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Elements of management information related to the ATN Network Layer

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SUMMARY

This document is the first draft of specification of management information related to the network layer within an ATN system.

The ATN Network Layer Management Information is defined by specifying:

- the managed object class definition of ATN Network Layer MOs following the MO template that has been proposed for use in ATN SARPs.
- the action type operations on the attributes of ATN Network Layer Mos that are available to ATN System Management

DOCUMENT CONTROL LOG

SECTION	DATE	REV. NO.	REASON FOR CHANGE OR REFERENCE TO CHANGE
	16/02/98	Issue 1.O	First Issue presented at the WG1/SG3 meeting in Gatwick
	10/03/98	Issue 2.0	Update of introductory sections for presentation to WG2

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1. Introduction

1.1 Scope

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- the action type operations on the attributes of ATN Network Layer MOs that are available to ATN System Management

1.2 History of the document

Under the initiative of Eurocontrol, a first System Management co-ordination meeting was held in October 97, before the ATNP WG meeting at Redondo, with representatives of the ProATN and ACI consortia (Thomson, Vertel, Sofreavia) and with participants of the ATNP Working Groups (Eurocontrol, STNA).

One of the subject of the meeting was the definition of a plan for the alignment of the MIB of the ProATN and ATNSI projects, and the injection of the resulting harmonised material into ATNP WG meeting. At this time, no MIB had yet been defined for the ATNSI project, but this was planned to be completed by the end 97 (the ACI NMA FRS document). It was agreed that this ACI MIB would be defined taking into account input from ATN experts currently operating experimental systems, and input from the ProATN project. It was then agreed that this MIB would be considered as input material for injection into ICAO ATNP meetings in March 98.

This plan was presented to ATNP WG2 at the Redondo meeting and accepted. Stephane Tamalet was tasked to produce a first proposal for the ICS MIB, to be presented at the Rio WG2 meeting in March 98.

A second System Management co-ordination meeting was held in January 98, one week after the ACI NMA FRS document was made available. One of the result of this meeting was the creation of a Task Team for the production of an harmonised MIB for the projects and a proposal for a minimum subset of MOs for the ATN SARPs. The task team consisted of representatives of ProATN and ACI consortia (Thomson, Sita and Vertel) representing the views and the constraints of the projects and of participants to the ATNP WGs (STNA and Eurocontrol) representing the views and the requirements from an ATNP perspective.

The MIB convergence activity undertook by the team resulted in the production of 3 documents:

- A document presenting the proposed elements, for the ATN SARPs, of management information related to the ATN Network Layer (i.e. this document (WG2-14/WP 440))

- A document presenting the proposed elements, for the ATN SARPs, of management information related to the ATN Transport Layer. (WG2-14/WP 441)

- A document defining a convergent MIB for the ACI and ProATN consortia. (WG2-14/IP 439)

1.3 Status

1.3.1 General

This document is the first draft of specification of management information related to the network layer within an ATN system. In its current version, it only addresses system management aspects pertaining to fault and performance management.

Accounting and Security management for the ATN Network Layer will be considered in a future version.

Configuration management is a system management functional area that has been considered to be out of the scope of the SARPs.

This issue of the document is an annotated version. Every description of attribute, action, and notification is annotated with a paragraph providing some level of rational explaining why the attribute, notification or action is proposed to be standardised in the ATN SARPs. These annotations will be removed at a later stage.

1.3.2 Level of convergence with the projects

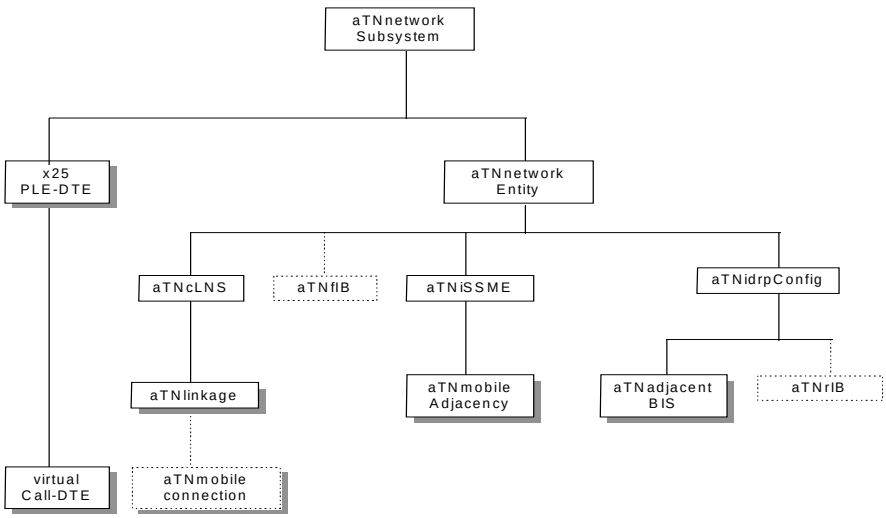
Note: Convergence with the projects means that what is proposed to be standardised in the SARPs, is acceptable for implementation by the projects.

With respect to the Network Layer MOs, convergence of views between the representatives of the ProATN and ACI consortia and the team members participant to ATNP was completed at 90 % (this is a rough estimate).

The main divergences relate to the implementation of certain MO classes in the containment tree as the way to model certain Network Layer information with Managed Objects. More specifically convergence has not been achieved on the ways to model the following information with Managed Objects:

- The Forwarding Information Bases
- The Routing Information Bases
- The mobile connections

The following figure represents the agreed common subset of the containment tree for the Network Layer MO classes. Agreed MO classes are represented by rectangles with a plain border. Points of disagreement are represented by rectangles with a dotted border.



In parallel, the projects have converged on a number of additional (projects specific) attributes in each MO class, and on a limited number of additional Managed Object Classes. These additional MOCs and attributes pertain for the most to configuration management (e.g. Initial Value MO (IVMO), nSAP MO, etc...).

1.3.3 Open Issues

The following main issues have been identified.

1. FIB and RIB MOs

Agreement was not reached on the way to represent the management information pertaining to the Forwarding Information Base and the Routing Information Bases.

The current proposal for the SARPs is to model the RIB and the FIB as a « black box » (i.e. one single MO is defined for representing the RIBs and another one single MO is defined for representing the FIB) », and to define a limited number of specific actions on these « black boxes » (e.g. action to get the route matching the specified destination). The rational is that this seems to be the simplest , most general solution, and the least constraining for the implementations.

The current proposal from the ACI consortium is to define individual MOs for representing each RIB, FIB, and each entry in the RIB and in the FIB (i.e. the routes). The rational is that there already exists within CMIP the facility to apply filters for the selection of Managed Objects; if routes are individually represented by Managed Objects, the standard scoping and filtering function will then allow any consultation in the Information bases without requiring the development of specific browsing operations.

ProATN has no firm position on this point.

2. location of the FIB MOC in the containment tree.

The representatives of the ACI consortium would prefer to have the FIB MOC anchored below the aTNcLNS MO rather than below the aTNnetworkEntity MO.

3. MOCs for representing the mobile Virtual Circuits established with a same mobile DTE.

The ACI consortium sees some advantage in having an MO representing the set of all mobile Virtual Circuits established with a same mobile DTE, plus subordinate objects existing per priority level (i.e. representing all mobile Virtual Circuits established with a same mobile DTE at the same priority) (These subordinates would normally map to a single X.25 Virtual Circuit or multiple in the case of a VDL subnetwork). The exact comment made by Vertel on this issue has been reproduced below:

« The grouping of information for mobile subnetworks is inefficient. The two objects currently proposed represent the subnetwork and the individual connections. For example on a single VDL subnetwork communicating with 500 aircraft there can be thousands of Virtual Circuits, ie. number of aircraft (500) X priority levels (3) X multiple transponders (2). To extract information for a particular aircraft requires the filtering on thousands of aTNmobileConnection managed objects. This is extremely inefficient. In addition in the case where we have subnetwork connection groups the LREF compression information is replicated in each member aTNmobileConnection MO. This is unnecessary duplication of information.

Our proposal is to have the following MOs:

- *aTNLinkage to represent the subnetwork, ie. VDL*

- *mobileConnection to represent a particular remote destination, i.e. aircraft*
- *subnetConnectionGroup to represent one or more virtual circuits to a particular destination, i.e. aircraft, sharing the same compression data.*
- *virtualCall to represent the individual VCs »*

In the current proposal of MIB for the ATN SARPs, it is considered sufficient to implement one single MO class, each instance of which represents one mobile Virtual Circuit. The main rational is that it is believed that in a realistic operational context the system manager (more specifically the operator) will not require to get dynamically the current values of attributes of current mobile connections (e.g. requests such as « how many packets have been sent to that particular aircraft at the moment ? »). It is believed that the requirement is that all the information be registered and logged for post-processing (e.g. accounting, performance tuning, etc...). It is then believed that the current proposal better fulfils this requirement and is simpler to implement.

4. Congestion management related information

Information pertaining to congestion management is difficult to model. The proposed attributes and notifications that address this point are still under discussion. At the moment congestion related information is only proposed to be stored and reported by attributes and notifications implemented at the level of the aTNcLNS MO (i.e. at CLNP level). There is a common feeling however that congestion related information is required at subnetwork level (i.e. aTNLinkage).

5. Miscellaneous issues:

There are divergences and discussions on a very few number of attributes:

- ACI representatives consider that the proposed "outstandingUpdatesCounter" and "maxOutstandingUpdates" attributes in the aTNadjacentBIS managed object are implementation specific and are based on the assumption that IDRP generates all update PDUs and then waits for a credit.

- From the proposed aTNmobileConnection MO attributes, the projects have not retained the following 2 attributes: « lREFused » and « lREFfullConditions »

6. MOC naming conventions:

In this document, MOC names are all prefixed by ‘aTN’ (e.g. aTNnetworkEntity). Projects have followed a different approach: ATN specific MO classes have their names prefixed by ‘aTN’. On the other hand, MO classes reused with no deviations from ISO/IEC 10733 keep the standard ISO name.

7. Definition of subnetwork level MO classes

In this version of this document, it has been considered that the scope of the ATN SARPs do not cover protocol entities below the SNDCF level, and that MOCS pertaining to SNAcP had not to be part of the ATN SARPs (see last page of this document). However, requirements exist for management information at SNAcP level (e.g. for accounting over mobile subnetwork, subnetwork fault reporting, etc..).

In chapter 2, the points of divergence have been highlighted in the MO description tables using a grey background.

1.4 Recommendation

WG2 is invited to review this material and to provide comments.

2. Elements of ATN network layer management information

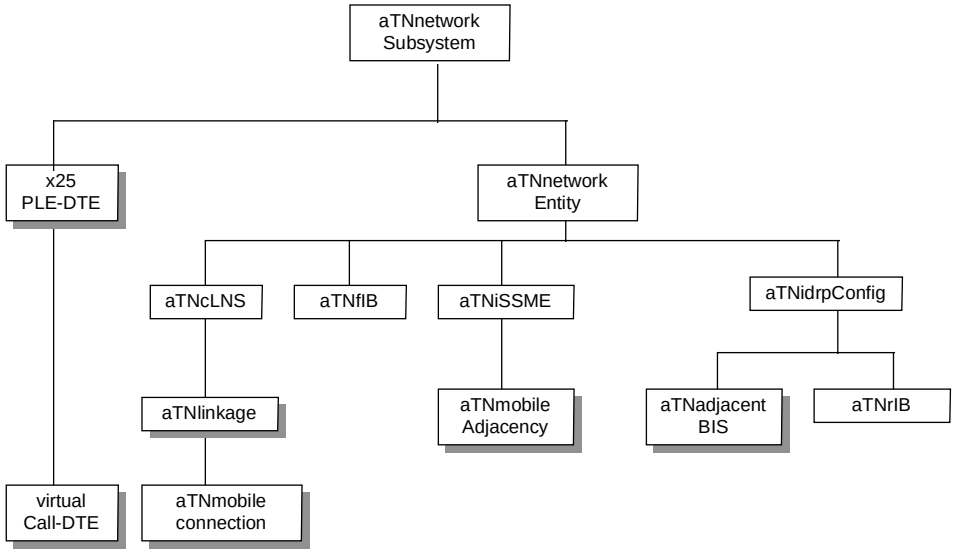
2.1 Summary of managed objects

The following set of managed object classes are defined for the ATN Network layer:

- aTNnetworkSubsystem
- aTNnetworkEntity
- aTNcLNS
- aTNlinkage
- aTNmobileConnection
- aTNfIB
- aTNidrpConfig
- aTNadjacentBIS
- aTNrIB
- aTNiSSME
- aTNmobileAdjacency
- x25PLE-DTE
- virtualCall-DTE

2.2 Containment hierarchy

The containment hierarchy is illustrated in figure 1. Managed Objects which can have multiple instances are illustrated by shadowed boxes. These objects are defined in detail in the following sections.



