INTERNATIONAL TELECOMMUNICATION UNION

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TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Amendment 1

X.284

(11/95)

DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

OPEN SYSTEMS INTERCONNECTION – LAYER MANAGED OBJECTS

ELEMENTS OF MANAGEMENT INFORMATION RELATED TO THE OSI TRANSPORT LAYER

AMENDMENT 1: NETWORK CONNECTION MANAGEMENT SUBPROTOCOL (NCMS) MANAGEMENT

Amendment 1 to

ITU-T Recommendation X.284

(Previously "CCITT Recommendation")

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (ITU). The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

Amendment 1 to ITU-T Recommendation X.284, was prepared by ITU-T Study Group 7 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 21st of November 1995.

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NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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ITU-T X-SERIES RECOMMENDATIONS

DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

(February 1994)

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Superseded by a more recent version

CONTENTS

SUMMARY

This amendment describes the elements of management information relating to Network Connection Management Subprotocol (NCMS) specified in Annex B/X.224.

INTRODUCTION

Recommendation X.284 specifies the elements of management information related to the OSI Trasnport layer service and protocol described in Recommendations X.214 and X.224. However, the management information relating to the Network Connection Management Subprotocol (NCMS) is not included.

This amendment adds to Recommendation X.284 the elements of management information relating to NCMS specified in Annex B/X.224.

This amendment has a structure which is similar to that of Recommendation X.284 in order to facilite cross reference between the two documents and the eventual incorporation of this amendment into Recommendation X.284. In the following subclauses italic font is used for instructions for incorporating this amendment into Recommendation X.284.

Amendment 1 to Recommendation X.284

ELEMENTS OF MANAGEMENT INFORMATION RELATED TO THE OSI TRANSPORT LAYER

AMENDMENT 1: NETWORK CONNECTION MANAGEMENT SUBPROTOCOL (NCMS) MANAGEMENT[1]

(Geneva, 1995)

1   Scope

No changes.

2   Normative references

No changes.

3   Definitions

No changes.

4   Symbols and abbreviations

Insert the following symbols and abbreviations after MO:

NC   Network Connection

NCC   Network Connection Control

NCMS   Network Connection Management Subprotocol

5   Elements of transport layer management information

5.1   Managed object hierarchy

5.1.1   Summary of managed objects

Add the following new items after item g):

h)   NCMS Protocol Machine management object(ncmsPM, subclause 5.9);

i)   NetworkConnection Control managed object(ncc, subclause 5.10.1);

j)   NetworkConnection Control Initial Value managed object(nccIV, subclause 5.10.2).

---

[1] This Recommendation was developed collaboratively with ISO/IEC and is technically aligned with ISO/IEC 10737/Amd.1, *Information technology – Telecommunications and information exchange between systems – Elements of management information relating to OSI transport layer standards, Amd.1: NCMS management.*

