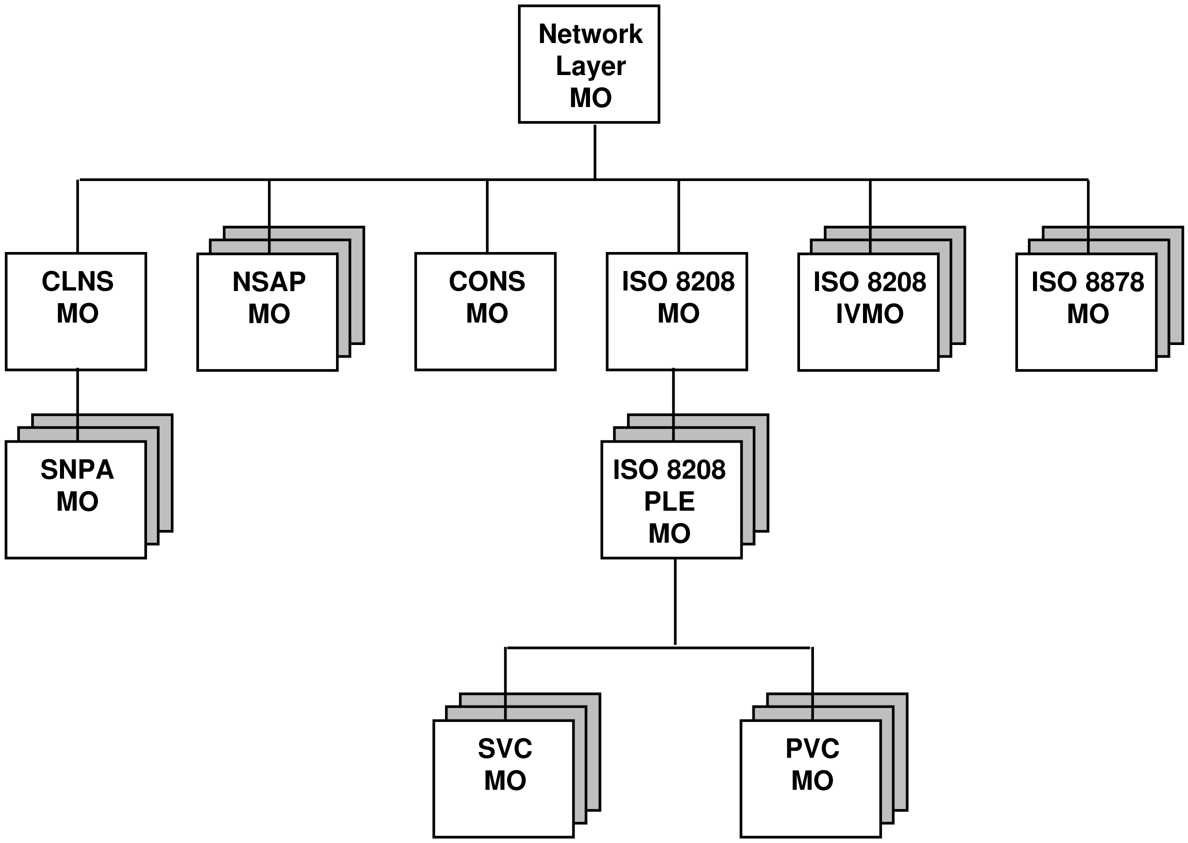
--
-- Description of Network Layer Managed Objects using GDMO DIS text 21N 4852 (15th June 1990)
-- It is based on SC6/WG2/N349 (Editors instructions output from Paris, P2.77), though I have taken the liberty
-- to make some modifications where the text of 2N349 was obviously wrong or disagreed strongly with my
-- recollections of the agreement reached in Paris. All (I hope) such changes have been documented in
-- comments.
--
-- 29th June 1990 Mike Shand

--
-- The following diagram shows the naming hierarchy of the Managed Objects defined for the Network Layer in
-- this document.



```
--
--      General Comments
--
--      According to GDMO the first character of a label-string is supposed to be  a lower case alpha character.
--      Things like cLNS, cONS and iSO8473, look so strange that I haven't followed this strictly.
--
--      In 2N349, the majority of attributes are preceeded by ISOxxxx.  This is unnecessary and  may lead to
--      problems with CCITT alignment.  These prefixes have therefore been removed.


--      Managed Object for Network Layer
--
--      There is exactly one of these MOs within a system.  It exists to provide a container for the
--      layer entity MOs. Its definition permits it to be created and deleted by management, but in
--      many systems it will exist inherently in the system and neither creation nor deletion will
--      be possible.
--

-- NOTE: the following definition reflects 2N349, although I don't believe we ever reached an agreement
-- in Paris that there would be a single NET for the network layer and that this attribute could be used
-- as the naming attribute.

networkLayer MANAGED OBJECT CLASS
        DERIVED FROM "ISO/IEC 10165-2":top;
        CHARACTERIZED BY nlPackage PACKAGE
                ATTRIBUTES
                        networkEntityTitle GET;
REGISTERED AS <object-identifier>;

nl-NB NAME BINDING
        SUBORDINATE OBJECT CLASS networkLayer;
        NAMED BY
                SUPERIOR OBJECT CLASS system;
                WITH ATTRIBUTE networkEntityTitle;
        CREATE;
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;

networkEntityTitle  ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.NSAPAddress;
        MATCHES FOR Equality;
        BEHAVIOUR networkEntityTitleB BEHAVIOUR
                DEFINED AS The Network Entity Title (having the same abstract syntax as an
                        NSAP address), which unambiguously identifies the Network Entity in
                        an End or Intermediate System. For the purposes of OSI management
                        there is assumed to be one Network Enity per open system;
                        -- National Body comment is solicited as to how the NET value is acquired.
REGISTERED AS <object-identifier>;
```

```
--      Connectionless Mode Network Entity
--
--      There is exactly one of these MOs within a system. Its definition permits it to be created
--       and deleted by management, but in many systems it will exist inherently in the system and neither
--      creation nor deletion will be possible.  Similarly, although the enable and disable actions are
--      defined here, a system may always exist in the 'On' operational state.

CLNS MANAGED OBJECT CLASS
        DERIVED FROM "ISO/IEC 10165-2":top;
        CHARACTERIZED BY CLNS PACKAGE
                ATTRIBUTES
                        "ISO/IEC 10165-2":OperationalState GET,
                        cLNS-MO-Name DEFAULT VALUE SyntaxModule.CLNS-MO-Name-Value
                                REQUIRED VALUES SyntaxModule.CLNS-MO-Name-Value
                                PERMITTED VALUES SyntaxModule.CLNS-MO-Name-Value
                                GET,
                        lifetime REPLACE WITH DEFAULT
                                GET-REPLACE,
                        segmentationPermitted REPLACE WITH DEFAULT
                                GET-REPLACE,  -- see note on attribute definition
                        segmentsReceived GET,
                        segmentsDiscarded GET,
                        expiredSegmentsDiscarded GET,
                        errorReportsReceived GET,  -- see note on attribute definition
                        pDUFormatErrors GET,
                        unsupportedOptions GET,
                        otherErrors GET; -- see note before attribute definition
                ATTRIBUTE GROUPS
                        counters
                                segmentsReceived
                                segmentsDiscarded
                                expiredSegmentsDiscarded
                                errorReportsReceived
                                pDUFormat Errors
                                unsupportedOptions
                                otherErrors;
                ACTIONS
                        enable,
                        disable;
                                -- Note: the terms suggested in SC21 for these actions are ACTIVATE and
                                -- DEACTIVATE.
                NOTIFICATIONS
                        pDUFormatError,
                        unsupportedOption,
                        otherError;          -- see note before notification definition
        CONDITIONAL PACKAGES CLNSChecksumPackage
                PRESENT IF The 8473 Generate Checksum option is implemented;
REGISTERED AS <object-identifier>;

CLNS-NB NAME BINDING
        SUBORDINATE OBJECT CLASS CLNS;
        NAMED BY
                SUPERIOR OBJECT CLASS Network Layer;
                WITH ATTRIBUTE CLNS-MO-Name;
        CREATE with-reference-object, with-automatic-instance-naming;
                -- Since the only possible instance name for this is 'CLNS' it seems reasonable to permit
                -- creation without specifying an instance name.
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;
```

```
CLNSChecksumPackage PACKAGE
        BEHAVIOUR DEFINITIONS CLNSChecksumPackageB BEHAVIOUR
                DEFINED AS When present checksum generation is controlled by the 8473EnableChecksum
                        attribute;
        ATTRIBUTES
                enableChecksum REPLACE WITH DEFAULT
                        DEFAULT VALUE SyntaxModule.False
                        REQUIRED VALUES SyntaxModule.False
                                -- If the ChecksumPackage is present it must be possible to turn off
                                -- checksum generation
                        GET-REPLACE;
REGISTERED AS <object-identifier>;

CLNS-MO-Name ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.GraphicString;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR CLNS-MO-NameB BEHAVIOUR
                DEFINED AS The naming attribute for the CLNS MO;
                        --Note: The value of this attribute is always ‘CLNS’.
REGISTERED AS <object-identifier>;

lifetime ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.lifetime;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR lifetimeB BEHAVIOUR
                DEFINED AS The value to be used for the ISO 8473 lifetime field in PDUs originated
                        by this network entity. The value is expressed as the number of ½ seconds;
REGISTERED AS <object-identifier>;

segmentationPermitted ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.Boolean;
        MATCHES FOR Equality;
        BEHAVIOUR segmentationPermittedB  BEHAVIOUR
                DEFINED AS Boolean indication of whether or not the segmentation permitted flag
                        shall be set in PDUs originated by this network entity;
                        -- Note: This attribute is considered "on probation" and National Body
                        -- comment on its suitability is solicited.
REGISTERED AS <object-identifier>;

segmentsReceived ATTRIBUTE
        DERIVED FROM  NonReplaceableCounter;
        BEHAVIOUR segmentsReceivedB BEHAVIOUR
                DEFINED AS Counter of the number of data and error report NPDUs received
                        prior to reassembly, including those which may subsequently be discarded;
REGISTERED AS <object-identifier>;

segmentsDiscarded ATTRIBUTE
        DERIVED FROM  NonReplaceableCounter;
        BEHAVIOUR segmentsDiscardedB BEHAVIOUR
                DEFINED AS Counter of the number of data and error report NPDUs discarded
                        without delivery to a transport entity. This includes segments discarded
                        for any reason except lifetime expiry during reassembly;
REGISTERED AS <object-identifier>;

expiredSegmentsDiscarded ATTRIBUTE
        DERIVED FROM  NonReplaceableCounter;
        BEHAVIOUR expiredSegmentsDiscardedB BEHAVIOUR
                DEFINED AS Counter of the number of data and error report NPDUs discarded
                        due to PDU lifetime expiry during reassembly;
REGISTERED AS <object-identifier>;
```