2.3 Symbols, abbreviations and terms

In each table, the "ISO Status" column indicates the conformance requirement as specified in the ISO/IEC base standard that defines the MO. A hierarchy exists, so that the conformance requirements of a dependent feature only apply if the "parent" feature is supported (e.g. if an MO class is not supported, then none of the attributes will be supported, even if classified as "M"). Possible values for ISO Status are:

M - Mandatory to implement

O - Optional to implement

C - Dependent upon some Condition explained in a footnote to the table

A - Feature is ATN-specific, i.e. not present in base standard.

The "ATN Status" column indicates the conformance requirement as specified in the ATN SARPs. Notes may be used to expand on the support requirement, e.g. to differentiate between different types of ATN system. Possible values for ATN Status are:

M - Mandatory to implement (equivalent to a "shall" statement)

R - Recommended to implement (equivalent to a "should" statement)

O - Optional to implement (i.e. an implementation is free to implement the feature or not)

X - Prohibited to implement.

2.4 The aTNnetworkSubsystem managed object

2.4.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNnetworkSubsystem There shall be one such MO within an ATN system. It exists to provide a container for all Network Layer specific MOs. The aTNnetworkSubsystem MO can not be created or deleted explicitly by management operation. It exists inherently in an ATN system; created and deleted as part of system operation.	ISO/IEC 10733 networkSubsyste m MO: M	M
2.	Naming attribute	subsystemId		
3.	Superior in Naming Tree	aTNsystem		

2.4.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status
1.	subsystemId naming attribute GraphicString Initial Value = « aTNnetworkSubsystem »	GET	M	M

2.4.3 Actions

None

2.4.4 Notifications

None

2.5 The aTNnetworkEntity managed object

2.5.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNnetworkEntity There shall be one such MO within an ATN system. It exists to provide a container for all Network Entity specific MOs. The aTNnetworkEntity MO can not be created or deleted explicitly by management operation. It exists inherently in an ATN system; created and deleted as part of system operation.	ISO/IEC 10733 networkEntity MO: M	M
2.	Naming attribute	communicationsEntityId		M
3.	Superior in Naming Tree	aTNnetworkSubsystem		M

2.5.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status
1.	communicationsEntityId naming attribute GraphicString Initial Value = « aTNnetworkEntity »	GET	M	M
2.	operationalState Operational state as defined in ISO/IEC 10164-2 ENUMERATED { disabled(0), enabled(1) } *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not.*	GET	M	M

Note: A number of ISO/IEC 10733 standard attributes are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

networkEntityTitles:	*its a configuration management related attribute*
systemTypes::	*its a configuration management related attribute*
localSapNames	*(derived from GMI:communicationsEntity)* *its a configuration management related attribute*

2.5.3 Actions

None

2.5.4 Notifications

Index	Notification Name (Description)	ISO Status	ATN Status
1.	stateChange stateChange notification as defined in ISO/IEC 10165-2. used to report the changes to the operationalState attribute. A single parameter set is included in the State change definition field. The mandatory attributeId and newAttributeValue parameters are used *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not. Monitoring the operationalState may not be sufficient, since the polling period may not allow to detect problem quickly enough*	M	M

Note: A number of ISO/IEC 10733 standard notification are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

objectCreation	*This notification allows the manager to dynamically discover that the managed system implements the MO, or to confirm a create operation, and allows to report initial MO attribute values. ATN systems are required to support one such MO. Manager are therefore assumed to a-priori know that one instance of this MO will exist. The stateChange notification will allow to know when the MO is operational. No requirement for the logging of initial attribute values is identified for this MO*
objectDeletion:	*This notification allows the manager to dynamically discover that the managed system does not implements the MO anymore, or to confirm a delete operation, and allows to report final MO attribute values. ATN systems are required to support one such MO. It is therefore not assumed to be deleted. The stateChange notification will allow to know when the MO is not operational anymore. No requirement for the logging of final attribute values is identified for this MO*

2.6 The aTNcLNS managed object

2.6.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNcLNS There shall be one such MO within each ATN system per Network entity. This MO represents an implementation of the ISO/IEC 8473-1 protocol. It can not be created or deleted explicitly by management operation. It exists inherently in an ATN system; created and deleted as part of system operation.	ISO/IEC 10733 cLNS MO: M	M
2.	Naming attribute	clProtocolMachineId		M
3.	Superior in Naming Tree	aTNnetworkEntity		M

2.6.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status
1.	clProtocolMachineId Naming attribute GraphicString Initial Value = « CLNS»	GET	M	M
2.	operationalState Operational state as defined in ISO/IEC 10164-2 ENUMERATED { disabled(0), enabled(1) } *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not.*	GET	M	M
3.	segmentsReceived Counter of segments received. This is the number of data and error report NPDUs received prior to reassembly, including those which may subsequently be discarded or forwarded. INTEGER *Rational: the numbers of segments sent/received are essential indicator of the load of the systems.* *Note: the ratio of error report versus data NPDUs in the traffic, will be computed by comparison of the value of this attribute with the value of the errorReportReceived+errorReportForwarded attributes.*	GET	M	M

4.	segmentsSent Counter of segments sent. This is the number of data and error report NPDUs sent after segmentation processing occurs. INTEGER *Rational: the numbers of segments sent/received are essential indicator of the load of the systems.*	GET	M	M
5.	errorReportsReceived Number of error report NPDUs received which were addressed to the local network entity. INTEGER *Rational: The errorReportsReceived attribute as defined in the ISO/IEC 10733 standard allows to have an indication of the amount of locally issued data NPDUs which did not reach the destination. The standard attribute is therefore useful: it might be used as an indicator for a given ES of the percentage of loss of issued NPDU.*	GET	M	M
6.	errorReportsForwarded Number of error report NPDUs received which were not addressed to the local network entity and were forwarded to another system INTEGER *Rational: there is a requirement to monitor the amount of Error Reports that circulates in the network as compared to the total amount of traffic. This give an estimate of the overhead traffic due to Error Reporting.*	GET	A	IS: M ES: X
7.	SegmentsDiscarded Counter of segments discarded. This is the number of data and error report NPDUs discarded without being delivered to a Network Service User or forwarded. This includes segments discarded for any reason except reassembly time expiry. INTEGER *rational: this attribute allows to get statistics on the loss of NPDUs in the managed network and to identify the nodes in the network where a high percentage of traffic is discarded (i.e. the nodes where there is a problem (e.g. slow routing convergence, congestion, etc..).* *Segments discarded due to reassembly time expiry are not taken into account because the managed system must not be considered as responsible for the error (one segment was lost or excessively delayed at another point of the network)*	GET	M	M
8.	congestionDiscards Number of DT and ER discarded due to congestion. This counter is incremented irrespective of the setting of the Error Report bit in the received NPDU INTEGER *rational: this attribute allows to get statistics on the loss of NPDUs due to congestion in the managed network and to identify the nodes in the network where a high percentage of traffic is discarded due to congestion.*	GET	M	M

9.	pDUDiscards Number of DT and ER NPDUs discarded for any of the reasons specified in ISO/IEC 8473-1 Table 7 with the exception of 'PDU discarded due to congestion'. This counter is incremented irrespective of the setting of the Error Report bit in the received NPDU. Note: This counter is associated with the pDUdiscard event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	M	M
10.	congestionsSegmentsReceived Number of DT and ER NPDU segments received with the 'congestion experienced' flag set INTEGER *rational: needed to get statistics on the level of congestion in the network*	GET	A	IS: M ES: O
11.	congestionsExperienced Number of times the local network entity set the 'congestion experienced' flag in a DT or ER NPDU segment. This counter is incremented when congestion is experienced by the managed system, irrespective of the original value of the 'congestion experienced' flag in the forwarded NPDU segment. INTEGER *rational: needed to get statistics on the level of congestion of the managed system*	GET	A	IS: M ES: O

12.	congestionState Status of congestion of the managed system. This attribute has 3 possible values: 1. 'congestion experienced': when the ratio of NPDUs forwarded in the condition of congestion described in 5.6.2.4.1 exceeds the configured high level water mark 2. 'congestion discard': when the managed system discards an NPDU for the reason of congestion, and while the 'not congestionned' state is not resumed 3. 'Not congestionned': when the ratio of NPDUs forwarded in the condition of congestion described in 5.6.2.4.1 is lower than the configured low level water mark ENUMERATED { normal(0), congestion(1), discard(2) } *rational: the system manager must be warned when NPDUs are discarded due to congestion. The standard ISO/IEC 10733 pDUDiscard notification does not report this event; it is therefore necessary to introduce management information elements that will allow to palliate the lack of a standard notification.* *It is considered unnecessary to issue a communicationAlarm notification for each NPDUs that is discarded due to congestion. It is indeed assumed that the manager will rather require to know when a system begins to discard NPDU due to congestion and when a normal (not-congestionned) situation is resumed. Notifying every congestionDiscard event could furthermore result in increasing the level of congestion of the managed system.* *The proposed congestionState attribute will allow to report as stateChange events the following events:* *1. the system begins to discard NPDU due to congestion (transition to 'congestion discard' state)* 2. *the system is not congestionned anymore (transition to 'Not congestionned' state)*	GET	A	IS: M ES: O
13.	congestedPriority Priority level under which NPDUs are currently affected by congestion and may be discarded *rational: If mixed priority queue are implemented, congestion may only be experienced for NPDUS below a certain level of priority. This level is of interrest to know: it allows to know which category of traffic is impacted by the congestion. This allows to have a better knowledge of the severity of the problem.*		A	IS: M ES: O

14.	trafficSentCounter set of the counters of total user data octets sent in valid data NPDUs for each main different categories of traffic. The set consists of the following individual counters: • atscClassAoctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating a class A ATSC traffic • atscClassBoctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating a class B ATSC traffic • atscClassCoctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating a class C ATSC traffic • atscClassDoctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating a class D ATSC traffic • atscClassEoctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating a class E ATSC traffic • atscClassFoctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating a class F ATSC traffic • atscClassGoctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating a class G ATSC traffic • atscClassHoctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating a class H ATSC traffic • atscClassNPoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating ATSC traffic with no traffic type policy preference • aocTrafficOctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating AOC traffic • aacTrafficOctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating AAC traffic • genTrafficOctetsSentCounter: Total number of user data octets sent in valid data NPDUs without a security label • smTrafficOctetsSentCounter: Total number of user data octets sent in valid data NPDUs with a security label indicating System Management traffic SEQUENCE OF INTEGER *rational: it is considered that the manager may have the requirement to get statistics on the forwarded volume of traffic individually for each traffic type. Possible reasons are:* • *monitoring of the sharing of the managed resource in the forwarding of the different traffic types* • *monitoring of the increase of traffic per traffic category* • *monitoring of the overhead of Network management traffic* • *detection of ATSC traffic forwarded through paths with an ATSC class that is lower than the required ATSC class*	GET	A	IS: M ES: O