Replace Figure 1 by the following figure:
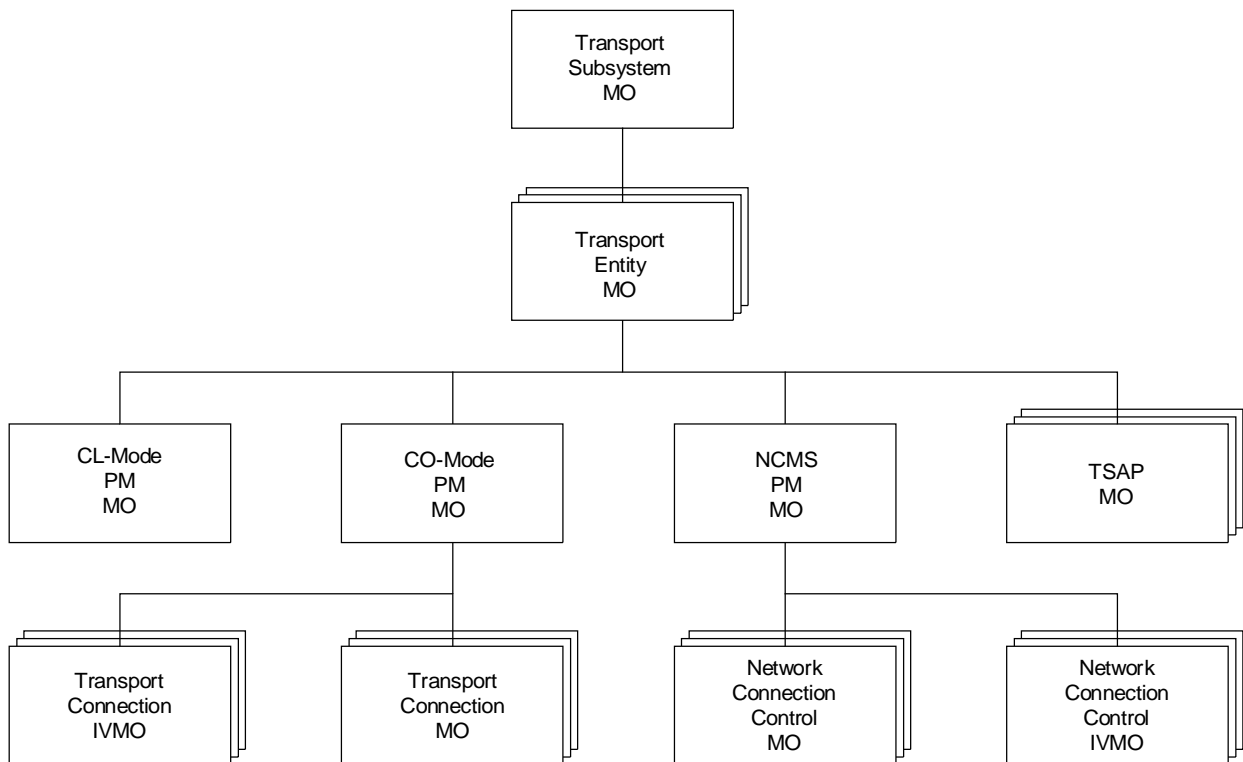
T0722730-95/d01

FIGURE 1/X.284

Transport layer containment hierarchy

Add the following new subclause 5.9:

5.9   NCMS Protocol Machine

ncmsPM MANAGED OBJECT CLASS
   DERIVED FROM "DMI":top;
   CHARACTERIZED BY ncmsPM-P PACKAGE
     BEHAVIOUR
     commonCreationDeletion-B,
     commonStateChange-B,
   ncmsPMPackageImportedNotifications-B,
    ncmsPM-B BEHAVIOUR
    DEFINED AS
     !This managed object class represents the part of transport entity that performs the
     NCMS protocol.
     Only one instance of this managed object class may exist within a TEMO instance.!
    ;
;

ATTRIBUTES
   ncmsPMId GET,
   "DMI":administrativeState GET-REPLACE,
   "DMI":operationalState GET;
ACTIONS
   "GMI":activate,
   "GMI":deactivate;

NOTIFICATIONS

"DMI":communicationsAlarm,
ncmsPMPDUHeader,
ncmsPMSourceAddress,
"DMI":objectCreation,
"DMI":objectDeletion,
"DMI":stateChange
;
;

REGISTERED AS{TLM.moi ncmsPM (8)};

-- *Behaviours*

ncmsPMPackageImportedNotifications-B BEHAVIOUR
DEFINED AS
!The ncmsPM-P package imports communicationsAlarm from DMI, in order to report the failure of NC sharing. The probableCause is set to

TLM.communicationsProtocolError. The ncmsPMPDUHeader and ncmsPMSourceAddress are reported as parameters in the additionalInformation field of the communicationsAlarm.

The significance subparameter of each item of the additionalInformation shall be set to the value 'False'
(i.e. not significant) so that a managing system receiving the event will be less likely to reject it.
The perceivedSeverity shall be set to Minor.

A subsequent communicationsAlarm with a perceived Severity value of 'Cleared' shall not be generated. No other fields or parameters shall be used, with the exception of further parameters in the additionalInformation field.!
;

