AMHS gateway service, the XMIB Gateway MO shall support multiple MO instances of this class.

*Note.— Attributes of this class include: the MTCU type ("Basic service" AFTN/AMHS MTCU, "Extended service" AFTN/AMHS MTCU, CIDIN/AMHS MTCU with different MCFs), the maximum convertible message size, the maximum convertible recipient number, the supported character sets, Administrative State, Operational State, more generally the attributes and packages specified in ITU-T Rec. M.3100 for state change notification.*

6.6.4.28.3 Instantiations of this MOC shall conform to the formal specification of mTCU defined below using GDMO notation.

6.6.4.29 **The aMHSSumAdjMTA MO Class**

6.6.4.29.1 When a domain supports the AMHS service, the AMHS Summary of Adjacent MTAs (aMHSSumAdjMTA) MO Class shall be used to represent the MTAs adjacent to the MTA represented by the higher level instance of aMHSSumMTA MO.

6.6.4.29.2 Within that portion of the tree, multiple MO instances of this class under one aMHSSumMTA MO instance shall be supported.

6.6.4.29.3 Instantiations of this MOC shall conform to the formal specification of aMHSSumAdjMTA defined below using GDMO notation.

6.6.4.30 **The aMHSassociation MO Class**

6.6.4.30.1 When a domain supports the AMHS gateway service, the aMHSassociation MO Class shall be used to represent the associations between an adjacent MTA and the MTA represented by the higher level instance of aMHSSumMTA MO.

6.6.4.30.2 Within that portion of the tree, multiple aMHSassociation MO instances of this class shall be supported under one aMHSSumAdjMTA MO instance.

6.6.4.30.3 Instantiations of this MOC shall conform to the formal specification of aMHSassociation defined below using GDMO notation.

### 6.6.4.31 **The aMHSSumMTA MO Class**

6.6.4.31.1 Instantiations of the AMHS Summary MTA (aMHSSumMTA) MOC shall conform to the formal specification of aMHSSumMTA defined below using GDMO notation.