15.	trafficReceivedCounter set of the counters of user data octets received in valid data NPDUs for each main different categories of traffic. The set consists of the following individual counters: • atscClassAoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating a class A ATSC traffic • atscClassBoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating a class B ATSC traffic • atscClassCoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating a class C ATSC traffic • atscClassDoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating a class D ATSC traffic • atscClassEoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating a class E ATSC traffic • atscClassFoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating a class F ATSC traffic • atscClassGoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating a class G ATSC traffic • atscClassHoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating a class H ATSC traffic • atscClassNPoctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating ATSC traffic with no traffic type policy preference • aocTrafficOctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating AOC traffic • aacTrafficOctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating AAC traffic • genTrafficOctetsReceivedCounter: Total number of user data octets received in valid data NPDUs without a security label • smTrafficOctetsReceivedCounter: Total number of user data octets received in valid data NPDUs with a security label indicating System Management traffic SEQUENCE OF INTEGER *rational: same rational as for the trafficSentCounter attribute*	GET	A	IS: M ES: O

Note: A number of ISO/IEC 10733 standard attributes are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

administrativeState: its a configuration management related attribute

supportedProtocols:	*its a configuration management related attribute*
operationalSystemType:	*its a configuration management related attribute*
octetSentCounter *octetReceivedCounter:*	*have been replaced by trafficSentCounter and trafficReceived Counter*
assemblingSegmentsdiscarded	*no obvious requirement: segmenting should not occur in the ATN (use of non-segmenting subset is recommended). Furthermore, the loss of a segment is reported by routers, and the loss of the NSDU can be logged thanks to the TP4 retransmission counter*
maximumLifetime:	*its a configuration management related attribute*
enableChecksum:	*its a configuration management related attribute*

2.6.3 Actions

Index	Action Name (Description)	ISO Status	ATN Status
1.	echoRequest invoke the ISO/IEC 8473-1 echo request function. The echo request function causes an Echo Request (ERQ) PDU to be created and issued by the managed CL network entity. action parameters: • destination NSAP/NET • security attribute • priority • use or not of the route recording option • waiting delay for the response If the action succeeds, the reply contains the parameters of the echo Response NPDU: • time stamping information ? • list of recorded ISs	A	O

Note: A number of ISO/IEC 10733 standard actions are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

activate:	*it is an action used for local administration of the systems*
deactivate:	*it is an action used for local administration of the systems*

2.6.4 Notifications

Index	Notification Name (Description)	ISO Status	ATN Status

1.	communicationsAlarm Used to report a communication alarm condition in the operation of the cLNS managed object. It is used to report the following events: • pDUDiscard: generated when a data NPDU is discarded due to any reasons specified in ISO/IEC 8473 Table 8, with the exception of 'PDU discarded due to congestion'. The header of the PDU in error shall be reported as a parameter in the additionalInformation field of the communicationsAlarm, using the notificationPDUHeader parameters. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The value NLM.pDUDiscard and that corresponding to the Reason For Discard shall be reported in the specificProblem parameter. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field. A PDU which does not contain one of the protocol identifiers defined in ISO/IEC 8473 shall not cause this event. If an error report PDU is generated, the PDU header and Discard Reason in the error report shall be the same as those in the corresponding notification. *rational: the reasons other than congestion for having an NPDU discarded are the following: protocol error, incorrect chacksum/header syntax error, segmentation needed but not permitted received PDU is incomplete, destination address unreachable, lifetime expired, unsupported option. In some case, the error will be transient and will affect one NPDU only (e.g. checksum error); but in other cases, there might be a permanent problem which will affect all NPDUs with the same characteristics (e.g. invalid configuration). This will necessitate investigation from the manager.*	M	M

2.	stateChange stateChange notification as defined in ISO/IEC 10165-2. Used to report the changes to the following attributes: • operationalState. A single parameter set is included in the State change definition field. The mandatory attributeId and newAttributeValue parameters are used *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not. Monitoring the operationalState may not be sufficient, since the polling period may not allow to detect problem quickly enough* • congestionState: Only transition from 'normal' to 'discard' and form 'discard' to 'normal' shall be reported. A single parameter set is included in the State change definition field. The mandatory attributeId and newAttributeValue parameters are used. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: – linkageId: identifier of the linkage on which congestion is/was experienced – congestedPriority: Priority level under which NPDUs are currently affected by congestion and may be discarded *rational: see the congestionState attribute*	M	M
3.	objectDeletion Generated whenever an instance of the managed object class is deleted. Implementations may optionally include the sourceIndicator parameter in the notification. If deletion occured as a result of internal operation of the resource, the value 'resourceOperation' is used. If deletion occured in response to a management operation, the value 'managementOperation' is used A value 'unknown' may be returned if it is not possible to determine the source of the operation. The attributeList parameter shall be used to report the values of the MO attributes. None of the other optional parameters are used. *rational: needed for the logging of the actual value of the MO attributest*	M	M

Note: A number of ISO/IEC 10733 standard notification are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

objectCreation	*This notification allows the manager to dynamically discover that the managed system implements the MO, or to confirm a create operation, and allows to report initial MO attribute values. ATN systems are required to support one such MO. Manager are therefore assumed to a-priori know that one instance of this MO will exist. The stateChange notification will allow to know when the MO is operational. No requirement for the logging of initial attribute values is identified for this MO*

2.7 The aTNlinkage managed object

2.7.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNlinkage Linkage Managed Object There shall be one aTNlinkage MOs associated with each separate provision of the underlying service to the CLNS protocol machine, that is for each linkage emanating from the system or each subnetwork the system is attached to. Its definition permits it to be created and deleted explicitly by management operation, but in some systems it will exist inherently and neither creation or deletion by management operation will be possible An instance of the aTNlinkage MO shall be created when the system is being initialised, when the system is being attached to a new subnetwork and/or the system is configured with a new SNDCF/SNAcP. An instance of the aTNlinkage MO shall be deleted when the system is no longer attached to the subnetwork identified by that MO.	ISO/IEC 10733 linkage MO: M	M
2.	Naming attribute	linkageId		
3.	Superior in Naming Tree	aTNcLNS		

2.7.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status
1.	linkageId Naming attribute GraphicString	GET	M	M
2.	operationalState Operational state as defined in ISO/IEC 10164-2 ENUMERATED { disabled(0), enabled(1) } *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not.*	GET	M	M

3.	octetsSentCounter Total number of user data octets sent over this subnetwork INTEGER *rational: the attribute is useful for monitoring the effective outgoing throughput over a subnetwork. The requirement for this attribute is questionable. This attribute may not needed if the equivalent counters are implemented at data link or SNAcP layer*	GET	A	M
4.	octetsReceivedCounter Total number of user data octets received from this subnetwork INTEGER *Rational: the attribute is useful for monitoring the effective incoming throughput from a subnetwork. The requirement for this attribute is questionable. This attribute may not needed if the equivalent counters are implemented at data link or SNAcP layer*	GET	A	M
5.	pdusReceivedCounter counter of the total number of PDUs received over this subnetwork. Only PDUs conveying user data shall be counted. Mobile SNDCF LREF Error Report and LREF Cancel PDUs shall not be counted INTEGER *Rational: This attribute is useful to compute the ratio of the CLNP traffic which is supported by each subnetwork. In an A/G BIS, it allows to compute the ratio of the air/ground and ground/ground traffic exchanged via a local X.25 subnetwork attachment. The requirement for this attribute is questionable.*	GET	A	M
6.	pdusSentCounter counter of the total number of PDUs sent over this subnetwork. Only PDUs conveying user data shall be counted. Mobile SNDCF LREF Error Report and LREF Cancel PDUs shall not be counted INTEGER *comment: same as pdusReceived attribute in the FRS. It is proposed to use the standard DMI name* *Rational: This attribute is useful to compute the ratio of the CLNP traffic which is supported by each subnetwork. In an A/G BIS, it allows to compute the ratio of the air/ground and ground/ground traffic exchanged via a local X.25 subnetwork attachment. The requirement for this attribute is questionable.*	GET	A	M

Conditional Package for ISO/IEC 8208 standard **and** mobile SNDCFs:

9.	callsPlaced Counter of the number of X.25 VCs successfully established by the SNDCF INTEGER *rational: this parameter allows the monitoring of the number and frequency of (successful) outgoing calls. In A/G BIS, it is a statistic of interest to see the evolution in the number of mobile connection establishments, which may allow to foresee the future requirements in terms of performance of the systems. In Airborne and A/G BISs it allows for the computation of the ratio of successful calls, which is a statistics of interrest on the performance of the mobile subnetwork. For ground-ground connection, this attribute is needed for a correct tunning of the idle timer.*	GET	M	M
10.	callsFailed Counter of the number of X.25 call failures while attempting establishment by the SNDCF Note: This counter is associated with the callFailed event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	M	M
11.	callsAccepted Counter of the number of X.25 VCs successfully established by a remote system with the local SNDCF INTEGER *rational: this parameter allows the monitoring of the number and frequency of (successful) incoming calls. In A/G BIS, it is a statistic of interest to see the evolution in the number of mobile connection establishments, which may allow to foresee the future requirements in terms of performance of the systems. In Airborne and A/G BISs it allows for the computation of the ratio of successful calls, which is a statistics of interrest on the performance of the mobile subnetwork. For ground-ground connection, this attribute is needed for a correct tunning of the idle timer.*	GET	A	O
12.	callsRejected Counter of the number of X.25 incoming calls rejected by the local SNDCF Note: This counter is associated with the callRejected event which generates a communication alarm notification. INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M

13.	abnormalVCreleases counter of the number of Virtual Circuits which were cleared with a cause and diagnostic code indicating an error Note: This counter is associated with the abnormalVCrelease event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M

Note: A number of ISO/IEC 10733 standard attributes are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

administrativeState:	*it is a configuration management related attribute*
sN-ServiceProvider:	*it is a configuration management related attribute*
sN-SAP:	*it is a configuration management related attribute*
operationalProtocols:	*it is a configuration management related attribute*
idleTimer:	*it is a configuration management related attribute*
initialMinimumTimer	*it is a configuration management related attribute*
enableChecksum	*it is a configuration management related attribute*
iSO9542 packages	*most of the attributes relates to configuration management. For the others, no requirement has been identified (a lot are of interest in an intra-domain context only (outside the scope of SARPs))*
iSO10589 packages	*of interest in an intra-domain context only (outside the scope of SARPs)*

Note 2: for a correct tuning of the required X.25 configuration (number of simultaneous VCs allowed) the following counters could be required:

- *Current number of Virtual Circuit established over a mobile subnetwork*
- *Maximum number of Virtual Circuit that where concurrently established*

They are not proposed to be standardised in the ATN SARPs, at the moment, because it is considered that these counters could be better placed at SNAcP level (to be investigated)

Note3: No counter and notification have been proposed for the cases where the SNDCF would discard an SNSDU due to congestion. This is because the ATN ICS SARPs assume that congestion problems are tackled at CLNP level: the SNDCFs are not assumed to discard SNSDU for congestion reasons; in the case of congestion, the SNDCFs should signal the congestion problem to CLNP, which in turn should be responsible for discarding the packets.:

Note 4: No counter and notification have been proposed for the cases where the SNDCF would discard an SNDU because an X.25 VC to the destination DTE cannot be established. It is considered that the problem will be reported with the alarm on the failure to open a connection.

