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SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Digital transmission systems – Digital networks – SDH
network characteristics

**Common elements of the information viewpoint
for the management of a transport network**

ITU-T Recommendation G.853.1
Superseded by a more recent version

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION G.853.1

COMMON ELEMENTS OF THE INFORMATION VIEWPOINT FOR THE MANAGEMENT OF A TRANSPORT NETWORK

Summary

This Recommendation provides the Common Information Viewpoint Specification that will be used as the basis for the development of Management Application Specific Information Viewpoints that will support the management of transport networks, based on the principles of Recommendation G.805, "Generic functional architecture of transport networks". The Information Viewpoint is an RM-ODP concept.

Source

ITU-T Recommendation G.853.1 was prepared by ITU-T Study Group 15 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 8th of November 1996.

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FOREWORD

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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.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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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Recommendation G.853.1

COMMON ELEMENTS OF THE INFORMATION VIEWPOINT FOR THE MANAGEMENT OF A TRANSPORT NETWORK

(Geneva, 1996)

1 Scope

This Recommendation provides the Common Information Viewpoint Specification that will be used as the basis for the development of Management Application Specific Information Viewpoints that will support the management of transport networks, based on the principles of Recommendation G.805, "Generic functional architecture of transport networks". The Information Viewpoint is a RM-ODP concept. The application of the RM-ODP framework in the context of this Recommendation is defined in Recommendation G.851.1. The terminology and templates used in this Recommendation are defined in Recommendation G.851.1. It is assumed that the functional and structural architecture of a transport network being managed is described using the concepts and terminology identified in Recommendation G.805. The generic definitions, symbols and abbreviations that are defined in Recommendation G.805 are used in this Recommendation. The Common Information Viewpoint contains the definition of the information objects and relationships that represent the Recommendation G.805 resources, independent of any particular management service. Common information attributes and states are also specified.

The architectural and functional concepts identified in Recommendation G.805 allow the partitioning of layer networks. The application of these concepts in the context of this Recommendation is described in Appendix I.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T Recommendation X.901¹ | ISO/IEC 10746-1¹, *Information technology – Basic reference model of Open Distributed Processing – Part 1: Overview.*
- [2] ITU-T Recommendation X.902 (1995) | ISO/IEC 10746-2:1996, *Information technology – Open Distributed Processing – Reference Model: Foundations.*
- [3] ITU-T Recommendation X.903 (1995) | ISO/IEC 10746-3:1996, *Information technology – Open Distributed Processing – Reference Model: Architecture.*
- [4] ITU-T Recommendation X.904¹ | ISO/IEC 10746-4¹, *Information technology – Basic reference model of Open Distributed Processing – Architectural Semantics.*

¹ Presently at the stage of draft.

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- [5] CCITT Recommendation X.722 (1992) | ISO/IEC 10165-4:1992, *Information technology – Open Systems Interconnection – Structure of management information: Guidelines for the definition of managed objects.*
- [6] ITU-T Recommendation X.725 (1995) | ISO/IEC 10165-7:1996, *Information technology – Open Systems Interconnection – Structure of management information: General relationship model.*
- [7] SPIVEY (J.M.): *The Z Notation – A Reference Manual*, 2nd Edition, *Prentice Hall International*, ISBN 0-13-978529-9, 1992.
- [8] ITU-T Recommendation G.805 (1995), *Generic functional architecture of transport networks.*
- [9] ITU-T Recommendation G.851.1 (1996), *Management of the transport network – Application of the RM-ODP framework.*

3 Definitions

None.

4 Abbreviations

This Recommendation uses the following abbreviations:

GDMO Guidelines for the Definition of Managed Objects

GRM General Relationship Model

5 Use of the Common Information Viewpoint

This Recommendation, "Common elements of the information viewpoint for the management of a transport network", or Common Information Viewpoint, contains the definition of the information objects and relationships that represent the G.805 resources, independent of any particular management service. Common information attributes and states are also specified.

The Common Information Viewpoint provides the basis for the development of management application specific application information viewpoints.

When requirements are identified for a specific management application (e.g. Connection Management) they are defined in an enterprise community, the corresponding management application specific information viewpoint is then developed. This Recommendation provides the base from which such a management application specific viewpoint is developed.

Management application specific information objects may be created by subclassing from the objects in the Common Information Viewpoint, and extending them for that application. In this case, the new management application specific subclass may include other attributes from the Common Information Viewpoint, in addition to those defined in its superclass. Additional relationships and attributes may also be created as needed for that management application. New objects, inherited from `networkInformationTop`, can also be added.

If attribute definitions are compatible with attributes from existing GDMO Managed Object models (e.g. in Recommendation G.774), then reference to these attributes shall be informally provided. In this case the information viewpoint specification imports the semantics of the attribute but not its syntax (which can be imported into the corresponding computational viewpoint).

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Modified General Relationship Model (GRM) templates have been included in this specification to indicate how objects relate to each other. Each GRM template identifies roles in the relationship, and identifies information objects that may play each of these roles. In the common information viewpoint specification, the initially defined relationships that an information object may take part in are listed in the Potential relationships part of the object description. When a common information viewpoint object is subclassed for a management application-specific information viewpoint, the relationships that are considered to be required for that application are declared to be mandatory.

This Recommendation also contains common attributes that may be included when the management application specific subclasses are created; examples of these attributes include `operationalState` and `userLabel`.

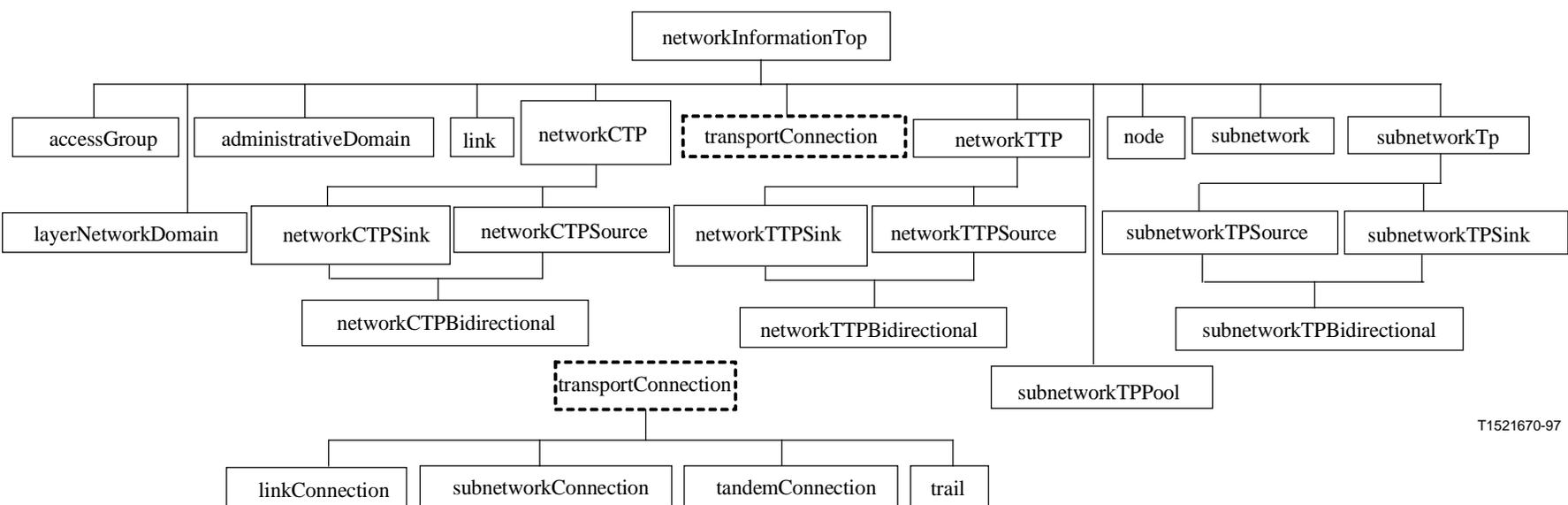
ANNEX A

A.1 References

None.

A.2 Information object classes definition

A.2.1 Inheritance diagram



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A.2.2 Object classes

A.2.2.1 accessGroup

A.2.2.1.1 Informal description

DEFINITION

"An accessGroup information object represents a G.805:1995 accessGroup (see G.805:1995 definition)."

ATTRIBUTE

signalIdentification

"An access group has a characteristic information which represents the specific format of signal that the resource carries. The specific format values will be defined in the technology specific extensions."

A.2.2.1.2 Semi-formal description

accessGroup INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

accessGroupPackage PACKAGE

BEHAVIOUR

accessGroupPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ATTRIBUTES

signalIdentification;;;

A.2.2.1.3 Formal description

_____accessGroup_Static_____

accessGroup : F OBJECT
networkInformationTop_Static
signalIdentification_Static

accessGroup \subseteq *networkInformationTop*

accessGroup \subseteq *dom* *signalIdentification*

_____accessGroup_Dynamic_____

Δ *accessGroup_Static*
networkInformationTop_Dynamic
signalIdentification_Dynamic

A.2.2.1.4 Potential relationships

<accessGroupIsMadeOfNetworkTTPs>

<linkBinds>

A.2.2.2 administrativeDomain

A.2.2.2.1 Informal description

DEFINITION

"An administrativeDomain information object represents a set of information objects and relationships reflecting resources grouped for management purposes."