### 6.6.5 GDMO specification of XMIB

6.6.5.1 XMIB implementations shall conform to the formal definitions, or a proper subset thereof as indicated in the preceding paragraphs, as presented in this paragraph.

```
- - ****************************
- - Managed Object Class definitions
- - ****************************
aMHSSumAdjMTA MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      "Rec. M.3100 : 1992":createDeleteNotificationsPackage,
      "Rec. M.3100 : 1992":attributeValueChangeNotificationPackage,
      "Rec. M.3100 : 1992":stateChangeNotificationPackage,
      aMHSSumAdjMTA-P;
   CONDITIONAL PACKAGES
      "Rec. X.467 | ISO/IEC 11588-8":dirServiceReferencePackage PRESENT IF
         !Directory is used for MHS and an mhs-message-transfer-agent directory object instance is present
         for the adjacent MTA!;
REGISTERED AS   { moi aMHSSumAdjMTA(21) };

aMHSSumMTA MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. M.3100 : 1992":equipment;
   CHARACTERIZED BY
      "Rec. M.3100 : 1992":createDeleteNotificationsPackage,
      "Rec. M.3100 : 1992":stateChangeNotificationPackage,
      "Rec. M.3100 : 1992":administrativeOperationalStatesPackage,
      "Rec. M.3100 : 1992":equipmentsEquipmentAlarmPackage,
      aMHSSumMTA-P;
   CONDITIONAL PACKAGES
      "Rec. X.467 | ISO/IEC 11588-8":dirServiceReferencePackage PRESENT IF
         !Directory is used for MHS and an mhs-message-transfer-agent directory object instance is present
         for the adjacent MTA!;
REGISTERED AS   { moi aMHSSumMTA(10) };

aMHSassociation MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      "Rec. M.3100 : 1992":createDeleteNotificationsPackage,
      "Rec. M.3100 : 1992":stateChangeNotificationPackage,
      aMHSassociation-P;
```

```
   CONDITIONAL PACKAGES
      "Rec. X.467 | ISO/IEC 11588-8":simpleCredentialsPackage PRESENT IF
         !Simple credentials are used for the current association!;
REGISTERED AS   { moi aMHSassociation(22) };

aMHSgateway MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. M.3100 : 1992":equipment;
   CHARACTERIZED BY
      "Rec. M.3100 : 1992":createDeleteNotificationsPackage,
      "Rec. M.3100 : 1992":stateChangeNotificationPackage,
      "Rec. M.3100 : 1992":administrativeOperationalStatesPackage,
      aMHSgateway-P,
     "Rec. M.3100 : 1992":equipmentsEquipmentAlarmPackage;
   CONDITIONAL PACKAGES
      "Rec. X.467 | ISO/IEC 11588-8":dirServiceReferencePackage PRESENT IF
         !Directory is used for MHS and an mhs-message-transfer-agent directory object instance is present
         for the adjacent MTA!;
REGISTERED AS   { moi aMHSgateway(9) };

atnADS MANAGED OBJECT CLASS
   DERIVED FROM
      atnSumAGapp;
   CHARACTERIZED BY
      atnADS-P;
REGISTERED AS   { moi atnADS(23) };

atnARF MANAGED OBJECT CLASS
   DERIVED FROM
      atnSumAGapp;
   CHARACTERIZED BY
      atnARF-P;
REGISTERED AS   { moi atnARF(24) };

atnAdjacentGroundBIS MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      atnadjGroundBIS-P;
REGISTERED AS   { moi atnAdjacentGroundBIS(11) };

atnApplicationEntity MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      aTNapplicationEntity-P;
```

```
REGISTERED AS   { moi aTNapplicationEntity(8) };

atnApplicationServices MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      atnApplicationServices-P;
REGISTERED AS   { moi atnApplicationServices(3) };

atnBIS MANAGED OBJECT CLASS
   DERIVED FROM
      atnSystem;
   CHARACTERIZED BY
      atnBIS-P;
REGISTERED AS   { moi atnBIS(6) };

atnCM MANAGED OBJECT CLASS
   DERIVED FROM
      atnSumAGapp;
   CHARACTERIZED BY
      atnCM-P;
REGISTERED AS   { moi atnCM(25) };

atnCMInvocation MANAGED OBJECT CLASS
   DERIVED FROM
      atnApplicationEntity;
   CHARACTERIZED BY
      atnCMInvocation-P;
REGISTERED AS   { moi atnCMInvocation(28) };

atnCPDLC MANAGED OBJECT CLASS
   DERIVED FROM
      atnSumAGapp;
   CHARACTERIZED BY
      atnCPDLC-P;
REGISTERED AS   { moi atnCPDLC(26) };

atnDomain MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      atnDomain-P;
REGISTERED AS   { moi atnDomain(1) };
```

```
atnES MANAGED OBJECT CLASS
   DERIVED FROM
      atnSystem;
   CHARACTERIZED BY
      atnES-P;
REGISTERED AS   { moi atnES(7) };

atnFISatis MANAGED OBJECT CLASS
   DERIVED FROM
      atnSumAGapp;
   CHARACTERIZED BY
      atnFISatis-P;
REGISTERED AS   { moi atnFISatis(27) };

atnFISmetar MANAGED OBJECT CLASS
   DERIVED FROM
      atnSumAGapp;
   CHARACTERIZED BY
      atnFISmetar-P;
REGISTERED AS   { moi atnFISmetar(30) };

atnInternetServices MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      atnInternetServices-P;
REGISTERED AS   { moi atnInternetServices(2) };

atnLinkage MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      atnLinkage-P;
REGISTERED AS   { moi atnLinkage(19) };

atnAMHSServices MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      atnAMHSServices-P;
REGISTERED AS   { moi atnAMHSServices(4) };
```

```
atnSumAGapp MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      atnSumAGapp-P;
REGISTERED AS   { moi atnSumAGapp(29) };

atnSystem MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":system;
   CHARACTERIZED BY
      atnSystem-P;
REGISTERED AS   { moi atnSystem(5) };

eventForwardingDiscriminator MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":eventForwardingDiscriminator;
REGISTERED AS   {joint-iso-ccitt ms(9) smi(3) part2(2) managedObjectClass(3) 4};

fIB MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      fIB-P;
REGISTERED AS   { moi fIB(12) };

idrpRIB MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      idrpRIB-P;
REGISTERED AS   { moi idrpRIB(14) };

idrpRIBin MANAGED OBJECT CLASS
   DERIVED FROM
      idrpRIB;
   CHARACTERIZED BY
      idrpRIBin-P;
REGISTERED AS   { moi idrpRIBin(15) };

idrpRIBout MANAGED OBJECT CLASS
   DERIVED FROM
      idrpRIB;
   CHARACTERIZED BY
      idrpRIBout-P;
REGISTERED AS   { moi idrpRIBout(16) };
```

```
idrpRoute MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      idrpRoute-P;
   CONDITIONAL PACKAGES
      nextHop-P PRESENT IF
         ! the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP NEXT_HOP
         attribute !,
      distListIncl-P PRESENT IF
         ! the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP DIST_LIST_INCL
         attribute !,
      distListExcl-P PRESENT IF
         ! the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP DIST_LIST_EXCL
         attribute !,
      multiExitDisc-P PRESENT IF
         ! the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP
         MULTI_EXIT_DISC attribute !,
      security-P PRESENT IF
         ! the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP SECURITY attribute
         !;
REGISTERED AS   { moi idrpRoute(18) };

locRIB MANAGED OBJECT CLASS
   DERIVED FROM
      idrpRIB;
   CHARACTERIZED BY
      locRIB-P;
REGISTERED AS   { moi locRIB(17) };

mTCU MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      "Rec. M.3100 : 1992":createDeleteNotificationsPackage,
      "Rec. M.3100 : 1992":stateChangeNotificationPackage,
      "Rec. M.3100 : 1992":administrativeOperationalStatesPackage,
      "Rec. M.3100 : 1992":processingErrorAlarmPackage,
      mTCU-P,
      "Rec. X.467 | ISO/IEC 11588-8":securityAlarmPackage;
REGISTERED AS   { moi mTCU(20) };
```

```
reachableAddress MANAGED OBJECT CLASS
   DERIVED FROM
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
   CHARACTERIZED BY
      reachableAddress-P;
REGISTERED AS   { moi reachableAddress(13) };

- - ****************************
- - Name Binding definitions
- - ****************************

aMHSSumAdjMTA-aMHSSumMTA NAME BINDING
   SUBORDINATE OBJECT CLASS       aMHSSumAdjMTA AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  aMHSSumMTA AND SUBCLASSES;
   WITH ATTRIBUTE
                        "Rec. X.467 | ISO/IEC 11588-8":adjMtaGlobalDomainId;
   CREATE                    WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi aMHSSumAdjMTA-aMHSSumMTA(14) };

aMHSSumMTA-aMHSgateway NAME BINDING
   SUBORDINATE OBJECT CLASS       aMHSSumMTA AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  aMHSgateway AND SUBCLASSES;
   WITH ATTRIBUTE
                        "Rec. X.467 | ISO/IEC 11588-8":globalDomainId;
   CREATE                    WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                    ONLY-IF-NO-CONTAINED-OBJECTS ;
REGISTERED AS   { nboi aMHSSumMTA-gateway(16) };

aMHSSumMTA-atnAMHSServices NAME BINDING
   SUBORDINATE OBJECT CLASS       aMHSSumMTA AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnAMHSServices AND SUBCLASSES;
   WITH ATTRIBUTE
                        "Rec. X.467 | ISO/IEC 11588-8":globalDomainId;
   CREATE                    WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi aMHSSumMTA-atnAMHSServices(15) };

aMHSassociation-aMHSSumAdjMTA NAME BINDING
   SUBORDINATE OBJECT CLASS       aMHSassociation AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  aMHSSumAdjMTA AND SUBCLASSES;
   WITH ATTRIBUTE
                        "Rec. X.467 | ISO/IEC 11588-8":applicationContext;
   CREATE                    WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi aMHSassociation-aMHSSumAdjMTA(13) };
```

```
aMHSgateway-aMHSServices NAME BINDING
   SUBORDINATE OBJECT CLASS       aMHSgateway AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnAMHSServices AND SUBCLASSES;
   WITH ATTRIBUTE              aMHSgatewayName;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi aMHSgateway-atnAMHSServices(17) };

atnADS-atnApplicationServices NAME BINDING
   SUBORDINATE OBJECT CLASS       atnADS AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnApplicationServices AND SUBCLASSES;
   WITH ATTRIBUTE              aDSsumId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnADS-atnApplicationServices(21) };

atnARF-atnApplicationServices NAME BINDING
   SUBORDINATE OBJECT CLASS       atnARF AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnApplicationServices AND SUBCLASSES;
   WITH ATTRIBUTE              aRFsumId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnARF-atnApplicationServices(22) };

atnAdjacentGroundBIS-atnBIS NAME BINDING
   SUBORDINATE OBJECT CLASS       atnAdjacentGroundBIS AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnBIS AND SUBCLASSES;
   WITH ATTRIBUTE              bisNET;
   BEHAVIOUR                   atnAdjacentGroundBIS-atnBIS-B;
   CREATE                   ;
   DELETE                   ;
REGISTERED AS   { nboi atnAdjacentGroundBIS-atnBIS(3) };

atnApplicationServices-atnDomain NAME BINDING
   SUBORDINATE OBJECT CLASS       atnApplicationServices AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnDomain AND SUBCLASSES;
   WITH ATTRIBUTE              applicationServiceId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnApplicationServices-atnDomain(25) };

atnBIS-atnInternetServices NAME BINDING
   SUBORDINATE OBJECT CLASS       atnBIS AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnInternetServices AND SUBCLASSES;
   WITH ATTRIBUTE              nET;
   BEHAVIOUR                   atnBIS-atnInternetServices-B;
   CREATE                   ;
   DELETE                   ;
REGISTERED AS   { nboi atnBIS-atnInternetServices(1) };
```

```
atnCM-atnApplicationServices NAME BINDING
   SUBORDINATE OBJECT CLASS       atnCM AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnApplicationServices AND SUBCLASSES;
   WITH ATTRIBUTE              cMsumId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnCM-atnApplicationServices(20) };

atnCMInvocation-atnCM NAME BINDING
   SUBORDINATE OBJECT CLASS       atnCMInvocation AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnCM AND SUBCLASSES;
   WITH ATTRIBUTE              cMInvocationId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnCMInvocation-atnCM(19) };

atnCPDLC-atnApplicationServices NAME BINDING
   SUBORDINATE OBJECT CLASS       atnCPDLC AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnApplicationServices AND SUBCLASSES;
   WITH ATTRIBUTE              cPDLCsumId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnCPDLC-atnApplicationServices(23) };

atnES-atnInternetServices NAME BINDING
   SUBORDINATE OBJECT CLASS       atnES AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnInternetServices AND SUBCLASSES;
   WITH ATTRIBUTE              nET;
   BEHAVIOUR                   atnES-atnInternetServices-B;
   CREATE                   ;
   DELETE                   ;
REGISTERED AS   { nboi atnES-atnInternetServices(2) };

atnFISatis-atnApplicationServices NAME BINDING
   SUBORDINATE OBJECT CLASS       atnFISatis AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnApplicationServices AND SUBCLASSES;
   WITH ATTRIBUTE              fISsumId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnFISatis-atnApplicationServices(24) };

atnFISmetar-atnApplicationServices NAME BINDING
   SUBORDINATE OBJECT CLASS       atnFISmetar AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnApplicationServices AND SUBCLASSES;
   WITH ATTRIBUTE              fISsumId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnFISmetar-atnApplicationServices(30) };
```

```
atnInternetServices-atnDomain NAME BINDING
   SUBORDINATE OBJECT CLASS       atnInternetServices AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnDomain AND SUBCLASSES;
   WITH ATTRIBUTE                  internetServicesId;
   CREATE                     WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnInternetServices-atnDomain(26) };

atnLinkage-atnBIS NAME BINDING
   SUBORDINATE OBJECT CLASS       atnLinkage AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnBIS AND SUBCLASSES;
   WITH ATTRIBUTE                  linkageID;
   BEHAVIOUR                    atnLinkage-atnBIS-B;
   CREATE                     ;
   DELETE                     ;
REGISTERED AS   { nboi atnLinkage-atnBIS(12) };

atnAMHSServices-atnDomain NAME BINDING
   SUBORDINATE OBJECT CLASS       atnAMHSServices AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnDomain AND SUBCLASSES;
   WITH ATTRIBUTE                  mHSServicesId;
   CREATE                     WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi atnAMHSServices-atnDomain(27) };

eventForwardingDiscriminator-atnDomain NAME BINDING
   SUBORDINATE OBJECT CLASS
                        "Rec. X.721 | ISO/IEC 10165-2 : 1992":eventForwardingDiscriminator;
   NAMED BY SUPERIOR OBJECT CLASS  atnDomain AND SUBCLASSES;
   WITH ATTRIBUTE
                        "Rec. X.721 | ISO/IEC 10165-2 : 1992":discriminatorId;
   CREATE                     WITH-REFERENCE-OBJECT,
                        WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                     ONLY-IF-NO-CONTAINED-OBJECTS ;
REGISTERED AS   { nboi eventForwardingDiscriminator-atnDomain(29) };

fIB-atnBIS NAME BINDING
   SUBORDINATE OBJECT CLASS       fIB AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnBIS AND SUBCLASSES;
   WITH ATTRIBUTE                  dumpID;
   BEHAVIOUR                    fIB-atnBIS-B;
   CREATE                     WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                     ;
REGISTERED AS   { nboi fIB-atnBIS(4) };

idrpRIBIn-atnAdjacentGroundBIS NAME BINDING
   SUBORDINATE OBJECT CLASS       idrpRIBin AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnAdjacentGroundBIS AND SUBCLASSES;
```

```
   WITH ATTRIBUTE              ribID;
   BEHAVIOUR                idrpRIBIn-atnAdjacentGroundBIS-B;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                   DELETES-CONTAINED-OBJECTS ;
REGISTERED AS   { nboi idrpRIBIn-atnAdjacentGroundBIS(6) };

idrpRIBout-atnAdjacentGroundBIS NAME BINDING
   SUBORDINATE OBJECT CLASS      idrpRIBout AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnAdjacentGroundBIS AND SUBCLASSES;
   WITH ATTRIBUTE              ribID;
   BEHAVIOUR                idrpRIBout-atnAdjacentGroundBIS-B;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                   DELETES-CONTAINED-OBJECTS ;
REGISTERED AS   { nboi idrpRIBout-atnAdjacentGroundBIS(7) };

idrpRoute-idrpRIBin NAME BINDING
   SUBORDINATE OBJECT CLASS      idrpRoute AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  idrpRIBin AND SUBCLASSES;
   WITH ATTRIBUTE              routeID;
   BEHAVIOUR                idrpRoute-idrpRIBin-B;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                   DELETES-CONTAINED-OBJECTS ;
REGISTERED AS   { nboi idrpRoute-idrpRIBin(10) };

idrpRoute-idrpRIBout NAME BINDING