2.7.3 Actions

None

Note: A number of ISO/IEC 10733 standard actions are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

activate:	*it is an action used for local administration of the systems*

deactivate: *it is an action used for local administration of the systems*

2.7.4 Notifications

Index	Notification Name (Description)	ISO Status	ATN Status
1.	communicationsAlarm Used to report a communication alarm condition in the operation of the managed SNDCF. It is used to report the following events: • callFailed: Issued on the clearing of a locally initiated call request. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The value NLM. callFailed shall be reported in the specificProblem parameter. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: – value of the cause field of the clear indication packet – value of the diagnostic field of the clear indication packet *Rational: reject of a mobile or ground-ground connection request may prevent communication between an aircraft and the ground. It is a severe event which must be investigated (there might be a configuration error; etc..).* • callRejected: Issued on the clearing by the local SNDCF of an incoming call. This alarm shall only be issued when the incoming call is cleared under the initiative of the SNDCF (e.g. invalid compression mechanisms are proposed, unrecognized PID, etc...). The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The value NLM. callRejected shall be reported in the specificProblem parameter. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: – value of the cause field of the clear request packet – value of the diagnostic field of the clear request packet *Rational: reject of a mobile or ground-ground connection request may prevent communication between an aircraft and the ground. It is a severe event which must be investigated (there might be a configuration error; there might be an attack from an unauthorized system, etc..).* *Note: this alarm must not be issued when the reject is under the initiative of the ISSME (e.g. DTE Validation error). In such a case, the ISSME will be responsible for issuing the alarm. (see Communication alarms of the iSSME MO)*	A	M

	communicationsAlarm (continued) • abnormalVCrelease: Issued upon the clearing of an established Virtual Circuit with a cause and diagnostic codes indicating an error. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The value NLM. abnormalVCrelease shall be reported in the specificProblem parameter. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: – value of the cause field of the clear request/indication packet – value of the diagnostic field of the clear request/indication packet *Rational: VC abnormal disconnection may stop communication between an aircraft and the ground. It is a severe event which must be investigated.*		
2.	stateChange stateChange notification as defined in ISO/IEC 10165-2. used to report the changes to the operationalState attribute. A single parameter set is included in the State change definition field. The mandatory attributeId and newAttributeValue parameters are used *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not. Monitoring the operationalState may not be sufficient, since the polling period may not allow to detect problem quickly enough*	M	M
3.	objectCreation Generated whenever an instance of the managed object class is created. Implementations may optionally include the sourceIndicator parameter in the notification. If creation occured as a result of internal operation of the resource, the value 'resourceOperation' is used. If creation occured in response to a management operation, the value 'managementOperation' is used. A value 'unknown' may be returned if it is not possible to determine the source of the operation. None of the other optional parameters are used. *rational: the definition of the MOC permits an instance to be created and deleted explicitly by (local or remote) management operation. As a consequence, if this notification was not implemented, the manager could not know that linkage has been added or recovered on a system.*	M	M

4.	objectDeletion Generated whenever an instance of the managed object class is deleted. Implementations may optionally include the sourceIndicator parameter in the notification. If deletion occured as a result of internal operation of the resource, the value 'resourceOperation' is used. If deletion occured in response to a management operation, the value 'managementOperation' is used A value 'unknown' may be returned if it is not possible to determine the source of the operation. The attributeList parameter shall be used to report the values of the MO attributes. None of the other optional parameters are used. *rational: the definition of the MOC permits an instance to be created and deleted explicitly by (local or remote) management operation. As a consequence, if this notification was not implemented, the manager could not know that linkage has been removed or lost on a system. It is also needed for the logging of the actual value of the MO attributes.*	M	M

2.8 The aTNmobileConnection managed object

2.8.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNmobileConnection This MO represents one existing X.25 Virtual Circuit created by the SNDCF for ISO/IEC mobile subnetwork of the managed system. There shall be one instance of the aTNmobileConnection MO corresponding to each air-ground Virtual Circuit managed by the SNDCF for ISO/EEC 8208 Mobile Subnetworks. It is not created by management, but by the operation of the SNDCF for ISO/IEC 8208 mobile subnetwork. An instance of the aTNmobileConnection MO shall be created and exist as long as real resources are consumed by the existence of the Virtual circuit. An instance of the aTNmobileConnection MO shall be deleted when the associated Virtual Circuit is cleared.	A	class5IS: M class6IS: M class7IS: M
2.	Naming attribute	mobileConnectionId		
3.	Superior in Naming Tree	aTNlinkage		

2.8.2 Attributes

Index	**Attribute Name** **(Description)** **Syntax**	Operations	ISO Status	ATN Status
1.	mobileConnectionId Naming attribute GraphicString	GET	A	M
2.	mobileConnectionGroupId The identifier of the mobile subnetwork connections group to which the Virtual circuit belongs. The mobile subnetwork group is the set of virtual circuits consecutively created between the same pair of DTEs, and which use the same subnetwork priority level, the same data compression mechanisms and options, and share the same Local Reference Directory GraphicString *rational: needed to monitor the effectiveness of the reuse of LREF directory option under handover conditions*	GET	A	M

3.	sNconnection Distinguished Name referencing the ISO/IEC 8208 Virtual Circuit supporting this mobile connection *rational: information provided by this MO have to be complemented by the information contained in the associated virtualCall-DTE MO. This attribute represents the relationship between the 2 Mos..*			
4.	remoteSNPAaddress The DTE address of the remote DTE. In the case of an outgoing call, this is the called address. In the case of an incoming call, this is the calling address SEQUENCE { type [1] OBJECT IDENTIFIER, address [2] OCTET STRING } *rational: to keep a trace of the identity of the remote system. Needed for accounting and for investigation of any potential problem*	GET	A	M
5.	priority priority of the X.25 Virtual Circuits INTEGER *rational: it is one of the main characteristics of the mobile connection. It needs to be logged with the other parameters for a correct understanding of the connection context* *Note: this attribute could be better placed in the virtualCall-DTE MO. However, this attribute does not exist in the standard ISO/IEC 10733 definition of the virtualCall-DTE MO class*	GET	A	M
6.	octetsSentCounter Counter of the total number of octets of SNDUs sent to the remote DTE over the Virtual Circuit. When compression procedures are in effect, this attribute applies before the compression of the unit data. INTEGER *Rational: needed to compute the compression ratio. The counter applying on the compressed unit data is assumed to be the octetsSentCounter implemented in the associated virtualCall-DTE MO*	GET	A	M
7.	octetsReceivedCounter Counter of the total number of octets of SNDUs received from the remote DTE over the Virtual Circuit. When compression procedures are in effect, this attribute applies after decompression of the received unit data. INTEGER *Rational: needed to compute the compression ratio. The counter applying on the compressed unit data is assumed to be the octetsSentCounter implemented in the associated virtualCall-DTE MO*	GET	A	M

8.	providerInitiatedResets The number of times a reset indication was received with a cause and diagnostic indicating that the reset was initiated by the provider Note: This counter is associated with the providerInitiatedReset event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.* *Note: this attribute might be redundant with the providerInitiatedResets attribute implemented within the virtualCall-DTE MO. It might be removed in a future version of this document*	GET	A	M
9.	remotelyInitiatedResets The number of times a reset indication was received with a cause and diagnostic indicating that the reset was initiated by the remote DTE Note: This counter is associated with the remotelyInitiatedReset event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification* *Note: this attribute might be redundant with the providerInitiatedResets attribute implemented within the virtualCall-DTE MO. It might be removed in a future version of this document*	GET	A	M
10.	locallyInitiatedResets The number of times the local SNDCF initiated a reset. Note: This counter is associated with the locallyInitiatedReset event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification* *Note: this attribute does not exist within the virtualCall-DTE MO.*	GET	A	M
11.	activeCompressionMode Indicates the compression mode which is currently applied to the connection context BitString *rational: information required for the analysis of the compression performance related MO attributes*	GET	A	M

12.	lREFdirectorySize The size of the LREF directory that has been negotiated INTEGER *rational: information required for analysis of the LREF performance related attributes*	GET	A	M
13.	lREFused The number of Local Reference that are in use INTEGER *Rational: needed for the tuning of the required size of LREF directory. maxLREFused is not proposed because it is considered that if lREFused is decreased during the connection, this will be seen thanks to the counter of full conditions and of cancel SNPDU* *Note: the presence of this attribute could be conditional to the compression mechanism negotiated at the object creation time (to be investigated)*	GET	A	M
14.	lREFfullConditions The number of times a LREF directory full condition occurred in the context of this subnetwork connection INTEGER *Rational: needed for the tuning of the LREF cancellation threshold and for understanding the cause of locally initiated resets.* *Note: the presence of this attribute could be conditional to the compression mechanism negotiated at the object creation time (to be investigated)*	GET	A	M
15.	sndcfERPDUsReceived The total number of SNDCF Error Report PDUs received on this subnetwork connection INTEGER *Rational: needed for the diagnostic of reset events, and the to know the ratio of errors occurring with the LREF compression* *Note: the presence of this attribute could be conditional to the compression mechanism negotiated at the object creation time (to be investigated)*	GET	A	M
16.	sndcfERPDUsSent The total number of SNDCF Error Report PDUs sent on this subnetwork connection INTEGER *Rational: needed for the diagnostic of reset events, and the to know the ratio of errors occurring with the LREF compression* *Note: the presence of this attribute could be conditional to the compression mechanism negotiated at the object creation time (to be investigated)*	GET	A	M

17.	sNcancelRqReceived The total number of SNDCF Cancel Request PDUs received in on this subnetwork connection INTEGER *Rational: needed for the tuning of the LREF cancellation threshold and of the negotiated directory size* *Note: the presence of this attribute could be conditional to the compression mechanism negotiated at the object creation time (to be investigated)*	GET	A	M
18.	sNcancelRqSent The total number of SNDCF Cancel Request PDUs sent on this subnetwork connection INTEGER *Rational: needed for the tuning of the LREF cancellation threshold and of the negotiated directory size* *Note: the presence of this attribute could be conditional to the compression mechanism negotiated at the object creation time (to be investigated)*	GET	A	M
19.	deflateErrors The number of deflate decompression errors that occurred on this subnetwork connection INTEGER *Rational: needed for the diagnostic of reset events, and to know the ratio of errors occurring with the deflate compression* *Note: the presence of this attribute could be conditional to the compression mechanism negotiated at the object creation time (to be investigated)*	GET	A	M

2.8.3 Actions

None

2.8.4 Notifications

Index	**Notification Name** **(Description)**	**ISO Status**	**ATN Status**

1.	communicationsAlarm Used to report a communication alarm condition in the operation of the managed object. It is used to report the following events: • providerInitiatedReset: Issued upon the occurrence of a provider initiated reset. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The value NLM.providerInitiatedReset shall be reported in the specificProblem parameter. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: – value of the cause field of the reset packet – value of the diagnostic field of the reset packet *Note: this attribute might be redundant with the providerInitiatedResets attribute implemented within the virtualCall-DTE MO. It might be removed in a future version of this document* • remotelyInitiatedReset: Issued upon the occurrence of a remotely initiated reset. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The value NLM.remotelyInitiatedReset shall be reported in the specificProblem parameter. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: – value of the cause field of the reset packet – value of the diagnostic field of the reset packet • locallyInitiatedReset: Issued upon the occurrence of a locally initiated reset. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The value NLM.locallyInitiatedReset shall be reported in the specificProblem parameter. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: – value of the cause field of the reset packet – value of the diagnostic field of the reset packet *rational: reset causes degradation of the QoS. The causes of the reset need therefore to be investigated.* *Note: the providerInitiatedReset and remotelyInitiatedReset notification might be redundant with the notifications implemented with the x25PLE-DTE MO. They might be removed in a future version of this document* *Note: the locallyInitiatedReset notification does not exist in the x25PLE-DTE MO.*	A	M

2.	objectCreation Generated whenever an instance of the managed object class is created. The sourceIndicator parameter shall be set to the value 'resourceOperation'. None of the other optional parameters are used, with the exception of the additionalInformation field which contains the following parameters: • virtualCircuitId • mobileConnectionGroupId • remoteDTEaddress • priority *rational: needed for the logging of every mobile connection establishment*	X	A	M
3.	objectDeletion Generated whenever an instance of the managed object class is deleted. The attributeList parameter shall be used to report the values of the MO attributes. None of the other optional parameters are used, with the exception of the additionalInformation field which contains the following parameters: • cause: value of the cause field of the X.25 clear request/indication • diagnostic: value of the diagnostic field of the X.25 clear request/indication *rational: needed for the logging of every mobile connection attribute (for further analysis)*	X	A	M

2.9 The aTNfIB managed object

2.9.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNfIB There shall be one such MO within each ATN Intermediate System. This MO represents the Forwarding Information Base used by the routing function of the ISO/IEC 8473-1 protocol. It can not be created or deleted explicitly by management operation. It exists inherently in an ATN IS created and deleted as part of system operation.	A	IS: M ES: X
2.	Naming attribute	fIBid		
3.	Superior in Naming Tree	aTNcLNS		

2.9.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status
1.	fIBiD Naming attribute GraphicString	GET	A	M

