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TELECOMMUNICATIONS AND INFORMATION EXCHANGE BETWEEN SYSTEMS - DATA COMMUNICATIONS

Secretariat: UK (BSI)

Title: Additional Comments on CD 10733 (NLMO)

Source: USA

Status: This contribution contains additional comments on issues raised in the USA ballot response on CD 10733. The USA ballot response noted that these issues would be addressed further in subsequent contributions.

COMMENT 1: Protocol Configurations to Support the CLNS.

There are several protocol configurations that can be deployed to support and provide the CLNS. Given the current set of mature protocols, one could expect to find the following CLNS configurations of system types and operational protocols:

System Type	Protocols to Support CLNS
End System	CLNS := 8473 CLNS := 8473 + 9542
Intermediate System	CLNS := 8473 CLNS := 8473 + 9542 CLNS := 8473 + 9542 + 10589

The decision as to which of these configurations is deployed in support of the CLNS is a function of the protocols available on a system, its position in the physical/logical topology, and local administrative decisions. In particular, it should be noted that some systems with multiple subnetwork interfaces may not operate as Intermediate Systems and that some systems may not operate a given protocol even though it is available on the system. It is conceivable that these configuration decisions could change while the CLNS is enabled.

To support management control of this configuration function additions are proposed to the NLMO. These additions allow a manager to assess which CLNS protocols are available on a system and to parameterize the instantiation of the CLNS into the configurations specified above.

Proposed Text Modifications:

Add to the networkSubsystem managed object (clause 5.2) the following attributes:

```
    supportedProtocols GET,
    systemTypes GET,

supportedProtocols ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.SupportedProtocols;
    MATCHES FOR Equality;
    BEHAVIOUR supportedProtocols-B
        BEHAVIOR DEFINED AS The set of Network Layer protocols
        supported by this system.
REGISTERED AS {ISO 10733-NLMN.aoi supportedProtocols (TBD)};

systemTypes ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.SystemTypes;
    MATCHES FOR Equality;
    BEHAVIOUR SystemTypes-B
        BEHAVIOR DEFINED AS The set of system roles (End System
        Intermediate System) supported by this system.
REGISTERED AS {ISO 10733-NLMN.aoi systemTypes (TBD)};
```

Add to the ASN.1 modules (clause 5.14) the following definitions:

```
SupportedProtocols :== SET OF SupportedProtocol

SupportedProtocol  :== SEQUENCE {
    protocol        [1] OBJECT IDENTIFIER,
    versions        [2] SET OF ProtocolVersion,
    defectsRepaired [3] SET OF OBJECT IDENTIFIER OPTIONAL}

SystemTypes       :== INTEGER {ES(1), IS(2)}  -- Allow for both?
```

To control the configuration of a CLNS entity add the following two parameters to the create operation specified in the cLNS-NB name binding (clause 5.5):

```
    CREATE cLNS-NB-p1, cLNS-NB-p2;

cLNS-NB-p1 PARAMETER
    CONTEXT CREATE-INFO;
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.SupportedProtocols;
    BEHAVIOUR cLNS-NB-p1-B
        BEHAVIOR DEFINED AS The set of Network Layer protocols
        to be supported by this instance of the CLNS MO.
        The value of this parameter is assigned to the
        operationalProtocols attribute on MO creation.;;
REGISTERED AS {ISO 10733-NLMN.proi cLNS-NB-p1 (TBD)};

cLNS-NB-p2 PARAMETER
    CONTEXT CREATE-INFO;
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.SystemTypes;
    BEHAVIOUR cLNS-NB-p2-B
        BEHAVIOR DEFINED AS The system role (End System,
        Intermediate System) supported by this instance of the CLNS MO.
        The value of this parameter is to be assigned to the
        operationalSystemType attribute on MO creation.;;
REGISTERED AS {ISO 10733-NLMN.proi cLNS-NB-p2 (TBD)};
```

Add to the cLNS managed object (clause 5.5) the following attributes:

```
    operationalProtocols GET,  -- Note: To change values requires deleting
    systemTypes GET,           --       and re-creating CLNS MO.

operationalProtocols ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.SupportedProtocols;
    MATCHES FOR Equality;
    BEHAVIOUR operationalProtocols-B
        BEHAVIOR DEFINED AS The set of Network Layer protocols
        supported by this instance of the CLNS MO.;;
REGISTERED AS {ISO 10733-NLMN.aoi operationalProtocols (TBD)};

operationalSystemType ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.SystemTypes;
    MATCHES FOR Equality;
    BEHAVIOUR operationalSystemType-B
        BEHAVIOR DEFINED AS The system role (End System,
        Intermediate System) supported by this instance
        of the CLNS MO. Note that a CLNS entity with
        operationalSystemType = 'ES' will not perform
        the relaying function to forward non-local CLNP
        PDUs.;;
REGISTERED AS {ISO 10733-NLMN.aoi operationalSystemType (TBD)};
```