-- *Name Bindings*

ncmsPM-transportEntity-Management NAME BINDING
SUBORDINATE OBJECT CLASS ncmsPM AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS transportEntity AND SUBCLASSES;
WITH ATTRIBUTE ncmsPMId;
BEHAVIOUR
ncmsPM-transportEntity-B BEHAVIOUR
DEFINED AS
!The name binding that applies when the ncmsPM managed object is explicitly created by management.!
;
;
CREATE;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS{TLM.nboi ncmsPM-transportEntity-Management (13)};

ncmsPM-transportEntity-Automatic NAME BINDING
SUBORDINATE OBJECT CLASS ncmsPM AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS transportEntity AND SUBCLASSES;
WITH ATTRIBUTE ncmsPMId;
BEHAVIOUR
ncmsPM-transportEntity-B BEHAVIOUR
DEFINED AS
!The name binding that applies when the ncmsPM managed object is created.
The name binding that applies when the ncmsPM managed object can not be explicitly created by management.!
;
;
REGISTERED AS{TLM.nboi ncmsPM-transportEntity-Automatic (14)};

-- Attribute

ncmsPMId ATTRIBUTE
   WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameSyntax;
   MATCHES FOR EQUALITY;
   BEHAVIOUR
     ncmsPMId-B BEHAVIOUR
     DEFINED AS
       !The attribute that is used in naming instances of the ncms Protocol Machine managed object class.!
     ;
  ;
REGISTERED AS{TLM.aoi ncmsPMId (67)};

-- Parameters

ncmsPMPHeader PARAMETER
   CONTEXT EVENT-INFO;
   WITH SYNTAX TLM.PDUHeaderSyntax;
   BEHAVIOUR ncmsPMPDUHeader-B BEHAVIOUR
     DEFINED AS
       !Header of the PDU that causes the failure of NC sharing.
       Returned in the problemData field of a communicationsAlarm notification.
     ;
  ;
REGISTERD AS{TLM.proi ncmsPMPDUHeader (8)};

ncmsPMSourceAddress PARAMETER
   CONTEXT EVENT-INFO;
   WITH SYNTAX TLM.SourceAddressSyntax;
   BEHAVIOUR ncmsPMSourceAddress-B BEHAVIOUR
     DEFINED AS
       !Source N-Address.
       Returned in the problemData field of a communicationsAlarm notification.
     ;
  ;
REGISTERD AS{TLM.proi ncmsPMSourceAddress (9)};

Add the following new subclause 5.10:

5.10   Network connection control MO and IVMO

5.10.1   Network connection control managed object

nccMANAGED OBJECT CLASS
   DERIVED FROM "DMI":top;
   CHARACTERIZED BY ncc-P PACKAGE
     BEHAVIOUR
       nccInitialValues-B,
       ncc-B BEHAVIOUR
       DEFINED AS
         !This managed object class represents the management aspect of the information needed to control the network connections by NCMS.
         Multiple instances of this managed object class may exist within a NCMSPM MO instance. This MO is created and deleted as a result of NCMS operation.!
       ;
     ;
     ATTRIBUTES
       nccId GET,
       nc-COL GET,
       nc-REC GET,
       nc-REF GET,
       nc-PREF GET,
       nc-Right GET,
       ncRecoveries GET,
       ttrNCTime GET,
       tpdNCTime GET,
       tfrNCTime GET,
       sourceOfAllocation GET,
       "GMI":underlyingConnectionNames GET;

```
        NOTIFICATIONS
            "DMI":objectCreation,
            "DMI":objectDeletion;
    ;
;
REGISTERED AS{TLM.moi ncc (9)};
```

5.10.2   Network connection control initial value managed object

```
nccIVMO MANAGED OBJECT CLASS
    DERIVED FROM "DMI":top;
    CHARACTERIZED BY nccIVMO-P PACKAGE
        BEHAVIOUR
             use-of-nccInitialValues-B,
            nccIVMO-B BEHAVIOUR
             DEFINED AS
                !This managed object class represents the set of initial values for NCC MO instances.
                Multiple instances of this managed object class may exist within a NCMSPM MO instance.
                The relationship between instances of NCC MO and NCCIV MO is not specified in this Recommendation.!
            ;
        ;
        ATTRIBUTES
            nccIVMOId  GET,
            nc-COL  REPLACE-WITH-DEFAULT GET-REPLACE,
            nc-REC  REPLACE-WITH-DEFAULT GET-REPLACE,
            nc-PREF  REPLACE-WITH-DEFAULT GET-REPLACE,
            nc-Right  REPLACE-WITH-DEFAULT GET-REPLACE,
            ttrNCTime  REPLACE-WITH-DEFAULT GET-REPLACE,
            tpdNCTime  REPLACE-WITH-DEFAULT GET-REPLACE,
            tfrNCTime   REPLACE-WITH-DEFAULT GET-REPLACE;
    ;
;
REGISTERED AS{TLM.moi nccIVMO(10)};
```