2.9.3 Actions

Index	Action Name (Description)	ISO Status	ATN Status

1.	getReachableAddress get the set of reachable NSAP addresses or reachable NSAP addresses prefix currently selected in the FIB, and which match the parameters of the action request. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo, and the set of matching reachable NSAP addresses and NSAP address prefixes is returned as parameters of the action reply. If the action succeeds, but there are no matching reachable NSAP addresses or NSAP address prefixes, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. If the action fails, response code is set to ProcessingError. Action request Parameters: • NSAP address prefix to be matched by the reachable addresses and address prefixes • required security (optional parameter) Action reply parameters: • set of the matching reachable ATN NSAP addresses or ATN NSAP address prefixes *rational: the capability to get access to the FIB content has been identified as a requirement by all ATN expert. The combination of the getReachableAddress and getNPDUroutingDecision (see below) actions is considered as the most practical and easiest way to meet this requirement*	A	M
2.	getNPDUroutingDecision invoke the ISO/IEC 8473-1 route function with the parameter values supplied in the parameter of the action request, and return the result with the action reply. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo, and the resulting parameters of ISO/IEC 8473-1 route function are returned as parameters of the action reply. If the action fails, response code is set to ProcessingError. Action request Parameters: • destination NSAP address • traffic type security tag Action reply parameters: • SNPA of the next hop system • identifier of the subnetwork that has been selected to reaching the next hop system • NET of the next hop system (optional parameter) • associated metrics (?) *rational: see above*	A	M
3.	logFIBcontent dump the FIB content locally in a file of the managed system *rational: the 2 actions above allow on-line diagnostic and monitoring of specific forwarding decisions. They may not be suitable for a complete off-line analysis of the routing decisions.*	A	O

2.9.4 Notifications

None

2.10 The aTNidrpConfig managed object

2.10.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNidrpConfig There shall be one such MO within a class 4, 5 or 6 ATN router. This MO represents an implementation of the ISO/IEC 10737 protocol. It can not be created or deleted explicitly by management operation. It exists inherently in class 4, 5 and 6 ATN Intermediate System; created and deleted as part of system operation.	ISO/IEC 10747 idrpConfig MO: ?	class4IS: M class5IS: M class6IS: M
2.	Naming attribute	idrpConfigId		
3.	Superior in Naming Tree	aTNnetworkEntity		

2.10.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status
1.	idrpConfigId The NET of the local BIS . This is the naming attribute GraphicString	GET	?	M
2.	operationalState Operational state as defined in ISO/IEC 10164-2 ENUMERATED { disabled(0), enabled(1) } *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not.*	GET	A	M
3.	totalUpdadesIn The total number of UPDATE BISPDUs received by this BIS INTEGER *rational: this attribute allows to monitor the global update rate supported by the router. The update rate is considered as one of the most critical routing performance parameter. This attribute is particularly of interest when implemented by ground BIS which have to manage a large number of routes to the aircraft (e.g. the backbone BIS)*	GET	A	M

4.	totalUpdadesOut The total number of UPDATE BISPDUs sent by this BIS INTEGER *rational: same rational as totalUpdatesIn*	GET	A	M
5.	successfulConnections The number of IDRP BIS-BIS connections which have reached the ESTABLISHED state INTEGER *rational: this attribute is only useful when implemented in A/G and airborne BISs. It allows the monitoring of the number and the frequency of new BIS-BIS connections to be supported by the BIS.* *Note: this attribute does not exist in the ISO/IEC 10747 standard because the standard has not assumed the use of IDRP with (mobile) dynamic adjacent BIS.* *Note: this attribute could be separated in a conditional package of attribute for A/G and Airborne BISs*	GET	A	M
6.	openConnections The number of IDRP BIS-BIS connections which are in the ESTABLISHED state. Updated upon each connection establishment and release. INTEGER *rational: this attribute is only useful when implemented in A/G and airborne BISs. It allows to monitor the current number of IDRP connections supported by the BIS.* *Note: this attribute does not exist in the ISO/IEC 10747 standard because the standard has not assumed the use of IDRP with (mobile) dynamic adjacent BIS.* *Note: this attribute could be separated in a conditional package of attribute for A/G and Airborne BISs*	GET	A	M
7.	maxOpenConnections The highest number of simultaneously established IDRP BIS-BIS connections. INTEGER *rational: this attribute is only useful when implemented in A/G and airborne BISs. It is needed for a correct tuning of the IDRP configuration.* *Note: this attribute does not exist in the ISO/IEC 10747 standard because the standard has not assumed the use of IDRP with (mobile) dynamic adjacent BIS.* *Note: this attribute could be separated in a conditional package of attribute for A/G and Airborne BISs*	GET SET DEFAULT	A A	M M

8.	errorsBISPDUsent The number of times a BISPDU is received with an error in its format. Note: This counter is associated with the errorBISPDUsent event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M
9.	errorsBISPDUconnectionclose The number of times an ERROR BISPDU has been received from a remote BIS. Note: This counter is associated with the errorBISPDUconnectionclose event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M
10.	unacknowledgedPDUclose The number of times a BIS-BIS connection was closed after *n* unacknowledged retransmissions of a BISPDU. Note: This counter is associated with the unacknowledgedPDUclose event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M
11.	ceaseBISPDUconnectionclose The number of times a BIS-BIS connection was closed due to the receipt of a CEASE PDU. Note: This counter is associated with the ceaseBISPDUconnectionclose event which generates a communication alarm notification INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators)*	GET	A	M

12.	rIBoverloads The number of times the BIS experienced a RIB-overload condition Note: This counter is associated with the rIBoverload event which generates a communication alarm notification *Note: see Annex G of ISO/IEC 10747* INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M

Note: Counters associated to the events corruptAdjRIBIn, packetBomb, connectRequestBISUnknown and processorOverload are not proposed because it is considered that these are rare and critical events that should not be filtered by a forwarding discriminator. The ISO/IEC 10165-4 recommendation is therefore less relevant.

Note: all ISO/IEC 10747 standard attributes that are not proposed to be retained for standardisation in the ATN SARPs, are attributes related to configuration management.

2.10.3 Actions

None

Note: A number of ISO/IEC 10747 standard actions are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

activate:	*it is an action used for local administration of the systems*
deactivate:	*it is an action used for local administration of the systems*

2.10.4 Notifications

Index	**Notification Name** **(Description)**	**ISO Status**	**ATN Status**

1.	communicationsAlarm Used to report a communication alarm condition in the operation of the managed object. It is used to report the following events: • errorBISPDUsent: generated when a BISPDU is received with an error in its format. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: 1. RemoteBISNET 2. BISPDU error code 3. BISPDU error subcode 4. BISPDU error information *rational for the notification*:: *there is an obvious requirement to notify every abnormal BIS-BIS disconnection, especially on the ground where such an event can have serious consequence, but also on air/ground since the consequence is the loss of communication with the aircraft.* • errorBISPDUconnectionclose: generated when an ERROR BISPDU has been received from a remote BIS. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: 1. RemoteBISNET 2. BISPDU error code 3. BISPDU error subcode 4. BISPDU error information *rational for the notification*:: *there is an obvious requirement to notify every abnormal BIS-BIS disconnection, especially on the ground where such an event can have serious consequence, but also on air/ground since the consequence is the loss of communication with the aircraft.*	?	M

	communicationsAlarm (continued) • unacknowledgedPDUclose: generated when a BIS-BIS connection is closed after *n* unacknowledged retransmissions of a BISPDU.. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: 1. RemoteBISNET *rational for the notification*:: *there is an obvious requirement to notify every abnormal BIS-BIS disconnection, especially on the ground where such an event can have serious consequence, but also on air/ground since the consequence is the loss of communication with the aircraft. Curiously, such a notification does not exist in ISO/IEC 10747: ISO/IEC 10747 only defines alarms for the receipt and issue of ERROR PDUs, and defines nothing for the disconnections due to unacknowledged retransmissions, or the receipt of a CEASE PDU.* • ceaseBISPDUconnectionclose: generated when a CEASE BISPDU is received from a remote BIS on a BIS-BIS connection that is in OPEN-RCVD, OPEN-SENT or ESTABLISHED state. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: 1. RemoteBISNET *rational for the notification*:: *there is an obvious requirement to notify every abnormal BIS-BIS disconnection, especially on the ground where such an event can have serious consequence, but also on air/ground since the consequence is the loss of communication with the aircraft. Curiously, such a notification does not exist in ISO/IEC 10747: ISO/IEC 10747 only defines alarms for the receipt and issue of ERROR PDUs, and defines nothing for the disconnections due to unacknowledged retransmissions, or the receipt of a CEASE PDU.* • rIBoverloads: generated when a RIB-overload condition is experienced by the managed BIS. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field *rational for the notification: RIB overloads may result in the loss of routes and in the termination of BIS-BIS connections. This is a problem which may require investigation.* *Note: see ISO/IEC 10747 Annex G* *Note: This notification may be better placed within the aTNilB MO*		

	communicationsAlarm (continued) • corruptAdjRIBIn: generated when the local method of checking the Adj-RIB-In has found an error. All Adj-RIBs-In are being purged. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: 1. The number of integrity check failures detected 2. The remote BIS associated with this adjacent RIB *rational for the notification: RIB corruption may cause the dissemination of invalid routing information in the network. This is a problem which may require investigation* *Note: This notification may be better placed within the aTNilB MO. However, in ISO/IEC 10747 it is defined with the idrpConfig MO* • packetBomb: generated when the localBIS received a BISPDU other than an OPEN PDU, from an unknown BIS. The Source NSAP or NET address is reported in the AdditionalInformation field. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows. 1. NET or NSAP address of the system sending packet bomb *rational for the notification: The packet bomb may be a security problem: an unknown system may be trying to inject UPDATE BISPDUs in the normal routing information flow. The problem may also be due to configuration errors. Further investigations may be required.* *Note: the ISO/IEC 10747 description of the notification seems defective on the parameter values (possible mistake with connectRequestBISUnknown notification)* • connectRequestBISUnknown: generated when the localBIS has received an OPEN PDU from an unknown BIS. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows. These parameters are created from the OPEN PDU values: 1. NET of remote BIS sending OPEN PDU 2. RDI of remote BIS sending OPEN PDU 3. RDC information for remote BIS sending OPEN PDU *rational for the notification: There may be a security problem: an unauthorized system may be trying to open an IDRP connection with the local BIS. Further investigations may be required.*		

	communicationsAlarm (continued) • processorOverload: generated when a CPU overload condition is experienced. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field *rational for the notification: CPU Overloads may result in the depletion of the LOC-RIB and in the termination of IDRP connections. This is a problem which may require investigation.* *Note: see ISO/IEC 10747 Annex H*		
2.	stateChange stateChange notification as defined in ISO/IEC 10165-2. used to report the changes to the operationalState attribute. A single parameter set is included in the State change definition field. Only the mandatory attributeId and newAttributeValue parameters are used *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not. Monitoring the operationalState may not be sufficient, since the polling period may not allow to detect problem quickly enough*	A	M
3.	objectDeletion Generated whenever an instance of the managed object class is deleted. Implementations may optionally include the sourceIndicator parameter in the notification. If deletion occured as a result of internal operation of the resource, the value 'resourceOperation' is used. If deletion occured in response to a management operation, the value 'managementOperation' is used A value 'unknown' may be returned if it is not possible to determine the source of the operation. The attributeList parameter shall be used to report the values of the MO attributes. None of the other optional parameters are used. *rational: needed for the logging of the actual value of the MO attributest*	A	M

Note: an additional CommunicationAlarm notification will certainly be required for reporting authentication failures

Note: A number of ISO/IEC 10747 standard notification are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

(communicationsAlarm) connectionRequested	*this does not seem to be a critical event; the problem will be notified by the adjacent BIS)*
(communicationsAlarm) EnterFSMStateMachine	*this notification is not understood*
(communicationsInformation) EnterFSMState	*no requirement identified*
(communicationsInformation) FSMStateChange	*reporting every state change transitions for all BIS-BIS connections will result in a lot of notification in the ATN case considering the high number and the short number of mobile BIS-BIS connections. It is proposed to replace this notification by an iDRPconnectionEstablishment and an iDRPdisconnection notification to be defined in the adjacentBIS MO*