A.2.2.2.2 Semi-formal description

administrativeDomain INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

administrativeDomainPackage PACKAGE

Superseded by a more recent version

BEHAVIOUR

administrativeDomainPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;

A.2.2.2.3 Formal description

administrativeDomain_Static

administrativeDomain : F OBJECT

networkInformationTop_Static

administrativeDomain \subseteq *networkInformationTop*

administrativeDomain_Dynamic

Δ *administrativeDomain_Static*

networkInformationTop_Dynamic

A.2.2.2.4 Potential relationships

<administrativeDomainIsMadeOf>

A.2.2.3 layerNetworkDomain

A.2.2.3.1 Informal description

DEFINITION

"A layerNetworkDomain information object represents the part of a layer network which is managed by a management system."

ATTRIBUTE

signalIdentification

"The signalIdentification describes the signal that is transferred across the layer network domain."

A.2.2.3.2 Semi-formal description

layerNetworkDomain INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

layerNetworkDomainPackage PACKAGE

BEHAVIOUR

layerNetworkDomainPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";

ATTRIBUTES

signalIdentification;;

A.2.2.3.3 Formal description

layerNetworkDomain_Static

layerNetworkDomain : F OBJECT

networkInformationTop_Static

signalIdentification_Static

layerNetworkDomain \subseteq *networkInformationTop*

layerNetworkDomain \subseteq *dom* *signalIdentification*

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layerNetworkDomain_Dynamic

Δ *layerNetworkDomain_Static*
networkInformationTop_Dynamic
signalIdentification_Dynamic

A.2.2.3.4 Potential relationships

<layerNetworkDomainIsDelimitedBy>

A.2.2.4 link

A.2.2.4.1 Informal description

DEFINITION

"A link information object represents the capacity between two subnetworks or a subnetwork and an accessGroup. It also represents a set of linkConnections."

ATTRIBUTE

signalIdentification

"The signalIdentification describes the signal that is transferred across the link."

directionality

"The directionality characterises the ability of a link to carry traffic in one or two directions."

A.2.2.4.2 Semi-formal description

link INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

linkPackage PACKAGE

BEHAVIOUR

linkPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ATTRIBUTES

signalIdentification,

directionality;;;

A.2.2.4.3 Formal description

link_Static

link : F OBJECT
networkInformationTop_Static
signalIdentification_Static
directionality_Static

$link \subseteq networkInformationTop$

$link \subseteq dom\ signalIdentification$

$link \subseteq dom\ directionality$

link_Dynamic

Δ *link_Static*
networkInformationTop_Dynamic
signalIdentification_Dynamic
directionality_Dynamic

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A.2.2.4.4 Potential relationships

<compoundLinkHasLinks>
<linkBinds>
<concatenatedLinkHasLinks>
<linkHasLinkConnections>

A.2.2.5 linkConnection

A.2.2.5.1 Informal description

DEFINITION

"A linkConnection information object represents the atomic, fixed and transparent capacity of transfer of an information characterized by a given signalIdentification.

The linkConnection information object type is a sub-type of the transportConnection information object type."

A.2.2.5.2 Semi-formal description

linkConnection INFORMATION OBJECT CLASS

DERIVED FROM transportConnection;

CHARACTERIZED BY

linkConnectionPackage PACKAGE

BEHAVIOUR

linkConnectionPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

A.2.2.5.3 Formal description

linkConnection_Static

linkConnection : F OBJECT
transportConnection_Static

linkConnection \subseteq *transportConnection*

linkConnection_Dynamic

Δ *linkConnection_Static*
transportConnection_Dynamic

A.2.2.5.4 Potential relationships

<clientServer>
<extremitiesTerminateLinkConnection>
<linkConnectionIsBundleOfLinkConnections>
<linkConnectionIsSupportedByTrail>
<linkConnectionIsMadeOfTransportEntities>
<linkConnectionIsTerminatedBySubnetworks>
<linkHasLinkConnections>
<subnetworkConnectionIsMadeOfTransportEntities>
<subnetworkTPIsRelatedToExtremity>
<tandemConnectionIsMadeOfTransportEntities>
<trailsIsMadeOfTransportEntities>

A.2.2.6 networkCTP

A.2.2.6.1 Informal description

DEFINITION

"The networkCTP information object represents an extremity of a linkConnection."

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A.2.2.6.2 Semi-formal description

networkCTP INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

networkCTPPackage PACKAGE

BEHAVIOUR

networkCTPPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

A.2.2.6.3 Formal description

networkCTP_Static

networkCTP : F OBJECT

networkInformationTop_Static

$networkCTP \subseteq networkInformationTop$

networkCTP_Dynamic

$\Delta networkCTP_Static$

networkInformationTop_Dynamic

A.2.2.6.4 Potential relationships

<clientServer>

<extremitiesTerminateTransportEntity>

<networkTTPAdaptsNetworkCTP>

<subnetworkTPIsRelatedToExtremity>

A.2.2.7 networkCTPBidirectional

A.2.2.7.1 Informal description

DEFINITION

"A networkCTPBidirectional information object is intended to be bound to *the output of a unidirectional link connection or the input to a unidirectional link connection.*

The networkCTPBidirectional information object type is a sub-type of the networkCTPSink and networkCTPSource information object types."

A.2.2.7.2 Semi-formal description

networkCTPBidirectional INFORMATION OBJECT CLASS

DERIVED FROM networkCTPSink, networkCTPSource;

CHARACTERIZED BY

networkCTPBidirectionalPackage PACKAGE

BEHAVIOUR

networkCTPBidirectionalPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

A.2.2.7.3 Formal description

networkCTPBidirectional_Static

networkCTPBidirectional : F OBJECT

networkCTPSink_Static

networkCTPSource_Static

$networkCTPBidirectional \subseteq networkCTPSink \cap networkCTPSource$

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networkCTPBidirectional_Dynamic

Δ networkCTPBidirectional_Static
networkCTPSink_Dynamic
networkCTPSource_Dynamic

A.2.2.7.4 Potential relationships

No additional relationship.

A.2.2.8 networkCTPSink

A.2.2.8.1 Informal description

DEFINITION

"A networkCTPSink information object is intended to *be bound to the output of a unidirectional link connection.*

The networkCTPSink information object type is a sub-type of the networkCTP information object type."

A.2.2.8.2 Semi-formal description

networkCTPSink INFORMATION OBJECT CLASS

DERIVED FROM networkCTP;

CHARACTERIZED BY

networkCTPSink Package PACKAGE

BEHAVIOUR

networkCTPSinkPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;

A.2.2.8.3 Formal description

networkCTPSink_Static

networkCTPSink : F OBJECT
networkCTP_Static

networkCTPSink \subseteq networkCTP

networkCTPSink_Dynamic

Δ networkCTPSink_Static
networkCTP_Dynamic

A.2.2.8.4 Potential relationships

<extremitiesTerminateLinkConnection>

A.2.2.9 networkCTPSource

A.2.2.9.1 Informal description

DEFINITION

"A networkCTPSource information object is intended to *be bound to the input to a unidirectional link connection.*

The networkCTPSource information object type is a sub-type of the networkCTP information object type."

A.2.2.9.2 Semi-formal description

networkCTPSource INFORMATION OBJECT CLASS

DERIVED FROM networkCTP;

CHARACTERIZED BY

networkCTPSourcePackage PACKAGE

Superseded by a more recent version

BEHAVIOUR

networkCTPSourcePackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

A.2.2.9.3 Formal description

networkCTPSource_Static

networkCTPSource : F OBJECT

networkCTP_Static

networkCTPSource \subseteq *networkCTP*

networkCTPSource_Dynamic

Δ *networkCTPSource_Static*

networkCTP_Dynamic

A.2.2.9.4 Potential relationships

<extremitiesTerminateLinkConnection>

A.2.2.10 networkInformationTop

A.2.2.10.1 Informal description

DEFINITION

"The networkInformationTop information object type is the root of the inheritance diagram of CIVS. All the other information object types are subtypes of networkInformationTop, either directly or indirectly."

A.2.2.10.2 Semi-formal description

networkInformationTop INFORMATION OBJECT CLASS

CHARACTERIZED BY

networkInformationTopPackage PACKAGE

BEHAVIOUR

networkInformationTopPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

A.2.2.10.3 Formal description

networkInformationTop_Static

networkInformationTop : F OBJECT

networkInformationTop_Dynamic

Δ *networkInformationTop_Invariant*

A.2.2.10.4 Potential relationships

<administrativeDomainIsMadeOf>

<nodeIsMadeOf>

<oneToOneRelationship>

<setOf>

A.2.2.11 networkTTP

A.2.2.11.1 Informal description

DEFINITION

"The networkTTP information object represents an extremity of a trail".

Superseded by a more recent version

A.2.2.11.2 Semi-formal description

networkTTP INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

networkTTPPackage PACKAGE

BEHAVIOUR

networkTTPPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

A.2.2.11.3 Formal description

networkTTP_Static

networkTTP : F OBJECT

networkInformationTop_Static

networkTTP \subseteq networkInformationTop

networkTTP_Dynamic

Δ *networkTTP_Static*

networkInformationTop_Dynamic

A.2.2.11.4 Potential relationships

<accessGroupIsMadeOfNetworkTTPs>

<clientServer>

<extremitiesTerminateTransportEntity>

<layerNetworkDomainIsDelimitedBy>

<networkTTPAdaptsNetworkCTP>

<subnetworkTPIsRelatedToExtremity>

A.2.2.12 networkTTPBidirectional

A.2.2.12.1 Informal description

DEFINITION

"The networkTTPBidirectional information object type is a sub-type of the information object types networkTTPSink and networkTTPSource."