   SUBORDINATE OBJECT CLASS      idrpRoute AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  idrpRIBout AND SUBCLASSES;
   WITH ATTRIBUTE              routeID;
   BEHAVIOUR                idrpRoute-idrpRIBout-B;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                   DELETES-CONTAINED-OBJECTS ;
REGISTERED AS   { nboi idrpRoute-idrpRIBout(11) };

idrpRoute-locRIB NAME BINDING
   SUBORDINATE OBJECT CLASS      idrpRoute AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  locRIB AND SUBCLASSES;
   WITH ATTRIBUTE              routeID;
   BEHAVIOUR                idrpRoute-locRIB-B;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                   DELETES-CONTAINED-OBJECTS ;
REGISTERED AS   { nboi idrpRoute-locRIB(9) };

locRIB-atnBIS NAME BINDING
   SUBORDINATE OBJECT CLASS      locRIB AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnBIS AND SUBCLASSES;
   WITH ATTRIBUTE              ribID;
```

```
   BEHAVIOUR                locRIB-atnBIS-B;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
   DELETE                   DELETES-CONTAINED-OBJECTS ;
REGISTERED AS   { nboi locRIB-atnBIS(8) };

log-atnDomain NAME BINDING
   SUBORDINATE OBJECT CLASS       "Rec. X.721 | ISO/IEC 10165-2 : 1992":log
                          AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  atnDomain AND SUBCLASSES;
   WITH ATTRIBUTE
                          "Rec. X.721 | ISO/IEC 10165-2 : 1992":logId;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi log-atnDomain(28) };

mTCU-aMHSgateway NAME BINDING
   SUBORDINATE OBJECT CLASS       mTCU AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  aMHSgateway AND SUBCLASSES;
   WITH ATTRIBUTE           mTCUname;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi mTCU-gateway(18) };

reachableAddress-fIB NAME BINDING
   SUBORDINATE OBJECT CLASS       reachableAddress AND SUBCLASSES;
   NAMED BY SUPERIOR OBJECT CLASS  fIB AND SUBCLASSES;
   WITH ATTRIBUTE           reachableAddressId;
   BEHAVIOUR                reachableAddress-fIB-B;
   CREATE                   WITH-AUTOMATIC-INSTANCE-NAMING;
REGISTERED AS   { nboi reachableAddress-fIB(5) };

- - ****************************
- - Package definitions
- - ****************************

 aMHSSumAdjMTA-P PACKAGE
   BEHAVIOUR         creationAndDeletionNotification-B,
                     administrativeStateChangeNotification-B,
                     attributeValueChangeNotification-B,
                     aMHSSumAdjMTA-B;
   ATTRIBUTES
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState          GET,
      "Rec. X.467 | ISO/IEC 11588-8":adjMtaAccessPointAddress          GET,
      "Rec. X.467 | ISO/IEC 11588-8":adjMtaGlobalDomainId              GET,
      "Rec. X.467 | ISO/IEC 11588-8":adjMtaMaxMessageSize              GET,
      "Rec. X.467 | ISO/IEC 11588-8":adjMtaName                        GET,
      "Rec. X.467 | ISO/IEC 11588-8":adjMtaSupportedApplicationContexts      GET,
      "Rec. X.467 | ISO/IEC 11588-8":localMTAMaxMessageSize          GET,
```

```
      "Rec. X.467 | ISO/IEC 11588-8":waitTimeToRelease                    GET;
REGISTERED AS   { poi aMHSSumAdjMTA-P(8) };

aMHSSumMTA-P PACKAGE
   BEHAVIOUR         creationAndDeletionNotification-B,
                     operationalStateChangeNotification-B,
                     usageStateChangeNotification-B,
                     equipmentsEquipmentAlarm-B,
                     aMHSSumMTA-B;
   ATTRIBUTES
      "Rec. X.467 | ISO/IEC 11588-8":globalDomainId                    GET,
      "Rec. X.467 | ISO/IEC 11588-8":defaultNonUrgentMprExpiryDuration      GET,
      "Rec. X.467 | ISO/IEC 11588-8":defaultNormalMprExpiryDuration         GET,
      "Rec. X.467 | ISO/IEC 11588-8":defaultUrgentMprExpiryDuration  GET,
      "Rec. X.467 | ISO/IEC 11588-8":maxAdjMTAInboundAssocs           GET,
      "Rec. X.467 | ISO/IEC 11588-8":maxAdjMTAOutboundAssocs          GET,
      "Rec. X.467 | ISO/IEC 11588-8":mtaName                          GET,
      "Rec. X.467 | ISO/IEC 11588-8":supportedApplicationContexts     GET;
REGISTERED AS   { poi aMHSSumMTA-P(10) };

aMHSassociation-P PACKAGE
   BEHAVIOUR         creationAndDeletionNotification-B,
                     operationalStateChangeNotification-B,
                     usageStateChangeNotification-B,
                     aMHSassociation-B,
                     aMHSassociationCreationDeletion-B;
   ATTRIBUTES
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState           GET,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":usageState                 GET,
      "Rec. X.467 | ISO/IEC 11588-8":applicationContext                GET,
      "Rec. X.467 | ISO/IEC 11588-8":associationInitiator              GET,
      "Rec. X.467 | ISO/IEC 11588-8":associationObjectInstanceId       GET,
      "Rec. X.467 | ISO/IEC 11588-8":creationTime                      GET,
      "Rec. X.467 | ISO/IEC 11588-8":initiatorAccessPointAddress       GET,
      "Rec. X.467 | ISO/IEC 11588-8":responderAccessPointAddress       GET;
REGISTERED AS   { poi aMHSassociation-P(9) };

aMHSgateway-P PACKAGE
   BEHAVIOUR         aMHSgateway-B,
                     creationAndDeletionNotification-B,
                     operationalStateChangeNotification-B,
                     usageStateChangeNotification-B,
                     equipmentsEquipmentAlarm-B;
   ATTRIBUTES
      "Rec. X.467 | ISO/IEC 11588-8":globalDomainId          GET,
      aMHSgatewayName                                       GET,
```

```
      aMHSgatewayMFaddress                    GET,
      aMHSgatewayAFaddress                    GET,
      aMHSgatewayAeAxAddress                  GET,
      adjacentComCentre                       GET;
REGISTERED AS   { poi aMHSgateway-P(6) };

aTNapplicationEntity-P PACKAGE
   BEHAVIOUR        aTNapplicationEntity-B;
   ATTRIBUTES
      pduErrorsThreshold,
      remoteAbortsThreshold,
      remoteConnectRejectsThreshold,
      aSEversion,
      iCAOAddress,
      tSel;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":communicationsAlarm;
REGISTERED AS   { poi aTNapplicationEntity-P(11) };

atnADS-P PACKAGE
   BEHAVIOUR        atnADS-B;
   ATTRIBUTES
      aDScontractEstablishmentMeanDelay,
      aDScontractEstablishmentMaxDelay,
      aDSsumId;
REGISTERED AS   { poi atnADS-P(12) };

atnARF-P PACKAGE
   BEHAVIOUR        atnARF-B;
   ATTRIBUTES
      aRFcontractEstablishmentMeanDelay,
      aRFcontractEstablishmentMaxDelay,
      aRFsumId;
REGISTERED AS   { poi atnARF-P(13) };

atnApplicationServices-P PACKAGE
   BEHAVIOUR        atnApplicationServices-B;
   ATTRIBUTES
      contactNames,
      aETypes,
      applicationServiceId;
REGISTERED AS   { poi atnApplicationServices-P(14) };

atnBIS-P PACKAGE
   BEHAVIOUR        atnBIS-B;
   ATTRIBUTES
```

```
      routerClass          GET,
      localRDI             GET;
   ACTIONS
      fibDump,
      ribDump;
REGISTERED AS   { poi atnBIS-P(15) };

atnCM-P PACKAGE
   BEHAVIOUR          atnCM-B;
   ATTRIBUTES
      cMLogonMeanDelay,
      cMLogonMaxDelay,
      cMContactMeanDelay,
      cMContactMaxDelay,
      cMForwardMeanDelay,
      cMForwardMaxDelay,
      cMsumId;
REGISTERED AS   { poi atnCM-P(16) };

atnCMInvocation-P PACKAGE
   BEHAVIOUR          atnCMInvocation-B;
   ATTRIBUTES
      atnESPointer,
      cMPsap,
      cMInvocationId;
REGISTERED AS   { poi atnCMInvocation-P(17) };

atnCPDLC-P PACKAGE
   BEHAVIOUR          atnCPDLC-B;
   ATTRIBUTES
      cPDLCdialogueEstablishmentMeanDelay,
      cPDLCdialogueEstablishmentMaxDelay,
      dSCdialogueEstablishmentMeanDelay,
      dSCdialogueEstablishmentMaxDelay,
      forwarddialogueEstablishmentMeanDelay,
      forwarddialogueEstablishmentMaxDelay,
      cPDLCsumId;
REGISTERED AS   { poi atnCPDLC-P(18) };

atnDomain-P PACKAGE
   BEHAVIOUR          atnDomain-B;
   ATTRIBUTES
      domainID,
      contactNames,
      locationName,
      atnInternetServicesFlag,
```

```
      atnApplicationServicesFlag,
      atnAMHSServicesFlag;
   ATTRIBUTE GROUPS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":relationships;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":relationshipChange;
REGISTERED AS   { poi atnDomain-P(19) };

atnES-P PACKAGE
   BEHAVIOUR         atnES-B;
   ATTRIBUTES
      nsaps       GET;
REGISTERED AS   { poi atnES-P(20) };

atnFISatis-P PACKAGE
   BEHAVIOUR         atnFIS-B;
   ATTRIBUTES
      fISdialogueEstablishmentMeanDelay,
      fISdialogueEstablishmentMaxDelay,
      fISsumId;
REGISTERED AS   { poi atnFISatis-P(21) };

atnFISmetar-P PACKAGE
   BEHAVIOUR         atnFIS-B;
   ATTRIBUTES
      fISdialogueEstablishmentMeanDelay,
      fISdialogueEstablishmentMaxDelay,
      fISsumId;
REGISTERED AS   { poi atnFISmetar-P(22) };

atnInternetServices-P PACKAGE
   BEHAVIOUR         atnInternetServices-B;
   ATTRIBUTES
      contactNames,
      internetServicesId,
      numberBISinstances,
      numberESinstances;
REGISTERED AS   { poi atnInternetServices-P(23) };

atnLinkage-P PACKAGE
   BEHAVIOUR         atnLinkage-B;
   ATTRIBUTES
      linkageID                  GET,
      octetsReceivedCounter      GET,
```

```
      octetsSentCounter          GET,
      pDUsReceivedCounter        GET,
      pDUsSentCounter            GET,
      snpaAddress;
REGISTERED AS   { poi atnLinkage-P(24) };

atnAMHSServices-P PACKAGE
   BEHAVIOUR         atnAMHSServices-B;
   ATTRIBUTES
      contactNames,
      mHSServicesId;
REGISTERED AS   { poi atnAMHSServices-P(25) };

atnSumAGapp-P PACKAGE
   BEHAVIOUR         atnSumAGapp-B;
   ATTRIBUTES
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState,
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":systemId;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange;
REGISTERED AS   { poi atnSumAGapp-P(26) };

atnSystem-P PACKAGE
   BEHAVIOUR         atnSystem-B,
                     atnSystemCommunicationsInformation-B,
                     atnSystemStateChange-B;
   ATTRIBUTES
      nET         GET;
   ACTIONS
      requestEcho;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange,
      "Rec. X.723 | ISO/IEC 10165-5":communicationsInformation  pDU  sourceNSAP;
REGISTERED AS   { poi atnSystem-P(27) };

atnadjGroundBIS-P PACKAGE
   BEHAVIOUR         atnAdjacentGroundBIS-B,
                     iDRPconnectionStateChangeNotification-B;
   ATTRIBUTES
      bisNET                     GET,
      bisRDI                     GET,
      idrpConnectionState        GET;
   NOTIFICATIONS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange;
REGISTERED AS   { poi atnadjGroundBIS-P(28) };
```

```
distListExcl-P PACKAGE
   BEHAVIOUR         distListExclPackage-B;
   ATTRIBUTES
      disListExcl          GET;
REGISTERED AS   { poi distListExcl-P(3) };

distListIncl-P PACKAGE
   BEHAVIOUR         distListInclPackage-B;
   ATTRIBUTES
      distListIncl         GET;
REGISTERED AS   { poi distListIncl-P(2) };

fIB-P PACKAGE
   BEHAVIOUR         fIB-B;
   ATTRIBUTES
      timeOfDump           GET,
      dumpID               GET;
REGISTERED AS   { poi fIB-P(29) };

idrpRIB-P PACKAGE
   BEHAVIOUR         idrpRIB-B;
   ATTRIBUTES
      timeOfDump           GET,
      dumpID               GET,
      ribID,
      ribAtt               GET;
REGISTERED AS   { poi idrpRIB-P(30) };

idrpRIBin-P PACKAGE
   BEHAVIOUR         idrpRIBin-B;
REGISTERED AS   { poi idrpRIBin-P(31) };

idrpRIBout-P PACKAGE
   BEHAVIOUR         idrpRIBout-B;
REGISTERED AS   { poi idrpRIBout-P(32) };

idrpRoute-P PACKAGE
   BEHAVIOUR         idrpRoute-B;
   ATTRIBUTES
      routeID              GET,
      nlri                 GET,
      path                 GET,
      hopCount,
      capacity,
      receivedFrom         GET,
      extInfo              GET;
```

```
REGISTERED AS   { poi idrpRoute-P(33) };

locRIB-P PACKAGE
   BEHAVIOUR         locRIB-B;
REGISTERED AS   { poi locRIB-P(34) };

mTCU-P PACKAGE
   BEHAVIOUR         creationAndDeletionNotification-B,
                     mTCU-B,
                     administrativeStateChangeNotification-B,
                     attributeValueChangeNotification-B,securityAlarm-B;
   ATTRIBUTES
      mTCUtype                    GET,
      mCFtype           GET,
      mTCUMaxMessageRecipientNumber       GET,
      supportedCharSet  GET,
      mTCUname          GET,
      mTCUMaxTextMessageSize,
      mTCUMaxBinaryMessageSize;
REGISTERED AS   { poi mTCU-P(7) };

multiExitDisc-P PACKAGE
   BEHAVIOUR         multiExitDiscPackage-B;
   ATTRIBUTES
      multiExitDisc               GET;
REGISTERED AS   { poi multiExitDisc-P(4) };

nextHop-P PACKAGE
   BEHAVIOUR         nextHop-B;
   ATTRIBUTES
      nextHop           GET;
REGISTERED AS   { poi nextHop-P(1) };

reachableAddress-P PACKAGE
   BEHAVIOUR         reachableAddress-B;
   ATTRIBUTES
      reachableAddressId          GET,
      nSAPprefix                  GET,
      cLNPsecurity                GET,
      encapsulation               GET,
      encapsulationNET            GET,
      nextLinkage                 GET,
      nextSNPA                          GET;
REGISTERED AS   { poi reachableAddress-P(35) };

security-P PACKAGE
```

```
   BEHAVIOUR          iDRPsecurity-B;
   ATTRIBUTES
      iDRPsecurity;
REGISTERED AS   { poi security-P(5) };


- - ****************************
- - Attribute definitions
- - ****************************

aDScontractEstablishmentMaxDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             aDScontractEstablishmentMaxDelay-B;
REGISTERED AS   { aoi aDScontractEstablishmentMaxDelay(37) };

aDScontractEstablishmentMeanDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             aDScontractEstablishmentMeanDelay-B;
REGISTERED AS   { aoi aDScontractEstablishmentMeanDelay(38) };

aDSsumId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR             aDSsumId-B;
REGISTERED AS   {CDSM.aoi aDSsumId(83)};

aEQualifier ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.AEQualifier;
                  MATCHES FOR EQUALITY;
REGISTERED AS   {CDSM.aoi aEQualifier(88)};

aETypes ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.AETypes;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR             aETypes-B;
REGISTERED AS   { aoi aETypes(56) };

aMHSgatewayAFaddress ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.AFaddress;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR             aMHSgatewayAFaddress-B;
REGISTERED AS   { aoi aMHSgatewayAFaddress(68) };

aMHSgatewayAeAxAddress ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.AeAxAddress;
                  MATCHES FOR EQUALITY;
```

```
   BEHAVIOUR          aMHSgatewayAeAxAddress-B;
REGISTERED AS   { aoi aMHSgatewayAeAxAddress(69) };

aMHSgatewayMFaddress ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.MFaddress;
                MATCHES FOR EQUALITY;
   BEHAVIOUR          aMHSgatewayMFaddress-B;
REGISTERED AS   { aoi aMHSgatewayMFaddress(70) };

aMHSgatewayName ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.AMHSgatewayName;
                MATCHES FOR EQUALITY;
   BEHAVIOUR          aMHSgatewayName-B;
REGISTERED AS   { aoi aMHSgatewayName(71) };

aRFcontractEstablishmentMaxDelay ATTRIBUTE
   DERIVED FROM       delayTime;
   BEHAVIOUR          aRFcontractEstablishmentMaxDelay-B;
REGISTERED AS   { aoi aRFcontractEstablishmentMaxDelay(39) };

aRFcontractEstablishmentMeanDelay ATTRIBUTE
   DERIVED FROM       delayTime;
   BEHAVIOUR          aRFcontractEstablishmentMeanDelay-B;
REGISTERED AS   { aoi aRFcontractEstablishmentMeanDelay(40) };

aRFsumId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                MATCHES FOR EQUALITY;
   BEHAVIOUR          aRFsumId-B;
REGISTERED AS   {CDSM.aoi aRFsumId(84)};

aSEversion ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.ASEversion;
                MATCHES FOR EQUALITY;
   BEHAVIOUR          aSEversion-B;
REGISTERED AS   { aoi aSEversion(65) };

adjacentComCentre ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.AdjacentComCentre;
                MATCHES FOR EQUALITY;
   BEHAVIOUR          adjacentComCentre-B;
REGISTERED AS   { aoi adjacentComCentre(72) };

applicationServiceId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                MATCHES FOR EQUALITY;
```

```
REGISTERED AS   {CDSM.aoi applicationServiceId(81)};

atnApplicationServicesFlag ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Boolean;
                  MATCHES FOR EQUALITY;
REGISTERED AS   { aoi atnApplicationServicesFlag(91) };

atnESPointer ATTRIBUTE