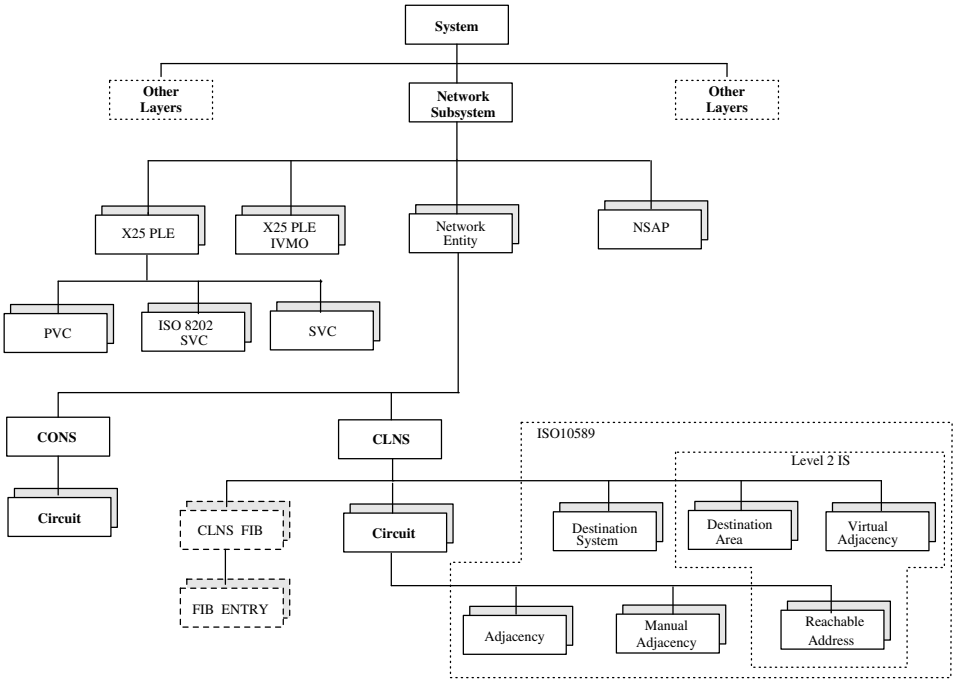
Note that there are various conditional packages throughout the remainder of the document (e.g., clause 5.6 circuit-ISO9542ESPackage) that are conditioned upon "support" of a particular protocol (e.g., ISO 9542) or "operation as an ES or IS". These conditional packages should now make explicit reference to values of the above two attributes.

COMMENT 2: CLNP Forwarding Information Bases.

The NLMO should provide a consistent representation of some resources independent of particular protocol configurations. In particular, the concept of a Forwarding Information Base (FIB) is common to various combinations of protocols used to support the CLNS in end systems (ESs) and intermediate systems (ISs).

A manager should be able to have consistent access CLNP FIBs in both local and remote systems in the all of the CLNS configurations described in the table in comment #1.

What follows is the definition of a general CLNS FIB object. Instances (more than one FIB is allowed) of the CLNS FIB are subordinate to the CLNS object. Individual FIBs contain instances of the CLNSFIBEntry object. The figure below depicts the position of these new objects in the Network Layer containment hierarchy.



Proposed Text Modifications:

Add a new clause after the CLNS MO (clause 5.5) to define the CLNS FIB and FIBEntry objects. Proposed object definitions are as follows:

```
cLNSFIB MANAGED OBJECT CLASS
    DERIVED FROM "ISO/IEC 10165-2":top;
    CHARACTERIZED BY cLNSFIBPackage PACKAGE
        ATTRIBUTES
        cLNSFIB-MO-Name GET,
    ;;
    CONDITIONAL PACKAGES
        cLNSFIB-ISO10589Package
            PRESENT IF NetworkEntity is an IS operating ISO-10589,
REGISTERED AS {ISO 10733-NLMN.moi cLNSFIB (TBD)};

-- Note: TBD if useful to allow MGMT to manually create entire FIB.
cLNSFIB-NB NAME BINDING
    SUBORDINATE OBJECT CLASS cLNSFIB;
    NAMED BY
        SUPERIOR OBJECT CLASS cLNS;
```

```
    WITH ATTRIBUTE cLNSFIB-MO-Name;
REGISTERED AS {ISO 10733-NLMN.nboi cLNSFIB-NB (TBD)};

cLNSFIB-ISO10589Package PACKAGE
    BEHAVIOUR DEFINITIONS cLNSFIB-ISO10589Package-B
        BEHAVIOUR DEFINED AS Present when FIB is created and
            maintained through the operation of the ISO 10589
            IS-IS protocol.
    ATTRIBUTES
        iSO10589-FIBType GET;
REGISTERED AS {ISO 10733-NLMN.poi cLNSFIB-ISO10589Package (TBD)};

iSO10589-FIBType ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.iSO10589-FIBType;
    MATCHES FOR Equality;
    BEHAVIOUR iSO10589-FIBType-B
        BEHAVIOR DEFINED AS The distinguishing attributes
        of this FIB with respect to the operation of the
        ISO 10589 IS-IS protocol.;;
REGISTERED AS {ISO 10733-NLMN.aoi iSO10589-FIBType (TBD)};

cLNSFIBEntry MANAGED OBJECT CLASS
    DERIVED FROM "ISO/IEC 10165-2":top;
    CHARACTERIZED BY cLNSFIBEntryPackage PACKAGE
        ATTRIBUTES
        cLNSFIBEntry-MO-Name GET,
        destination GET,
        forwardingInfo GET;
        createdBy GET;
    ;;
REGISTERED AS {ISO 10733-NLMN.moi cLNSFIBEntry (TBD)};

cLNSFIBEntry-NB-Automatic NAME BINDING
    SUBORDINATE OBJECT CLASS cLNSFIBEntry;
    NAMED BY
        SUPERIOR OBJECT CLASS cLNSFIB;
    WITH ATTRIBUTE cLNSFIB-MO-Name;
REGISTERED AS {ISO 10733-NLMN.nboi cLNSFIBEntry-NB-Automatic (TBD)};

cLNSFIBEntry-NB-Manual NAME BINDING
    SUBORDINATE OBJECT CLASS cLNSFIBEntry;
    NAMED BY
        SUPERIOR OBJECT CLASS cLNSFIB;
    WITH ATTRIBUTE cLNSFIBEntry-MO-Name;
    CREATE  cLNSFIBEntry-NB-p1,     -- TBD: Initial value of destination attribute.
          cLNSFIBEntry-NB-p2;    -- TBD: Initial value of forwardingInfo attribute.
    DELETE ;
REGISTERED AS {ISO 10733-NLMN.nboi cLNSFIBEntry-NB-Manual (TBD)};

destination ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.FIBDestination;
    MATCHES FOR Equality;
    BEHAVIOUR destination-B
```

```
        BEHAVIOR DEFINED AS The set of NSAP addresses
        to which this FIB Entry pertains;;
REGISTERED AS {ISO 10733-NLMN.aoi destination (TBD)};

forwardingInfo ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.ForwardingInfo;
    MATCHES FOR Equality;
    BEHAVIOUR forwardingInfo-B
        BEHAVIOR DEFINED AS The CLNP forwarding information
        associated with a specific set of destinations;;
REGISTERED AS {ISO 10733-NLMN.aoi forwardingInfo (TBD)};

createdBy ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.LocalDistinguishedName;
    MATCHES FOR Equality;
    BEHAVIOUR createdBy-B
        BEHAVIOR DEFINED AS The distinguished name of the entity
        that created this entry.;;
REGISTERED AS {ISO 10733-NLMN.aoi createdBy (TBD)};
```

Add to the ASN.1 modules (clause 5.14) the following:

```
iSO10589-FIBType :== SEQUENCE {
    level        [1] INTEGER{Level1(1), Level2(2)}
    metric       [2] INTEGER{default(1),delay(2),error(3),expense(4),throughput(5)}
    areaAddresses[3] NSAPAddresses}

FIBDestination :== SEQUENCE {
    destination [1] NSAPAddress,
    mask        [2] OctetString(0..20) OPTIONAL}

ForwardingInfo :== CHOICE {
    local       [1] localDistinguishedName, -- Name of NSAP instance for delivery.
    remote      [2] SET OF RemoteForwardingInfo,
    other       [3] INTEGER{ unknown(1), unreachable(2), unacceptable(3)}}

RemoteForwardingInfo :== SEQUENCE {
    nextHopSNPA [1] SubnetworkAddress,  -- Data type is TBD.
    snpaMask    [2] OctetString(0..20) OPTIONAL,
    nextHopNET  [3] NSAPAddress OPTIONAL,
    metric      [4] INTEGER}
```

COMMENT 3: ISO-9542 Operation.