-- NCC Initial values behaviour

```
nccInitialValues-B BEHAVIOUR
    DEFINED AS
        !When an instance of the NCC MO is created using the ncc-ncmsPM name binding, the initial values for some of the
        attributes of the NCC MO may be supplied by an instance of the NCC IVMO. The means by which an instance(if any) of
        the NCC IVMO are identified are a local matter.!
    ;
```

-- Use of NCC initial values behaviour

```
use-of-nccInitialValues-B BEHAVIOUR
    DEFINED AS
        !The creation of an instance of the NCC MO using the ncc-ncmsPM name binding may reference an instance
        of NCC IVMO. When this occurs, some of the initial values of the attributes of the instance of NCC MO may be supplied
        by the values of the attributes in the specified instance of the NCC IVMO.
        However any such value may be overridden by a value supplied by local means (for example across an internal
        interface). Where values are supplied by the IVMO, the initial values of an attribute of NCC MO shall be the value of
        the corresponding attribute in the NCC IVMO (that is, which has the same attribute template label).!
    ;
```

-- Name Binding

```
ncc-ncmsPM NAME BINDING
    SUBORDINATE OBJECT CLASS ncc AND SUBCLASSES;
    NAMED BY
        SUPERIOR OBJECT CLASS ncmsPM AND SUBCLASSES;
        WITH ATTRIBUTE nccId;
    BEHAVIOUR
        ncc-ncmsPM-B BEHAVIOUR
        DEFINED AS
            !The name binding that applies when the ncc managed object is created and deleted.!
        ;
    ;
```

CREATE WITH-REFERENCE-OBJECT;
DELETE;
REGISTERED AS{TLM.nboi ncc-ncmsPM (15)};

nccIVMO-ncmsPM NAME BINDING
SUBORDINATE OBJECT CLASS nccIV AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS ncmsPM AND SUBCLASSES;
WITH ATTRIBUTE nccIVMOId;
BEHAVIOUR
nccIVMO-ncmsPM-B BEHAVIOUR
DEFINED AS
!The name binding that applies when the nccIV managed object is created and deleted.!
;
;
CREATE WITH-REFERENCE-OBJECT;
DELETE;
REGISTERED AS{TLM.nboi nccIV-ncmsPM(16)};

--- Attribute

nccId ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR
nccId-B BEHAVIOUR
DEFINED AS
!The attribute that is used in naming instances of the network connection control managed object class.!
;
;
REGISTERED AS{TLM.aoi nccId (68)};

nccIVMOId ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR
nccIVMOId-B BEHAVIOUR
DEFINED AS
!The attribute that is used in naming instances of the network connection control initial value managed object class.!
;
;
REGISTERED AS{TLM.aoi nccIVMOId (69)};

nc-COL ATTRIBUTE
WITH ATTRIBUTE SYNTAX TLM.NC-COLSyntax;
MATCHES FOR EQUALITY;
BEHAVIOUR
nc-COL-B BEHAVIOUR
DEFINED AS
!The attribute that indicates the collision algorithm as defined in Annex B of ITU-T Rec. X.224 | ISO/IEC 8073. In NCCIV managed object, indicates the collision algorithm to be used. In NCC managed object, indicates the collision algorithm in use.!
;
;
REGISTERED AS{TLM.aoi nc-COL (70)};

nc-PREF ATTRIBUTE
WITH ATTRIBUTE SYNTAX TLM.NC-PREFSyntax;
MATCHES FOR EQUALITY;
BEHAVIOUR
nc-PREF-B BEHAVIOUR
DEFINED AS
!The attribute that indicates the preference the initiator has to keep the network connection as defined in Annex B of ITU-T Rec. X.224 | ISO/IEC 8073. In NCCIV managed object, indicates the preference to be used. In NCC managed object, indicates the preference in use.!
;
;
REGISTERED AS{TLM.aoi nc-PREF (71)};

nc-REC ATTRIBUTE
  WITH ATTRIBUTE SYNTAX TLM.NC-RECSyntax;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    nc-REC-B BEHAVIOUR
    DEFINED AS
      !The attribute that indicates the recovery optimization option as defined in Annex B of ITU-T Rec. X.224 |
      ISO/IEC 8073. In NCCIV managed object, indicates the recovery optimization option to be used. In NCC managed
      object, indicates the recovery optimization option in use.!
    ;
  ;
REGISTERED AS{TLM.aoi nc-REC (72)};