   DERIVED FROM          "Rec. X.721 | ISO/IEC 10165-2 : 1992":systemTitle;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR             atnESPointer-B;
REGISTERED AS   { aoi atnESPointer(57) };

atnInternetServicesFlag ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Boolean;
                  MATCHES FOR EQUALITY;
REGISTERED AS   { aoi atnInternetServicesFlag(90) };

atnAMHSServicesFlag ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Boolean;
                  MATCHES FOR EQUALITY;
REGISTERED AS   { aoi atnAMHSServicesFlag(92) };

bisNET ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Naddress;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR             bisNET-B;
REGISTERED AS   { aoi bisNET(5) };

bisRDI ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.RDI;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR             bisRDI-B;
REGISTERED AS   { aoi bisRDI(6) };

cLNPsecurity ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.CLNPsecurity;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR             cLNPsecurity-B;
REGISTERED AS   { aoi cLNPsecurity(12) };

cMContactMaxDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             cMContactMaxDelay-B;
REGISTERED AS   { aoi cMContactMaxDelay(41) };
```

```
cMContactMeanDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             cMContactMeanDelay-B;
REGISTERED AS   { aoi cMContactMeanDelay(42) };

cMForwardMaxDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             cMforwardMaxDelay-B;
REGISTERED AS   { aoi cMForwardMaxDelay(43) };

cMForwardMeanDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             cMForwardMeanDelay-B;
REGISTERED AS   { aoi cMForwardMeanDelay(44) };

cMInvocationId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                MATCHES FOR EQUALITY;
   BEHAVIOUR             cMInvocationId-B;
REGISTERED AS   { aoi cMInvocationId(58) };

cMLogonMaxDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             cMLogonMaxDelay-B;
REGISTERED AS   { aoi cMLogonMaxDelay(45) };

cMLogonMeanDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             cMLogonMeanDelay-B;
REGISTERED AS   { aoi cMLogonMeanDelay(46) };

cMPsap ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Psap;
                MATCHES FOR EQUALITY;
   BEHAVIOUR             cMPsap-B;
REGISTERED AS   { aoi cMPsap(79) };

cMsumId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                MATCHES FOR EQUALITY;
   BEHAVIOUR             cMsumId-B;
REGISTERED AS   {CDSM.aoi cMsumId(85)};

cPDLCdialogueEstablishmentMaxDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             cPDLCdialogueEstablishmentMaxDelay-B;
```

```
REGISTERED AS   { aoi cPDLCdialogueEstablishmentMaxDelay(47) };

cPDLCdialogueEstablishmentMeanDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             cPDLCdialogueEstablishmentMeanDelay-B;
REGISTERED AS   { aoi cPDLCdialogueEstablishmentMeanDelay(48) };

cPDLCsumId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                MATCHES FOR EQUALITY;
   BEHAVIOUR             cPDLCsumId-B;
REGISTERED AS   {CDSM.aoi cPDLCsumId(86)};

capacity ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Capacity;
                MATCHES FOR EQUALITY;
   BEHAVIOUR             capacity-B;
REGISTERED AS   { aoi capacity(23) };

contactNames ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
REGISTERED AS   { aoi contactNames(59) };

dSCdialogueEstablishmentMaxDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             dSCdialogueEstablishmentMaxDelay-B;
REGISTERED AS   { aoi dSCdialogueEstablishmentMaxDelay(49) };

dSCdialogueEstablishmentMeanDelay ATTRIBUTE
   DERIVED FROM          delayTime;
   BEHAVIOUR             dSCdialoueEstablishmentMeanDelay-B;
REGISTERED AS   { aoi dSCdialogueEstablishmentMeanDelay(50) };

delayTime ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.DelayTime;
                MATCHES FOR EQUALITY;
   BEHAVIOUR             delayTime-B;
REGISTERED AS   { aoi delayTime(55) };

disListExcl ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.ListIncl;
                MATCHES FOR EQUALITY;
   BEHAVIOUR             distListExcl-B;
REGISTERED AS   { aoi distListExcl(28) };
```

```
distListIncl ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.ListIncl;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR              distListIncl-B;
REGISTERED AS   { aoi distListIncl(27) };

domainID ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                  MATCHES FOR EQUALITY;
REGISTERED AS   { aoi domainID(60) };

dumpID ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.DumpID;
                  MATCHES FOR EQUALITY, ORDERING;
   BEHAVIOUR              dumpID-B;
REGISTERED AS   { aoi dumpID(9) };

encapsulation ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Encapsulation;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR              encapsulation-B;
REGISTERED AS   { aoi encapsulatedNPDU(13) };

encapsulationNET ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Naddress;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR              encapsulationNET-B;
REGISTERED AS   { aoi encapsulationNET(14) };

extInfo ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Boolean;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR              extInfo-B;
REGISTERED AS   { aoi extInfo(25) };

fISdialogueEstablishmentMaxDelay ATTRIBUTE
   DERIVED FROM           delayTime;
   BEHAVIOUR              fISdialogueEstablishmentMaxDelay-B;
REGISTERED AS   { aoi fISdialogueEstablishmentMaxDelay(51) };

fISdialogueEstablishmentMeanDelay ATTRIBUTE
   DERIVED FROM           delayTime;
   BEHAVIOUR              fISdialogueEstablishmentMeanDelay-B;
REGISTERED AS   { aoi fISdialogueEstablishmentMeanDelay(52) };

fISsumId ATTRIBUTE
```

```
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR              fISsumId-B;
REGISTERED AS   {CDSM.aoi fISsumId(87)};

forwarddialogueEstablishmentMaxDelay ATTRIBUTE
   DERIVED FROM           delayTime;
   BEHAVIOUR              forwarddialogueEstablishmentMaxDelay-B;
REGISTERED AS   { aoi forwarddialogueEstablishmentMaxDelay(53) };

forwarddialogueEstablishmentMeanDelay ATTRIBUTE
   DERIVED FROM           delayTime;
   BEHAVIOUR              forwarddialogueEstablishmentMeanDelay-B;
REGISTERED AS   { aoi forwarddialogueEstablishmentMeanDelay(54) };

hopCount ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.HopCount;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR              hopCount-B;
REGISTERED AS   { aoi hopCount(22) };

iCAOAddress ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.ICAOAddress;
   BEHAVIOUR              iCAOAddress-B;
REGISTERED AS   { aoi iCAOAddress(66) };

iDRPsecurity ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.IDRPsecurity;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR              iDRPsecurity-B;
REGISTERED AS   { aoi iDRPsecurity(30) };

idrpConnectionState ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.IdrpConnectionState;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR              idrpConnectionState-B;
REGISTERED AS   { aoi idrpConnectionState(7) };

internetServicesId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                  MATCHES FOR EQUALITY;
REGISTERED AS   {CDSM.aoi internetServicesId(80)};

linkageID ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.LinkageID;
                  MATCHES FOR EQUALITY;
```

```
   BEHAVIOUR          linkageId-B;
REGISTERED AS   { aoi linkageID(31) };

localRDI ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.RDI;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR          rDI-B;
REGISTERED AS   { aoi localRDI(3) };

locationName ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.LocationName;
                  MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
REGISTERED AS   { aoi locationName(61) };

mCFtype ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.MCFtype;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR          mCFtype-B;
REGISTERED AS   { aoi mCFtype(73) };

mHSServicesId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.PString;
                  MATCHES FOR EQUALITY;
REGISTERED AS   {CDSM.aoi mHSServicesId(82)};

mTCUMaxBinaryMessageSize ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.SizeInOctets;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR          mTCUMaxBinaryMessageSize-B;
REGISTERED AS   {CDSM.aoi mTCUMaxBinaryMessageSize(89)};

mTCUMaxMessageRecipientNumber ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Number;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR          mTCUMaxMessageRecipientNumber-B;
REGISTERED AS   { aoi mTCUMaxMessageRecipientNumber(74) };

mTCUMaxTextMessageSize ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.SizeInCharacters;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR          mTCUMaxTextMessageSize-B;
REGISTERED AS   { aoi mTCUMaxTextMessageSize(75) };

mTCUname ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.MTCUname;
   BEHAVIOUR          mTCUname-B;
```

```
REGISTERED AS   { aoi mTCUname(76) };

mTCUtype ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.MTCUtype;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            mTCUtype-B;
REGISTERED AS   { aoi mTCUtype(77) };

multiExitDisc ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.MultiExitDisc;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            multiExitDisc-B;
REGISTERED AS   { aoi multiExitDisc(29) };

nET ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Naddress;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            nET-B;
REGISTERED AS   { aoi nET(1) };

nSAPprefix ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.NSAPprefix;
                  MATCHES FOR EQUALITY, SUBSTRINGS;
   BEHAVIOUR            nSAPprefix-B;
REGISTERED AS   { aoi nSAPprefix(11) };

nextHop ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.NextHop;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            nexthop-B;
REGISTERED AS   { aoi nextHop(26) };

nextLinkage ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.NextLinkage;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            nextLinkage-B;
REGISTERED AS   { aoi nextLinkage(15) };

nextSNPA ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.SNPAaddress;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            nextSNPA-B;
REGISTERED AS   { aoi nextSNPA(16) };

nlri ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Nlri;
```

```
                MATCHES FOR EQUALITY, SUBSTRINGS;
  BEHAVIOUR         nlri-B;
REGISTERED AS   { aoi nlri(20) };

nsaps ATTRIBUTE
  WITH ATTRIBUTE SYNTAX   CDSM.NSAPs;
                MATCHES FOR EQUALITY;
  BEHAVIOUR         nsaps-B;
REGISTERED AS   { aoi nsaps(4) };

numberBISinstances ATTRIBUTE
  WITH ATTRIBUTE SYNTAX   CDSM.Number;
                MATCHES FOR EQUALITY;
REGISTERED AS   { aoi numberBISinstances(93) };

numberESinstances ATTRIBUTE
  WITH ATTRIBUTE SYNTAX   CDSM.Number;
                MATCHES FOR EQUALITY;
REGISTERED AS   { aoi numberESinstances(94) };

octetsReceivedCounter ATTRIBUTE
  DERIVED FROM
                "Rec. X.723 | ISO/IEC 10165-5":nonWrapping64BitCounter;

  BEHAVIOUR         octetsReceivedCounter-B;
REGISTERED AS   { aoi octetsReceivedCounter(33) };

octetsSentCounter ATTRIBUTE
  DERIVED FROM
                "Rec. X.723 | ISO/IEC 10165-5":nonWrapping64BitCounter;

  BEHAVIOUR         octetsSentCounter-B;
REGISTERED AS   { aoi octetsSentCounter(34) };

pDUsReceivedCounter ATTRIBUTE
  DERIVED FROM
                "Rec. X.723 | ISO/IEC 10165-5":nonWrapping64BitCounter;

  BEHAVIOUR         pDUsReceivedCounter-B;
REGISTERED AS   { aoi pDUsReceivedCounter(35) };

pDUsSentCounter ATTRIBUTE
  DERIVED FROM
                "Rec. X.723 | ISO/IEC 10165-5":nonWrapping64BitCounter;

  BEHAVIOUR         pDUsSentCounter-B;
```

```
REGISTERED AS   { aoi pDUsSentCounter(36) };

path ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Path;
                  MATCHES FOR EQUALITY, SUBSTRINGS;
   BEHAVIOUR            path-B;
REGISTERED AS   { aoi path(21) };

pduErrorsThreshold ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.ThresholdValue;
   BEHAVIOUR            pduErrorsThreshold-B;
REGISTERED AS   { aoi pduErrorsThreshold(62) };

reachableAddressId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.ReachableAddressId;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            reachableAddressId-B;
REGISTERED AS   { aoi reachableAddressId(10) };

receivedFrom ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.Naddress;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            receivedFrom-B;
REGISTERED AS   { aoi receivedFrom(24) };

remoteAbortsThreshold ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.ThresholdValue;
                  MATCHES FOR SET-COMPARISON;
   BEHAVIOUR            remoteAbortsThreshold-B;
REGISTERED AS   { aoi remoteAbortsThreshold(63) };

remoteConnectRejectsThreshold ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.ThresholdValue;
                  MATCHES FOR SET-COMPARISON;
   BEHAVIOUR            remoteConnectRejectsThreshold-B;
REGISTERED AS   { aoi remoteConnectRejectsThreshold(64) };

ribAtt ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.RibAtt;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            ribAtt-B;
REGISTERED AS   { aoi ribAtt(18) };

ribID ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.RibID;
                  MATCHES FOR EQUALITY, ORDERING;
```

```
   BEHAVIOUR            ribID-B;
REGISTERED AS   { aoi ribID(17) };

routeID ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.RouteID;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            routeId-B;
REGISTERED AS   { aoi routeId(19) };

routerClass ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.RouterClass;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            routerClass-B;
REGISTERED AS   { aoi routerClass(2) };

snpaAddress ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.SNPAaddress;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            snpaAddress-B;
REGISTERED AS   { aoi snpaAddress(32) };

supportedCharSet ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.SupportedCharSet;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            supportedCharSet-B;
REGISTERED AS   { aoi supportedCharSet(78) };

tSel ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.TSel;
   BEHAVIOUR            tSel-B;
REGISTERED AS   { aoi tSel(67) };

timeOfDump ATTRIBUTE
   WITH ATTRIBUTE SYNTAX   CDSM.TimeOfDump;
                  MATCHES FOR EQUALITY;
   BEHAVIOUR            timeOfDump-B;
REGISTERED AS   { aoi timeOfDump(8) };

- - ****************************
- - Action definitions
- - ****************************

fibDump ACTION
   BEHAVIOUR            fibDump-B;
   MODE CONFIRMED ;
   WITH INFORMATION SYNTAX CDSM.ActionInfo;
```

```
   WITH REPLY SYNTAX      CDSM.DumpReply;
REGISTERED AS   { acoi fibDump(2) };

requestEcho ACTION
   BEHAVIOUR              requestEcho-B;
   MODE CONFIRMED ;
   WITH INFORMATION SYNTAX CDSM.RequestEchoInfo;
   WITH REPLY SYNTAX      CDSM.ActionTime;
REGISTERED AS   { acoi requestEcho(1) };

ribDump ACTION
   BEHAVIOUR              ribDump-B;
   MODE CONFIRMED ;
   WITH INFORMATION SYNTAX CDSM.ActionInfo;
   WITH REPLY SYNTAX      CDSM.DumpReply;
REGISTERED AS   { acoi ribDump(3) };

- - ****************************
- - Parameter definitions
- - ****************************

pDU PARAMETER
   CONTEXT            EVENT-INFO;
   WITH SYNTAX        CDSM.PDUsyntax;
REGISTERED AS   { proi pDU(1) };

sourceNSAP PARAMETER
   CONTEXT            EVENT-INFO;
   WITH SYNTAX        CDSM.Naddress;
REGISTERED AS   { proi sourceNSAP(2) };

- - ****************************
- - Behaviour definitions
- - ****************************
aDScontractEstablishmentMaxDelay-B BEHAVIOUR
   DEFINED AS
         !Max value of the observed round trip delay during ADS contract establishment exchange
         (from ADS-Demand/Event/Periodic Request to ADS-Demand/Event/Periodic Confirmation
         or ADS-Report Indication with a positive acknowledgement).!;

aDScontractEstablishmentMeanDelay-B BEHAVIOUR
   DEFINED AS
         !Mean value of the observed round trip delay during ADS contract establishment exchange
         (from ADS-Demand/Event/Periodic Request to ADS-Demand/Event/Periodic Confirmation
         or ADS-Report Indication with a positive acknowledgement).!;
```