2.11 The aTNadjacentBIS managed object

2.11.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNadjacentBIS This MO represents an adjacent BIS known by the managed system and the characteristics of the BIS-BIS IDRP connection which is or can be established with this adjacent BIS. The adjacent BIS may be located in the same routing domain as the local BIS or may be a BIS of a neighbouring Routing Domain. There shall be one instance of aTNadjacentBIS MO per adjacent BIS. Instances of aTNadjacentBIS MO may be automatically created for each configured adjacent BIS when the system is initialised. They can be automatically deleted at the end of system operation. Instances of aTNadjacentBIS MO may also be created and deleted explicitly by management operation initiated by the system manager or the ISSME.	ISO/IEC 10747 adjacentBIS MO: ?	class4IS: M class5IS: M class6IS: M
2.	CREATE Operation	Instances of aTNadjacentBIS MO may be created explicitly by management operation initiated by the system manager or the ISSME.		
3.	DELETE Operation	Instances of aTNadjacentBIS MO may be deleted explicitly by management operation initiated by the system manager or the ISSME.		
4.	Naming attribute	bisNet		
5.	Superior in Naming Tree	aTNidrpConfig		

2.11.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status

1.	bisNet The naming attribute The NET of the adjacent BIS OCTET STRING	GET	?	M

2.	bisPeerSNPAs
	The SNPAs announced by the remote BIS. This list also contains identifiers of the subnetworks over which these SNPAs can be reached
	SEQUENCE OF {
	linkageId [1] GraphicString,
	SEQUENCE {
	type [1] OBJECT IDENTIFIER,
	address [2] OCTET STRING }
	}
	rational: this attribute provides the list of subnetworks and the SNPAs on these subnetworks thanks to which the adjacent BIS is reachable. This is particularly of interest in the A/G case, where this attribute can indicate the available mobile subnetworks which are currently supporting the BIS-BIS connection.
		GET	?	M

3.	bisRDC The RDCs the remote BIS belongs to, as reported in the OPEN PDU received from the remote BIS SEQUENCE OF OCTET STRING *rational: access to the routing configuration information advertised from adjacent domain, may allow to detect inter-organization configuration inconsistencies and to understand problems (e.g. the adjacent BIS is not advertising all the RDCs it is supposed to belong to)*	GET	?	M
4.	bisRDI The RDI of the remote BIS participating in this BIS-BIS connection OCTET STRING *rational: this attribute complements the set of basic information that must be known on an adjacent BIS. Also it may be considered as a purely configuration parameter in the ground-ground case, it is an attribute which cannot be found in the configuration files in the case where the BIS is adjacent via mobile subnetworks (this parameter will then have been configured dynamically by the ISSME). Furthermore, this attribute may be of interest as matching attribute in GET operations: e.g. to know all the adjacent BISs which belongs to a given RD or to the local RD.*	GET	?	M

5.	HoldTimePeer Hold Time of the adjacent BIS, as reported in the OPEN PDU received from the remote BIS. This is the number of seconds that the adjacent BIS allows the FSM to remain in the ESTABLISHED state without receipt of a KEEPALIVE, UPDATE or RIB REFRESH PDU from the local BIS. INTEGER *rational: access to the routing configuration information advertised from adjacent domain, may allow to detect inter-organization configuration inconsistencies and to understand problems (e.g. remoteHoldTime is too short, or different from what was agreed):* *comment: the FRS proposes an holdTimeInterval attribute which seems equivalent to the ISO10747 HoldTimer attribute. (why changing the name?) No requirement is identified for the SARPS to monitor the duration which remains to the timers before expiration*	GET	?	M
6.	maxPDUPeer The maximum number of octets that this BIS will include in a BISPDU that it sends to its peer BIS. This value is obtained from information in the header of the peer BIS's OPEN PDU INTEGER *rational: access to the routing configuration information advertised from the adjacent domain, may allow to detect inter-organisation configuration inconcistencies and to understand problems (e.g. maxPDUPeer is too short, or different from what was agreed):*	GET	?	M
7.	state The current state of the BIS-BIS connection in the local BIS *rational: contrarily to MO forTP4 connections, the MO for BIS-BIS connections may continue to exist whereas the BIS-BIS connection is closed. There is therefore an obvious requirement to have access to the state of the connections. This attribute may be particularly of interrest as matching attribute in GET operations: e.g. to know all the BIS-BIS connections that are closed.*	GET	?	M
8.	totalIDRPOctetsSent The number of octets of BISPDUs received by this BIS from the remote BIS on this BIS to BIS connection INTEGER *rational: needed to monitor the amount of IDRP traffic between 2 BISs. Usefull an air-ground adjacencies to analyse the overhead of IDRP.*	GET	?	M
9.	totalIDRPOctetsReceived The number of octets of BISPDUs sent by this BIS to the remote BIS on this BIS to BIS connection INTEGER *rational: needed to monitor the amount of IDRP traffic between 2 BISs.*	GET	?	M

10.	totalBISPDUsIn The number of BISPDUs received by this BIS from the remote BIS on this BIS to BIS connection INTEGER *rational: (there are no obvious requirements - this ttribute is therefore questionable); it may complement the totalIDRPOctetsReceived attribute in the analysis of the overhead of IDRP on particular adjacencies. This is a standard ISO10747 attribute*	GET	?	M
11.	totalBISPDUsOut The number of BISPDUs sent by this BIS to the remote BIS on this BIS to BIS connection INTEGER *rational: (there are no obvious requirements - this ttribute is therefore questionable); it may complement the totalIDRPOctetsReceived attribute in the analysis of the overhead of IDRP on particular adjacencies. This is a standard ISO10747 attribute*	GET	?	M
12.	updatesIn The number of UPDATE PDUs received by this BIS on this BIS to BIS connection INTEGER *rational: this attribute allows to monitor the update rate on specific BIS-BIS connections. The update rate is considered as one of the most critical routing performance parameter. Knowing the update rate on BIS-BIS connections may allow the network designers to react to foreasable performance limitations that could jeopardize the correct operation of the network.*	GET	?	M
13.	updatesOut The number of UPDATE PDUs received by this BIS on this BIS to BIS connection INTEGER *rational: same rational as updatesIn*	GET	?	M
14.	retransmittedBISPDUs The number of BISPDUs that had to be retransmitted on this BIS-BIS connection INTEGER *rational: needed for a correct tunning of the IDRP protocol parameters. The processing load of a router may prevent a quick acknowledgement of the received BISPDUs, which may lead to unnecessary retransmission if retransmission timers are too short. On the other hand, long retransmission timers may delay the dissemination time of a route in the case of the loss of an UPDATE BISPDU.*	GET	?	M

15.	outstandingUpdatesCounter The current number of outstanding UPDATE BISPDUs blocked for advertisement due to a lack of credit. This attribute is a gauge. INTEGER *rational: IDRP implements a credit-based flow control mechanism which allows the receiver to block the advertisement of BISPDUs from the adjacent BIS when it is not in position to process all the incoming routing traffic. The cases where a BIS sets its credit to 0 are critical, since they stop the dissemination of the routing information.*	GET	A	M
16.	maxOutstandingUpdates The maximum size reached by the queue of outstanding UPDATE BISPDUs blocked for advertisement due to a lack of credit. INTEGER *rational: same rational as for the outstandingUpdates attribute*	GET SET DEFAULT	A A	M M
17.	outstandingUpdatesDelay The blocking delay exerienced by the last UPDATE BISPDU that was sent on this connection. INTEGER *rational: same rational as for the outstandingUpdates attribute*	GET	A	M
18.	maxOutstandingDelay The maximum blocking delay that was exerienced by an UPDATE BISPDU sent on this connection. INTEGER *rational: same rational as for the outstandingUpdates attribute* *Note: a threshold, with a notification, could be required for this attribute*	GET SET DEFAULT	A A	M M

Note: A number of ISO/IEC 10747 standard attributes are not proposed to be retained for standardisation in the ATN SARPs; the rational is provided below:

bisNegociatedVersion	*there is only one version possible at the moment for the ATN systems*
holdTimer, keepAlivesSinceLastUpdate, keepAliveTimer, lastAckRecv, lastAckSent, lastSeqNoRecv, lastPriorSeqNo, lastSeqNoSent, outstandingPDUs:	*No requirement is identified*
closeWaitDelayTimer, listenForOPEN, minRouteAdvertisementInterval, minRouteAdvertisementTimer	*configuration management related attributes*

2.11.3 Actions

Index	Action Name (Description)	ISO Status	ATN Status

1.	activate Activate action as defined in ISO/IEC 10165-5. The effect of the activate action on an aTNadjacent BIS MO is described in the Table 2 of ISO/IEC 10747. If the FSM is in the CLOSED state, the activate action triggers the sending of anOPEN BISPDU to the adjacent BIS and puts the FSM in the OPEN-SENT state. *rational: this action has been identified as a requirement by all ATN experts that are currently operating experimental ATN BIS. It is required for ground-ground routing initiation. It is also required by the ISSME for A/G routing initiation*	M	?	M
2.	deactivate Deactivate action as defined in ISO/IEC 10165-5. The effect of the deactivate action on an aTNadjacent BIS MO is described in the Table 2 of ISO/IEC 10747. If the FSM is in the OPEN-RCVD, OPEN-SENT or ESTABLISHED state, the deactivate action triggers the sending of a CEASE BISPDU to the adjacent BIS and puts the FSM in the CLOSE-WAIT state. The deactivate action causes the BIS-BIS connection to be terminated. The termination should occur as rapidly as practical, but no particular time constraints are implied. The Managed Object remains in existence after completion of the Deactivate action. *rational: this action has been identified as a requirement by all ATN experts that are currently operating experimental ATN BIS. It is required for ground-ground routing termination. It is also required by the ISSME for A/G routing termination*	M	?	M
3.	solliciteRefresh The solliciteRefresh action invokes the solicited refresh procedure as described in ISO/IEC 10747 clause 7.10.3.a *rational: the capability to refresh the RIBs might be needed for the cases where routing inconsistencies are detected by the system manager. This is questionable*		A	O
4.	initiateRefresh The initiateRefresh action invokes the unsollicited refresh procedure as described in ISO/IEC 10747 clause 7.10.3.b *rational: the capability to refresh the RIBs might be needed for the cases where routing inconsistencies are detected by the system manager. This is questionable*		A	O

2.11.4 Notifications

Index	**Notification Name** **(Description)**	**ISO Status**	**ATN Status**

1.	communicationsInformation Used to report the occurrence of events pertaining to the normal operation of a managed object. It is used to report the following events: • iDRPconnectionEstablishment: generated when a BIS-BIS connection is successfully established. The value NLM.successfulConnectionEstablishment shall be reported in the informationType field. The RemoteBis-NET is reported in the AdditionalInformation field. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. • iDRPdisconnection: generated when a BIS-BIS connection is terminated. The RemoteBis-NET is reported in the AdditionalInformation field. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. *rationale: there is an obvious requirement to report every IDRP connection and disconnection. ISO/IEC 10747 does not specify such notifications because an FSMStateChange notification reporting every change of status of IDRP connection is defined. Here, the 2 above notifications are prefered to the standard FSMStateChange notification because it is considered that reporting every changes of state is not required and whould result in a lot more of events reported.*		?	M
2.	objectCreation Generated whenever an instance of the managed object class is created. Implementation may optionally include the sourceIndicator parameter in the notification. If creation occured as a result of internal operation of the resource, the value 'resourceOperation' is used. If creation occurred in response to a management operation, the value 'managementOperation' is used. A value of 'unknown' may be returned if it is not possible to determine the source of the operation. None of the other optional parameters are used, with the exception of the additionalInformation field which contains the following parameters: • bisNet • bisRDI *rational: notifying the IDRP connection establishment may not be sufficient. In the air-ground case, it may happen that an adjacent BIS MO is created for a new mobile neighbour but that the IDRP connection fails to be established (e.g. authentification failure). There is therefore a requirement to keep a trace of the MO creation.*	X	?	M
3.	objectDeletion Generated whenever an instance of the managed object class is deleted. Implementation may optionally include the sourceIndicator parameter in the notification. If deletion occured as a result of internal operation of the resource, the value 'resourceOperation' is used. If deletion occurred in response to a management operation, the value 'managementOperation' is used. A value of 'unknown' may be returned if it is not possible to determine the source of the operation. The attributeList parameter shall be used to report the values of the MO attributes. None of the other optional parameters are used *rational: to record all parameter values of the terminated BIS-BIS connection*	X	?	M