nc-REF ATTRIBUTE
  WITH ATTRIBUTE SYNTAX TLM.NC-REFSyntax;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    nc-REF-B BEHAVIOUR
    DEFINED AS
      !The attribute that indicates the nc-reference as defined in Annex B of ITU-T Rec. X.224 | ISO/IEC 8073.!
    ;
  ;
REGISTERED AS{TLM.aoi nc-REF (73)};

ncRecoveries ATTRIBUTE
  DERIVED FROM "GMI":nonwrapping64BitCounter;
  BEHAVIOUR
    ncRecoveries-B BEHAVIOUR
    DEFINED AS
      !The attribute that indicates the total number of network connection successful recoveries.!
    ;
  ;
REGISTERED AS{TLM.aoi ncRecoveries (74)};

nc-Right ATTRIBUTE
  WITH ATTRIBUTE SYNTAX TLM.NC-RightSyntax;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    nc-Right-B BEHAVIOUR
    DEFINED AS
      !The attribute that indicates the type of right of use as defined in Annex B of ITU-T Rec. X.224 | ISO/IEC 8073. In
      NCCIV managed object, indicates the type of right of use to be used. Namely, the value "my-side" means "SA",
      "remote-side" means "RA" and "both-sides" means "RR". In NCC managed object, indicates the type of right of use
      in use.!
    ;
  ;
REGISTERED AS{TLM.aoi networkConnectionRight (75)};

sourceOfAllocation ATTRIBUTE
  WITH ATTRIBUTE SYNTAX TLM.SourceOfAllocationSyntax;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    sourceOfAllocation-B BEHAVIOUR
    DEFINED AS
      !The attribute that indicates the transport entity that established the network connection at the first time during the
      life time of an NC reference.!
    ;
  ;
REGISTERED AS{TLM.aoi sourceOfAllocation (76)};

tfrNCTime ATTRIBUTE
  DERIVED FROM "GMI":timer;
  BEHAVIOUR
    tfrNCTime-B BEHAVIOUR
    DEFINED AS
      !Value of the TFR-NC timer as defined in Annex B of ITU-T Rec. X.224 | ISO/IEC 8073.!
    ;
  ;
REGISTERED AS{TLM.aoi tfrNCTime (77)};

tpdNCTime ATTRIBUTE
   DERIVED FROM "GMI":timer;
   BEHAVIOUR
      tpdNCTime-B BEHAVIOUR
      DEFINED AS
         !Value of the TPD-NC timer as defined in Annex B of ITU-T Rec. X.224 | ISO/IEC 8073.!
      ;
   ;
REGISTERED AS{TLM.aoi tpdNCTime (78)};

ttrNCTime ATTRIBUTE
   DERIVED FROM "GMI":timer;
   BEHAVIOUR
      ttrNCTime-B BEHAVIOUR
      DEFINED AS
         !Value of the TTR-NC timer as defined in Annex B of ITU-T Rec. X.224 | ISO/IEC 8073.!
      ;
   ;
REGISTERED AS{TLM.aoi ttrNCTime (79)};

6   ASN.1 module

6.2   Other definitions

Add the following definitions:

NC-COLSyntax::=ENUMERATED{nc-COL0(0)}

NC-PREFSyntax::=ENUMERATED{highest(0),
                                    medium(1),
                                    lowest(3)}

NC-RECSyntax::=ENUMERATED{pleaseDoNotRecover(0),
                                    pleaseRecover(1)}

NC-REFSyntax::=INTEGER

NC-RightSyntax::=ENUMERATED{my-side(1),
                                    remote-side(2),
                                    both-sides(3)}

SourceOfAllocationSyntax:=ENUMERATED{local(0),
                                                remote(1)}

Annex A

Allocation of Object Identifiers
(This annex forms an integral part of this Recommendation)

Add the following Object Class Identifiers:

         ncmsPM (8)
         ncc (9)
         nccIVMO (10)

Add the following parameter Identifiers:

         ncmsPMPDUHeader (8)
         ncmsPMSourceAddress(9)