aDSsumId-B BEHAVIOUR
DEFINED AS
!This naming attribute will be used to construct the RDN for instances of this MO class.!;

aETypes-B BEHAVIOUR
DEFINED AS
!This parameter contains the bit map for the applications which may be present in the domain.!;

aMHSSumAdjMTA-B BEHAVIOUR
DEFINED AS
!The aMHSSumAdjMTA Managed Object Class describes the summary information related to the establishment of associations and to the exchange of MPR between the managed MTA and an adjacent MTA. For each cross-domain visible adjacent MTA of the managed MTA, an instance of this class is created. An aMHSSumAdjMTA object instance is named by the adjMtaName attribute.!;

aMHSSumMTA-B BEHAVIOUR
DEFINED AS
!The aMHSSumMTA Managed Object Class describes summary MTA management information in order to provide the cross-domain management of the MTA a view on the MTA overall capability and availability. This information is not changed except under specific management actions of the AMHS SM Manager in charge of local management of the managed MTA (i.e. different from the cross-domain SM Manager). One instance of this object class is be created for each monitored MTA. The AMHSSumMTA Managed Object Class is inherited from the equipment Managed Object Class, which is defined in Rec. M.3100. The following packages of the equipment object class are provided:
createDeleteNotificationPackage
stateChangeNotificationPackage
administrativeOperationalStatePackage
equipmentsEquipmentAlarmPackage
The equipmentId attribute is used to name an aMHSSumMTA object instance.!;

aMHSassociation-B BEHAVIOUR
DEFINED AS
!The association managed object maintains dynamic information on an association established with the managed MTA. As several associations can be established at the same time between the managed MTA and an adjacent MTA, several association object instance can exist at the same time.
An association object instance is named by the associationObjectInstanceId attribute.!;

aMHSassociationCreationDeletion-B BEHAVIOUR
DEFINED AS
!An association object instance is created each time an association is established between the managed MTA and an adjacent MTA which are both visible in the ATN XMIB. An association object instance may also be created for a rejected attempt to establish an

association. An association object instance need not to be deleted when the corresponding association is released.
The operational state attribute is set to enable if the association request was accepted. The operational state attribute is set to disable if the association request was rejected.
The usage state attribute is set to active at the creation of an association object instance. The usage state attribute is set to idle when the association is normally released.
The usage state attribute is set to idle and the operational state attribute is set to disable when the association is abnormally released.!;

aMHSgateway-B BEHAVIOUR
DEFINED AS
!The AMHS gateway Managed Object Class describes AMHS gateway management information in order to provide cross-domain management with a view on the gateway overall capability and availability. One instance of this object class is created for each gateway described in the ATN XMIB, i.e. for each gateway with AMHS or AFTN/CIDIN cross-domain connectivity. The gateway Managed Object Class is inherited from the equipment Managed Object Class, which is defined in Rec. M.3100. The following packages of the equipment object class are provided:
createDeleteNotificationPackage
stateChangeNotificationPackage
administrativeOperationalStatePackage
equipmentsEquipmentAlarmPackage
An aMHSgateway object instance is named by the aMHSgatewayName attribute.!;

aMHSgatewayAFaddress-B BEHAVIOUR
DEFINED AS
!For an AFTN/AMHS Gateway, this attribute provides the AF-address of the control position of the gateway, which is also the originator indicator used for any AFTN service message generated at the gateway.!;

aMHSgatewayAeAxAddress-B BEHAVIOUR
DEFINED AS
!For a CIDIN/AMHS Gateway, this attribute provides the entry/exit address of the operator position of the gateway, which is also the originator indicator used for any CIDIN operator message generated at the gateway.!;

aMHSgatewayMFaddress-B BEHAVIOUR
DEFINED AS
!This attribute provides the MF-address of the control position of the gateway.!;

aMHSgatewayName-B BEHAVIOUR
DEFINED AS
!This attribute provides the name of the gateway for identification purposes.!;

aRFcontractEstablishmentMaxDelay-B BEHAVIOUR
DEFINED AS

!Max value of the observed round trip delay during ARF contract establishment exchange (from ADS-Start-Forward Request to ADS-Start-Forward Confirmation).!;

aRFcontractEstablishmentMeanDelay-B BEHAVIOUR
DEFINED AS
!Mean value of the observed round trip delay during ARF contract establishment exchange (from ADS-Start-Forward Request to ADS-Start-Forward Confirmation ).!;

aRFsumId-B BEHAVIOUR
DEFINED AS
!This naming attribute will be used to construct the RDN for instances of this MO class.!;

aSEversion-B BEHAVIOUR
DEFINED AS
!Indicates the application ASE version number; Nominal value: 1: Range:[1,255].!;

aTNapplicationEntity-B BEHAVIOUR
DEFINED AS
!This ATN-specific MO Class holds reference information about an ATN application entity. The aTNapplicationEntity represents information about the application ASE including the CF. !;

adjacentComCentre-B BEHAVIOUR
DEFINED AS
!This attribute indicates the adjacent (AFTN and/or CIDIN) Communication Centre to which the gateway is interconnected through its AFTN or CIDIN component. The identification of the Centre is made through the AFTN or CIDIN (Ae/Ax) address of its operator position.!;

administrativeStateChangeNotification-B BEHAVIOUR
DEFINED AS
!A state change notification is emitted when the administrative state attribute changes in value!;

atnADS-B BEHAVIOUR
DEFINED AS
!This MO provides aggregated performance parameters of the ADS application for the domain.!;

atnARF-B BEHAVIOUR
DEFINED AS
!This MO provides aggregated performance parameters for the ADS Report Forwarding (ARF) application for the domain.!;

atnAdjacentGroundBIS-B BEHAVIOUR
DEFINED AS

! The atnAdjacentGroundBIS MO class represents a BIS to BIS IDRP connection between the local BIS represented by the superior atnBIS MOs and an adjacent ground or air/ground BIS. !;

atnAdjacentGroundBIS-atnBIS-B BEHAVIOUR
DEFINED AS
! The name binding identifies a ground BIS-to-BIS connection. An instance of an atnAdjacentGroundBIS MO using this name binding can only be created or deleted by the organisation providing the CDSM service. !;

atnApplicationServices-B BEHAVIOUR
DEFINED AS
! This MO operates as a container class for Application Services. It contains the contact information for the domain. !;

atnBIS-B BEHAVIOUR
DEFINED AS
! The atnBIS MO represents one instance of a Boundary Intermediate System of the local organisation that is made externally visible, for Cross-Domain Systems Management purposes to other organisations.
The atnBIS MO class is a subclass of the atnSystem MO class. !;

atnBIS-atnInternetServices-B BEHAVIOUR
DEFINED AS
! The name binding which applies when the atnBIS is created by management as a subordinate object of the atnInternetServices managed object class. An instance of an atnBIS MO using this name binding can only be created or deleted by the organisation providing the CDSM service. !;