--Note: in P2.40 a ISO8473ErrorReportsGenerated attribute
--was defined which is not present in 2N349. It is not clear if this deletion was intentional.

errorReportsReceived **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR errorReportsReceivedB **BEHAVIOUR**
        DEFINED AS Counter of the number of error report NPDUs received;
REGISTERED AS <object-identifier>;

pDUFormatErrors **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR pDUFormatErrorsB **BEHAVIOUR**
        DEFINED AS Counter of the number of data or error report PDUs discarded due
            to the presence of a format error. This counter is incremented irrespective
            of the setting of the Error Report bit in the received PDU;
            -- Note: this counter is therefore a count of the number of
            -- pDUFormatError notifications generated (as opposed to CMIP events,
            -- may be suppressed) as required by GDMO clause 9.8.5 (SC21 N4852).
REGISTERED AS <object-identifier>;

pDUFormatError **NOTIFICATION**
    BEHAVIOUR pDUFormatErrorB **BEHAVIOUR**
        DEFINED AS Notification issued when a data or error report PDU is discarded due
            to the presence of a format error. The notification includes the header of the
            invalid PDU;
    MODE NON-CONFIRMED;
    WITH INFORMATION SYNTAX SyntaxModule.pDUFormatErrorSyntax;
REGISTERED AS <object-identifier>;

unsupportedOptions **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR unsupportedOptionsB **BEHAVIOUR**
        DEFINED AS Counter of the number of data or error report PDUs discarded due
            to the presence of an unsupported option. This counter is incremented irrespective
            of the setting of the Error Report bit in the received PDU;
REGISTERED AS <object-identifier>;

unsupportedOption **NOTIFICATION**
    BEHAVIOUR unsupportedOptionB **BEHAVIOUR**
        DEFINED AS Notification issued when a data or error report PDU is discarded due
            to the presence of an unsupported option. The notification includes the header
            of the invalid PDU;
    MODE NON-CONFIRMED;
    WITH INFORMATION SYNTAX SyntaxModule.unsupportedOptionSyntax;

REGISTERED AS <object-identifier>;

-- Note: Although not reflected in 2N349 there was agreement at the Paris meeting that a third type of error
-- notification and counter should be defined to cover the cases not dealt with by the existing two. The following
-- counter and event are place-holders for this. National Body comment is solicited on the suitability of these
-- three classifications and the division of the protocol errors among them.

otherErrors **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR otherErrorsB **BEHAVIOUR**
        DEFINED AS Counter of the number of data or error report PDUs discarded due
            to the presence of an error other than a format error or unsupported option.
            This counter is incremented irrespective of the setting of the Error Report
            bit in the received PDU;
REGISTERED AS <object-identifier>;

```
otherError NOTIFICATION
        BEHAVIOUR otherErrorB BEHAVIOUR
                DEFINED AS Notification issued when a data or error report PDU is discarded due
                        to the presence of an error other than a format error or unsupported option.
                        The notification includes the header of the invalid PDU;
        MODE NON-CONFIRMED;
        WITH INFORMATION SYNTAX SyntaxModule.pDUOtherErrorSyntax;
REGISTERED AS <object-identifier>;

enable ACTION
        BEHAVIOUR enableB BEHAVIOUR
                DEFINED AS Sets OperationalState to 'On' and commences operation. Note that it is
                        permissible for a system to be initially in an enabled state. Note also that an
                        enable while in Operational State 'On' has no effect and does not return an error;
        MODE CONFIRMED;
        PARAMETERS <parameter-label>;  -- yes we probably need some to carry the error reports --
        WITH INFORMATION SYNTAX <syntax-label>;  -- I don't think we need any of this
        WITH REPLY SYNTAX <syntax-label>; -- we might need this for an OK? --
                -- Note: it is not clear from GDMO how to use  PARAMETERS in conjuntion with
                -- INFORMATION SYNTAX and REPLY SYNTAX.
REGISTERED AS <object-identifier>;

disable ACTION
        BEHAVIOUR disableB BEHAVIOUR
                DEFINED AS Sets OperationalState to 'Off' and shuts down operation. Note that it is
                        permissible for this action to always fail in a given implementation (i.e. that
                        implementation is not capable of shutting down). Note also that a disable
                        while in Operational State 'Off' has no effect and does not return an error;
        MODE CONFIRMED;
        PARAMETERS <parameter-label>;  -- yes we probably need some to carry the error reports --
        WITH INFORMATION SYNTAX <syntax-label>;  -- I don't think we need any of this
        WITH REPLY SYNTAX <syntax-label>; -- we might need this for an OK? --
REGISTERED AS <object-identifier>;

counters ATTRIBUTE GROUP
        -- No GROUP ELEMENTS so far. They are all added in the package definitions.
        DESCRIPTION The group of all counter attributes;
REGISTERED AS <object-identifier>;

nonReplaceableCounter ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  SyntaxModule.Counter;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR nonReplaceableCounterB BEHAVIOUR
                DEFINED AS Non-replaceable, non-wrapping counter;
REGISTERED AS <object-identifier>;
```

```
--      NSAP Managed Object
--
--      There is one NSAP MO for each NSAP supported by the Network Layer Entity.
--

-- NOTE: The following definition reflects that agreed in 2N349. National Bodies may like to consider
-- the suitability of the Sap Objects and attributes defined in GMO for this purpose.

NSAP MANAGED OBJECT CLASS
        DERIVED FROM "ISO/IEC 10165-2":top;
        CHARACTERIZED BY NSAP PACKAGE
                ATTRIBUTES
                        NSAP-MO-Name  GET,
                                -- It might be more appropriate to just call this NSAP
                                -- National Body comment is solicited as to how the value of this
                                -- attribute is derived on creation of the MO, and how it may be
                                -- changed during the operation of the entity.
                        transportClientRelationship GET;
                                -- We should probably look into using some already defined
                                -- relationship attribute if an appropriate one exists
REGISTERED AS <object-identifier>;

NSAP-NB NAME BINDING
        SUBORDINATE OBJECT CLASS NSAP;
        NAMED BY
                SUPERIOR OBJECT CLASS NetworkLayer;
                WITH ATTRIBUTE NSAP-MO-Name;
        CREATE;
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;

-- The following attribute could possible be replaced by the LocalSapAddress attribute from GMO

NSAP-MO-Name ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.NSAPAddress;
                -- Defined as an OCTETSTRING
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR NSAP-MO-NameB BEHAVIOUR
                DEFINED AS The NSAP address in the Hexadecimal Reference Publication Format;
                        --Note: National Bodies are encouraged to comment on the appropriateness of this
                        -- attribute and its definition. Specifically, should multiple NSAP addresses be
                        -- permitted and should it be permitted to add and/or delete members from the set?
REGISTERED AS <object-identifier>;

-- The following attribute could possible be replaced by the UserEntityName attribute from GMO
-- but that doesn't have the concept of a set of users.

transportClientRelationship ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.transportClientRelationship;
                -- Defined as Set of CMIP-1.ObjectInstance
                -- This includes localDistinguishedName as one of the choices, which is what is
                -- required here..
        MATCHES FOR Equality;
        BEHAVIOUR transportClientRelationshipB BEHAVIOUR
                DEFINED AS The set of Distinguished names of the Transport Layer client MOs within
                        the local system supported by the NSAP. This attribute is included to represent
                        protocol usage relationships;
REGISTERED AS <object-identifier>;
```

```
--      Subnetwork Point of Attachment Managed Object
--
--      One such MO exists for each SNPA of the local system over which the CLNS is supported.
--

-- The following text reflects the agreement in Paris to use conditional packages to represent the various
-- sub-types of SNPA support. National Body comment is solicited as to whether this is the most appropriate
-- way or whether (for example) multiple MO classes should be defined for ES and IS operation. The attributes
-- defined here for IS operation include only those aspects related to the operation of ISO 9542.  Many more
-- attributes would be required in order to manage the operation of the DP 10589 protocols.  The requirement
-- to add these extra attributes should be taken into account when defining the present structure.  In addition
-- National Body comment is solicited on the possible requirement for additional package granularity to deal
-- with the optional implementation the various subsets of ISO 9542 (e.g. configuration information subset)

SNPA MANAGED OBJECT CLASS
        DERIVED FROM "ISO/IEC 10165-2":top;
        CHARACTERIZED BY SNPA PACKAGE
                ATTRIBUTES
                        SNPA-MO-Name GET,
                        "ISO/IEC 10165-2":operationalState GET,
                        "ISO/IEC 10165-2":administrativeState GET-REPLACE,
                                -- while the above attribute is included in 2N349 it is by no means
                                -- clear what function it is intended to perform. The associated text reads
                                -- 'Indication of the the last Enable/Disable operation to be performed.
                                -- This may only be appropriate for some subclasses of SNPAs and
                                -- National Body comments are welcomed'
                        SNPARequestedSDUSize REPLACE WITH DEFAULT
                                -- Note: default value is implementation specific
                                -- Note: 2N349 has this called SNPADesiredSDUSize. I believe the
                                -- agreement in Paris was to remove this anthropomorphism
                                GET-REPLACE,
                        SN-SAP GET,
                        SN-ServiceProvider GET-REPLACE;
                ACTIONS
                        enable,
                        disable;
                                -- Note: Although 2N349 defines separate attributes for the enable
                                -- (and disable) actions of each MO, there is currently no reason why
                                -- the same attributes cannot be used for all Network Layer MOs.
                                -- If, subsequently, different PARAMETERS are required for different
                                -- actions, they can be added here in the PACKAGE definitions.
                                -- However, as GDMO currently stands, the same would not be true for
                                -- INFORMATION SYNTAX, and this would require the definition of
                                -- separate attributes.
        CONDITIONAL PACKAGES
                -- NOTE the syntax of the 'present if' clause defined in GDMO is such that the
                -- English language <condition-definition> is terminated by the presence of a comma.
                -- Avoiding the use of embedded commas makes for stilted English. Attempts to parse
                -- the following productions using the strict syntax of GDMO may therefore fail.
                SNPA-ISO9542ESPackage
                        PRESENT IF support for ISO 9542 operating as an ES,
                SNPA-ISO9542ISPackage
                        PRESENT IF support for ISO 9542 operating as an IS,
                SNPA-ISO8208Package
                        PRESENT IF support for ISO 8208 as a subnetwork over which the system
                                is running ISO 8473. That is, these definitions represent management of
                                the ISO8208 SNDCF for ISO 8473,
                SNPA-ISO8802Package
                        PRESENT IF support for an ISO 8802 subnetwork;
REGISTERED AS <object-identifier>;
```

```
SNPA-NB NAME BINDING
        SUBORDINATE OBJECT CLASS SNPA;
        NAMED BY
                SUPERIOR OBJECT CLASS CLNS;
                WITH ATTRIBUTE SNPA-MO-Name;
        CREATE with-reference-object;
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;
```

```
SNPA-MO-Name ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SyntaxModule.GraphicString;
    MATCHES FOR Equality, Substrings;
    BEHAVIOUR SNPA-MO-NameB BEHAVIOUR
        DEFINED AS The naming attribute of the SNPA MO instance;
            -- Note: although 2N349 states this is an RDN, I believe it is only the attribute
            -- assertion of this attribute which is required to be an RDN
REGISTERED AS <object-identifier>;

requestedSDUSize ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SyntaxModule.SDUSize;
        -- A cardinal seems right.
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR requestedSDUSizeB BEHAVIOUR
        DEFINED AS The data link SDU size to be used for this SNPA. Where negotiation is
            permitted, this represents the proposed value;
REGISTERED AS <object-identifier>;

SN-SAP ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SyntaxModule.LocalDistinguishedName;
    MATCHES FOR Equality;
    BEHAVIOUR SN-SAPB BEHAVIOUR
        DEFINED AS Distinguished name of the subnetwork SAP MO.  This is obtained via
            an internal interface when the SNPA is enabled;
            -- Note: 2N349 states that 'This attribute is conditional upon SN type and requires
            -- redefinition for each.  However, since it is not yet clear what form this would take,
            -- it has been included here in the non-conditional package.
REGISTERED AS <object-identifier>;

SN-ServiceProvider ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SyntaxModule.LocalDistinguishedName;
    MATCHES FOR Equality;
    BEHAVIOUR SN-ServiceProviderB BEHAVIOUR
        DEFINED AS Distinguished name of the SN service provider MO.  Identifies the
            subnetwork entity to be used to support the SNPA, when enabled;
REGISTERED AS <object-identifier>;
```

```
SNPA-ISO9542ESPackage PACKAGE
    BEHAVIOUR DEFINITIONS SNPA-ISO9542ESPackageB BEHAVIOUR
        DEFINED AS Controls the operation of ISO 9542 on an EndSystem;
    ATTRIBUTES
        holdingTimerMultiplier
            DEFAULT VALUE SyntaxModule.HoldingTimerMultiplierDefault
                -- 3
            REQUIRED VALUES SyntaxModule.HoldingTimerMultiplierRequired
                -- 2
            PERMITTED VALUES SyntaxModule.HoldingTimerMultiplierPermitted
                -- 2-63
            GET-REPLACE,
            -- Note: The actual values quoted here for the default, required and permitted values
            -- are subject to NB agreement.  They are presented here as a place-holder for the
            -- finally agreed values.
        defaultESConfigTimer REPLACE WITH DEFAULT
            GET-REPLACE,
        activeESConfigTimer GET,
        iSReachabilityChanges GET;
    ATTRIBUTE GROUPS
        counters
            iSReachabilityChanges;
    NOTIFICATIONS
        iSReachabilityChange;
REGISTERED AS <object-identifier>;

holdingTimerMultiplier ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR holdingTimerMultiplierB BEHAVIOUR
        DEFINED AS Parameter which, when multiplied by a configuration timer yields the value of
            the holding timer parameter issued with configuration information.  The semantics of
            this parameter are such that it is permissible to also add a delta value to the result to
            compensate for imprecision in delay estimates. That is, local overestimation is
            permitted.  The result of the calculation is truncated, upon overflow, to the maximum
            value for the parameter permitted by the protocol (65535);
REGISTERED AS <object-identifier>;

defaultESConfigTimer ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR defaultESConfigTimerB BEHAVIOUR
        DEFINED AS Default value for the ISO 9542 configuration timer, used when the ES has not
            received, or has not chosen to accept, a suggested configuration timer value from an
            Intermediate System;
REGISTERED AS <object-identifier>;

activeESConfigTimer ATTRIBUTE
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR activeESConfigTimerB BEHAVIOUR
        DEFINED AS Currently active value for the ISO 9542 configuration timer;
            -- National Body comment is solicited as to the need for this attribute;
REGISTERED AS <object-identifier>;

iSReachabilityChanges ATTRIBUTE
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR iSReachabilityChangesB BEHAVIOUR
        DEFINED AS Counter associated with the iSReachabilityChange notification;
REGISTERED AS <object-identifier>;
```

```
iSReachabilityChange NOTIFICATION
        BEHAVIOUR iSReachabilityChangeB BEHAVIOUR
                DEFINED AS Notification generated when an ES detects a change in the reachability of a
                        neighboring IS;
                        -- Note: This is not strictly reachability information. It is more akin to an adjacency
                        -- in DP 10589.
        MODE NON-CONFIRMED;
        WITH INFORMATION SYNTAX SyntaxModule.iSReachabilityChangeSyntax;
REGISTERED AS <object-identifier>;

SNPA-ISO9542ISPackage PACKAGE
        BEHAVIOUR DEFINITIONS SNPA-ISO9542ISPackageB BEHAVIOUR
                DEFINED AS Controls the operation of ISO 9542 on an Intermediate System;
        ATTRIBUTES
                holdingTimerMultiplier
                        DEFAULT VALUE SyntaxModule.HoldingTimerMultiplierDefault
                                -- 3
                        REQUIRED VALUES SyntaxModule.HoldingTimerMultiplierRequired
                                -- 2
                        PERMITTED VALUES SyntaxModule.HoldingTimerMultiplierPermitted
                                -- 2-63
                        GET-REPLACE,
                        -- Note: The actual values quoted here for the default, required and permitted values
                        -- are subject to NB agreement.  They are presented here as a place-holder for the
                        -- finally agreed values.
                iSConfigurationTimer REPLACE WITH DEFAULT
                        GET-REPLACE,
                suggestedESConfigurationTimer REPLACE WITH DEFAULT
                        GET-REPLACE,
                eSReachabilityChanges GET;
        ATTRIBUTE GROUPS
                counters
                        eSReachabilityChanges;
        NOTIFICATIONS
                eSReachabilityChange;
REGISTERED AS <object-identifier>;

iSConfigurationTimer ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR iSConfigurationTimerB BEHAVIOUR
                DEFINED AS Value for the ISO 9542 configuration timer, used to determine how
                        often an IS reports configuration information to ESs;
REGISTERED AS <object-identifier>;

suggestedESConfigurationTimer ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR suggestedESConfigurationTimerB BEHAVIOUR
                DEFINED AS Value to be used for the ISO 9542 suggested ES configuration timer value,
                        advertised in IS hellos generated by this network entity;
                        -- Note: It is far from clear that this attribute would be able to be set to a specific
                        -- value in all implementations. For example, the DP 10589 ES poll protocol relies
                        -- on the IS being able to set this to different values in different circumstances.
                        -- it may be useful to be able to GET the current value.
REGISTERED AS <object-identifier>;
```