Add the following name binding Identifiers:

> **ncmsPM-transportEntity-Automatic (14)**
> **ncc-ncmsPM (15)**
> **nccIVMO-ncmsPM (16)**

Add the following attribute Identifiers:

> **ncmsPMId (67)**
> **nccId (68)**
> **nccIVMOId (69)**
> **nc-COL (70)**
> **nc-PREF (71)**
> **nc-REC (72)**
> **nc-REF (73)**
> **ncRecoveries (74)**
> **networkConnectionRight (75)**
> **sourceOfAllocation (76)**
> **tfrNCTime (77)**
> **tpdNCTime (78)**
> **ttrNCTime (79)**

Annex B

Shorthand description of managed objects

(This annex does not form an integral part of this Recommendation)
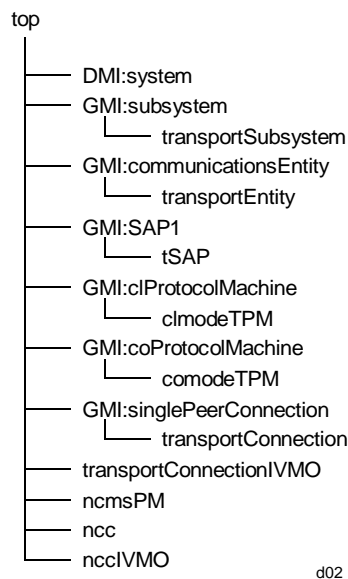
Replace Figure B.1 by the following figure:


```
top
    ──── DMI:system
    ──── GMI:subsystem
            └──── transportSubsystem
    ──── GMI:communicationsEntity
            └──── transportEntity
    ──── GMI:SAP1
            └──── tSAP
    ──── GMI:clProtocolMachine
            └──── clmodeTPM
    ──── GMI:coProtocolMachine
            └──── comodeTPM
    ──── GMI:singlePeerConnection
            └──── transportConnection
    ──── transportConnectionIVMO
    ──── ncmsPM
    ──── ncc
    └──── nccIVMO                d02
```

FIGURE B.1/X.284

Superseded by a more recent version

Add the shorthand description of NCMS PM MO, NCC MO and NCCIV MO:

MANAGED OBJECT CLASS ncmsPM DERIVED FROM (DMI:top)

CONTAINED IN (transportEntity)

    ncmsPMId ATTRIBUTE (G)

    DMI:administrativeState ATTRIBUTE (G,R)

    DMI:operationalState ATTRIBUTE (G)

    GMI:activate ACTION

    GMI:deactivate ACTION

    DMI:communicationsAlarm NOTIFICATION

    DMI:objectCreation NOTIFICATION

    DMI:objectDeletion NOTIFICATION

    DMI:stateChange NOTIFICATION

END MANAGED OBJECT CLASS ncmsPM

MANAGED OBJECT CLASS ncc DERIVED FROM (DMI:top)

CONTAINED IN (ncmsPM)

    nccId ATTRIBUTE (G)

    nc-COL ATTRIBUTE (G)

    nc-REC ATTRIBUTE (G)

    nc-REF ATTRIBUTE (G)

    nc-PREF ATTRIBUTE (G)

    nc-Right ATTRIBUTE (G)

    ncRecoveries ATTRIBUTE (G)

    ttrNCTime ATTRIBUTE (G)

    tpdNCTime ATTRIBUTE (G)

    tfrNCTime ATTRIBUTE (G)

    sourceOfAllocation ATTRIBUTE (G)

    GMI:underlyingConnectionName ATTRIBUTE (G)

    DMI:objectCreation NOTIFICATION

    DMI:objectDeletion NOTIFICATION

END MANAGED OBJECT CLASS ncc

MANAGED OBJECT CLASS nccIVMO DERIVED FROM (DMI:top)

CONTAINED IN (ncmsPM)

    nccIVMOId ATTRIBUTE (G)

    nc-COL ATTRIBUTE (G,R,RWD)

    nc-REC ATTRIBUTE (G,R,RWD)

    nc-REF ATTRIBUTE (G,R,RWD)

    nc-PREF ATTRIBUTE (G,R,RWD)

    nc-Right ATTRIBUTE (G,R,RWD)

    ttrNCTime ATTRIBUTE (G,R,RWD)

    tpdNCTime ATTRIBUTE (G,R,RWD)