atnCM-B BEHAVIOUR
DEFINED AS
!This MO logs basic performance parameters for off line storage and analysis of aggregated CM performance.!;

atnCMInvocation-B BEHAVIOUR
DEFINED AS
!This MO represents an particular invocation of the CM Application Entity.!;

atnCPDLC-B BEHAVIOUR
DEFINED AS
!This MO provides aggregated performance parameters for the CPDLC application for the domain.!;

atnDomain-B BEHAVIOUR
DEFINED AS

! An atnDomain MO may be instantiated by the Agent system as the result of internal processing (initialisation, request etc.) or by the Managing system issuing a CREATE operation to the Agent system. The relationshipChange notification is used when the contactNames and/or locationNames are changed. Flags are used to indicate the ATN systems present in the managament domain that is represented by the XMIB:
- The attribute atnInternetServicesFlag is set TRUE if the XMIB contains an instantiation of the atnInternetServices MOC, and FALSE otherwise.
- The attribute atnApplicationServicesFlag is set TRUE if the XMIB contains an instantiation of the atnApplicationServices MOC, and FALSE otherwise.
- The attribute atnAMHSServicesFlag is set TRUE if the XMIB contains an instantiation of the atnAMHSServices MOC, and FALSE otherwise. !;

atnES-B BEHAVIOUR
DEFINED AS
! The atnES MO represents one instance of an ATN End System of the local organisation that is made externally visible, for Cross-Domain Systems Management purposes to other organisations. The atnES MO class is a subclass of the atnSystem MO class. !;

atnES-atnInternetServices-B BEHAVIOUR
DEFINED AS
! The name binding which applies when the atnES MO is created by management as a subordinate object of the atnInternetServices managed object class. An instance of an atnES MO using this name binding can only be created or deleted by the organisation providing the CDSM service. !;

atnESPointer-B BEHAVIOUR
DEFINED AS
!This attribute points to a particular ATN End System that hosts a particular ATN Application.!;

atnFIS-B BEHAVIOUR
DEFINED AS
!This MO provides aggregated performance parameters for the FIS applications for the domain.!;

atnInternetServices-B BEHAVIOUR
DEFINED AS
! This MO acts as a container for ATN Internet Services. It contains contact information for the ATN Internet within the management domain.
The attribute numberBISinstances indicates the number of atnBIS MO instantiations in the XMIB.
The attribute numberESinstances indicates the number of atnES MO instantiations in the XMIB. !;

atnLinkage-B BEHAVIOUR
DEFINED AS
! The atnLinkage MO represents the attachment of the BIS represented by the superior atnBIS MO to one subnetwork.!;

atnLinkage-atnBIS-B BEHAVIOUR
DEFINED AS
! The name binding which applies when the atnLinkage managed object is created as a subordinate object of the atnBIS manage object class. An instance of an atnLinkage MO using this name binding can only be created or deleted by the organisation providing the CDSM service.!;

atnAMHSServices-B BEHAVIOUR
DEFINED AS
! This MO operates as a container class for AMHS Services. It contains the contact information for the domain. !;

atnSumAGapp-B BEHAVIOUR
DEFINED AS
!This generic MO represent the status of the AG applications. It represents the super class for the summarized application MOs.!;

atnSystem-B BEHAVIOUR
DEFINED AS
! The atnSystem MO class is a generic MO class used to represent characteristics of an ATN System (IS or ES) that are made visible by the local organisation to external organisations for Cross-Domain Systems Management purposes. !;

atnSystemCommunicationsInformation-B BEHAVIOUR
DEFINED AS
! This MO class imports the communicationsInformation notification from GMI (X.723 | ISO/IEC 10165-5). It is used to report the following atnSystem managed object events:
EchoRequestReceived:
This notification is generated when a CLNP Echo Request (ERQ) NPDU is received that has reached its final destination. The value CDSM.echoRequestReceived is reported as the informationType attribute. The Echo Request PDU is reported as a parameter in the informationData attribute of the communicationsInformation, using the pDU parameter. The source NSAP address of the Echo Request PDU is reported as a parameter in the informationData attribute of the communicationsInformation, using the sourceNSAP parameter.
EchoResponseReceived:
This notification is generated when a CLNP Echo Response (ERP) NPDU is received that has reached its final destination. The value CDSM.echoResponseReceived is reported as the informationType attribute. The Echo Response PDU is reported as a parameter in the informationData attribute of the communicationsInformation, using the pDU parameter. The source NSAP address of the Echo Response PDU is reported as a parameter in the informationData attribute of the communicationsInformation, using the sourceNSAP parameter.
ErrorReportReceived:
This notification is generated when a CLNP Error NPDU is received that has reached its final destination. The value CDSM.errorReportReceived is reported as the informationType

attribute. The Error Report PDU is reported as a parameter in the informationData attribute of the communicationsInformation, using the pDU parameter. The source NSAP address of the Error Report PDU is reported as a parameter in the informationData attribute of the communicationsInformation, using the sourceNSAP parameter. !;

atnSystemStateChange-B BEHAVIOUR
DEFINED AS
! This MO class also imports the stateChange notification from DMI (X.721 | ISO/IEC 10165-2). It is used to report the changes to the operationalState attribute, and where present, the administrativeState attribute. A single parameter set is included in the State change definition field. Only the (mandatory) attributeId and (optional) newAttributeValue parameters are used. !;

attributeValueChangeNotification-B BEHAVIOUR
DEFINED AS
!An attribute change notification is emitted when any of the attributes change in value!;

bisNET-B BEHAVIOUR
DEFINED AS
! The NET of the remote BIS of this BIS to BIS connection. !;

bisRDI-B BEHAVIOUR
DEFINED AS
! The Routing Domain Identifier of the remote BIS participating in this BIS to BIS connection. This is an NSAP Address prefix identifying the routing domain where the remote BIS is located.!;

cLNPsecurity-B BEHAVIOUR
DEFINED AS
! The security information associated with the route. !;

cMContactMaxDelay-B BEHAVIOUR
DEFINED AS
!Max delay of the observed round trip delays (from CM-Contact Request to CM-Contact Confirmation).!;

cMContactMeanDelay-B BEHAVIOUR
DEFINED AS
!Mean value of the observed round trip delays (from CM-Contact Request to CM-Contact Confirmation).!;

cMForwardMeanDelay-B BEHAVIOUR
DEFINED AS
!Mean value of observed round trip (from CM-Forward Request to CM-Forward Confirmation).!;

cMInvocationId-B BEHAVIOUR
DEFINED AS
!This attribute provides the RDN for naming this MO Instance.!;

cMLogonMaxDelay-B BEHAVIOUR
DEFINED AS
!Max value of the observed round trip delays during a logon exchange (from CM-Logon Request to CM-Logon Confirmation).!;

cMLogonMeanDelay-B BEHAVIOUR
DEFINED AS
!Mean value of the observed round trip delays during a logon exchange (from CM-logon request to CM-Logon confirmation).!;

cMPsap-B BEHAVIOUR
DEFINED AS
!This attribute provices the Psap of the CM application.!;

cMforwardMaxDelay-B BEHAVIOUR
DEFINED AS
!Max value of the observed round trip (from CM-Forward Request to CM-Forward Confirmation).!;

cMsumId-B BEHAVIOUR
DEFINED AS
!This naming attribute will be used to construct the RDN for instances of this MO class.!;

cPDLCdialogueEstablishmentMaxDelay-B BEHAVIOUR
DEFINED AS
!Max value of observed round trip delay during a CPDLC contract establishment exchange (from CPDLC-Start Request to CPDLC-Start Confirmation).!;

cPDLCdialogueEstablishmentMeanDelay-B BEHAVIOUR
DEFINED AS
!Mean value of the observed round trip delay during a CPDLC contract establishment exchange (from CPDLC-Start Request to CPDLC-Start Confirmation).!;

cPDLCsumId-B BEHAVIOUR
DEFINED AS
!This naming attribute will be used to construct the RDN for instances of this MO class.!;

capacity-B BEHAVIOUR
DEFINED AS
! Relative capacity of the route for handling traffic. It corresponds to the information conveyed in the CAPACITY attribute of the route within IDRP UPDATE BISPDUs.!;

creationAndDeletionNotification-B BEHAVIOUR
DEFINED AS
!An object creation or object deletion notification is generated at the creation and deletion of the object instance.!;

dSCdialogueEstablishmentMaxDelay-B BEHAVIOUR
DEFINED AS
!Max value of the observed round trip delay during DSC contract establishment exchange (from DSC-Start Request to DSC-Start Confirmation).!;

dSCdialoueEstablishmentMeanDelay-B BEHAVIOUR
DEFINED AS
!Mean value of the observed round trip delay during a DSC contract establishment exchange (from DSC-Start Request to DSC-Start Confirmation).!;

delayTime-B BEHAVIOUR
DEFINED AS
! Generic time interval in seconds.!;

distListExcl-B BEHAVIOUR
DEFINED AS
! The value of the distListExcl attribute conveyed in the IDRP BISPDU associated with this route.!;

distListExclPackage-B BEHAVIOUR
DEFINED AS
! Present when the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP DIST_LIST_EXCL attribute.!;

distListIncl-B BEHAVIOUR
DEFINED AS
! The value of the DIST_LIST_INCL attribute conveyed in the IDRP BISPDU associated with this route.!;

distListInclPackage-B BEHAVIOUR
DEFINED AS
! Present when the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP DIST_LIST_INCL attribute. !;

dumpID-B BEHAVIOUR
DEFINED AS
! This unique identifier of the dump allows distinguishing the RIB or FIB dump from any previously generated RIB or FIB dump. !;

encapsulation-B BEHAVIOUR
DEFINED AS

! It indicates whether NPDUs sent over this route are requested to be encapsulated or not. !;

encapsulationNET-B BEHAVIOUR
DEFINED AS
! Defines the NET of the Intermediate System to which encapsulated NPDUs are delivered. This attribute is valid only if the attribute encapsulation is set to true. !;

equipmentsEquipmentAlarm-B BEHAVIOUR
DEFINED AS
!A processing error alarm notification is emitted when the entity experiences any of the processing alarms conditions defined in Rec. X.733 | ISO/IEC 10164-4 (e.g. storage capacity problem, version mismatch, corrupt data, software error, underlying resources unavailable!;

extInfo-B BEHAVIOUR
DEFINED AS
! Boolean that indicates whether the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP EXT_INFO attribute.!;

fIB-B BEHAVIOUR
DEFINED AS
! The fIB MO is the container MO of all fIBentry MOs created as a result of a fibDump action on a bIS MO.!;

fIB-atnBIS-B BEHAVIOUR
DEFINED AS
! The name binding that applies when the fIB Managed Object or its subclasses are created by automatic operation of the system as a result of a fibDump action performed on the superior atnBIS MO. The mechanisms by which an instance of a fIB MO is deleted is a local matter of the organisation providing the CDSM service: the fIB MO instance can be deleted when a new fIB MO instance is created as a result of a fibDump action. Alternatively, it can be deleted after several other fIB MO instances have
been created !;

fISdialogueEstablishmentMaxDelay-B BEHAVIOUR
DEFINED AS
!Max value of the observed round trip delay during FIS contract (update or contract) establishment exchange (from FIS-Demand/Update-Start Request from FIS-Demand/Update-Start Confirmation).!;

fISdialogueEstablishmentMeanDelay-B BEHAVIOUR
DEFINED AS
!Mean value of the observed round trip delay during FIS contract (update or contract) establishment exchange (from FIS-Demand/Update-Start Request from FIS-Demand/Update-Start Confirmation).!;

fISsumId-B BEHAVIOUR

DEFINED AS
!This naming attribute will be used to construct the RDN for instances of this MO class.!;

fibDump-B BEHAVIOUR
DEFINED AS
! This action allows the creation of a new snapshot of the content of the Forwarding Information Base of the BIS, under the form of a fIB MO and its subordinate reachableAddress MOs created under the atnBIS MO as a result of the action.
If a new fIB MO is created with its subordinate reachableAddress MOs, or if a recent enough (according to considerations that are local to the XMIB provider) fIB Mo already existed, the fibDump action completes successfully. Otherwise the fibDump action returns a processingFailure error.
If successful, the action reply conveys the following information:
- the time at which the dump has effectively been produced by the ATN system.
- the unique identifier of the dump. !;