eSReachabilityChanges **ATTRIBUTE**
DERIVED FROM NonReplaceableCounter;
BEHAVIOUR eSReachabilityChangesB **BEHAVIOUR**
DEFINED AS Counter associated with the eSReachabilityChange notification;
REGISTERED AS <object-identifier>;

eSReachabilityChange **NOTIFICATION**
BEHAVIOUR eSReachabilityChangeB **BEHAVIOUR**
DEFINED AS Notification generated when an IS detects a change in the reachability of a neighboring ES;
MODE NON-CONFIRMED;
WITH INFORMATION SYNTAX SyntaxModule.eSReachabilityChangeSyntax;
REGISTERED AS <object-identifier>;

SNPA-ISO8208Package **PACKAGE**
BEHAVIOUR DEFINITIONS SNPA-ISO8208PackageB **BEHAVIOUR**
DEFINED AS Controls the operation of ISO 8208 as an SNDCF for ISO 8473;
ATTRIBUTES
recallTimer **REPLACE WITH DEFAULT**
GET-REPLACE,
idleTimer **REPLACE WITH DEFAULT**
GET-REPLACE,
maxRecallAttempts **REPLACE WITH DEFAULT**
GET-REPLACE,
initialMinimumTimer **REPLACE WITH DEFAULT**
GET-REPLACE,
reserveTimer **REPLACE WITH DEFAULT**
GET-REPLACE,
dTEAddress **GET-REPLACE**,
-- Note: this attribute may be better handled using an IVMO
callsPlaced **GET**,
callsFailed **GET**;
ATTRIBUTE GROUPS
counters
callsPlaced,
callsFailed;
NOTIFICATIONS
<none-yet-defined>;
REGISTERED AS <object-identifier>;

recallTimer **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
MATCHES FOR Equality, Ordering;
BEHAVIOUR recallTimerB **BEHAVIOUR**
DEFINED AS The timer which determines the interval (in seconds) after which the SNDCF will attempt to place subsequent calls following an unsuccessful first call attempt;
REGISTERED AS <object-identifier>;

idleTimer **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
MATCHES FOR Equality, Ordering;
BEHAVIOUR idleTimerB **BEHAVIOUR**
DEFINED AS The timer which determines the interval (in seconds) for which a call is permitted to remain idle (i.e. no data traffic in either direction) before being released by the SNDCF;
REGISTERED AS <object-identifier>;

maxRecallAttempts **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
MATCHES FOR Equality, Ordering;
BEHAVIOUR maxRecallAttemptsB **BEHAVIOUR**
DEFINED AS The maximum number of times the SNDCF will attempt to place a call before (doing what?????);
REGISTERED AS <object-identifier>;

reserveTimer **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
MATCHES FOR Equality, Ordering;
BEHAVIOUR reserveTimerB **BEHAVIOUR**
DEFINED AS The timer which determines the interval (in seconds) for which resources are retained for re-establishment of an idled VC;
REGISTERED AS <object-identifier>;

dTEAddress **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.DTEAddress;
    MATCHES FOR Equality;
    BEHAVIOUR dTEAddresB **BEHAVIOUR**
        DEFINED AS The DTEAdress to which calls associated with the SNDCF are to established;
REGISTERED AS <object-identifier>;

callsPlaced **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR callsPlacedB **BEHAVIOUR**
        DEFINED AS The number of X.25 VCs successfully established by the SNDCF;
REGISTERED AS <object-identifier>;