A.2.2.12.2 Semi-formal description

networkTTPBidirectional INFORMATION OBJECT CLASS

DERIVED FROM networkTTPSink, networkTTPSource;

CHARACTERIZED BY

networkTTPBidirectionalPackage PACKAGE

BEHAVIOUR

networkTTPBidirectionalPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

A.2.2.12.3 Formal description

networkTTPBidirectional_Static

networkTTPBidirectional : F OBJECT

networkTTPSink_Static

networkTTPSource_Static

networkTTPBidirectional \subseteq networkTTPSink \cap networkTTPSource

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networkTTPBidirectional_Dynamic

Δ *networkTTPBidirectional_Static*
networkTTPSink_Dynamic
networkTTPSource_Dynamic

A.2.2.12.4 Potential relationships

No additional relationship.

A.2.2.13 networkTTPSink

A.2.2.13.1 Informal description

DEFINITION

"A **networkTTPSink** class is a class of information objects that terminates trails.

The **networkTTPSink** information object type is a subtype of the **networkTTP** information object type."

A.2.2.13.2 Semi-formal description

networkTTPSink INFORMATION OBJECT CLASS

DERIVED FROM **networkTTP**;

CHARACTERIZED BY

networkTTPSinkPackage PACKAGE

BEHAVIOUR

networkTTPSinkPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;

A.2.2.13.3 Formal description

networkTTPSink_Static

networkTTPSink : F OBJECT
networkTTP_Static

networkTTPSink \subseteq *networkTTP*

networkTTPSink_Dynamic

Δ *networkTTPSink_Static*
networkTTP_Dynamic

A.2.2.13.4 Potential relationships

<extremitiesTerminateTrail>

A.2.2.14 networkTTPSource

A.2.2.14.1 Informal description

DEFINITION

"A **networkTTPSource** information object class is a class of information objects that originates trails.

The **networkTTPSource** information object type is a subtype of the **networkTTP** information object type."

A.2.2.14.2 Semi-formal description

networkTTPSource INFORMATION OBJECT CLASS

DERIVED FROM **networkTTP**;

CHARACTERIZED BY

networkTTPSourcePackage PACKAGE

BEHAVIOUR

networkTTPSourcePackageBehaviour BEHAVIOUR

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DEFINED AS

"<DEFINITION>";;;

A.2.2.14.3 Formal description

_____networkTTPSource_Static_____

networkTTPSource : F OBJECT
networkTTP_Static

_____networkTTPSource \subseteq networkTTP_____

_____networkTTPSource_Dynamic_____

Δ *networkTTPSource_Static*
networkTTP_Dynamic

A.2.2.14.4 Potential relationships

<extremitiesTerminateTrail>

A.2.2.15 node

A.2.2.15.1 Informal description

DEFINITION

"A node information object represents a collection of information objects and relationships reflecting resources grouped in a single geographical location."

A.2.2.15.2 Semi-formal description

node INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

nodePackage PACKAGE

BEHAVIOUR

nodePackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;

A.2.2.15.3 Formal description

_____node_Static_____

node : F OBJECT
networkInformationTop_Static

_____node \subseteq networkInformationTop_____

_____node_Dynamic_____

Δ *node_Static*
networkInformationTop_Dynamic

A.2.2.15.4 Potential relationships

<nodeIsMadeOf>

A.2.2.16 subnetwork

A.2.2.16.1 Informal description

DEFINITION

"A subnetwork information object represents a G.805:1995 sub-network (see G.805:1995 definition)."

Superseded by a more recent version

ATTRIBUTE

signalIdentification

"A sub-network carries a specific format. The specific formats will be defined in the technology specific extensions."

A.2.2.16.2 Semi-formal description

subnetwork INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

subnetworkPackage PACKAGE

BEHAVIOUR

subnetworkPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ATTRIBUTES

signalIdentification;;;

A.2.2.16.3 Formal description

subnetwork_Static

subnetwork : F OBJECT
networkInformationTop_Static
signalIdentification_Static

subnetwork \subseteq *networkInformationTop*
subnetwork \subseteq *dom* *signalIdentification*

subnetwork_Dynamic

Δ *subnetwork_Static*
networkInformationTop_Dynamic
signalIdentification_Dynamic

A.2.2.16.4 Potential relationships

<linkBinds>

<linkConnectionIsTerminatedBySubnetworks>

<sNIsPartitionedBySn>

<subnetworkHasSubnetworkConnections>

<subnetworkIsDelimitedBy>

<topologicalComponentIsDelimitedBy>

A.2.2.17 subnetworkConnection

A.2.2.17.1 Informal description

DEFINITION

"A subnetworkConnection information object represents a G.805:1995 sub-network connection (see G.805:1995 definition).

The subnetworkConnection information object type is a sub-type of the transportConnection information object type."

A.2.2.17.2 Semi-formal description

subnetworkConnection INFORMATION OBJECT CLASS

DERIVED FROM transportConnection ;

CHARACTERIZED BY

subnetworkConnectionPackage PACKAGE

BEHAVIOUR

subnetworkConnectionPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

Superseded by a more recent version

A.2.2.17.3 Formal description

_____subnetworkConnection_Static_____

subnetworkConnection : *F OBJECT*
transportConnection_Static

subnetworkConnection \subseteq *transportConnection*

_____subnetworkConnection_Dynamic_____

Δ *subnetworkConnection_Static*
transportConnection_Dynamic

A.2.2.17.4 Potential relationships

<extremitiesTerminateLinkConnection>
<extremitiesTerminateSubnetworkConnection>
<snCBidIsSupportedByUnis>
<subnetworkConnectionIsMadeOfTransportEntities>
<subnetworkHasSubnetworkConnections>
<tandemConnectionIsMadeOfTransportEntities>
<trailsMadeOfTransportEntities>

A.2.2.18 subnetworkTP

A.2.2.18.1 Informal description

DEFINITION

"The subnetworkTP information object class is an abstraction that represents the potential termination of a transport entity and the associated port (see G.805:1995 definition). It also represents the potential for connection across sub-networks."

A.2.2.18.2 Semi-formal description

subnetworkTP INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

subnetworkTPPackage PACKAGE

BEHAVIOUR

subnetworkTPPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;

A.2.2.18.3 Formal description

_____subnetworkTP_Static_____

subnetworkTP : *F OBJECT*
networkInformationTop_Static

subnetworkTP \subseteq *networkInformationTop*

_____subnetworkTP_Dynamic_____

Δ *subnetworkTP_Static*
networkInformationTop_Dynamic

A.2.2.18.4 Potential relationships

<extremitiesTerminateTransportEntity>
<isConnectedTo>
<subnetworkTPIsBundleOfSubnetworkTPs>

Superseded by a more recent version

<subnetworkTPIsRelatedToExtremity>
<subnetworkTPPoolIsMadeOfSubnetworkTP>
<topologicalComponentIsDelimitedBy>

A.2.2.19 subnetworkTPBidirectional

A.2.2.19.1 Informal description

DEFINITION

"The subnetworkTPBidirectional information object type is a sub-type of the subnetworkTPSink and subnetworkTPSource information object types."

A.2.2.19.2 Semi-formal description

subnetworkTPBidirectional INFORMATION OBJECT CLASS

DERIVED FROM subnetworkTPSink, subnetworkTPSource;

CHARACTERIZED BY

subnetworkTPBidirectionalPackage PACKAGE

BEHAVIOUR

subnetworkTPBidirectionalPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

A.2.2.19.3 Formal description

_____subnetworkTPBidirectional_Static_____

subnetworkTPBidirectional : F OBJECT

subnetworkTPSink_Static

subnetworkTPSource_Static

subnetworkTPBidirectional \subseteq subnetworkTPSink \cap subnetworkTPSource

_____subnetworkTPBidirectional_Dynamic_____

Δ *subnetworkTPBidirectional_Static*

subnetworkTPSink_Dynamic

subnetworkTPSource_Dynamic

A.2.2.19.4 Potential relationships

No additional relationship.

A.2.2.20 subnetworkTPPool

A.2.2.20.1 Informal description

DEFINITION

"A subnetworkTPPool information object represents a set (possibly empty) of subnetworkTPs at the frontier of a given sub-network."

ATTRIBUTE

signalIdentification

"A sub-network carries a specific format. The specific formats will be defined in the technology specific extensions."

A.2.2.20.2 Semi-formal description

subnetworkTPPool INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

subnetworkTPPoolPackage PACKAGE

Superseded by a more recent version

BEHAVIOUR

subnetworkTPPoolPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

A.2.2.20.3 Formal description

subnetworkTPPool_Static

subnetworkTPPool : F OBJECT

networkInformationTop_Static

subnetworkTPPool \subseteq *networkInformationTop*

subnetworkTPPool_Dynamic

Δ *subnetworkTPPool_Static*

networkInformationTop_Dynamic

A.2.2.20.4 Potential relationships

<subnetworkTPPoolIsMadeOfSubnetworkTP>

A.2.2.21 subnetworkTPSink

A.2.2.21.1 Informal description

DEFINITION

"The subnetworkTPSink information object class is an abstraction that represents the potential termination of a transport entity and the associated unidirectional port (see G.805:1995 definition). It also represents the potential for connection across sub-networks.

The subnetworkTPSink information object type is a subtype of the subnetworkTPinformation object type."

A.2.2.21.2 Semi-formal description

subnetworkTPSink INFORMATION OBJECT CLASS

DERIVED FROM subnetworkTP;

CHARACTERIZED BY

subnetworkTPSinkPackage PACKAGE

BEHAVIOUR

subnetworkTPSinkPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;

A.2.2.21.3 Formal description

subnetworkTPSink_Static

subnetworkTPSink : F OBJECT

subnetworkTP_Static

subnetworkTPSink \subseteq *subnetworkTP*

subnetworkTPSink_Dynamic

Δ *subnetworkTPSink_Static*

subnetworkTP_Dynamic

A.2.2.21.4 Potential relationships

<extremitiesTerminateSubnetworkConnection>

Superseded by a more recent version

A.2.2.22 subnetworkTPSource

A.2.2.22.1 Informal description

DEFINITION

"The subnetworkTPSource information object class is an abstraction that represents the potential origin of a transport entity and the associated unidirectional port (see G.805:1995 definition). It also represents the potential for connection across sub-networks. The subnetworkTPSource information object type is a subtype of the subnetworkTPinformation object type."