forwarddialogueEstablishmentMaxDelay-B BEHAVIOUR
DEFINED AS
!Max value of the observed round trip delay during the forward contract establishment exchange (from CPDLC-Forward Request to CPDLC-Forward Confirmation).!;

forwarddialogueEstablishmentMeanDelay-B BEHAVIOUR
DEFINED AS
!Mean value of the observed round trip delay during a forward contract establishment exchange (from CPDLC-forward Request to CPDLC-forward Confirmation).!;

hopCount-B BEHAVIOUR
DEFINED AS
! Unsigned integer that is the upper bound on the number of routing domains through which this route goes. It corresponds to the information conveyed in the RD_HOP_COUNT attribute of the route within IDRP UPDATE BISPDUs.!;

iCAOAddress-B BEHAVIOUR
DEFINED AS
!The ICAO address. It can be either the 'aircraft identifier' (24 bit address) or the 'groundFacilityDesignator' (4-8 octets).!;

iDRPconnectionStateChangeNotification-B BEHAVIOUR
DEFINED AS
! This MO class imports the stateChange notification from DMI (X.721 | ISO/IEC 10165-2). It is used to report the changes to the idrpConnectionState attribute. A single parameter set is included in the State change definition field. Only the (mandatory) attributeId and (optional) newAttributeValue parameters are used. !;

iDRPsecurity-B BEHAVIOUR
DEFINED AS

! The value of the SECURITY attribute conveyed in the IDRP BISPDU associated with this route.!;

idrpConnectionState-B BEHAVIOUR
DEFINED AS
! The current state (active, inactive) of the BIS to BIS communication in the local BIS. !;

idrpRIB-B BEHAVIOUR
DEFINED AS
! The idrpRIB is a generic MO class used in the construction of the of the idrpRIBin, idrpRIBout and locRIB MO classes. !;

idrpRIBIn-atnAdjacentGroundBIS-B BEHAVIOUR
DEFINED AS
! The name binding that applies when the idrpRIBIn Managed Object or its subclasses are created by automatic operation of the system as a result of a ribDump action performed on an atnBIS MO. The mechanism by which an instance of a idrpRIBin MO is deleted is a local matter of the organisation providing the CDSM service: the idrpRIBin MO instance can be deleted when a new MO instance is created as a result of a ribDump action.
Alternatively, it can be deleted after several other ribDump actions have been performed. !;

idrpRIBin-B BEHAVIOUR
DEFINED AS
! The idrpRIBin MO class is used as a container MO of idrpRoute MOs. Instances are created as a result of a ribDump action on a bIS MO. The idrpRIBin MO represents one instance of the IDRP adjRIBin in the Local BIS that is associated with the BIS to BIS connection established with the adjacent BIS represented by the superior atnAdjacentGroundBIS MO. !;

idrpRIBout-B BEHAVIOUR
DEFINED AS
! The idrpRIBout MO class is used as a container MO of all idrpRoute MOs. Instances are created as a result of a ribDump action on an atnBIS MO. The idrpRIBout MO represents one instance of the IDRP adjRIBout in the Local BIS that is associated with the BIS to BIS connection established with the adjacent BIS represented by the superior atnAdjacentGroundBIS MO. !;

idrpRIBout-atnAdjacentGroundBIS-B BEHAVIOUR
DEFINED AS
! The name binding that applies when the idrpRIBout Managed Object or its subclasses are created by automatic operation of the system as a result of a ribDump action performed on an atnBIS MO. The mechanism by which an instance of a idrpRIBout MO is deleted is a local matter of the organisation providing the CDSM service: the idrpRIBout MO instance can be deleted when a new MO instance is created as a result of a ribDump action.
Alternatively, it can be deleted after several other ribDump actions have been performed. !;

idrpRoute-B BEHAVIOUR
DEFINED AS
! The idrpRoute MO represents one entry in an adjRIBin, adjRIBout or locRIB of the BIS.
!;

idrpRoute-idrpRIBin-B BEHAVIOUR
DEFINED AS
! The name binding that applies when the idrpRoute Managed Object or its subclasses are created by automatic operation of the system as a result of a ribDump action performed on an atnBIS MO, and when the idrpRoute MO is a subordinate MO of an adjRIBin MO. The idrpRoute managed objects are deleted when the superior adjRIBin MO is deleted.!;

idrpRoute-idrpRIBout-B BEHAVIOUR
DEFINED AS
! The name binding that applies when the idrpRoute Managed Object or its subclasses are created by automatic operation of the system as a result of a ribDump action performed on an atnBIS MO, and when the idrpRoute MO is a subordinate MO of an adjRIBout MO. The idrpRoute managed objects are deleted when the superior adjRIBout MO is deleted.!;

idrpRoute-locRIB-B BEHAVIOUR
DEFINED AS
! The name binding that applies when the idrpRoute Managed Object or its subclasses are created by automatic operation of the system as a result of a ribDump action performed on an atnBIS MO, and when the idrpRoute MO is a subordinate MO of a locRIB MO. The idrpRoute managed objects are deleted when the superior locRIB MO is deleted.!;

linkageId-B BEHAVIOUR
DEFINED AS
! An identifier that uniquely identifies the linkage MO.!;

locRIB-B BEHAVIOUR
DEFINED AS
! The locRIB MO class is used as a container MO of idrpRoute MOs.
Instances are created as a result of a ribDump action on an atnBIS MO. The locRIB MO represents one instance of the IDRP locRIB in the Local BIS represented by the superior atnBIS MO. !;

locRIB-atnBIS-B BEHAVIOUR
DEFINED AS
! The name binding that applies when the locRIB Managed Object or its subclasses are created by automatic operation of the system as a result of a ribDump action performed on an atnBIS MO. The mechanism by which an instance of a locRIB MO is deleted is a local matter of the organisation providing the CDSM service: the locRIB MO instance can be deleted when a new MO instance is created as a result of a ribDump action.
Alternatively, it can be deleted after several other ribDump actions have been performed. !;

mCFtype-B BEHAVIOUR
DEFINED AS
!For a CIDIN/AMHS MTCU, this attribute specifies the CIDIN application supported by the managed MTCU.!;

mTCU-B BEHAVIOUR
DEFINED AS
!The MTCU Managed Object Class describes the information in order to provide the cross-domain management with a view the MTCU capability (e.g. whether it provides connectivity to the AFTN or to the CIDIN) and availability within an AMHS Gateway. If the MTCUtype is CIDIN/AMHS, then the MCFtype is present and provides the CIDIN application supported by the MTCU (AFTN, OPMSG, OPMET). This information is not changed except under specific management actions of the AMHS SM Manager in charge of local management of the gateway and MTCU (i.e. different from the XMIB SM Manager). One instance of this object-class is created for each MTCU in each AMHS gateway described in the ATN XMIB. A MTCU object instance is named by the MTCUName attribute.!;

mTCUMaxBinaryMessageSize-B BEHAVIOUR
DEFINED AS
!For a CIDIN/AMHS MTCU supporting the OPMET application, this attribute specifies the maximum size of binary data messages incoming from the AMHS which can be converted by the managed MTCU for conveyance over the CIDIN.!;

mTCUMaxMessageRecipientNumber-B BEHAVIOUR
DEFINED AS
!This attribute indicates the maximum number of recipients per message which the MTCU can accept in the message incoming from the AMHS. This attribute is set in relation with the message splitting capability and policy for the managed gateway, according to the number of recipients, to fit to the recipient number restrictions of the AFTN or CIDIN.!;

mTCUMaxTextMessageSize-B BEHAVIOUR
DEFINED AS
!For a CIDIN/AMHS MTCU supporting the OPMET application, this attribute specifies the maximum size of binary data message incoming from the AMHS which can be converted by the managed MTCU for conveyance over the CIDIN.!;

mTCUname-B BEHAVIOUR
DEFINED AS
!This attribute provides the name of the MTCU for identification purposes.!;

mTCUtype-B BEHAVIOUR
DEFINED AS
!This attribute indicates whether the managed MTCU performs AFTN/AMHS conversion with support of the Basic ATS Message Service, or AFTN/AMHS conversion with support of the Extended ATS Message Service, or CIDIN/AMHS conversion.!;

multiExitDisc-B BEHAVIOUR
DEFINED AS
! The value of the MULTI_EXIT_DISC attribute conveyed in the IDRP BISPDU associated with this route.!;

multiExitDiscPackage-B BEHAVIOUR
DEFINED AS
! Present when the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP MULTI_EXIT_DISC attribute.!;

nET-B BEHAVIOUR
DEFINED AS
! The Network Entity Title (having the same abstract syntax as NSAP Address), which unambiguously identifies the Network Entity in an End or Intermediate System. !;

nSAPprefix-B BEHAVIOUR
DEFINED AS
! The common prefix of all NSAP addresses that can be reached. !;

nextHop-B BEHAVIOUR
DEFINED AS
! Present when the IDRP UPDATE BISPDU that corresponds to this route comprises an IDRP NEXT_HOP attribute.!;

nextLinkage-B BEHAVIOUR
DEFINED AS
! Indentifier of the linkage over which NPDUs following this route are going to be forwarded.!;

nextSNPA-B BEHAVIOUR
DEFINED AS
! SNPA address of the Next (hop) System to which the NPDUs following this route are forwarded. !;

nexthop-B BEHAVIOUR
DEFINED AS
! The value of the NEXT_HOP attribute conveyed in the IDRP BISPDU associated with this route.!;

nlri-B BEHAVIOUR
DEFINED AS
! Network Layer Reachability Information. It is the list of the destinations that are reachable by following the route.!;

nsaps-B BEHAVIOUR
DEFINED AS

```
        ! The list of NSAPs configured on the ATN End Systems !;

octetsReceivedCounter-B BEHAVIOUR
  DEFINED AS
        ! Counter of the number of octets received by the BIS on that linkage.!;

octetsSentCounter-B BEHAVIOUR
  DEFINED AS
        ! Counter of the number of octets sent by the BIS on that linkage.!;

operationalStateChangeNotification-B BEHAVIOUR
  DEFINED AS
        !A state change notification is emitted when the operational state attribute changes in value.!;

pDUsReceivedCounter-B BEHAVIOUR
  DEFINED AS
        ! Counter of the number of PDUs received by the BIS on that linkage.!;

pDUsSentCounter-B BEHAVIOUR
  DEFINED AS
        ! Counter of the number of PDUs sent by the BIS on that linkage.!;

path-B BEHAVIOUR
  DEFINED AS
        ! The list of RDIs, for Routing Domains or for confederations in the order that the route
        passes through them from the reachable domains to the domain of the ATN BIS. It
        corresponds to the information conveyed in the RD_PATH attribute of the route within IDRP
        UPDATE BISPDUs !;

pduErrorsThreshold-B BEHAVIOUR
  DEFINED AS
        !Threshold for the number of PDU errors detected by the local ASE entity.!;

rDI-B BEHAVIOUR
  DEFINED AS
        ! Local Routing Identifier. This is an NSAP Address prefix identifying the routing domain
        where the BIS is located. !;

reachableAddress-B BEHAVIOUR
  DEFINED AS
        ! The reachableAddress MO represents one entry in the Forwarding Information Base of the
        BIS. !;

reachableAddress-fIB-B BEHAVIOUR
  DEFINED AS
```