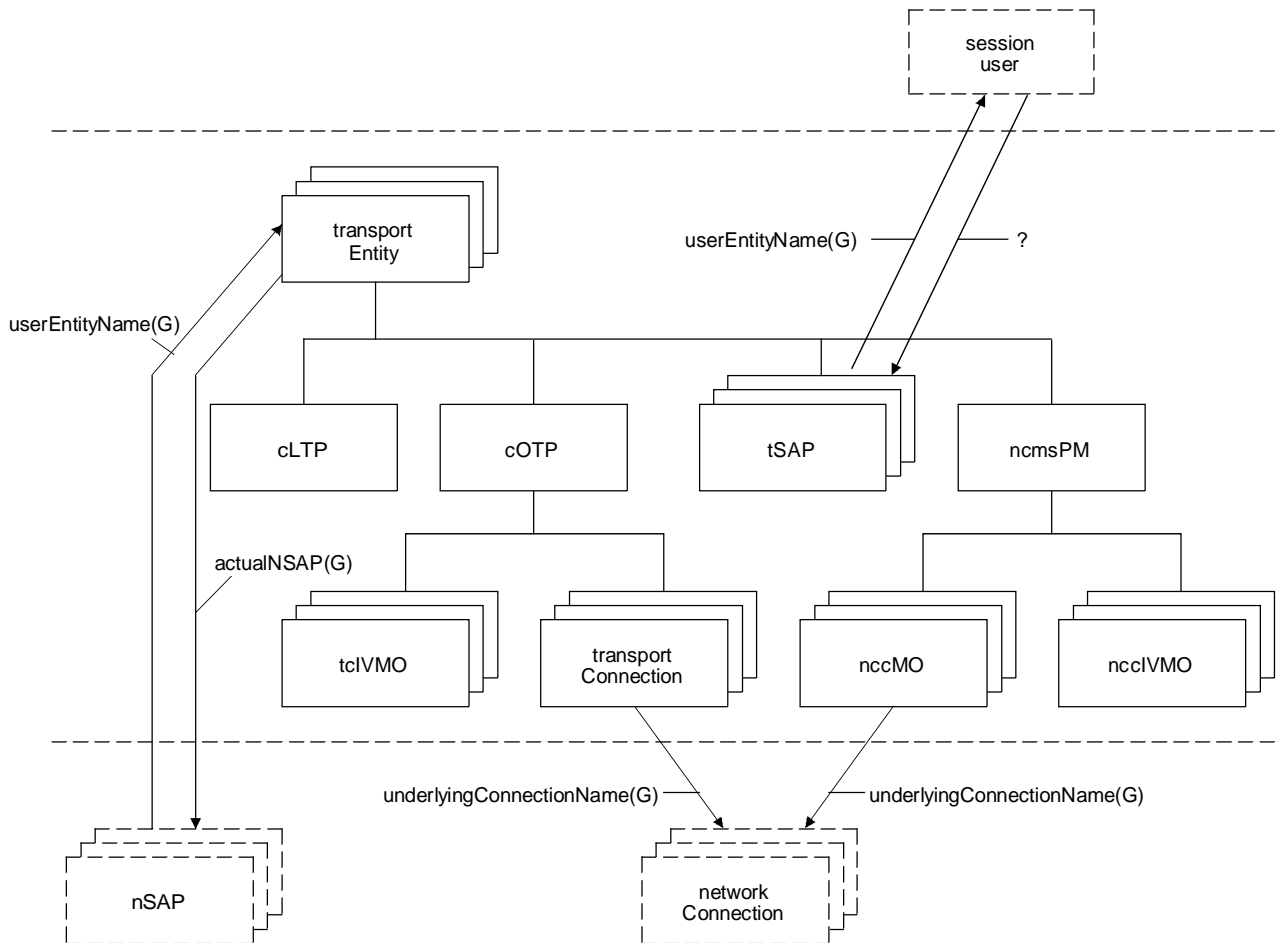   **tfrNCTime ATTRIBUTE (G,R,RWD)**

END MANAGED OBJECT CLASS nccIVMO

Annex C

Examples of the use of relationships

(This annex does not form an integral part of this Recommendation)

Add the following Figure C.3:

FIGURE C.3/X.284

COTP using NCMS over CONS