A.2.2.22.2 Semi-formal description

subnetworkTPSource INFORMATION OBJECT CLASS

DERIVED FROM subnetworkTP;

CHARACTERIZED BY

subnetworkTPSourcePackage PACKAGE

BEHAVIOUR

subnetworkTPSourcePackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

A.2.2.22.3 Formal description

subnetworkTPSource_Static

subnetworkTPSource : F OBJECT

subnetworkTP_Static

subnetworkTPSource \subseteq *subnetworkTP*

subnetworkTPSource_Dynamic

Δ *subnetworkTPSource_Static*

subnetworkTP_Dynamic

A.2.2.22.4 Potential relationships

<extremitiesTerminateSubnetworkConnection>

A.2.2.23 tandemConnection

A.2.2.23.1 Informal description

DEFINITION

"A tandemConnection information object represents a G.805:1995 tandem connection, i.e. *an arbitrary series of contiguous link connections and/or sub-network connections*.

The tandemConnection information object type is a sub-type of the transportConnection information object type."

A.2.2.23.2 Semi-formal description

tandemConnection INFORMATION OBJECT CLASS

DERIVED FROM transportConnection ;

CHARACTERIZED BY

tandemConnectionPackage PACKAGE

BEHAVIOUR

tandemConnectionPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;;

Superseded by a more recent version

A.2.2.23.3 Formal description

<p><i>tandemConnection_Static</i></p> <hr/> <p><i>tandemConnection</i> : <i>F OBJECT</i> <i>transportConnection_Static</i></p> <hr/>
<p><i>tandemConnection</i> \subseteq <i>transportConnection</i></p> <hr/>

<p><i>tandemConnection_Dynamic</i></p> <hr/> <p>Δ <i>tandemConnection_Static</i> <i>transportConnection_Dynamic</i></p> <hr/>

A.2.2.23.4 Potential relationships

<tandemConnectionIsMadeOfTransportEntities>

A.2.2.24 trail

A.2.2.24.1 Informal description

DEFINITION

"A trail information object represents a G.805:1995 trail (see G.805:1995 definition).

The trail information object type is a sub-type of the transportConnection information object type."

A.2.2.24.2 Semi-formal description

trail INFORMATION OBJECT CLASS

DERIVED FROM transportConnection ;

CHARACTERIZED BY

trailPackage PACKAGE

BEHAVIOUR

trailPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;;

A.2.2.24.3 Formal description

<p><i>trail_Static</i></p> <hr/> <p><i>trail</i> : <i>F OBJECT</i> <i>transportConnection_Static</i></p> <hr/>
<p><i>trail</i> \subseteq <i>transportConnection</i></p> <hr/>

<p><i>trail_Dynamic</i></p> <hr/> <p>Δ <i>trail_Static</i> <i>transportConnection_Dynamic</i></p> <hr/>

A.2.2.24.4 Potential relationships

<clientServer>

<extremitiesTerminateTrail>

<linkConnectionIsSupportedByTrail>

<trailsMadeOfTransportEntities>

Superseded by a more recent version

A.2.2.25 transportConnection

A.2.2.25.1 Informal description

DEFINITION

"A transportConnection information object represents a G.805:1995 connection (see G.805:1995 definition).

The information transfer can be uni- or bi-directional, qualifying the directionality of the transportConnection."

ATTRIBUTE

signalIdentification

"The signalIdentification describes the signal that is transferred across the transportConnection."

directionality

"The directionality characterises the ability of a transportConnection to carry traffic in one or two directions."

A.2.2.25.2 Semi-formal description

transportConnection INFORMATION OBJECT CLASS

DERIVED FROM networkInformationTop;

CHARACTERIZED BY

transportConnectionPackage PACKAGE

BEHAVIOUR

transportConnectionPackageBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ATTRIBUTES

signalIdentification,

directionality;;;