It is desirable to be able to control the operation of the ES-IS protocol on a per circuit basis. In particular one must be capable of selecting which subsets of the protocol are to be operated on individual circuits.

Proposed Text Modifications:

To provide this support add the following attribute to both the ES and IS ISO9542 conditional packages on circuits:

```
    iSO9542OperationalSubsets GET-REPLACE,
```

```
iSO9542OperationalSubsets ATTRIBUTE
    WITH ATTRIBUTE SYNTAX ISO10733-NLMN.ISO9542Subsets;
    MATCHES FOR Equality;
    BEHAVIOUR iSO9542OperationalSubsets-B
        BEHAVIOR DEFINED AS The set ISO 9542 subsets operational
        on this circuit
REGISTERED AS {ISO 10733-NLMN.aoi iSO9542OperationalSubsets (TBD)};
```

Add to the ASN.1 modules (clause 5.14) the following definitions:

```
ISO9542Subsets :== SET { configuration(1), redirection(2)}
```

COMMENT 4: Counter Change Notifications

Page: 8, 9, 10, 11, 20, 21, 26, 27, 28, 40

Clause: 5.5 cLNS, 5.8 x25PLE, 5.9 NOTIFICATIONs, 5.14 NotificationInfo

The definitions of cLns and x25PLE should be amended to replace the specific counter change NOTIFICATIONs with more generic countChange notification types, differentiated by the syntax requirements. The counterAttributeId can be a high level parameter in the event syntax for discrimination purposes, and the notification can also report the new value of the counter.

This would also alleviate the need for Parameter definitions associated with the notifications.

Proposed Text Modifications:

Replace the 3 specific notification types below with one, called cLnsDiscardPDUCountChange.

OBJECT	COUNTER ATTRIBUTE	SPECIFIC NOTIFICATION
cLns	pDUFormatErrors	pDUFormatError
	unsupportedOptions	unsupportedOption
	otherErrors	otherError

The definition of the cLnsDiscardPDUCountChange NOTIFICATION shall use the NOTIFICATION SYNTAX defined below. The counterAttributeID is available for discrimination purposes.

```
cLnsDiscardPDUCountChange ::= SEQUENCE {
    counterAttributeID  AttributeId,
    newCounterValue     ANY DEFINED BY counterAttributeID,
    pduHeader           OCTET STRING,
    discardReason       INTEGER(0..255) OPTIONAL
    }
```

Similarly, replace the 9 notification types below with one, called x25PLECountChange.

OBJECT	COUNTER ATTRIBUTE	SPECIFIC NOTIFICATION
x25PLE	providerInitiatedDisconnects	providerInitiatedDisconnect
	remotelyInitiatedResets	remotelyInitiatedReset
	providerInitiatedResets	providerInitiatedReset
	remotelyInitiatedRestarts	remotelyInitiatedRestart
	restartTimeouts	restartTimeout
	protocolErrorsDetectedLocally	protocolErrorDetectedLocally
	protocolErrorsAccusedOf	accusedOfProtocolError
	retryCountsExceeded	retryCountExceeded
	clearCountsExceeded	clearCountExceeded

The definition of the x25PLECountChange NOTIFICATION shall use the NOTIFICATION SYNTAX defined below. The counterAttributeID is available for discrimination purposes.

```
x25PLECountChange ::= SEQUENCE {
    counterAttributeID  AttributeId,
    newCounterValue     ANY DEFINED BY counterAttributeID,
    callData            NotificationCallDataSyntax }
```

The production ”PDUOtherErrorSyntax” is not used anywhere and should be deleted.

COMMENT 5: Specification of Non-wrapping Counters

Page: 45

Clause: 7.13

To require all systems to support 64 bit counters seems overly restrictive.

Proposed Text Modifications:

The ASN.1 INTEGER type allows unlimited size for integer values. Change ”INTEGER(0–2**64-1)” to ”INTEGER” in the ASN.1 production for nonWrappingCounter. Pragmatic limits to INTEGER size may be set by functional standards bodies.