2.12 The aTNrIB managed object

2.12.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNrIB There shall be one such MO within each ATN Intermediate System. This MO represents the set of Routing Information Bases (Adj-RIBs-In, Loc-RIBs and Adj-RIB-Out) maintained by the IDRP protocol implmentation. It can not be created or deleted explicitly by management operation. It exists inherently in an ATN IS created and deleted as part of system operation.	A	class4IS: M class5IS: M class6IS: M
2.	Naming attribute	rIBid		
3.	Superior in Naming Tree	aTNidrpConfig		

2.12.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status
1.	rIBiD Naming attribute GraphicString	GET	A	M
2.	securityLocRIBsize The number of routes currently stored in the Loc-RIB associated with the security RIB-Att INTEGER *rational: The maximum size of RIBs might be limited. Furthermore, the amount of routing information managed by the routers is (with the route update rate) a key parameter for the performance of the routing in the network. It is of interrest to corelate the update rate with the amount of routing information. This may allow to forecast when the limit of the current configuration will be reached.*	GET	A	M
3.	maximumSecurityLocRIBsize The maximum number of routes that were concurrently stored in the Loc-RIB associated with the security RIB-Att. INTEGER *rational: The maximum size of RIBs might be limitted. It is of interrest to keep trace of the peeks value as concerns the RIB size.*	GET SET DEFAULT	A	M

4.	defaultLocRIBsize The number of routes currently stored in the Loc-RIB associated with the default RIB-Att INTEGER *rational: same rational as for the .securityLocRIBsize attribute*	GET	A	O
5.	maximumDefaultLocRIBsize The maximum number of routes that were concurrently stored in the Loc-RIB associated with the default RIB-Att. INTEGER *rational: same rational as for the maximumSecurityLocRIBsize attribute*	GET SET DEFAULT	A	O
6.	localUpdates The number of times a route update was performed in the Loc-RIBs INTEGER *rational: this attribute allows to monitor the effective update rate supported by the router. The update rate is considered as one of the most critical routing performance parameter. This attribute is particularly of interrest when implemented by ground BIS which have to manage a large number of routes to the aircraft (e.g. the backbone BIS). Note that the update rate can already be monitored thanks to the totalUpdadesIn attribute of the idrpConfig MO. However, totalUpdadesIn is related to the update rate for the Adj-RIBs-Ins and may be very different of the effective update rate supported by the Loc-RIBs.. This is because, 1) the policy rules may filter the received updates; 2) equivallent routes to a same destination are filtered.*	GET	A	M

2.12.3 Actions

Index	Action Name (Description)	ISO Status	ATN Status
1.	getReceivedNLRI get the set of Network Layer Reachability Information received from the specified adjacent BIS, associated with the specificed RIB-Att, and matching the specified NSAP address prefix. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo, and the set of NLRI matching the action parameters is returned as parameters of the action reply. If the action succeeds, but there are no matching NLRI, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. If the action fails, response code is set to ProcessingError. Action request Parameters: • adjacent BIS NET of the Adj-RIB-In to be scanned • RIB-Att of the Adj-RIB-In to be scanned • NSAP address prefix to be matched by the NLRI Action reply parameters: • set of the NLRI matching the action request parameters *rational: the capability to get access to the RIB content has been identified as a requirement by all ATN experts. The set of all actions defined her for the aTNrIB MO is considered as the most practical and easiest way to meet this requirement*	A	M

2.	getadvertisedNLRI get the set of Network Layer Reachability Information advertised to the specified adjacent BIS, associated with the specificed RIB-Att, and matching the specified NSAP address prefix. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo, and the set of NLRI matching the action parameters is returned as parameters of the action reply. If the action succeeds, but there are no matching NLRI, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. If the action fails, response code is set to ProcessingError. Action request Parameters: • adjacent BIS NET of the Adj-RIB-Out to be scanned • RIB-Att of the Adj-RIB-Out to be scanned • NSAP address prefix to be matched by the NLRI Action reply parameters: • set of the NLRI matching the action request parameters *rational: same as for the getReceivedNLRI action*	A	M
3.	getLocalNLRI get the set of Network Layer Reachability Information stored in the Loc-associated with the specificed RIB-Att, and matching the specified NSAP address prefix. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo, and the set of NLRI matching the action parameters is returned as parameters of the action reply. If the action succeeds, but there are no matching NLRI, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. If the action fails, response code is set to ProcessingError. Action request Parameters: • RIB-Att of the Loc-RIB to be scanned • NSAP address prefix to be matched by the NLRI Action reply parameters: • set of the NLRI matching the action request parameters *rational: same as for the getReceivedNLRI action*	A	M

4.	getReceivedRoute get all routes currently advertised by the specified adjacent BIS, associated with the specificed RIB-Att, and one NLRI of which exactly matches the specified NSAP address prefix. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo, and the set of routes matching the action parameters is returned as parameters of the action reply. If the action succeeds, but there are no matching routes, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. If the action fails, response code is set to ProcessingError. Action request Parameters: • adjacent BIS NET of the Adj-RIB-In to be scanned • RIB-Att of the Adj-RIB-In to be scanned • NSAP address prefix which must be part of the UPDATE NLRI field Action reply parameters: • set of route records; each route record contains the following information: – the route identifier in IDRP terms – the identifer of the RIB-Att used for this route – the value of all route path attributes – the set of reachable address prefixes included in the NLRI field of the route – the local preference *rational: same as for the getReceivedNLRI action*	A	M
5.	getLocalRoute get all routes currently stored in the Loc-RIB associated with the specificed RIB-Att, and one reachable address prefix of which exactly matches the specified NSAP address prefix. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo, and the set of routes matching the action parameters is returned as parameters of the action reply. If the action succeeds, but there are no matching routes, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. If the action fails, response code is set to ProcessingError. Action request Parameters: • RIB-Att of the Loc-RIB to be scanned • NSAP address prefix which must be present in the NLRI field of the route Action reply parameters: • set of route records; each route record contains the following information: – the route identifier in IDRP terms – the identifer of the RIB-Att used for this route – the value of all route path attributes – the set of reachable address prefixes included in the NLRI field of the route – the local preference *rational: same as for the getReceivedNLRI action*	A	M

6.	getAdvertisedRoute get all routes currently advertised to the specified adjacent BIS, associated with the specificed RIB-Att, and one NLRI of which exactly matches the specified NSAP address prefix. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo, and the set of routes matching the action parameters is returned as parameters of the action reply. If the action succeeds, but there are no matching routes, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. If the action fails, response code is set to ProcessingError. Action request Parameters: • adjacent BIS NET of the Adj-RIB-Out to be scanned • RIB-Att of the Adj-RIB-Out to be scanned • NSAP address prefix which must be part of the UPDATE NLRI field Action reply parameters: • set of route records; each route record contains the following information: – the route identifier in IDRP terms – the identifer of the RIB-Att used for this route – the value of all route path attributes – the set of reachable address prefixes included in the NLRI field of the route – the local preference *rational: same as for the getReceivedNLRI action*	A	M
7.	logRIBcontent dump the RIBs content locally in a file of the managed system *rational: all 6 actions above allow on-line diagnostic and monitoring of routing decisions. They may not be suitable for a complete off-line analysis of the routing decisions.*	A	O

8.	addExternalInfoRoute add a manually configured route in the Loc-RIB of the managed router. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. The provided route shall be flaged with the EXT_INFO attribute, stored in the appropriate RIBs, and advertised according to the configured policy, and the value of the possible DIS_LIST_INCL and DIST_LIST_EXCL parameters. If the action fails, response code is set to ProcessingError. Action request Parameters: • the identifer of the RIB-Att associated with this route • the value of the different path attributes • the set of reachable address prefixes Action reply parameters: • the route identifier in IDRP term • the local preference of the route *rational: This action is very usefull to measure the routing performance in a managed portion of the ATN and to perform tests on the routing. Amongst other things, and with the availability of the other actions defined hereafter, it will allow to measure the switness of routing convergence: convergence is the process of agreement, by all routers, on optimal routes. The values of interest for the manager, are the delay between the time where a route either go down or become available, and the time where all routers have eventually agree to a stable routing decision concerning this route. No simple network management mechanisms are available to get this value. A first solution is the off-line correlation and analysis of the time-stamped routing event traces that could be produced by each router. For the on-line computation of the swiftness of the routing decision, it is not conceivable to require that routers report every changes in the routing table: this would create a huge volume of system management traffic, and this would require the availability of a complex system management application, capable of performing the on-line correlation and analysis of all received routing events. The solution is then the capability for the system manager, to request from the managed BISs the reporting of routing events corresponding to* ***one*** *particular route; associated with the capability to inject a dummy route in the routing table of a given router, this allows the manager to perform on-line testing of the routing and to get indication on the swiftness of the routing decision.* *In conclusion, this action is very usefull to test the routing decisions, monitor the route propagation, and to get statistics on the propagation delays.*	A	M
9.	withdrawExternalInfoRoute Withdraw a manually configured route. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. The route that was previously added with the addExternalInfoRoute action shall be withdrawn from the appropriate RIBs, and its withdrawal shall be advertised as appropriate.. If the action fails, response code is set to ProcessingError. Action request Parameters: • the route identifier in IDRP term Action reply parameters: • None *rational: same as for the addExternalInfoRoute action*	A	M

10.	watchRouteRequest notify every routing update pertaining to the reachable address prefix that is supplied in parameter of the action request. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. The managed system shall then report every Loc-RIBs update pertaining to routes which NLRI matches the specified reachable address prefix. If the action fails, response code is set to ProcessingError. Action request Parameters: • the reachable address prefix Action reply parameters: • None *rational: same as for the addExternalInfoRoute action*	A	M
11.	watchRouteCancel Cancel a previous watchRouteRequest action. If the action succeeds, the value successResponse is returned in the responseCode parameter of the CMIP actionReplyInfo. The managed system shall then stop reporting every Loc-RIBs update pertaining to routes which NLRI matches the specified reachable address prefix. If the action fails, response code is set to ProcessingError. Action request Parameters: • the reachable address prefix Action reply parameters: • None *rational: same as for the addExternalInfoRoute action*	A	M

2.12.4 Notifications

Index	**Notification Name** **(Description)**	**ISO Status**	**ATN Status**
1.	communicationsInformation Used to report the occurrence of events pertaining to the normal operation of a managed object. It is used to report the following events: • routeUpdate: generated whenever an update of the LocRIBs occurs that relates to one of the reachable address prefixes for which a watchRouteRequest action has been performed. The value NLM.routeUpdate shall be reported in the informationType field. The received UPDATE BISPDU is reported in the AdditionalInformation field. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. *rational: same as for the addExternalInfoRoute action*	A	M

2.13 The aTNiSSME managed object

2.13.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNiSSME There shall be one such MO within each ATN system per Network entity. This MO represents an implementation of the IS-SME. It can not be created or deleted explicitly by management operation. It exists inherently in an ATN system; created and deleted as part of system operation.	A	class5IS: M class6IS: M class7IS: M
2.	Naming attribute	iSSMEid		
3.	Superior in Naming Tree	aTNnetworkEntity		

2.13.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status
1.	iSSMEid naming attribute GraphicString	GET	A	M
2.	operationalState Operational state as defined in ISO/IEC 10164-2 ENUMERATED { disabled(0), enabled(1) } *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not.*	GET	A	M
3.	currentClass6adjacencies The current number of mobile adjacencies for which IDRP is the selected Routing Information Exchange Procedure INTEGER *rational: this attribute is one parameter of the current load of an A/G BIS or of an airborne BIS. It will allow to monitor the evolution of the system load.*	GET	A	M
4.	currentClass7adjacencies The current number of mobile adjacencies for which the procedure for the Optional Non-Use of IDRP has been selected. INTEGER *rational: this attribute is one parameter of the current load of an A/G BIS or of an airborne BIS. It will allow to monitor the evolution of the system load.*	GET	A	M