A.2.2.25.3 Formal description

_____transportConnection_Static_____

transportConnection : **F OBJECT**

networkInformationTop_Static

signalIdentification_Static

directionality_Static

transportConnection \subseteq *networkInformationTop*

transportConnection \subseteq **dom** *signalIdentification*

transportConnection \subseteq **dom** *directionality*

_____transportConnection_Dynamic_____

Δ *transportConnection_Static*

networkInformationTop_Dynamic

signalIdentification_Dynamic

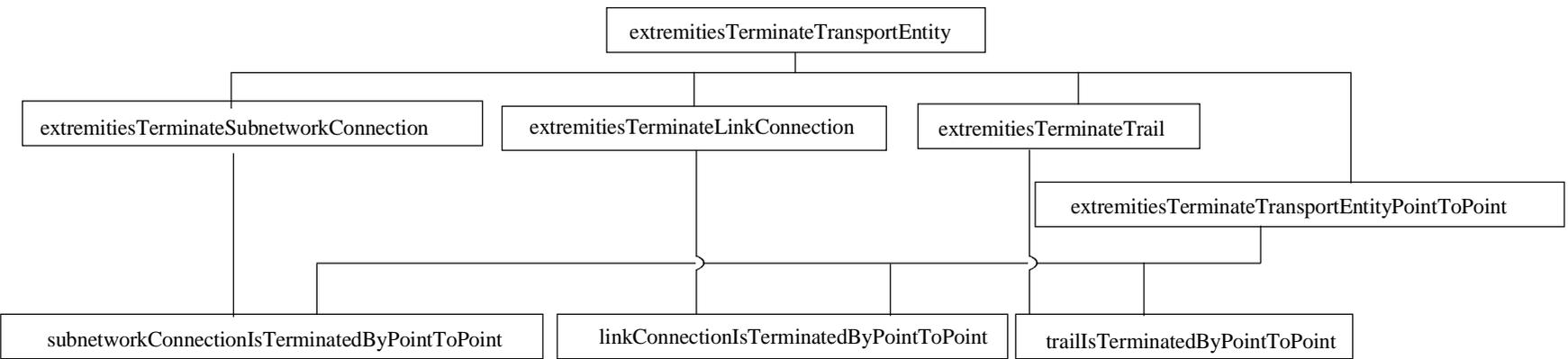
directionality_Dynamic

A.2.2.25.4 Potential relationships

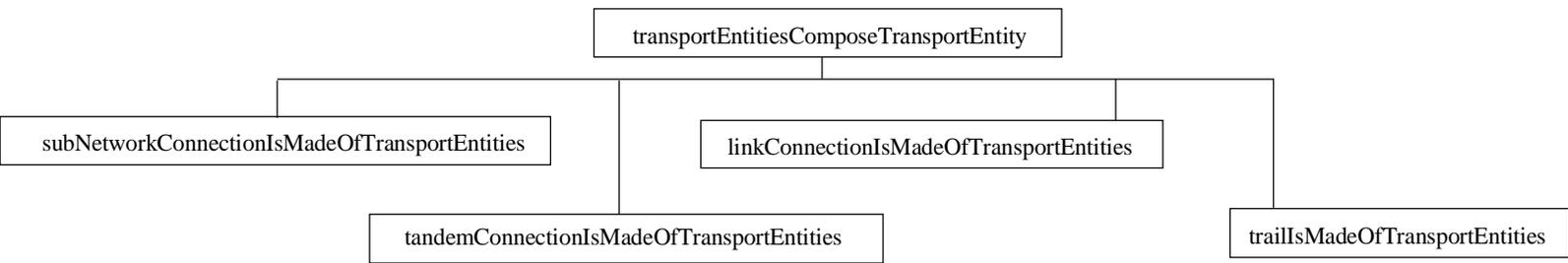
<extremitiesTerminateTransportEntity>

<topologicalComponentIsDelimitedBy>

<transportEntitiesComposeTransportEntity>

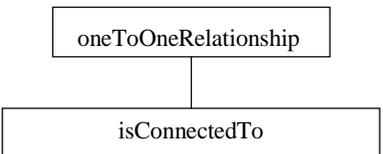


Inheritance diagram 1

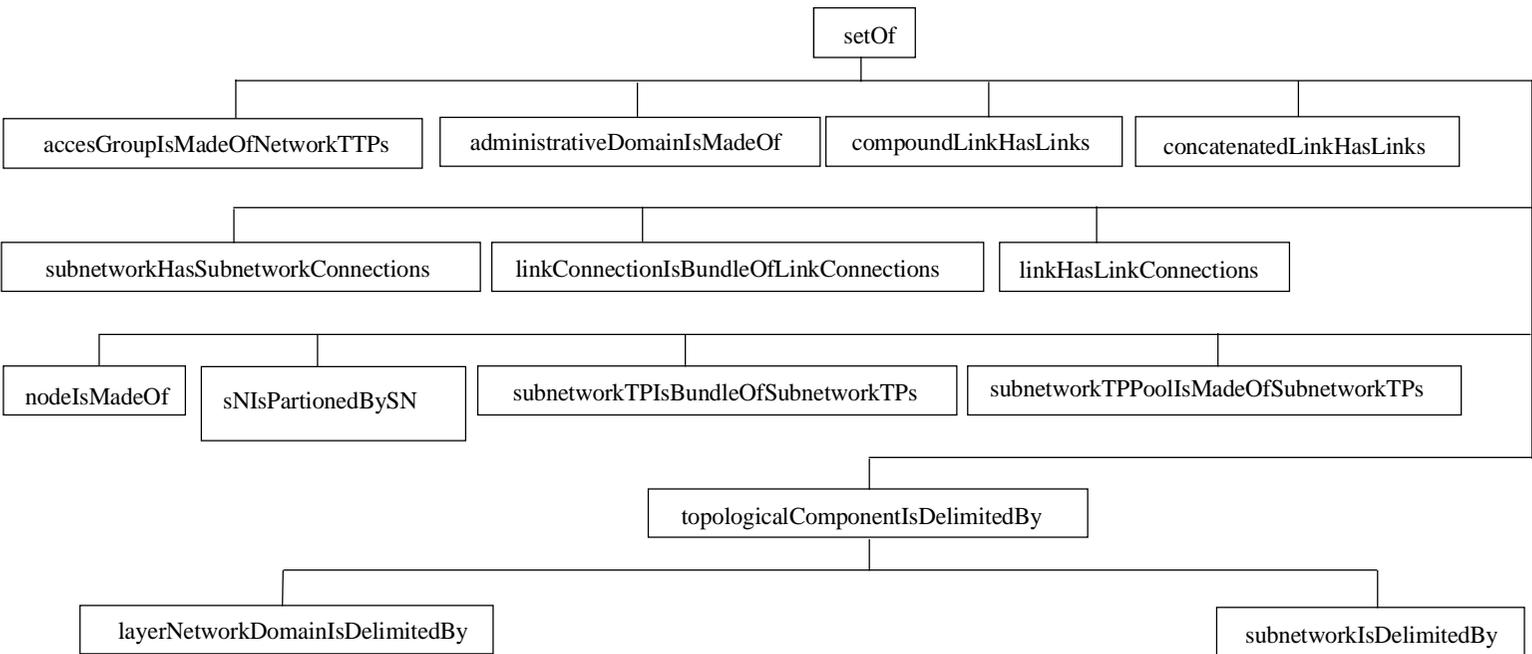
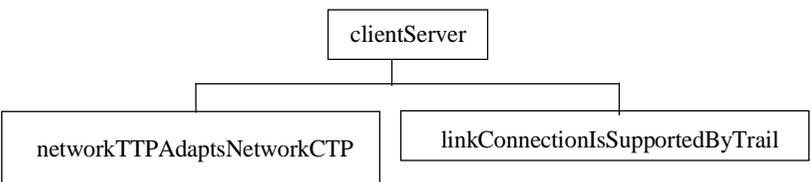


Inheritance diagram 2

T1522010-96



Inheritance diagram 3



Inheritance diagram 4

T1522020-96

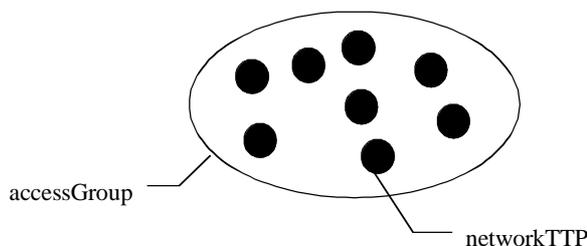
A.3.2 Relationships

A.3.2.1 accessGroupsMadeOfNetworkTTPs

A.3.2.1.1 Informal description DEFINITION

"The accessGroupsMadeOfNetworkTTPs relationship class describes the relationship that exists between an accessGroup and the networkTTPs that are part of it.
This relationship type is a subtype of setOf."

Superseded by a more recent version



T1521680-96

ROLE

container

"Played by an instance of the accessGroup information object type."

element

"Played by an instance of a sub-type of the networkTTP information object type."

A.3.2.1.2 Semi-formal description

accessGroupIsMadeOfNetworkTTPs RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

accessGroupIsMadeOfNetworkTTPsBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE container

COMPATIBLE WITH accessGroup;

ROLE element

COMPATIBLE WITH networkTTP AND SUBCLASSES;

A.3.2.1.3 Formal description

_____ accessGroupIsMadeOfNetworkTTPs_Static _____

accessGroupIsMadeOfNetworkTTPs : F RELATIONSHIP

setOf_Static

accessGroup_Static

networkTTP_Static

accessGroupIsMadeOfNetworkTTPs \subseteq *setOf*

$\forall R: accessGroupIsMadeOfNetworkTTPs \bullet container(R) \in accessGroup \wedge elementSet(R) \subseteq networkTTP$

_____ accessGroupIsMadeOfNetworkTTPs_Dynamic _____

Δ *accessGroupIsMadeOfNetworkTTPs_Static*

setOf_Dynamic

accessGroup_Dynamic

networkTTP_Dynamic

A.3.2.2 administrativeDomainIsMadeOf

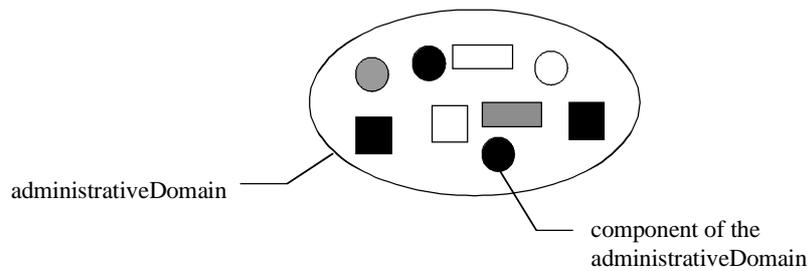
A.3.2.2.1 Informal description

DEFINITION

"The administrativeDomainIsMadeOf relationship class describes the relationship that exists between an administrativeDomain and the information objects that are part of it.

This relationship type is a subtype of setOf."

Superseded by a more recent version



T1521690-96

ROLE

container

"Played by an instance of the `administrativeDomain` information object type."

element

"Played by an instance of a subtype of the information object type : `networkInformationTop`."

A.3.2.2.2 Semi-formal description

`administrativeDomainIsMadeOf` RELATIONSHIP CLASS

DERIVED FROM `setOf`;

BEHAVIOUR

`administrativeDomainIsMadeOf` Behaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE container

COMPATIBLE WITH `administrativeDomain` AND SUBCLASSES;

ROLE element

COMPATIBLE WITH `networkInformationTop` AND SUBCLASSES;

A.3.2.2.3 Formal description

`administrativeDomainIsMadeOf` _Static

administrativeDomainIsMadeOf : F RELATIONSHIP

setOf _Static

administrativeDomain _Static

networkInformationTop _Static

$administrativeDomainIsMadeOf \subseteq setOf$

$\forall R: administrativeDomainIsMadeOf \bullet$

$container(R) \in administrativeDomain \wedge elementSet(R) \subseteq networkInformationTop$

`administrativeDomainIsMadeOf` _Dynamic

$\Delta administrativeDomainIsMadeOf$ _Static

setOf _Dynamic

administrativeDomain _Dynamic

networkInformationTop _Dynamic

A.3.2.3 clientServer

A.3.2.3.1 Informal description

DEFINITION

"The `clientServer` relationship class describes the relationship that exists between clients of a given layer network (known as the client layer network) and the server that supports them in a server layer network."

Explaining figure in the subclasses.

Superseded by a more recent version

ROLE

client

"Played by instances of the linkConnection information object type, or instances of a subtype of the networkCTP information object type."

server

"Played by an instance of the trail information object type, or an instance of the networkTTP information object type."

INVARIANT

inv_1

"At least one instance of the role client must participate in the relationship."

inv_2

"One and only one instance of the role server must participate in the relationship."

TRANSITION

tr_1

"The information objects playing the role client, provided one remains, can leave the relationship without breaking it."

tr_2

"During the lifetime of the relationship, additional information objects can enter the relationship, playing the role client."

A.3.2.3.2 Semi-formal description

clientServer RELATIONSHIP CLASS

BEHAVIOUR

clientServerBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE client

COMPATIBLE WITH linkConnection,
networkCTP AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..N)
BIND-SUPPORT
UNBIND-SUPPORT;

ROLE server

COMPATIBLE WITH trail,
networkTTP AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

A.3.2.3.3 Formal description

_____ clientServer_Static _____

clientServer : F RELATIONSHIP

clientSet : RELATIONSHIP → F OBJECT

server : RELATIONSHIP → OBJECT

linkConnection_Static

networkCTP_Static

trail_Static

networkTTP_Static

_____ *clientServer* ⊆ **dom** *clientSet*

clientServer ⊆ **dom** *server*

∀ R: *clientServer* •

clientSet(R) ⊆ *linkConnection* ∪ *networkCTP* ∧ *server*(R) ∈ *trail* ∪ *networkTTP*

∀ R: *clientServer* • #*clientSet* ≥ 1

Superseded by a more recent version

clientServer_Dynamic

Δ clientServer_Static
linkConnection_Dynamic
networkCTP_Dynamic
trail_Dynamic
networkTTP_Dynamic

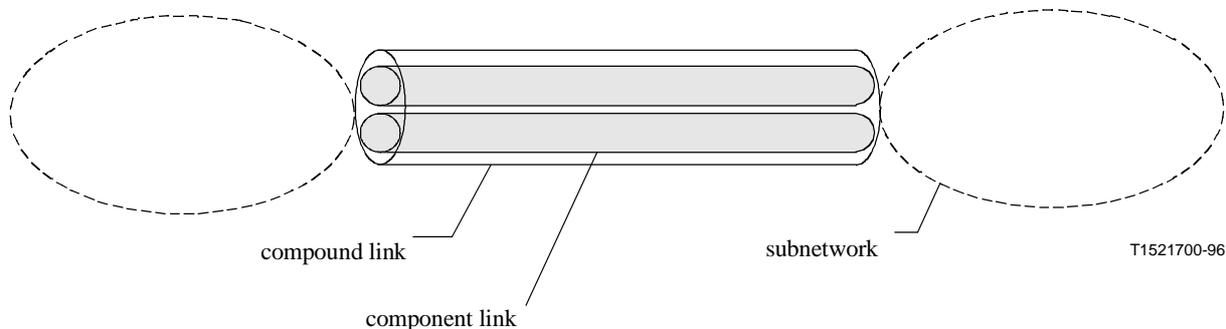
$\forall R: \text{clientServer} \cap \text{clientServer}' \bullet \text{server}'(R) = \text{server}(R)$

A.3.2.4 compoundLinkHasLinks

A.3.2.4.1 Informal description

DEFINITION

"The compoundLinkHasLinks relationship class describes the group of links to form a compound link. The relationship is a subtype of setOf."