! The name binding that applies when the reachableAddress Managed Object or its subclasses are created by automatic operation of the system as a result of a fibDump action performed on an atnBIS MO. The reachableAddress managed objects are deleted when the superior fIB MO is deleted. !;

reachableAddressId-B BEHAVIOUR
DEFINED AS
! A string which is the identifier for the reachable Address and which is unique amongst the set of reachable addresses for this fIB. !;

receivedFrom-B BEHAVIOUR
DEFINED AS
! The Network Entity Title of the BIS from which this route was received.!;

remoteAbortsThreshold-B BEHAVIOUR
DEFINED AS
!Threshold for the number of aborts generated by remote ASE entities.!;

remoteConnectRejectsThreshold-B BEHAVIOUR
DEFINED AS
!Threshold for the number of outgoing connections rejected by remote ASE entities.!;

requestEcho-B BEHAVIOUR
DEFINED AS
! This action allows requesting the issuing of an Echo Request from a specified ATN system and toward another designated ATN System. If as a result of this action, an Echo Request PDU is sent by the specified ATN system, the requestEcho action completes successfully. If the Echo Request PDU cannot be sent, the requestEcho action returns a processingFailure error.
The action request carries the following information:
- the source NET or NSAP address of the ATN system from which an ECHO request PDU has be issued
- the destination NET or NSAP address of the ECHO request PDU
Optionally, the action request may convey the following information:
- the security parameter value of the ECHO request PDU to be issued
- the priority parameter value of the ECHO request PDU to be issued
- the QoS Maintenance parameter value of the ECHO request PDU to be issued
- an indication on whether the route recording option has to be included in the ECHO request PDU
- the user data to be inserted in the user data field of the ECHO request PDU
If successful, the action reply conveys an indication of the time at which the Echo Request has effectively been issued !;

ribAtt-B BEHAVIOUR
DEFINED AS

! The distinct combination of IDRP Distinguishing attributes representing the RIB-Att (RIB attribute) of the RIB. !;

ribDump-B BEHAVIOUR
DEFINED AS
! This action allows the creation of a new snapshot of the content of the IDRP Routing Information Bases of the BIS, under the form of locRIB, idrpRIBin, and idrpRIBout MOs and their subordinate idrpRoute MOs created under the atnBIS and atnAdjacentGroundBIS MO as a result of the action. If a new set of locRIB, idrpRIBin, and idrpRIBout MOs with their subordinate idrpRoute MOs is created, or if a recent enough (according to considerations that are local to the XMIB provider) such set already existed, the ribDump action completes successfully. Otherwise the ribDump action returns a processingFailure error.
If successful, the action reply conveys the following information:
- the time at which the dump has effectively been produced by the ATN system.
- the unique identifier of the dump. !;

ribID-B BEHAVIOUR
DEFINED AS
! An identifier that allows distinguishing the RIB dump from any previously generated RIB dumps and from RIB dumps of other RIBs with different RIB-Att. !;

routeId-B BEHAVIOUR
DEFINED AS
! The route identifier (as defined by ISO/IEC 10747). It is a binary number that uniquely identifies the route and is conveyed in the ROUTE_SEPARATOR attributes of IDRP UPDATE BISPDUs.!;

routerClass-B BEHAVIOUR
DEFINED AS
! Class of the Boundary Intermediate System, among the following possibilities: Class 4 (ground BIS), class 5 (air/ground BIS), class 6 (airborne BIS), class 7 (airbone BIS without IDRP) !;

securityAlarm-B BEHAVIOUR
DEFINED AS
!A security error alarm notification is emitted when the entity experiences any of the security alarms conditions defined in Rec. X.736 | ISO/IEC 10164-7 (e.g. integrity violation, operational violation, physical violation, security service or mechanism violation, time domain violation).!;

snpaAddress-B BEHAVIOUR
DEFINED AS
! The SNPA address of the BIS on that linkage.!;

supportedCharSet-B BEHAVIOUR
DEFINED AS

```
        !For a MTCU converting text-oriented messages, this attribute indicates the character sets
        which are accepted in message incoming from the AMHS for conversion by the managed
        MTCU for conveyance over the AFTN or CIDIN.  The use of EncodedInformationTypes
        allows to cover ia5-text text bodies or body parts, as well as general-text bodyparts with
        character sets specified by the OIDs conveyed in the EITs fields of the message envelope.!;

tSel-B BEHAVIOUR
   DEFINED AS
        !The Transport Selector of the application entity (the Session and Presentation selectors being
        Null). !;

timeOfDump-B BEHAVIOUR
   DEFINED AS
        ! The time at which the dump was produced. !;

usageStateChangeNotification-B BEHAVIOUR
   DEFINED AS
        !A state change notification is emitted when the usage state attribute changes in value.!;

- - ****************************
- - ASN.1 supporting productions
- - ****************************

CDSM DEFINITIONS IMPLICIT TAGS ::=
BEGIN

   IMPORTS
   --  MTS abstract service
      EncodedInformationTypes,
      GlobalInformationTypes,
      ORAddress
      FROM MTSAbstractService { joint-iso-ccitt mhs-motis(6)mts(3)modules(0)mts-abstract-service(1)}

      ManagementExtension
      FROM Attribute-ASN1Module { joint-iso-ccitt ms(9) smi(3) part2(2) asn1Module(2) 1 };

   -- EXPORTS everything

   -- Object identifier definitions
   -- ************************
   -- Abbrevations
   icao-sm OBJECT IDENTIFIER ::= { iso(1) identified-organisation (3) icao(27) atn-sm(4)}
   icao-smi OBJECT IDENTIFIER ::= { icao-sm smi(3) }
   xmib1 OBJECT IDENTIFIER ::= { icao-smi xMIBv1(1) }
   sseoi OBJECT IDENTIFIER ::= { xmib1 standardSpecificExtensions(0) }
   moi OBJECT IDENTIFIER ::= { xmib1 managedObjectClass(3) }
```

```
   poi OBJECT IDENTIFIER ::= { xmib1 package(4) }
   proi OBJECT IDENTIFIER ::= { xmib1 parameter(5) }
   nboi OBJECT IDENTIFIER ::= { xmib1 nameBinding(6) }
   aoi OBJECT IDENTIFIER ::= { xmib1 attribute(7) }
   acoi OBJECT IDENTIFIER ::= { xmib1 action(9) }
   noi OBJECT IDENTIFIER ::= { xmib1 notification(10)}
   -- Others
   -- for communication  information notification
echoRequestReceived OBJECT IDENTIFIER ::= { sseoi informationtype(4) echoRequestReceived(1)}
echoResponseReceived OBJECT IDENTIFIER ::= { sseoi informationtype(4) echoResponseReceived (2)}
errorReportReceived OBJECT IDENTIFIER ::= { sseoi informationtype(4) errorReportReceived (3)}

   -- Other definitions
   -- **************
   ActionInfo ::=          SET OF ManagementExtension
   ActionTime ::=          UTCTime
   AdjacentComCentre ::=       PrintableString(SIZE(1..8))
   AeAxAddress ::=         PrintableString(SIZE(1..8))
   AEQualifier ::=         INTEGER(0..255)
   AETypes ::=                 BIT STRING
   AFaddress ::=           PrintableString(SIZE(8))
   AGsubnetworkTag ::= SEQUENCE {
      snType               AGsubnetworkType,
      permTraffic          BIT STRING (SIZE (8))
   }
   AGsubnetworkType ::= ENUMERATED { modeS(1), vDL(2), aMSS(3), gatelink(4), hF(5) }
   AMHSgatewayName ::=     PrintableString(SIZE(1..32))
   ASEversion ::=          INTEGER (1..255)
   ATSCclassTag ::=        SEQUENCE {
      tagName              ATSCTagName,
      supportedClasses     BIT STRING (SIZE (8))
   }
   ATSCTagName ::=         ENUMERATED { aTSConly(7), allTraffic(6) }
   Boolean ::=             BOOLEAN
   Capacity ::=            INTEGER (0..255)
   CLNPsecurity ::=        TrafficTypeSecurityTag
   DelayTime ::=           INTEGER
   DumpID ::=              INTEGER
   DumpReply ::=           SEQUENCE {
      timeOfDump           [0] TimeOfDump,
      dumpID               [1] DumpID,
      otherParams          [7] SET OF ManagementExtension OPTIONAL
   }
   Encapsulation ::=       BOOLEAN
   ENTRYseq ::=            SEQUENCE OF RDI
   ENTRYset ::=            SEQUENCE OF RDI
```

```
HopCount ::=            INTEGER (0..255)
ICAOAddress ::=         CHOICE {
   aircraftID                   [0] BIT STRING (SIZE (24)),
   facilityDesignator   [1] IA5String (SIZE (4..8)),
   pSAP                 [2] OCTET STRING
}
IdrpConnectionState ::= ENUMERATED { closed(0), established(1) }
IDRPsecurity ::=        SEQUENCE {
   snTags     [1] SEQUENCE OF AGsubnetworkTag OPTIONAL,
   atscClass  [2] ATSCclassTag OPTIONAL
}
LinkageID ::=           SEQUENCE {
   localID              LocalLinkageID,
   name                 PrintableString
}
ListIncl ::=            SEQUENCE OF RDI
LocalLinkageID ::=      INTEGER
LocationName ::=        GraphicString
MCFtype ::=                     INTEGER {
   opmsg      (1),
   aftn       (2),
   opmet      (3)
   ...}
MFaddress ::=           ORAddress
MTCUname ::=            PrintableString(SIZE(1..32))
MTCUtype ::=            INTEGER {
   basic-ATS-message-service-aftn               (0),
   extended-ATAS-message-service-aftn           (1),
   cidin                                        (2)}
MultiExitDisc ::=       INTEGER (0..255)
Naddress ::=                    OCTET STRING (SIZE (1..20))
NextHop ::=             SEQUENCE {
   serverAllowed        [0] BOOLEAN,
   netOfNextHop         [1] Naddress,
   snpas                [2] SEQUENCE OF SNPAaddress OPTIONAL
}
NextLinkage ::=         LocalLinkageID
Nlri ::=                SET OF NSAPprefix
NSAPprefix ::=          BIT STRING (SIZE (1..160))
NSAPs ::=               SEQUENCE OF Naddress
Number ::=              INTEGER
Path ::=                SEQUENCE OF PathSegment
PathSegment ::=         CHOICE {
   rdSet      [1] RDset,
   rdSeq      [2] RDseq,
   entrySeq   [3] ENTRYseq,
```

```
    entrySet    [4] ENTRYset
  }
  PDUsyntax ::=         OCTET STRING
  Priority ::=          INTEGER (1..14)
  Psap ::=              OCTET STRING (SIZE (20..22))
  PString ::=           PrintableString
  QOSMaintenance ::= BIT STRING (SIZE (8))
  RDI ::=               OCTET STRING (SIZE (1..20))
  RDset ::=             SEQUENCE OF RDI
  RDseq ::=             SEQUENCE OF RDI
  ReachableAddressId ::= INTEGER
  RequestEchoInfo ::= SEQUENCE {
    source              [0] Naddress,
    destination                 [1] Naddress,
    security            [2] TrafficTypeSecurityTag OPTIONAL,
    priority            [3] Priority OPTIONAL,
    qos                 [4] QOSMaintenance OPTIONAL,
    routeRecording      [5] BOOLEAN DEFAULT FALSE,
    userData            [6] OCTET STRING OPTIONAL,
    otherParams         [7] SET OF ManagementExtension OPTIONAL
  }
  RibAtt ::=            ENUMERATED { empty(0), security(1) }
  RibID ::=             SEQUENCE {
    ribAtt RibAtt,
    dumpId DumpID
  }
  RouteID ::=           OCTET STRING (SIZE (4))
  RouterClass ::=       ENUMERATED { class4(4), class5(5), class6(6), class7(7) }
  SizeInCharacters ::=  INTEGER
  SizeInOctets ::=      INTEGER
  SNPAaddress ::=       OCTET STRING (FROM (
    '1'H | '2'H | '3'H | '4'H | '5'H | '6'H | '7'H | '8'H | '9'H | '0'H | 'A'H | 'B'H | 'C'H | 'D'H | 'E'H | 'F'H ))
  -- integral number of hexadecimal digits
  SupportedCharSet ::=          EncodedInformationTypes
  ThresholdValue ::=    INTEGER
  TimeOfDump ::=        ActionTime
  TrafficTypeSecurityTag ::= BIT STRING (SIZE (8))
  TSel ::=              OCTET STRING (SIZE (1..2))

END -- End of ASN.1 module
```