callsFailed **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR callsFailedB **BEHAVIOUR**
        DEFINED AS The number of X.25 call failures while attempting establishment by the SNDCF;
REGISTERED AS <object-identifier>;

```
SNPA-ISO8802Package PACKAGE
    BEHAVIOUR DEFINITIONS SNPA-ISO8802PackageB BEHAVIOUR
        DEFINED AS Controls the operation of ISO 8802 as a subnetwork;
    ATTRIBUTES
        Address GET,
            ADD-REMOVE ;
    NOTIFICATIONS
        <none-yet-defined>;
REGISTERED AS <object-identifier>;

manualISAddress ATTRIBUTE
    WITH ATTRIBUTE SYNTAX  SyntaxModule.manualISAddress;
        -- Set of MACAddreses
    MATCHES FOR Set Comparison, Set Intersection;
    BEHAVIOUR manualISAddresB BEHAVIOUR
        DEFINED AS The set of MAC addresses of ISs on the subnetwork which do not implement
            the configuration subset of ISO 9542;
REGISTERED AS <object-identifier>;
```

```
--      Connection Mode Network Entity
--
--      There is exactly one of these MOs within a system. Its definition permits it to be created
--       and deleted by management, but in many systems it will exist inherently in the system and neither
--      creation nor deletion will be possible.

--      2N349 does not define any enable and disable actions for this MO, nor any operational state.
--      The assumption is that being a reliable service, unlike CLNS, it is always active?!?!

CONS MANAGED OBJECT CLASS
        DERIVED FROM "ISO/IEC 10165-2":top;
        CHARACTERIZED BY CONS PACKAGE
                ATTRIBUTES
                        CONS-MO-Name DEFAULT VALUE SyntaxModule.CONS-MO-Name-Value
                                REQUIRED VALUES SyntaxModule.CONS-MO-Name-Value
                                PERMITTED VALUES SyntaxModule.CONS-MO-Name-Value
                                GET,
                                -- Note: Unlike the CLNS MO, 2N349 does not constrain this to have a
                                -- single value such as 'CONS' or 'ISO8878'. It would seem reasonable
                                -- that there should be consistency in this matter between the two MOs, and
                                -- it is my belief that it was agreed in Paris.
                        minimumAcceptableEndToEndDelay REPLACE WITH DEFAULT
                                GET-REPLACE,
                        targetEndToEndDelay  REPLACE WITH DEFAULT
                                GET-REPLACE,
                        minimumAcceptableThroughputRequested REPLACE WITH DEFAULT
                                GET,
                        targetThroughputRequested REPLACE WITH DEFAULT
                                GET;
REGISTERED AS<object-identifier>;

CONS-NB NAME BINDING
        SUBORDINATE OBJECT CLASS CONS;
        NAMED BY
                SUPERIOR OBJECT CLASS Network Layer;
                WITH ATTRIBUTE CONS-MO-Name;
        CREATE with-reference-object, with-automatic-instance-naming;
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;

CONS-MO-Name ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.GraphicString;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR CONS-MO-NameB BEHAVIOUR
                DEFINED AS The name of the CONS MO;
REGISTERED AS <object-identifier>;

minimumAcceptableEndToEndDelay ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.EndToEndDelay;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR minimumAcceptableEndToEndDelayB BEHAVIOUR
                DEFINED AS The minimum acceptable End To End Delay to be requested when establishing
                        a network connection;
REGISTERED AS <object-identifier>;

targetEndToEndDelay ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.EndToEndDelay;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR targetEndToEndDelayB BEHAVIOUR
                DEFINED AS The target End To End Delay for a network connection;
REGISTERED AS <object-identifier>;
```

-- Although 2N349 specifies that the identifiers of the following two attributes end with ‘requested’, that has been
-- omitted here for consistency with the previous two attributes.

minimumAcceptableThroughput **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Throughput;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR minimumAcceptableThroughputB **BEHAVIOUR**
        DEFINED AS The minimum acceptable Throughput to be requested when establishing
            a network connection;
REGISTERED AS <object-identifier>;

targetThroughput **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Throughput;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR targetThroughputB **BEHAVIOUR**
        DEFINED AS The target Throughput for a network connection;
REGISTERED AS <object-identifier>;

```
--      ISO 8208 Managed Object
--
--      There is exactly one of these MOs within a system. Its definition permits it to be created
--       and deleted by management, but in many systems it will exist inherently in the system and neither
--      creation nor deletion will be possible.
ISO8208 MANAGED OBJECT CLASS
        DERIVED FROM "ISO/IEC 10165-2":top;
                -- Consideration should be given as to the suitability of the entity Managed Object defined in
                -- GMO.
        CHARACTERIZED BY ISO8208 PACKAGE
                ATTRIBUTES
                        ISO8208-MO-Name DEFAULT VALUE SyntaxModule.ISO8208-MO-Name-Value
                                REQUIRED VALUES SyntaxModule.ISO8208-MO-Name-Value
                                PERMITTED VALUES SyntaxModule.ISO8208-MO-Name-Value
                                GET,
                                -- Note: Unlike the CLNS MO, 2N349 does not constrain this to have a
                                -- single value such as  'ISO8208'. It would seem reasonable
                                -- that there should be consistency in this matter between the two MOs, and
                                -- it is my belief that it was agreed in Paris.
                        networkUserIdentity REPLACE WITH DEFAULT
                                GET-REPLACE,
                        rPOASequence REPLACE WITH DEFAULT
                                GET-REPLACE;
REGISTERED AS<object-identifier>;

ISO8208-NB NAME BINDING
        SUBORDINATE OBJECT CLASS ISO8208;
        NAMED BY
                SUPERIOR OBJECT CLASS Network Layer;
                WITH ATTRIBUTE ISO8208-MO-Name;
        CREATE with-reference-object, with-automatic-instance-naming;
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;

ISO8208-MO-Name ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.GraphicString;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR ISO8208-MO-NameB BEHAVIOUR
                DEFINED AS The name of the ISO8208 MO;
                        -- Note: 2N349 says 'The RDN of this particular ISO8208 MO', which implies that
                        -- there may be multiple such MOs and that they may have different names. However
                        -- the diagram in 2N349 only indicates the possibility of a single ISO8208MO
                        -- instance per system, and notes taken in Paris indicate that there was agreement that
                        --  the value of this attribute should be fixed as for CLNS.
REGISTERED AS <object-identifier>;

networkUserIdentity ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.NUI;
                -- Needs a value for 'not specified'
        MATCHES FOR Equality;
        BEHAVIOUR networkUserIdentityB BEHAVIOUR
                DEFINED AS The Network User Identity to be included in call (for billing or other purposes).
                        The syntax is defined by the PSDN administration;
REGISTERED AS <object-identifier>;
```

```
rPOASequence ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.RPOASequence;
                -- Sequence of 4 digit decimal numbers.
                -- Needs a value for 'Not specified'
        MATCHES FOR Equality;
        BEHAVIOUR rPOASequenceB BEHAVIOUR
                DEFINED AS Requests the Private Operating Agency sequence of transmit networks in
                        setting up the call.  Each network is identified by a 4 digit number. An empty
                        sequence indicates 'Not Specified';
REGISTERED AS <object-identifier>;
```

```
--	X25 PLE Managed Object
--
--	There may be multiple instances of these MOs within a system, corresponding to Multiple X.25 PLEs.

-- Note: The default values for many of these attributes have not been defined even though a
-- REPLACE WITH DEFAULT clause exists.  NB comment is solicited as to what values would be appropriate.
-- Where ISO 8208 specifies specific default values, these have been used.

x25PLE MANAGED OBJECT CLASS
	DERIVED FROM "ISO/IEC 10165-2":top;
	CHARACTERIZED BY x25PLE PACKAGE
		ATTRIBUTES
			x25PLE-MO-Name GET,
			"ISO/IEC 10165-2":operationalState GET,
			"ISO/IEC 10165-2":administrativeState GET-REPLACE,
				-- Note: This attribute exists in 2N349, but it is not clear how it is used
			-- Note: The following two attributes have been moved here from the VC MO in
			-- accordance with the ammendments to 2N349
			reverseCharging REPLACE WITH DEFAULT
				GET-REPLACE,
			fastSelect  REPLACE WITH DEFAULT
				GET-REPLACE,
			protocolVersionsSupported GET,
			localDTEAddress GET-REPLACE,
				-- Note: above attribute renamed to localDTEAddress to avoid conflict
				-- with SNPA DTEAddress.
			interfaceMode GET-REPLACE,
			maxActiveCircuits REPLACE WITH DEFAULT
				GET-REPLACE,
			restartTime REPLACE WITH DEFAULT
				DEFAULT VALUE SyntaxModule.restartTimeDefault
				GET-REPLACE,
			callTime REPLACE WITH DEFAULT
				DEFAULT VALUE SyntaxModule.callTimeDefault
				GET-REPLACE,
			resetTime REPLACE WITH DEFAULT
				DEFAULT VALUE SyntaxModule.resetTimeDefault
				GET-REPLACE,
			clearTime REPLACE WITH DEFAULT
				DEFAULT VALUE SyntaxModule.clearTimeDefault
				GET-REPLACE,
			windowTime REPLACE WITH DEFAULT
				DEFAULT VALUE SyntaxModule.windowTimeDefault
				GET-REPLACE,
			dataRetransmissionTime REPLACE WITH DEFAULT
				DEFAULT VALUE
					SyntaxModule.dataRetransmissionTimeDefault
				GET-REPLACE,
			interruptTime REPLACE WITH DEFAULT
				DEFAULT VALUE SyntaxModule.interruptTimeDefault
				GET-REPLACE,
			rejectTime REPLACE WITH DEFAULT
				DEFAULT VALUE SyntaxModule.rejectTimeDefault
				GET-REPLACE,
			registrationRequestTime REPLACE WITH DEFAULT
				DEFAULT VALUE
					SyntaxModule.registrationRequestTimeDefault
				GET-REPLACE,
			restartCount REPLACE WITH DEFAULT
				DEFAULT VALUE SyntaxModule.restartCountDefault
				GET-REPLACE,
```

```
        resetCount REPLACE WITH DEFAULT
            DEFAULT VALUE SyntaxModule.resetCountDefault
            GET-REPLACE,
        clearCount REPLACE WITH DEFAULT
            DEFAULT VALUE SyntaxModule.clearCountDefault
            GET-REPLACE,
        dataTransmissionCount REPLACE WITH DEFAULT
            DEFAULT VALUE SyntaxModule.dataTransmissionCountDefault
            GET-REPLACE,
        rejectCount REPLACE WITH DEFAULT
            DEFAULT VALUE SyntaxModule.rejectCountDefault
            GET-REPLACE,
        registrationRequestCount REPLACE WITH DEFAULT
            DEFAULT VALUE
                SyntaxModule.registrationRequestCountDefault
            GET-REPLACE,
        dataLinkID REPLACE WITH DEFAULT
            GET-REPLACE,
        logicalChannelAssignments REPLACE WITH DEFAULT
            GET-REPLACE,
        extendedPacketSequencing REPLACE WITH DEFAULT
            GET-REPLACE,
        "ISO/IEC 10165-2":OctetsSentCounter GET,
            -- This corresponds to the ISO8208OctetsSent attribute. Note that the DMI
            -- definition is in terms of user data octets.
        "ISO/IEC 10165-2":OctetsReceivedCounter GET,
            -- This corresponds to the ISO8208OctetsReceived attribute. Note that the
            --DMI definition is in terms of user data octets.
        dataPacketsSent GET,
            -- Note the "ISO/IEC 10165-2":PDUsSentCounter cannot be used here
            -- since it is defined as total number of PDUs sent, not just data PDUs.
        dataPacketsReceived GET,
        callAttempts GET,
        callsConnected GET,
        providerInitiatedDisconnects GET,
        callTimeouts GET,
        clearTimeouts GET,
        remotelyInitiatedResets GET,
        dataRetransmissionTimerExpires GET,
        providerInitiatedResets GET,
        resetTimeouts GET,
        restarts GET,
        restartTimeouts GET,
        protocolErrorsDetectedLocally GET,
        protocolErrorsAccusedOf GET,
        retryCountsExceeded GET,
        clearCountsExceeded GET,
        interruptPacketsSent GET,
        interruptPacketsReceived GET,
        interruptTimerExpiries GET,
        pLEClientMOName GET;
    ATTRIBUTE GROUPS
        counters
            "ISO/IEC 10165-2":OctetsSentCounter
            "ISO/IEC 10165-2":OctetsReceivedCounter
            dataPacketsSent
            dataPacketsReceived
            callAttempts
            callsConnected
            providerInitiatedDisconnects
            callTimeouts
```

```
                        clearTimeouts
                        remotelyInitiatedResets
                        dataRetransmissionTimerExpires
                        providerInitiatedResets
                        resetTimeouts
                        restarts
                        restartTimeouts
                        protocolErrorsDetectedLocally
                        protocolErrorsAccusedOf
                        retryCountsExceeded
                        clearCountsExceeded
                        interruptPacketsSent
                        interruptPacketsReceived
                        interruptTimerExpiries;
            ACTIONS
                  Enable,
                  Disable;
            NOTIFICATIONS
                  providerInitiatedDisconnect,
                  remotelyInitiatedReset,
                  providerInitiatedReset,
                  restartTimeout,
                  protocolErrorDetectedLocally,
                  accusedOfProtocolError,
                  retryCountExceded;
                  clearCountExceded;
REGISTERED AS<object-identifier>;

x25PLE-NB NAME BINDING
      SUBORDINATE OBJECT CLASS x25PLE;
      NAMED BY
            SUPERIOR OBJECT CLASS ISO8208;
            WITH ATTRIBUTE x25PLE-MO-Name;
      CREATE with-reference-object;
      DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;

x25PLE-MO-Name ATTRIBUTE
      WITH ATTRIBUTE SYNTAX SyntaxModule.GraphicString;
      MATCHES FOR Equality, Substrings;
      BEHAVIOUR x25PLE-MO-NameB BEHAVIOUR
            DEFINED AS The name of this instance of x25PLE MO;
REGISTERED AS <object-identifier>;

reverseCharging ATTRIBUTE
      WITH ATTRIBUTE SYNTAX  SyntaxModule.Boolean;
      MATCHES FOR Equality;
      BEHAVIOUR reverseChargingB BEHAVIOUR
            DEFINED AS When this has the value ‘True’ the call is to be charged to the accepting DTE;
REGISTERED AS <object-identifier>;

protocolVersionsSupported ATTRIBUTE
      WITH ATTRIBUTE SYNTAX SyntaxModule.ProtocolVersions;
      MATCHES FOR Equality;
      BEHAVIOUR protocolVersionsSupportedB  BEHAVIOUR
            DEFINED AS The supported set of versions of ISO8208 available on the PLE interface;
REGISTERED AS <object-identifier>;
```