ROLE

container

"Played by an instance of the link information object type or subtype."

element

"Played by instances of the link information object type or subtype."

INVARIANT

inv_1

"The container and the elements must contain the same signalIdentification information."

inv_2

"The container and the elements must have the same directionality."

A.3.2.4.2 Semi-formal description

compoundLinkHasLinks RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

compoundLinkHasLinksBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_1>, <inv_2>";;

ROLE container

COMPATIBLE WITH link AND SUBCLASSES;

ROLE element

COMPATIBLE WITH link AND SUBCLASSES;

Superseded by a more recent version

A.3.2.4.3 Formal description

<p><u>compoundLinkHasLinks_Static</u></p> <p><i>compoundLinkHasLinks</i> : F RELATIONSHIP <i>setOf_Static</i> <i>link_Static</i></p>
<p><i>compoundLinkHasLinks</i> \subseteq <i>setOf</i></p> <p>$\forall R: \text{compoundLinkHasLinks} \cdot \text{container}(R) \in \text{link} \wedge \text{elementSet}(R) \subseteq \text{link}$</p> <p>$\forall R: \text{compoundLinkHasLinks} \cdot \text{signalIdentification}(\text{elementSet}) = \text{signalIdentification}(\{\text{container}\})$</p> <p>$\forall R: \text{compoundLinkHasLinks} \cdot \text{directionality}(\text{elementSet}) = \text{directionality}(\{\text{container}\})$</p>
<p><u>compoundLinkHasLinks_Dynamic</u></p> <p>Δ <i>compoundLinkHasLinks_Static</i> <i>setOf_Dynamic</i> <i>link_Dynamic</i></p>

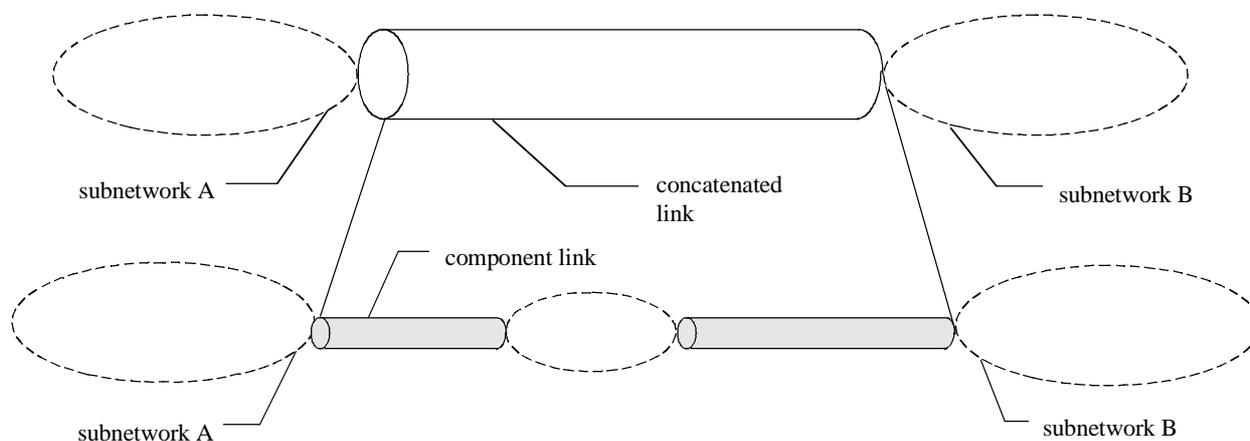
A.3.2.5 concatenatedLinkHasLinks

A.3.2.5.1 Informal description

DEFINITION

"The concatenatedLinkHasLinks relationship class describes the group of links to form a concatenated link.

The relationship is a subtype of setOf."



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ROLE

container

"Played by an instance of the link information object type and subtype."

element

"Played by instances of the link information object type and subtype."

INVARIANT

inv_1

"The container and the elements must contain the same signalIdentification information."

inv_2

"The container and the elements must have the same directionality."

Superseded by a more recent version

A.3.2.5.2 Semi-formal description

concatenatedLinkHasLinks RELATIONSHIP CLASS

BEHAVIOUR

DERIVED FROM setOF;

concatenatedLinkHasLinksBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_1>, <inv_2>";;

ROLE container

COMPATIBLE WITH link AND SUBCLASSES;

ROLE element

COMPATIBLE WITH link AND SUBCLASSES;

A.3.2.5.3 Formal description

concatenatedLinkHasLinks_Static

concatenatedLinkHasLinks : F RELATIONSHIP

setOf_Static

link_Static

$concatenatedLinkHasLinks \subseteq setOf$

$\forall R: concatenatedLinkHasLinks \cdot container(R) \in link \wedge elementSet(R) \subseteq link$

$\forall R: concatenatedLinkHasLinks \cdot signalIdentification(\{elementSet\}) = signalIdentification(\{container\})$

$\forall R: concatenatedLinkHasLinks \cdot directionality(\{elementSet\}) = directionality(\{container\})$

concatenatedLinkHasLinks_Dynamic

$\Delta concatenatedLinkHasLinks_Static$

setOf_Dynamic

link_Dynamic

A.3.2.6 extremitiesTerminateLinkConnection

A.3.2.6.1 Informal description

DEFINITION

"The extremitiesTerminateLinkConnection relationship class describes the relationship that exists between a linkConnection and its extremities.

This relationship type is a subtype of extremitiesTerminateTransportEntity."

Explaining figure in the subclasses.

ROLE

transportEntity

"Played by an instance of the linkConnection information object type or subtype."

A_end

"Played by instances of subnetworkConnection object type or subtype or by instances of the following networkCTPSource information object type or subtype."

Z_end

"Played by instances of subnetworkConnection object type or subtype or by instances of the following networkCTPSink information object type or subtype."

INVARIANT

inv_1

"One and only one instance of the role A_end must participate in the relationship."

inv_2

"One and only one instance of the role Z_end must participate in the relationship."

Superseded by a more recent version

inv_3

"No information object can have the role A_end more than one time."

inv_4

"No information object can have the role Z_end more than one time."

A.3.2.6.2 Semi-formal description

extremitiesTerminateLinkConnection RELATIONSHIP CLASS

DERIVED FROM extremitiesTerminateTransportEntity;

BEHAVIOUR

extremitiesTerminateLinkConnectionBehaviour BEHAVIOUR

DEFINED AS

" <DEFINITION>,

<inv_3>, <inv_4>";;

ROLE transportEntity

COMPATIBLE WITH linkConnection AND SUBCLASSES;

ROLE A_end

COMPATIBLE WITH networkCTPSource AND SUBCLASSES,

subnetworkConnection AND SUBCLASSES

PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT (1..1);

ROLE Z_end

COMPATIBLE WITH networkCTPSink AND SUBCLASSES,

subnetworkConnection AND SUBCLASSES

PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT (1..1);

A.3.2.6.3 Formal description

extremitiesTerminateLinkConnection_Static

extremitiesTerminateLinkConnection : F RELATIONSHIP

*extremitiesTerminateTransportEntity*_Static

*linkConnection*_Static

*subnetworkConnection*_Static

*networkCTPSource*_Static

*networkCTPSink*_Static

extremitiesTerminateLinkConnection \subseteq *extremitiesTerminateTransportEntity*

$\forall R$: *extremitiesTerminateLinkConnection* •

$transportEntity(R) \in linkConnection \wedge$

$A_endSet(R) \subseteq subnetworkConnection \cup networkCTPSource \wedge$

$Z_endSet(R) \subseteq subnetworkConnection \cup networkCTPSink$

$\forall R$: *extremitiesTerminateLinkConnection* • $\#(A_endSet(R)) = 1 \wedge \#(Z_endSet(R)) = 1$

$\forall R1, R2$: *extremitiesTerminateLinkConnection* •

$R1 \neq R2 \Rightarrow disjoint \langle A_endSet(R1), A_endSet(R2) \rangle$

$\forall R1, R2$: *extremitiesTerminateLinkConnection* •

$R1 \neq R2 \Rightarrow disjoint \langle Z_endSet(R1), Z_endSet(R2) \rangle$

Superseded by a more recent version

_____ extremitiesTerminateLinkConnection_Dynamic _____

Δ extremitiesTerminateLinkConnection_Static
extremitiesTerminateTransportEntity_Dynamic
linkConnection_Dynamic
subnetworkConnection_Dynamic
networkCTPSource_Dynamic
networkCTPSink_Dynamic

A.3.2.7 extremitiesTerminateSubnetworkConnection

A.3.2.7.1 Informal description

DEFINITION

"The *extremitiesTerminateSubnetworkConnection* relationship class describes the relationship that exists between a *subnetworkConnection* and its *extremities*.

This relationship type is a subtype of *extremitiesTerminateTransportEntity*."

Explaining figure in the subclasses.

ROLE

transportEntity

"Played by an instance of the *subnetworkConnection* information object type or subtype."

A_end

"Played by an instance of the following information object types and subtypes:
subnetworkTPSource, *subnetworkTPBidirectional*."