5.	maximumClass6adjacencies The maximum number of concurrent mobile adjacencies for which IDRP was the selected Routing Information Exchange Procedure INTEGER *rational: this parameter is needed for a correct tunning of the system configuration (to check that the current configuration foresees enough margins to absorb peaks condition on the number of adjacencies).*	GET SET DEFAULT	A A	M M
6.	maximumClass7adjacencies The maximum number of concurrent mobile adjacencies for which the procedure for the Optional Non-Use of IDRP had been selected. INTEGER *rational: this parameter is needed for a correct tunning of the system configuration (to check that the current configuration foresees enough margins to absorb peaks condition on the number of adjacencies).*	GET SET DEFAULT	A A	M M
7.	totalClass6adjacencies The total number of mobile adjacencies that were established and for which IDRP was the selected Routing Information Exchange Procedure INTEGER *rational: this parameter allows the monitoring of the number and frequency of mobile adjacency establishments. It a statistic of interrest to see the evolution in the number of A/G adjacencies, which may allow to foresee the future requirements in terms of performance of the systems.*	GET	A	M
8.	totalClass7adjacencies The total number of mobile adjacencies that were established and for which the procedure for the Optional Non-Use of IDRP had been selected. INTEGER *rational: this parameter allows the monitoring of the number and frequency of mobile adjacency establishments. It a statistic of interrest to see the evolution in the number of A/G adjacencies, which may allow to foresee the future requirements in terms of performance of the systems.*	GET	A	M
9.	nETvalidationErrors The number of times an A/G routing initiation was rejected by the managed system due to non validation of the received NET. Note: This counter is associated with the nETvalidationError event which generates a communication alarm notification. INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M
10.	dTEvalidationErrors The number of times an A/G routing initiation was rejected by the managed system due to non validation of the calling DTE address. Note: This counter is associated with the dTEvalidationError event which generates a communication alarm notification. INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M

11.	emergencyCalls The number of times an X.25 incoming calls was accepted under the condition of section 5.3.5.2.2 (emergency use of mobile subnetwork). Note: This counter is associated with the emergencyCall event which generates a communication alarm notification. INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M
12.	localRoutingInitiationErrors The number of times an A/G routing initiation failed due to other local reasons than NET or DTE validation errors (e.g. failure to create a new adjacentBIS MO, failure to activate the IDRP connections, maximum adjacencies number restriction, protocol error, etc...) Note: This counter is associated with the localRoutingInitiationError event which generates a communication alarm notification. INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M
13.	iSHflushedErrors The number of times an A/G routing termination occured due to expiration of the ISH Holding Timer Note: This counter is associated with the iSHflushedErrors event which generates a communication alarm notification. INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M
14.	jointEvents The number of times a joint event was received Note: This counter is associated with the jointEvent event which generates a communication information notification. INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M
15.	leaveEvents The number of times a leave event was received Note: This counter is associated with the leaveEvent event which generates a communication information notification. INTEGER *rational: ISO/IEC 10165-4 recommends to maintain a counter for managed resource events that result in the issuing of a notification (arguing that CMIS M-EVENT-REPORT may be suppressed by the event forwarding discriminators). See also rational for the notification.*	GET	A	M

2.13.3 Actions

None

2.13.4 Notifications

Index	Notification Name (Description)	ISO Status	ATN Status

1.	communicationsAlarm Used to report a communication alarm condition in the operation of the managed object. It is used to report the following events: • nETvalidationError: generated when air/ground routing initiation is aborted by the managed BIS due to non-validation of the NET of the remote BIS. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: 1. RemoteBISNET 2. RemoteBIS SNPA address 3. mobile subnetwork identifier *Rational: NET validation errors result in the reject of a requested mobile adjacency. The consequence is that communications with the adjacent system will not be permitted. This is therefore a severe event which must be investigated (there might be a configuration error; there might be an attack from an unauthorised system, etc..)* • dTEvalidationError: generated when air/ground routing initiation is aborted by the managed BIS due to non-validation of the DTE address of the remote BIS. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: 1. RemoteBIS SNPA address 2. mobile subnetwork identifier *Rational: DTE validation errors result in the reject of a requested mobile adjacency. The consequence is that communications with the adjacent system will not be permitted. This is therefore a severe event which must be investigated (there might be a configuration error; there might be an attack from an unauthorised system, etc..)* *Note: X.25 call rejects are also notified at Linkage MO level with the callRejected alarm. It is considered that the Linkage object will only report call rejects due to SNDCF protocol errors (e.g. proposed compression methods are invalid). It remains therefore a requirement to notify call rejects from the ISSME. This is the purpose of this notification*	A	M

	communicationsAlarm (continued) • emergencyCall: Issued upon the acceptation of an incoming call under the condition of section 5.3.5.2.2 (emergency use of mobile subnetwork). The calling DTE address shall be reported as a parameter in the additionalInformation field of the communicationsAlarm. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The value NLM. emergencyCall shall be reported in the specificProblem parameter. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation fieldlocalRoutingInitiationError, as follows: 1. RemoteBIS SNPA address 2. mobile subnetwork identifier *Rational: there is an obvious requirement to report emergency events.* • iSHflushedError: generated when air/ground routing termination occurs due to expiration of the ISH Holding Timer. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. The probableCause shall be set to NLM.communicationsProtocolError. The perceived severity shall be set to 'Minor'. A subsequent communicationsAlarm with a perceived severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field, as follows: 1. RemoteBIS NET *Rational: This is an abnormal case of A/G routing termination. The consequence is that communications with the adjacent system will not be anymore possible. This is therefore a severe event which must be investigated (there might be a configuration error; there might be a subnetwork error, etc...)*		
2.	communicationsInformation Used to report the occurrence of events pertaining to the normal operation of a managed object. It is used to report the following events: • jointEvent: generated whenever a joint event is received. The value NLM.jointEvent shall be reported in the informationType field. The parameters of the joint event are reported in the AdditionalInformation field. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. • leaveEvent: generated whenever a leave event is received. The value NLM.jointEvent shall be reported in the informationType field. The parameters of the joint event are reported in the AdditionalInformation field. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. *rational: these events deserve to be recorded.*	A	M

3.	stateChange stateChange notification as defined in ISO/IEC 10165-2. used to report the changes to the operationalState attribute. A single parameter set is included in the State change definition field. Only the (mandatory) attributeId and (optional) newAttributeValue parameters are used *rational: it is a basic requirement for the manager to know whether a protocol entity is operational or not. Monitoring the operationalState may not be sufficient, since the polling period may not allow to detect problem quickly enough*	M	M

2.14 The aTNmobileAdjacency managed object

2.14.1 MO Class Support

Index	Property	Description	ISO Status	ATN Status
1.	Managed Object Class	aTNmobileAdjacency This MO represents one BIS-BIS adjacency over mobile subnetworks. It is not created by management, but by the operation of the ISSME. An instance of the aTNmobileAdjacency MO shall be created on receipt by the ISSME of the first ISH PDU from a new adjacent BIS connected via a mobile subnetwork. The instance of the aTNmobileAdjacency MO shall be deleted on A/G routing termination with the adjacent BIS.	A	class5IS: M class6IS: M class7IS: M
2.	Naming attribute	bisNET		
3.	Superior in Naming Tree	aTNiSSME		

2.14.2 Attributes

Index	Attribute Name (Description) Syntax	Operations	ISO Status	ATN Status

1.	bisNet The naming attribute The NET of the adjacent BIS OCTET STRING *Note: from this attribute, on A/G BIS, it may be derived the class of the adjacent airborne BIS (class 6 or 7) and the aircraft ICAO 24 bit address.* *Note: in case of class 6 adjacencies, this attribute will also be used as a relationship attribute with the associated adjacentBIS MO.*	GET	A	M

2.	mobileSNPAs
	The list of SNPAs of the adjacent BIS that are currently accessible. These are the remote BIS SNPAs from which an ISH PDU has been received and for which subnetwork connectivity with the remote BIS is currently available. An SNPA in the list is a represented by a couple (linkageId, remoteDTEaddress).
	SEQUENCE OF {
	linkageId [1] GraphicString,
	SEQUENCE {
	type [1] OBJECT IDENTIFIER,
	address [2] OCTET STRING }
	}
	rational: this is a relationship attributes allowing the manager to get access to the individual aTNmobileConnection MOs associated with a mobile Adjacency. Without this attribute it may not be possible for the manager to associate the mobile connections with mobile adjacencies.
		GET	A	M

2.14.3 Actions

None

2.14.4 Notifications

Index	**Notification Name** **(Description)**	**ISO Status**	**ATN Status**

1.	communicationsInformation Used to report the occurrence of events pertaining to the normal operation of a managed object. It is used to report the following events: • newSubnetworkConnectivity: generated whenever mobile subnetwork connectivity becomes available a remote BIS. It is typically issued when a first ISH is received over a mobile subnetwork from a remote BIS. The value NLM. newSubnetworkConnectivity shall be reported in the informationType field. The linkageId and the remote DTE address through which subnetwork connectivity becomes available are reported in the AdditionalInformation field. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. • lostsubnetworkConnectivity: generated whenever mobile subnetwork connectivity with a remote BIS ceases to be available. It is typically issued on receipt of a LEAVE event or on expiration of the ISH Holding Timer. The value NLM. lostSubnetworkConnectivity shall be reported in the informationType field. The linkageId and the remote DTE address through which subnetwork connectivity ceases to be available are reported in the AdditionalInformation field. The significance sub-parameter of each item of additionalInformation shall be set to the value 'False' (i.e. not significant) so that a managing system receiving the event report will be less likely to reject it. *rational: these events must be logged, in order to record every subnetwork connectivity that were used between every airborne and A/G BIS. From this information, it is then possible to get the detail of every Virtual Circuit established between an A/G BIS and an Airborne BIS (by getting all objectCreation and objectDeletion records on aTNmobileConnection MOs and X.25DTEVirtualCircuit MOs the remoteDTE address of which matches one of the remoteDTEaddress recorded with the new/lostSubnetworkConnectivity notifications). This is usefull for accounting purpose, and for all off line analysis of the history of the communication between one particular airborne BIS and one particular A/GBIS*	A	M
2.	objectCreation Generated whenever an instance of the managed object class is created. The sourceIndicator parameter shall be set to the value 'resourceOperation'. The attributeList parameter shall be used to report the values of the MO attributes. None of the other optional parameters are used. *rational: needed for the logging of every mobile adjacency establishment*	A	M
3.	objectDeletion Generated whenever an instance of the managed object class is deleted. The sourceIndicator parameter shall be set to the value 'resourceOperation'. The attributeList parameter shall be used to report the values of the MO attributes. None of the other optional parameters are used, with the exception of the additionalInformation field which contains the following parameters: • objectDeletionCause: reason why the aTNmobileAdjacency Object is being deleted *rational: needed for the logging of every mobile adjacencies (for further analysis)*	A	M

2.15 The x25PLE-DTE managed object

x25PLE-DTE MOs shall be implemented in conformance with, and under the condition of ISO/IEC 10733.

Note: the injection in the ATN SARPS of the ISO/IEC 10733 definition of the x25PLE-DTE MO class is to be considered. SARPs do not define APRLs for ISO/IEC 8208 and the question is asked, whether MOCS related to SNAcP (and below) should be present.. In this version of this document, it has been considered that the scope of the ATN SARPs do not cover protocol entities below the SNDCF level, and that MOCS pertaining to SNAcP had not to be part of the ATN SARPs.

2.16 The virtualCall-DTE managed object

virtualCall-DTE MOs shall be implemented in conformance with, and under the condition of ISO/IEC 10733.

virtualCall-DTE Mos shall support the dTEVirtualCircuitCounters capabilities as defined in ISO/IEC 10733.

Note: the injection in the ATN SARPS of the ISO/IEC 10733 definition of the virtualCall-DTE MO class is to be considered. SARPs do not define APRLs for ISO/IEC 8208 and the question is asked, whether MOCS related to SNAcP (and below) should be present.. In this version of this document, it has been considered that the scope of the ATN SARPs do not cover protocol entities below the SNDCF level, and that MOCS pertaining to SNAcP had not to be part of the ATN SARPs.