localDTEAddress **ATTRIBUTE**
 WITH ATTRIBUTE SYNTAX SyntaxModule.DTEAddress;
 MATCHES FOR Equality;
 BEHAVIOUR localDTEAddressB **BEHAVIOUR**
 DEFINED AS The full DTE address of this PLE expressed as an X.121, X.31, etc. address;
REGISTERED AS <object-identifier>;

interfaceMode **ATTRIBUTE**
 WITH ATTRIBUTE SYNTAX SyntaxModule.InterfaceMode;
 MATCHES FOR Equality;
 BEHAVIOUR interfaceModeB **BEHAVIOUR**
 DEFINED AS To be supplied;
 -- 2N349 is silent on this matter. As I recall, this is the DCE/DTE mode in which
 -- the interface is currently operating. The attribute has been defined accordingly.
REGISTERED AS <object-identifier>;

fastSelect **ATTRIBUTE**
 WITH ATTRIBUTE SYNTAX SyntaxModule.FastSelect;
 -- Enumerated(Not Specified, Fast Select, Fast Select With Response, No Fast Select)
 MATCHES FOR Equality;
 BEHAVIOUR fastSelectB **BEHAVIOUR**
 DEFINED AS Request for *fast select*, *fast select with response*, or *no fast select* facility for the call. Includes a value 'not specified' which indicates that no preference is expressed;
REGISTERED AS <object-identifier>;

restartTime **ATTRIBUTE**
 WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
 MATCHES FOR Equality, Ordering;
 BEHAVIOUR restartTimeB **BEHAVIOUR**
 DEFINED AS Default Limit for Timer T20 (Restart Request Response Timer) in seconds;
REGISTERED AS <object-identifier>;

callTime **ATTRIBUTE**
 WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
 MATCHES FOR Equality, Ordering;
 BEHAVIOUR callTimeB **BEHAVIOUR**
 DEFINED AS Default Limit for Timer T21 (Call Request Response Timer) in seconds;
REGISTERED AS <object-identifier>;

resetTime **ATTRIBUTE**
 WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
 MATCHES FOR Equality, Ordering;
 BEHAVIOUR resetTimeB **BEHAVIOUR**
 DEFINED AS Default Limit for Timer T22 (Reset Request Response Timer) in seconds;
REGISTERED AS <object-identifier>;

clearTime **ATTRIBUTE**
 WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
 MATCHES FOR Equality, Ordering;
 BEHAVIOUR clearTimeB **BEHAVIOUR**
 DEFINED AS Default Limit for Timer T23 (Clear Request Response Timer) in seconds;
REGISTERED AS <object-identifier>;

windowTime **ATTRIBUTE**
 WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
 MATCHES FOR Equality, Ordering;
 BEHAVIOUR windowTimeB **BEHAVIOUR**
 DEFINED AS Default Limit for Timer T24 (Window Status Transmission Timer) in seconds;
REGISTERED AS <object-identifier>;

dataRetransmissionTime **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR dataRetransmissionTimeB **BEHAVIOUR**
        DEFINED AS Default for Timer T25 (Window Rotation Timer) in seconds;
REGISTERED AS <object-identifier>;

interruptTime **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR interruptTimeB **BEHAVIOUR**
        DEFINED AS Default Limit for Timer T26 (Interrupt Response Timer) in seconds;
REGISTERED AS <object-identifier>;

rejectTime **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR rejectTimeB **BEHAVIOUR**
        DEFINED AS Default Limit for Timer T27 (Reject Response Timer) in seconds;
REGISTERED AS <object-identifier>;

registrationRequestTime **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR registrationRequestTimeB **BEHAVIOUR**
        DEFINED AS Default for Timer T28 (Registration Request Timer) in seconds;
REGISTERED AS <object-identifier>;

restartCount **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR restartCountB **BEHAVIOUR**
        DEFINED AS Default for count R20 (Restart Request Retransmission Count);
REGISTERED AS <object-identifier>;

resetCount **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR resetCountB **BEHAVIOUR**
        DEFINED AS Default for count R22 (Reset Request Retransmission Count);
REGISTERED AS <object-identifier>;

clearCount **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR clearCountB **BEHAVIOUR**
        DEFINED AS Default for count R23 (Clear Request Retransmission Count);
REGISTERED AS <object-identifier>;

dataRetransmissionCount **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Integer;
    MATCHES FOR Equality, Ordering;
    BEHAVIOUR dataRetransmissionCountB **BEHAVIOUR**
        DEFINED AS Default for count R25 (Data Packet Retransmission Count);
REGISTERED AS <object-identifier>;

```
rejectCount ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  SyntaxModule.Integer;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR rejectCountB BEHAVIOUR
                DEFINED AS Default for count R27 (Reject Retransmission Count);
REGISTERED AS <object-identifier>;

registrationRequestCount ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  SyntaxModule.Integer;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR registrationRequestCountB BEHAVIOUR
                DEFINED AS Default for count R28 (Registration Request Retransmission Count);
REGISTERED AS <object-identifier>;

dataLinkID ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  SyntaxModule.LocalDistinguishedName;
        MATCHES FOR Equality;
        BEHAVIOUR dataLinkIDB BEHAVIOUR
                DEFINED AS Distinguished name of the Data Link Layer MO representing the Logical Link
                        used by the PLE;
                        -- Note: It is not clear whether this is the value to control which Data Link Layer MO
                        -- the PLE is to use, or whether it represents the one which the PLE is in fact using.
                        -- If the latter, shouldn't it be the Distinguished name of a DLSAP MO?
                        -- Note also: The present definition may need amendment to deal with the case of
                        -- multi-link operation. NB comment is solicited.
REGISTERED AS <object-identifier>;

logicalChannelAssignments ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  SyntaxModule.logicalChannelAssignments;
        MATCHES FOR Equality;
        BEHAVIOUR logicalChannelAssignmentsB BEHAVIOUR
                DEFINED AS Represents the logical channel assignments of this PLE, expressed as
                        a six-tuple where the values represent
                                the highest permanent channel,
                                the highest incoming channel,
                                the lowest two-way channel,
                                the highest two-way channel,
                                the lowest outgoing channel
                                and the highest outgoing channel, respectively.
                        This attribute is subject to the rules for logical assignments described in
                        clause 0.1.  It is understood that the Highest Permanent Channel (HPC) is
                        defined by the Lowest Incoming Channel (LPC) value minus one.;
                        -- Note: Clause 9.5.2 of GDMO argues that these should be separate attributes
                        -- if it is required to manipulate individual fields.
REGISTERED AS <object-identifier>;
```

0.1 Management Behaviour of Logical Channel Assignments[1]

An X.25 PLE Managed Object is management's view of an X.25 PLE and, as such, represents a grouping of logical channels. Any management operations applied to a DTE Managed Object may potentially affect any or all of the contained logical channels. Logical Channels are grouped into four basic types:

1) permanent virtual circuits,

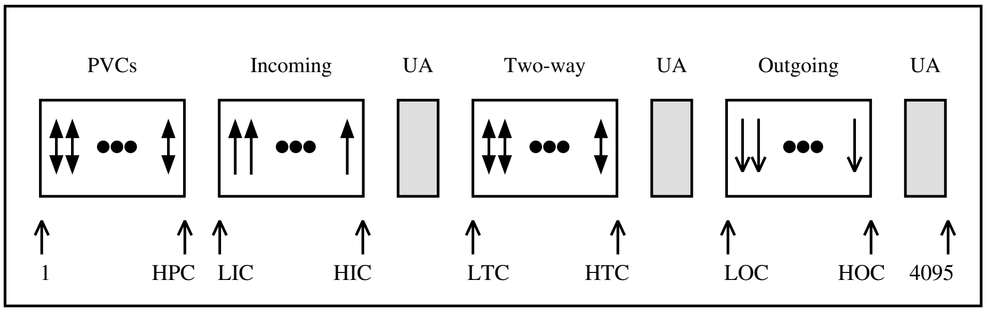
2) incoming,

3) outgoing, and

[1] Note: the text of this clause is included here in order to permit reference to it from the above attribute definition. It is a copy of the relevant clause from P2.23 (the Paris input document).