Z_end

"Played by an instance of the following information object types and subtypes : *subnetworkTPSink*,
subnetworkTPBidirectional."

INVARIANT

inv_1

"One and only one instance of the role *A_end* must participate in the relationship."

inv_2

"One and only one instance of the role *Z_end* must participate in the relationship."

inv_3

"No information object can have the role *A_end* more than one time."

inv_4

"No information object can have the role *Z_end* more than one time."

A.3.2.7.2 Semi-formal description

extremitiesTerminateSubnetworkConnection RELATIONSHIP CLASS

DERIVED FROM *extremitiesTerminateTransportEntity*;

BEHAVIOUR

extremitiesTerminateSubnetworkConnectionBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<*inv_3*>, <*inv_4*>";;

ROLE *transportEntity*

COMPATIBLE WITH *subnetworkConnection* AND SUBCLASSES;

ROLE *A_end*

COMPATIBLE WITH *subnetworkTPSource* AND SUBCLASSES

PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT (1..1);

ROLE *Z_end*

COMPATIBLE WITH *subnetworkTPSink* AND SUBCLASSES

PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT (1..1);

Superseded by a more recent version

A.3.2.7.3 Formal description

<p><u>extremitiesTerminateSubNetworkConnection_Static</u></p> <p><i>extremitiesTerminateSubNetworkConnection</i> : <i>F RELATIONSHIP</i> <i>extremitiesTerminateTransportEntity_Static</i> <i>subnetworkConnection_Static</i> <i>subnetworkTPSource_Static</i> <i>subnetworkTPBidirectional</i> <i>subnetworkTPSink_Static</i></p>
<p><i>extremitiesTerminateSubNetworkConnection</i> \subseteq <i>extremitiesTerminateTransportEntity</i></p> <p>$\forall R$: <i>extremitiesTerminateSubNetworkConnection</i> • <i>transportEntity</i>(<i>R</i>) \in <i>subnetworkConnection</i> \wedge <i>A_endSet</i>(<i>R</i>) \subseteq <i>subnetworkTPSource</i> \cup <i>subnetworkTPBidirectional</i> \wedge <i>Z_endSet</i>(<i>R</i>) \subseteq <i>subnetworkTPSink</i> \cup <i>subnetworkTPBidirectional</i></p> <p>$\forall R$: <i>extremitiesTerminateSubNetworkConnection</i> • #(<i>A_endSet</i>(<i>R</i>)) = 1 \wedge #(<i>Z_endSet</i>(<i>R</i>)) = 1</p> <p>$\forall R1, R2$: <i>extremitiesTerminateSubNetworkConnection</i> • <i>R1</i> \neq <i>R2</i> \Rightarrow <i>disjoint</i> <<i>A_endSet</i>(<i>R1</i>), <i>A_endSet</i>(<i>R2</i>)></p> <p>$\forall R1, R2$: <i>extremitiesTerminateSubNetworkConnection</i> • <i>R1</i> \neq <i>R2</i> \Rightarrow <i>disjoint</i> <<i>Z_endSet</i>(<i>R1</i>), <i>Z_endSet</i>(<i>R2</i>)></p>

<p><u>extremitiesTerminateSubNetworkConnection_Dynamic</u></p> <p>Δ <i>extremitiesTerminateSubNetworkConnection_Static</i> <i>extremitiesTerminateTransportEntity_Dynamic</i> <i>subnetworkConnection_Dynamic</i> <i>subnetworkTPSource_Dynamic</i> <i>subnetworkTPBidirectional</i> <i>subnetworkTPSink_Dynamic</i></p>
--

A.3.2.8 extremitiesTerminateTrail

A.3.2.8.1 Informal description

DEFINITION

"The *extremitiesTerminateTrail* relationship class describes the relationship that exists between a trail and its extremities.

This relationship type is a subtype of *extremitiesTerminateTransportEntity*."

Explaining figure in the subclasses.

ROLE

transportEntity

"Played by an instance of the trail information object type or subtype."

A_end

"Played by instances of *networkTTPSource* or a subtype."

Z_end

"Played by instances of *networkTTPSink* or a subtype."

INVARIANT

inv_1

"One and only one instance of the role *A_end* must participate in the relationship."

inv_2

"One and only one instance of the role *Z_end* must participate in the relationship."

Superseded by a more recent version

inv_3

"No information object can have the role A_end more than one time."

inv_4

"No information object can have the role Z_end more than one time."

A.3.2.8.2 Semi-formal description

extremitiesTerminateTrail RELATIONSHIP CLASS
DERIVED FROM extremitiesTerminateTransportEntity;
BEHAVIOUR
extremitiesTerminateTrailBehaviour BEHAVIOUR
DEFINED AS

"<DEFINITION>,"

<inv_3>, <inv_4>";

ROLE transportEntity

COMPATIBLE WITH trail AND SUBCLASSES;

ROLE A_end

COMPATIBLE WITH networkTTPSource AND SUBCLASSES

PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT (1..1);

ROLE Z_end

COMPATIBLE WITH networkTTPSink AND SUBCLASSES

PERMITTED-RELATIONSHIP-CARDINALITY-CONSTRAINT (1..1);

A.3.2.8.3 Formal description

extremitiesTerminateTrail_Static

extremitiesTerminateTrail : F RELATIONSHIP

extremitiesTerminateTransportEntity_Static

trail_Static

networkTTPSource_Static

networkTTPSink_Static

$extremitiesTerminateTrail \subseteq extremitiesTerminateTransportEntity$

$\forall R: extremitiesTerminateTrail \bullet$

$transportEntity(R) \in trail \wedge$

$A_endSet(R) \subseteq networkTTPSource \wedge$

$Z_endSet(R) \subseteq networkTTPSink$

$\forall R: extremitiesTerminateTrail \bullet \#(A_endSet(R)) = 1 \wedge \#(Z_endSet(R)) = 1$

$\forall R1, R2 : extremitiesTerminateTrail \bullet$

$R1 \neq R2 \Rightarrow disjoint \langle A_endSet(R1), A_endSet(R2) \rangle$

$\forall R1, R2 : extremitiesTerminateTrail \bullet$

$R1 \neq R2 \Rightarrow disjoint \langle Z_endSet(R1), Z_endSet(R2) \rangle$

extremitiesTerminateTrail_Dynamic

$\Delta extremitiesTerminateTrail_Static$

extremitiesTerminateTransportEntity_Dynamic

trail_Dynamic

networkTTPSource_Dynamic

networkTTPSink_Dynamic

Superseded by a more recent version

A.3.2.9 extremitiesTerminateTransportEntity

A.3.2.9.1 Informal description

DEFINITION

"The extremitiesTerminateTransportEntity relationship class describes the relationship that exists between a transport entity and its extremities. Through this transport entity, the signal goes from the A_end(s) to the Z_end(s) if it is uni-directional and in both ways if it is bi-directional."

Explaining figure in the subclasses.

ROLE

transportEntity

"Played by an instance of a subtype of the transportConnection information object type or subtype."

A_end

"Played by instance of the following information object types or subtypes : networkCTP, networkTTP, subnetworkTP or transportConnection."

Z_end

"Played by instances of the following information object types or subtypes : networkCTP, networkTTP, subnetworkTP or transportConnection."

INVARIANT

inv_1

"One and only one instance of the role transportEntity must participate in the relationship."

inv_2

"Zero or more instances of the role A_end may participate in the relationship."

inv_3

"Zero or more instances of the role Z_end may participate in the relationship."

inv_4

"If the information object playing the role transportEntity is bi-directional, then all the information objects playing the ROLE A_end and Z_end must be bi-directional."

A.3.2.9.2 Semi-formal description

extremitiesTerminateTransportEntity RELATIONSHIP CLASS

BEHAVIOUR

extremitiesTerminateTransportEntityBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,
<inv_4>"

ROLE transportEntity

COMPATIBLE WITH transportConnection AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1) ;

ROLE A_end

COMPATIBLE WITH transportConnection AND SUBCLASSES,
networkCTP AND SUBCLASSES,
networkTTP AND SUBCLASSES,
subnetworkTP AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (0..N);

ROLE Z_end

COMPATIBLE WITH transportConnection AND SUBCLASSES,
networkCTP AND SUBCLASSES,
networkTTP AND SUBCLASSES,
subnetworkTP AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (0..N);

Superseded by a more recent version

A.3.2.9.3 Formal description

extremitiesTerminateTransportEntity_Static

extremitiesTerminateTransportEntity : **F** RELATIONSHIP

transportEntity : RELATIONSHIP → OBJECT

A_endSet : RELATIONSHIP → **F** OBJECT

Z_endSet : RELATIONSHIP → **F** OBJECT

transportConnection_Static

networkCTP_Static

networkTTP_Static

subnetworkTP_Static

networkCTPBidirectional_Static

networkTTPBidirectional_Static

subnetworkTPBidirectional_Static

extremitiesTerminateTransportEntity ⊆ **dom** *transportEntity*

extremitiesTerminateTransportEntity ⊆ **dom** *A_endSet*

extremitiesTerminateTransportEntity ⊆ **dom** *Z_endSet*

∀ *R* : *extremitiesTerminateTransportEntity* •

transportEntity(*R*) ∈ *transportConnection* ∧

A_endSet(*R*) ⊆ *transportConnection* ∪ *networkCTP* ∪ *networkTTP* ∪ *subnetworkTP* ∧

Z_endSet(*R*) ⊆ *transportConnection* ∪ *networkCTP* ∪ *networkTTP* ∪ *subnetworkTP*