4) two-way virtual calls.

The ordering of different types of logical channels is important from the point of view of Systems Management. For example, the first group always consists of permanent virtual circuits, the second of incoming virtual calls, the third of two way, and the fourth of outgoing. In addition, ISO 8208 provides for spare capacity in that those logical channels that are not allocated circuits are considered unassigned. This contingency is only provided for incoming, outgoing and two-way groups. The organization of logical channels in an X.25 PLE is illustrated in



Key:	UA	Unassigned Channels	LTC	Lowest Two-way Channel
	HPC	Highest Permanent Channel	HTC	Highest Two-way Channel
	LIC	Lowest Incoming Channel	LOC	Lowest Outgoing Channel
	HIC	Highest Incoming Channel	HOC	Highest Outgoing Channel

Figure 1 - X.25 Packet Level Environment

Figure 1.

While it is correct to state that the range of all logical channels is 1..4095, there are additional criteria which influence the range which virtual call types may occupy. Increasing the number of logical channels available for a specific type of call, may require a decrease in an adjacent group if enough unassigned channels are not available. This problem may occur when adjusting the high, low, or both ends of a range of channels. In addition, the effect upon existing calls must be considered when reassigning channel allocations, as calls may be supported by logical channels which are affected by a reassignment.

moduloNumbering **ATTRIBUTE**
    WITH ATTRIBUTE SYNTAX SyntaxModule.Boolean;
    MATCHES FOR Equality;
    BEHAVIOUR moduloNumberingB **BEHAVIOUR**
        DEFINED AS The modulo of the packet sequence number space. Expressed as a boolean
            where a value of ‘True’ indicates 128 and a value of false indicates 8;
            -- Note: this is what the modification to 2N349 says! It would seem more logical to
            -- express this as an enumerated type with the two values 8 and 128
REGISTERED AS <object-identifier>;

dataPacketsSent **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR dataPacketsSentB **BEHAVIOUR**
        DEFINED AS The total number of data packets sent;
REGISTERED AS <object-identifier>;

dataPacketsReceived **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR dataPacketsReceivedB **BEHAVIOUR**
        DEFINED AS The total number of data packets received;
REGISTERED AS <object-identifier>;

```
callAttempts ATTRIBUTE
        DERIVED FROM NonReplaceableCounter;
        BEHAVIOUR callAttemptsB BEHAVIOUR
                DEFINED AS The total number of calls attempted;
                        -- It is not clear whether or not the
                        -- "ISO/IEC 10165-2":OutgoingConnectionRequestsCounter
                        -- could be used for this attribute, since that counts CR PDUs while this counts the
                        -- rather vague ‘attempts’.
REGISTERED AS <object-identifier>;

callsConnected ATTRIBUTE
        DERIVED FROM NonReplaceableCounter;
        BEHAVIOUR callsConnectedB BEHAVIOUR
                DEFINED AS The total number of calls which have reached the open state;
REGISTERED AS <object-identifier>;

providerInitiatedDisconnect NOTIFICATION
        BEHAVIOUR providerInitiatedDisconnectB BEHAVIOUR
                DEFINED AS Notification issued upon receipt of a clear packet with a cause code other than
                        ‘DTE initiated’;
        MODE NON-CONFIRMED;
        WITH INFORMATION SYNTAX SyntaxModule.providerInitiatedDisconnectSyntax;
REGISTERED AS <object-identifier>;

providerInitiatedDisconnects ATTRIBUTE
        DERIVED FROM NonReplaceableCounter;
        BEHAVIOUR providerInitiatedDisconnectsB BEHAVIOUR
                DEFINED AS Counter for the providerInitiatedDisconnect notifications;
REGISTERED AS <object-identifier>;

callTimeouts ATTRIBUTE
        DERIVED FROM NonReplaceableCounter;
        BEHAVIOUR callTimeoutsB BEHAVIOUR
                DEFINED AS The number of times timer T21 expiry is experienced by the PLE;
REGISTERED AS <object-identifier>;

clearTimeouts ATTRIBUTE
        DERIVED FROM NonReplaceableCounter;
        BEHAVIOUR clearTimeoutsB BEHAVIOUR
                DEFINED AS The number of times timer T23 expiry is experienced by the PLE;
REGISTERED AS <object-identifier>;

remotelyInitiatedReset NOTIFICATION
        BEHAVIOUR remotelyInitiatedResetB BEHAVIOUR
                DEFINED AS Notification issued upon occurance of a remotely initiated reset. This
                        notification is issued in lieu of an ‘providerInitiatedReset’ notification
                        when operating in a DTE-DXE environment;
        MODE NON-CONFIRMED;
        WITH INFORMATION SYNTAX SyntaxModule.remotelyInitiatedResetSyntax;
REGISTERED AS <object-identifier>;

remotelyInitiatedResets ATTRIBUTE
        DERIVED FROM NonReplaceableCounter;
        BEHAVIOUR remotelyInitiatedResetsB BEHAVIOUR
                DEFINED AS Counter associated with the remotelyInitiatedReset notification;
REGISTERED AS <object-identifier>;
```

dataRetransmissionTimerExpiries **ATTRIBUTE**
DERIVED FROM NonReplaceableCounter;
BEHAVIOUR dataRetransmissionTimerExpiriesB **BEHAVIOUR**
DEFINED AS Count of the number of expiries of timer T25. Returns zero if the option is not implemented;
REGISTERED AS <object-identifier>;

providerInitiatedReset **NOTIFICATION**
BEHAVIOUR providerInitiatedResetB **BEHAVIOUR**
DEFINED AS Notification issued upon occurrence of a provider initiated reset. This notification is issued when operating in a DTE-DCE environment;
MODE NON-CONFIRMED;
WITH INFORMATION SYNTAX SyntaxModule.providerInitiatedResetSyntax;
REGISTERED AS <object-identifier>;

providerInitiatedResets **ATTRIBUTE**
DERIVED FROM NonReplaceableCounter;
BEHAVIOUR providerInitiatedResetsB **BEHAVIOUR**
DEFINED AS Counter associated with the providerInitiatedReset notification;
REGISTERED AS <object-identifier>;

resetTimeouts **ATTRIBUTE**
DERIVED FROM NonReplaceableCounter;
BEHAVIOUR resetTimeoutsB **BEHAVIOUR**
DEFINED AS The number of timer T22 expiries experienced by the PLE;
REGISTERED AS <object-identifier>;

restarts **ATTRIBUTE**
DERIVED FROM NonReplaceableCounter;
BEHAVIOUR restartsB **BEHAVIOUR**
DEFINED AS The total number of restart experienced by the PLE, excluding the restart associated with bringing up the PLE interface;
REGISTERED AS <object-identifier>;

restartTimeout **NOTIFICATION**
BEHAVIOUR restartTimeoutB **BEHAVIOUR**
DEFINED AS Notification issued upon expiry of timer T20;
MODE NON-CONFIRMED;
WITH INFORMATION SYNTAX SyntaxModule.restartTimeoutSyntax;
REGISTERED AS <object-identifier>;

restartTimeouts **ATTRIBUTE**
DERIVED FROM NonReplaceableCounter;
BEHAVIOUR restartTimeoutsB **BEHAVIOUR**
DEFINED AS Counter associated with the restartTimeout notification;
REGISTERED AS <object-identifier>;

protocolErrorDetectedLocally **NOTIFICATION**
BEHAVIOUR protocolErrorDetectedLocallyB **BEHAVIOUR**
DEFINED AS Notification issued upon receipt of a packet in which a protocol error was detected;
-- Note: includes header of packet in notification format
MODE NON-CONFIRMED;
WITH INFORMATION SYNTAX SyntaxModule.protocolErrorDetectedLocallySyntax;
REGISTERED AS <object-identifier>;

protocolErrorsDetectedLocally **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR protocolErrorsDetectedLocallyB **BEHAVIOUR**
        DEFINED AS Counter associated with the protocolErrorDetectedLocally
            notification;
            -- Note: should this use the "ISO/IEC 10165-2":IncomingProtocolErrorCounter?
REGISTERED AS <object-identifier>;

accusedOfProtocolError **NOTIFICATION**
    BEHAVIOUR accusedOfProtocolErrorB **BEHAVIOUR**
        DEFINED AS Notification issued upon receipt of a diagnostic packet or a
            clear, reset or restart packet with a cause code equal to ‘protocol error’;
    MODE NON-CONFIRMED;
    WITH INFORMATION SYNTAX SyntaxModule.accusedOfProtocolErrorSyntax;
REGISTERED AS <object-identifier>;

protocolErrorsAccusedOf **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR protocolErrorsAccusedOfB **BEHAVIOUR**
        DEFINED AS Counter associated with the accusedOfProtocolError
            notification;
REGISTERED AS <object-identifier>;

retryCountExceeded **NOTIFICATION**
    BEHAVIOUR retryCountExceededB **BEHAVIOUR**
        DEFINED AS Notification issued on retry failure due to retry limit exceeded;
    MODE NON-CONFIRMED;
    WITH INFORMATION SYNTAX SyntaxModule.retryCountExceededSyntax;
REGISTERED AS <object-identifier>;

retryCountsExceeded **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR retryCountsExceededB **BEHAVIOUR**
        DEFINED AS Counter associated with the retryCountExceeded notification;
REGISTERED AS <object-identifier>;

-- According to the modifications to 2N349 the following Notification and associated counter should be added
-- for ‘R23 expires’
--
clearCountExceeded **NOTIFICATION**
    BEHAVIOUR clearCountExceededB **BEHAVIOUR**
        DEFINED AS Notification issued on retry failure due to clear limit (R23) exceeded;
    MODE NON-CONFIRMED;
    WITH INFORMATION SYNTAX SyntaxModule.clearCountExceededSyntax;
REGISTERED AS <object-identifier>;

clearCountsExceeded **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR clearCountsExceededB **BEHAVIOUR**
        DEFINED AS Counter associated with the clearCountExceeded notification;
REGISTERED AS <object-identifier>;

interruptPacketsSent **ATTRIBUTE**
    DERIVED FROM NonReplaceableCounter;
    BEHAVIOUR interruptPacketsSentB **BEHAVIOUR**
        DEFINED AS The total number of interrupt packets sent by the PLE or over the PVC/VC;
REGISTERED AS <object-identifier>;

```
interruptPacketsReceived ATTRIBUTE
        DERIVED FROM NonReplaceableCounter;
        BEHAVIOUR interruptPacketsReceivedB BEHAVIOUR
                DEFINED AS The total number of interrupt packets received by the PLE or over the PVC/VC;
REGISTERED AS <object-identifier>;

interruptTimerExpiries ATTRIBUTE
        DERIVED FROM NonReplaceableCounter;
        BEHAVIOUR interruptTimerExpiriesB BEHAVIOUR
                DEFINED AS The total number of expiries of of timer T26 experienced by the PLE or
                        over the PVC/VC;
REGISTERED AS <object-identifier>;

pLEClientMOName ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.LocalDistinguishedName;
                -- Not a set?
                -- Do we really intend to associate a client with the PLE rather than a particular VC?
        MATCHES FOR Equality;
        BEHAVIOUR pLEClientMONameB BEHAVIOUR
                DEFINED AS The Distinguished name of the client MO;
                        -- Note this will either be a Transport Layer MO or a CLNS MO
REGISTERED AS <object-identifier>;
```

```
--
-- Virtual Call Initial Values Managed Object
--
-- This managed object exists in order to permit the values of various parameters of a virtual call to
-- be specified in advance by management. When a virtual call is to be established, the values of all the
-- parameters to be used can be identified by specifying an instance of this MO.
--

-- Note: in 2N349 there is only a single IVMO class for virtual calls.  However, the agreements reached
-- in Paris were that there were to be two separate classes; one for ISO 8208 parameters, and one for
-- ISO8878 parameters.  This agreement is reflected in the definitions presented here.

ISO8208VirtualCallIVMO MANAGED OBJECT CLASS
        DERIVED FROM "ISO/IEC 10165-2":top;
        CHARACTERIZED BY ISO8208IVMOPackage PACKAGE
                ATTRIBUTES
                        ISO8208VirtualCall-IVMO-Name GET,
                        proposedPacketSize REPLACE WITH DEFAULT
                                GET-REPLACE,
                                -- Note: In 2N349 the above attribute was named
                                -- 'ISO8208ProposedPacketSize', but the following attribute name did not
                                -- include the prefix 'proposed'! This has been added for consistency.
                        proposedWindowSize REPLACE WITH DEFAULT
                                GET-REPLACE;
REGISTERED AS <object-identifier>;

ISO8208IVMO-NB NAME BINDING
        SUBORDINATE OBJECT CLASS ISO8208VirtualCallIVMO;
        NAMED BY
                SUPERIOR OBJECT CLASS NetworkLayer;
                        -- While 2N349 places this MO as subordinate to the PLE-MO, I believe the
                        -- agreement in Paris was that it be subordinate to the Network Layer.

                WITH ATTRIBUTE ISO8208VirtualCall-IVMO-Name;
        CREATE;
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;

ISO8208VirtualCall-IVMO-Name ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.GraphicString;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR ISO8208VirtualCall-IVMO-NameB BEHAVIOUR
                DEFINED AS The name of this instance of ISO8208VirtualCallIVMO;
REGISTERED AS <object-identifier>;

proposedPacketSize ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  SyntaxModule.ChoiceInteger;
                -- Includes a choice of a 'don't care' value.
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR proposedPacketSizeB BEHAVIOUR
                DEFINED AS The proposed value of the packet size parameter to be used when establishing
                        the virtual call, expressed in octets;
REGISTERED AS <object-identifier>;

proposedWindowSize ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  SyntaxModule.ChoiceInteger;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR proposedWindowSizeB BEHAVIOUR
                DEFINED AS The proposed value of the window size parameter to be used when establishing
                        the virtual call;
REGISTERED AS <object-identifier>;
```

```
--
-- ISO8878 Virtual Call Initial Values Managed Object
--
--  It is not yet clear which attributes are intended to be present in this MO.
--

ISO8878VirtualCallIVMO MANAGED OBJECT CLASS
        DERIVED FROM "ISO/IEC 10165-2":top;
        CHARACTERIZED BY ISO8878IVMOPackage PACKAGE
                ATTRIBUTES
                        ISO8878VirtualCall-IVMO-Name GET;
                        -- This needs some attributes!
REGISTERED AS <object-identifier>;

ISO8878IVMO-NB NAME BINDING
        SUBORDINATE OBJECT CLASS ISO8878VirtualCallIVMO;
        NAMED BY
                SUPERIOR OBJECT CLASS NetworkLayer;
                        -- While 2N349 places this MO as subordinate to the PLE-MO, I believe the
                        -- agreement in Paris was that it be subordinate to the Network Layer.

                WITH ATTRIBUTE ISO8878VirtualCall-IVMO-Name;
        CREATE;
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;

ISO8878VirtualCall-IVMO-Name ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.GraphicString;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR ISO8878VirtualCall-IVMO-NameB BEHAVIOUR
                DEFINED AS The name of this instance of ISO8878VirtualCallIVMO;
REGISTERED AS <object-identifier>;
```

```
-- Virtual Call Managed Object
--
-- This MO Class is never instantiated. It serves as a generic Virtual Call MO from which both the
-- Switched Virtual Call and the Permanent Virtual Circuit MOs are derived.
--

virtualCall MANAGED OBJECT CLASS
    DERIVED FROM "ISO/IEC 10165-2":top;
    CHARACTERIZED BY vCMOPackage PACKAGE
        ATTRIBUTES
            virtualCall-MO-Name GET,
            channel GET,
            packetSize GET,
            windowSize GET,
            -- The following two attribute, although not mentioned in P2.7, may be required
            --      remoteDTEAddress
            --      vCState
            "ISO/IEC 10165-2":OctetsSentCounter GET,
                -- This corresponds to the ISO8208OctetsSent attribute. Note that the DMI
                -- definition is in terms of user data octets.
            "ISO/IEC 10165-2":OctetsReceivedCounter GET,
                -- This corresponds to the ISO8208OctetsReceived attribute. Note that the
                --DMI definition is in terms of user data octets.
            dataPacketsSent GET,
                -- Note the "ISO/IEC 10165-2":PDUsSentCounter cannot be used here
                -- since it is defined as total number of PDUs sent, not just data PDUs.
            dataPacketsReceived GET,
            remotelyInitiatedResets GET,
            dataRetransmissionTimerExpires GET,
            providerInitiatedResets GET,
            resetTimeouts GET,
            interruptPacketsSent GET,
            interruptPacketsReceived GET,
            interruptTimerExpiries GET;
        ATTRIBUTE GROUPS
            counters
                "ISO/IEC 10165-2":OctetsSentCounter
                "ISO/IEC 10165-2":OctetsReceivedCounter
                dataPacketsSent
                dataPacketsReceived
                remotelyInitiatedResets
                dataRetransmissionTimerExpires
                providerInitiatedResets
                resetTimeouts
                interruptPacketsSent
                interruptPacketsReceived
                interruptTimerExpiries;

REGISTERED AS <object-identifier>;
```

```
--
--  Switched Virtual Call Managed Object
--
-- An instance of this MO exists for each Virtual Call. It is not created by management, but by the operation of
-- the protocol state machine.  An existing instance may, however, be deleted by management action, which will
-- cause the associated VC to be cleared.
--

-- Note: it is not clear exactly when this MO is created. Is it when a call is first attempted, or is it when it is
-- successfully established? If the former, it needs some state attributes to showwhat is going on.
--

switchedVirtualCall MANAGED OBJECT CLASS
        DERIVED FROM virtualCall;
        CHARACTERIZED BY sVCMOPackage PACKAGE
                ATTRIBUTES
                        direction GET,
                        calledDTEAddress GET,
                        callingDTEAddress GET,
                        callData GET,
                        throughputClass GET,
                        -- Note 2N349 (amendments) indicate that the ReverseCharging and FastSelect
                        -- attributes should be moved to the X.25 PLE MO. This has been done here,
                        -- though there may be a case for an attribute on the VC to indicate if either
                        -- of these facilities had been used for this particular call.
                        redirectReason GET,
                        originalCalledAddress GET,
                        callingAddressExtension GET,
                        targetAddressExtension GET;
REGISTERED AS <object-identifier>;

sVCMO-NB NAME BINDING
        SUBORDINATE OBJECT CLASS switchedVirtualCall;
        NAMED BY
                SUPERIOR OBJECT CLASS x25PLE;
                WITH ATTRIBUTE virtualCall-MO-Name;
        BEHAVIOUR sVCMO-NBB BEHAVIOUR
                DEFINED AS Created only by the operation of the protocol or local interface.  The instance
                        name is derived automatically (as for CREATE with-automatic-instance-naming);
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;

virtualCall-MO-Name ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.GraphicString;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR virtualCall-MO-NameB BEHAVIOUR
                DEFINED AS The name of this instance of virtualCall MO;
REGISTERED AS <object-identifier>;

channel ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.ChannelID;
                -- 12 bit channel ID
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR channelB BEHAVIOUR
                DEFINED AS The actual Channel ID used for the call;
REGISTERED AS <object-identifier>;
```

```
direction ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.Direction;
                -- Enumerated( Incoming, Outgoing)
        MATCHES FOR Equality;
        BEHAVIOUR directionB BEHAVIOUR
                DEFINED AS The direction (incoming or outgoing) of the call;
REGISTERED AS <object-identifier>;

calledDTEAddress ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.DTEAddress;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR calledDTEAddressB BEHAVIOUR
                DEFINED AS The destination DTE address used when the call was placed;
REGISTERED AS <object-identifier>;

callingDTEAddress ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.DTEAddress;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR callingDTEAddressB BEHAVIOUR
                DEFINED AS The DTE address of this PLE;
                        -- That is what 2N349 says, but surely if this is an incoming call the calling
                        -- DTE address would be that of the caller!
REGISTERED AS <object-identifier>;

callData ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.CallData;
                -- OctetString?
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR callDataB BEHAVIOUR
                DEFINED AS The first 16 octets of call user data associated with the call;
REGISTERED AS <object-identifier>;

throughputClass ATTRIBUTE
        WITH ATTRIBUTE SYNTAX  SyntaxModule.Throughput;
        MATCHES FOR Equality, Ordering;
        BEHAVIOUR throughputClassB BEHAVIOUR
                DEFINED AS The actual throughput class in use for the call. For SVCs this is the result of
                        negotiation;
REGISTERED AS <object-identifier>;

redirectReason ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.RedirectReason;
                -- Must include a ‘nil’ value
        MATCHES FOR Equality;
        BEHAVIOUR redirectReasonB BEHAVIOUR
                DEFINED AS The reason for call redirect. The zero value indicates that the call was not
                        redirected;
                        -- Is this information available for an outgoing call?
                        -- 2N349 said there was a ‘nil’ value, but the zero value seems acceptable
REGISTERED AS <object-identifier>;

originallyCalledAddress ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.DTEAddress;
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR originallyCalledAddressB BEHAVIOUR
                DEFINED AS The originally called address;
                        -- 2N349 states that this is an NSAP address, surely it is a DTE address
REGISTERED AS <object-identifier>;
```

```
callingAddressExtension ATTRIBUTE
        WITH ATTRIBUTE SYNTAX SyntaxModule.NSAPAddress;
                -- In the OSI context this will always be an NSAP address (as 2N349) but in other uses
                -- it may not.  In any case it may be null, for example when used by ISO 8473.
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR callingAddressExtensionB BEHAVIOUR
                DEFINED AS The calling NSAP Address;
                        -- Shouldn't it just be the contents of the calling address extension field?
REGISTERED AS <object-identifier>;

targetAddressExtension ATTRIBUTE
        -- Why 'Target' not 'called' as in ISO 8208?
        WITH ATTRIBUTE SYNTAX SyntaxModule.NSAPAddress;
                -- In the OSI context this will always be an NSAP address (as 2N349) but in other uses
                -- it may not.  In any case it may be null, for example when used by ISO 8473.
        MATCHES FOR Equality, Substrings;
        BEHAVIOUR targetAddressExtensionB BEHAVIOUR
                DEFINED AS The Target NSAP Address which was carried in the call packet;
                        -- Shouldn't it just be the contents of the called address extension field?
REGISTERED AS <object-identifier>;
```

```
--
--  Permanent Virtual Circuit Managed Object
--
-- An instance of this MO exists for each Permanent Virtual Circuit. It may be both created and deleted by
-- management.
--

permanentVirtualCircuit MANAGED OBJECT CLASS
        DERIVED FROM virtualCall;
        CHARACTERIZED BY pVCMOPackage PACKAGE
                ATTRIBUTES
                        -- 2N349 also specifies here
                        -- ISO8208ThroughputClass; but it is not clear what purpose this attribute serves.
REGISTERED AS <object-identifier>;

pVCMO-NB NAME BINDING
        SUBORDINATE OBJECT CLASS permanentVirtualCircuit;
        NAMED BY
                SUPERIOR OBJECT CLASS x25PLE;
                WITH ATTRIBUTE virtualCall-MO-Name;
        BEHAVIOUR pVCMO-NBB BEHAVIOUR
                DEFINED AS The following attributes may (shall?) have their initial values set by
                        parameters of the create operation.
                                channel, -- mandatory
                                packetSize,     -- optional
                                windowSize;     -- optional
        CREATE with-automatic-instance-naming;
        DELETE only-if-no-contained-objects;
REGISTERED AS <object-identifier>;
```

```
-- Additional Notes
--
--     1. A counter for the number of reject packets received was discussed, but not included owing to the
--        rarity of its implementation. However, it was recognized that this may tie into workload monitoring.
--        National Body comments are solicited.
--
--     2. Attributes etc., relating to registration have been excluded for the time being. However, suggestions
--        as to how these aspects should be managed are solicited from National Bodies.
--
```

0.2 ASN.1 modules

```
SyntaxModule {<object-identifier>}
DEFINITIONS ::= BEGIN

Boolean ::= BOOLEAN

CLNS-MO-Name-Value ::= "CLNS"

CONS-MO-Name-Value ::= "CONS"

CallData ::= OctetString(SIZE (0..16))
        -- limited to 16 octets

ChannelID ::= INTEGER (0..4095)

ChoiceInteger ::= CHOICE {
                [0] IMPLICIT NULL,       -- The ‘I don’t care’ value
                [1]  IMPLICIT INTEGER}

        -- Another way of achieving this would be to use a specific object ID to mean ‘I don’t care’

DTEAddress ::= NumericString(FROM("0"|"1"|"2"|"3"|"4"|"5"|"6"|"7"|"8"|"9"))(SIZE(0..15))
        -- Up to 15 Digits 0..9

Direction ::= ENUMERATED {
                Incoming(0),
                Outgoing(1)}

EndToEndDelay ::= INTEGER(0..65535)
        -- Note that according to ISO8208 a value of 65535 indicates that the delay is unknown
        -- or exceeds 65534 milliseconds.

False ::= FALSE

FastSelect ::= ENUMERATED{
                NotSpecified(0),
                FastSelect(1),
                FastSelectWithResponse(2),
                NoFastSelect(3)}

GraphicString ::= GraphicString

HoldingTimerMultiplierDefault ::= 3

HoldingTimerMultiplierPermitted ::= INTEGER(2..63)

HoldingTimerMultiplierRequired ::= INTEGER(2)

InterfaceMode ::= ENUMERATED{
                        DTE(0),
                        DCE(1)}

Integer ::= INTEGER

ISO8208-MO-Name-Value ::= "ISO8208"
```

```
notificationSyntax ::= SEQUENCE {
        Channel          [1]    ChannelID,
        SequenceNumber   [2]    INTEGER(0..127) OPTIONAL,
        Dbit             [3]    BOOLEAN,
        Mbit             [4]    BOOLEAN,
        Qbit             [5]    BOOLEAN,
        CallData         [6]    CallData}

accusedOfProtocolErrorSyntax ::= notificationSyntax

clearCountExceededSyntax ::= notificationSyntax

logicalChannelAssignments ::= SEQUENCE {
        HPC     [1]     INTEGER(0..4095),
        HIC     [2]     INTEGER(0..4095),
        LTC     [3]     INTEGER(0..4095),
        HTC     [4]     INTEGER(0..4095),
        LOC     [5]     INTEGER(0..4095),
        HOC     [6]     INTEGER(0..4095)}

protocolErrorDetectedLocallySyntax ::= notificationSyntax

providerInitiatedDisconnectSyntax ::= notificationSyntax

providerInitiatedResetSyntax ::= notificationSyntax

remotelyInitiatedResetSyntax ::= notificationSyntax

restartTimeoutSyntax ::= notificationSyntax

retryCountExceededSyntax ::= notificationSyntax

-- The following ISO8208 default values are taken from ISO 8208

restartTimeDefault ::= 180

callTimeDefault ::= 200

resetTimeDefault ::= 180

clearTimeDefault ::= 180

windowTimeDefault ::= 60

dataRetransmissionTimeDefault ::= 200

interruptTimeDefault ::= 180

rejectTimeDefault ::= 60

registrationRequestTimeDefault ::= 300

restartCountDefault ::= 1

resetCountDefault ::= 1

clearCountDefault ::= 1

dataTransmissionCountDefault ::= 0

rejectCountDefault ::= 0

registrationRequestCountDefault ::= 1
```

```
lifetime ::= INTEGER(0..255)
        -- Should this be (1..255)?

pDUFormatErrorSyntax ::= PDUHeader

PDUHeader ::= OctetString(SIZE(1..255))

pDUOtherErrorSyntax ::= SEQUENCE{
                errorCode       [1]     INTEGER(0..255),
                header          [2]     PDUHeader}

unsupportedOptionSyntax ::= PDUHeader

-- The following 2 definitions are suggestions only. Careful thought is required.
-- In particular, exactly when do the notifications get generated when an ES has multiple NSAPs
-- or if a single IS has multiple NETs?

eSReachabilityChangeSyntax ::= SEQUENCE{
                newState        [1]     ENUMERATED { Down(0), Up(1)},
                NSAPs           [2]     SET OF NSAPAddress,
                reason          [3]     ENUMERATED {HoldingTimerExpired(0),
                                                SNPADisabled(1)} OPTIONAL} -- Down only

iSReachabilityChangeSyntax ::= SEQUENCE{
                newState        [1]     ENUMERATED { Down(0), Up(1)},
                NET             [2]     NSAPAddress,
                reason          [3]     ENUMERATED {HoldingTimerExpired(0),
                                                SNPADisabled(1)} OPTIONAL} -- Down only

LocalDistinguishedName ::= CMIP-1.ObjectInstance
        -- This includes localDistinguishedName as one of its choices.  There doesn’t seem to be
        -- a free-standing definition of localDistinguishedName

MACAddress ::= OctetString(SIZE(6))
        -- exactly 6 octets in length

manualISAddress ::= SET OF MACAddress

nonReplaceableCounter ::= INTEGER(0..2^64-1)
        -- How should that be written in ASN.1? Is a fixed size counter necessary, especially for counts that are
        -- anticipated to increase slowly.  Should a separate size be defined for each individual counter.?

NSAPAddress ::= OctetString(SIZE(0..20))
        --up to 20 octets

NUI ::= OctetString(SIZE(0..255))
        -- Can they really be this long?

ProtocolVersion ::= ???
        -- NB comment is solicited as to what a suitable type would be

ProtocolVersions ::= SET OF ProtocolVersion

RPOASequence ::= SEQUENCE OF NumericString(SIZE(0..4))
        -- each numeric string limited to 4 decimal digits
        -- an empty sequence is permitted

RedirectReason ::= INTEGER(0..127)
        -- Note an alternative more explicit encoding could be an enumerated type of all the possible
        -- redirect reasons currently defined, but this would have the disadvantage of not being extensible.
        -- Will zero do for the ‘NIL’ value to indicate no redirection?
```

SDUSize ::= INTEGER

Throughput ::=INTEGER (0..15)

transportClientRelationship ::= SET OF CMIP-1.ObjectInstance

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