∀ *R* : *extremitiesTerminateTransportEntity* • ∀ *extremity* : *A_endSet*(*R*) ∪ *Z_endSet*(*R*) •

directionality(*transportEntity*(*R*)) = *bidirectional* ⇒

((*extremity* ∈ *networkCTPBidirectional* ∪ *networkTTPBidirectional*
∪ *subnetworkTPBidirectional*)

∨

(*extremity* ∈ *transportConnection* ∧ *directionality*(*extremity*) = *bidirectional*))

extremitiesTerminateTransportEntity_Dynamic

Δ *extremitiesTerminateTransportEntity_Static*

transportConnection_Dynamic

networkCTP_Dynamic

networkTTP_Dynamic

subnetworkTP_Dynamic

networkCTPBidirectional_Dynamic

networkTTPBidirectional_Dynamic

subnetworkTPBidirectional_Dynamic

∀ *R* : *extremitiesTerminateTransportEntity* ∪ *extremitiesTerminateTransportEntity*' •

transportEntity'(*R*) = *transportEntity*(*R*) ∧

A_endSet'(*R*) = *A_endSet*(*R*) ∧

Z_endSet'(*R*) = *Z_endSet*(*R*)

Superseded by a more recent version

A.3.2.10 extremitiesTerminateTransportEntityPointToPoint

A.3.2.10.1 Informal description

DEFINITION

"The *extremitiesTerminateTransportEntityPointToPoint* relationship class describes the relationship that exists between a transport entity and its two extremities. Through this transport entity, the signal goes from the *A_end* to the *Z_end* if it is uni-directional and in both ways if it is bi-directional. This relationship type is a subtype of *extremitiesTerminateTransportEntity*."

Explaining figure in the subclasses.

INVARIANT

inv_1

"One and only one instance of the role *A_end* must participate in the relationship."

inv_2

"One and only one instance of the role *Z_end* must participate in the relationship."

A.3.2.10.2 Semi-formal description

extremitiesTerminateTransportEntityPointToPoint RELATIONSHIP CLASS

DERIVED FROM *extremitiesTerminateTransportEntity*;

BEHAVIOUR

extremitiesTerminateTransportPointToPointBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";

ROLE *A_end*

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1) ;

ROLE *Z_end*

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1) ;

A.3.2.10.3 Formal description

extremitiesTerminateTransportEntityPointToPoint_Static

extremitiesTerminateTransportEntityPointToPoint : F RELATIONSHIP

extremitiesTerminateTransportEntity_Static

$extremitiesTerminateTransportEntityPointToPoint \subseteq extremitiesTerminateTransportEntity$

$\forall R : extremitiesTerminateTransportEntityPointToPoint \cdot \#(A_endSet(R)) = 1 \wedge \#(Z_endSet(R)) = 1$

extremitiesTerminateTransportEntityPointToPoint_Dynamic

$\Delta extremitiesTerminateTransportEntityPointToPoint_Static$

extremitiesTerminateTransportEntity_Dynamic

A.3.2.11 isConnectedTo

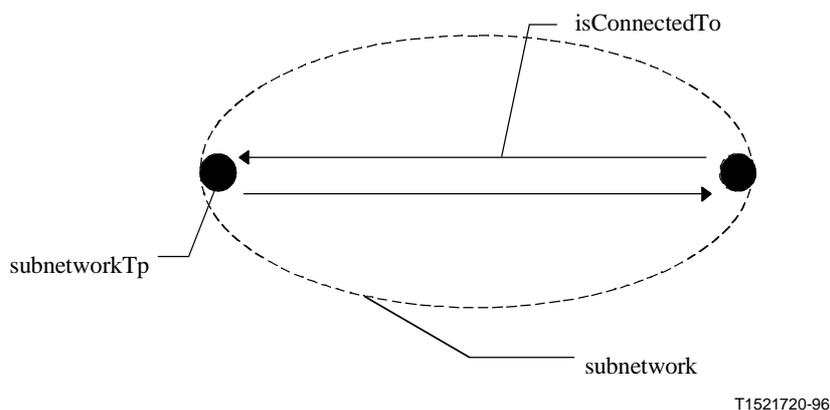
A.3.2.11.1 Informal description

DEFINITION

"The *isConnectedTo* relationship class describes the relationship that exists between subnetworkTPs through which the signal transfers.

This relationship type is a subtype of *oneToOneRelationship*."

Superseded by a more recent version



ROLE

peer

"Played by two instances of a subtype of the subnetworkTP information object type."

INVARIANT

inv_1

"One instance must be of the subnetworkTPSink object type or subtype and the other must be of the subnetworkTPSource object type or subtype."

A.3.2.11.2 Semi-formal description

isConnectedTo RELATIONSHIP CLASS

DERIVED FROM oneToOneRelationship;

BEHAVIOUR

isConnectedToBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_1>";;

ROLE peer

COMPATIBLE WITH subnetworkTP AND SUBCLASSES;

A.3.2.11.3 Formal description

isConnectedTo_Static

isConnectedTo : F RELATIONSHIP

oneToOneRelationship_Static

subnetworkTP_Static

subnetworkTPSink_Static

subnetworkTPSource_Static

$isConnectedTo \subseteq oneToOneRelationship$

$\forall R : isConnectedTo \bullet first(peer(R)) \in subnetworkTP \wedge second(peer(R)) \in subnetworkTP$

$\forall R : isConnectedTo \bullet$

$(first(peer(R)) \in subnetworkTPSink \wedge second(peer(R)) \in subnetworkTPSource) \vee$

$(first(peer(R)) \in subnetworkTPSource \wedge second(peer(R)) \in subnetworkTPSink)$

isConnectedTo_Dynamic

$\Delta isConnectedTo_Static$

oneToOneRelationship_Dynamic

subnetworkTP_Dynamic

subnetworkTPSink_Dynamic

subnetworkTPSource_Dynamic

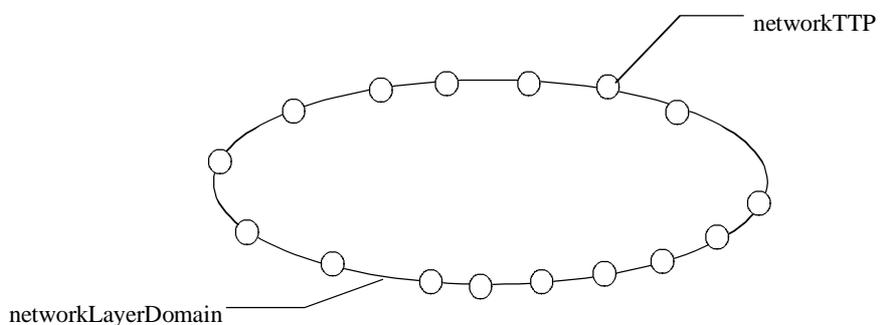
Superseded by a more recent version

A.3.2.12 layerNetworkDomainIsDelimitedBy

A.3.2.12.1 Informal description

DEFINITION

"The layerNetworkDomainIsDelimitedBy relationship class describes the relationship that exists between a layerNetworkDomain and the networkTTPs that delimit it. This relationship type is a subtype of topologicalComponentIsDelimitedBy."



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ROLE

container

"Played by an instance of the layerNetworkDomain information object type or subtype."

element

"Played by an instance of a subtype of the networkTTP information object type."

A.3.2.12.2 Semi-formal description

layerNetworkDomainIsDelimitedBy RELATIONSHIP CLASS

DERIVED FROM topologicalComponentIsDelimitedBy;

BEHAVIOUR

layerNetworkDomainIsDelimitedByBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE container

COMPATIBLE WITH layerNetworkDomain AND SUBCLASSES;

ROLE element

COMPATIBLE WITH networkTTP AND SUBCLASSES;

A.3.2.12.3 Formal description

layerNetworkDomainIsDelimitedBy_Static

layerNetworkDomainIsDelimitedBy : F RELATIONSHIP

topologicalComponentIsDelimitedBy_Static

layerNetworkDomain_Static

networkTTP_Static

layerNetworkDomainIsDelimitedBy \subseteq topologicalComponentIsDelimitedBy

$\forall R : \text{layerNetworkDomainIsDelimitedBy} \bullet$

$\text{container}(R) \in \text{layerNetworkDomain} \wedge \text{elementSet}(R) \subseteq \text{networkTTP}$

layerNetworkDomainIsDelimitedBy_Dynamic

Δ layerNetworkDomainIsDelimitedBy_Static

topologicalComponentIsDelimitedBy_Dynamic

layerNetworkDomain_Dynamic

networkTTP_Dynamic

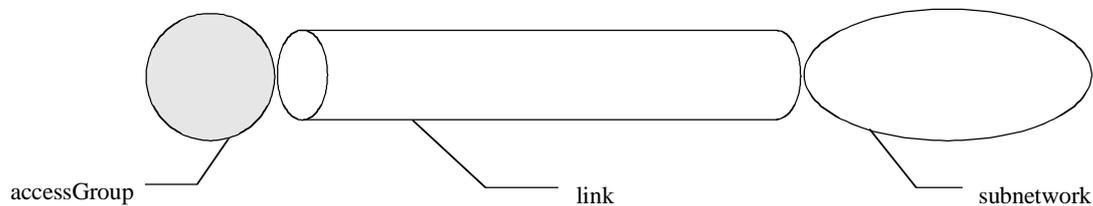
Superseded by a more recent version

A.3.2.13 linkBinds

A.3.2.13.1 Informal description

DEFINITION

"The linkBinds relationship class describes the relationship that exists between a link and its two extremities. These can be any of the following: subnetwork / accessGroup / networkTPPool. The two associated extremities are referred to as the A_end and the Z_end."



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ROLE

transferCapacity

"Played by an instance of the link information object type or subtype."

A_end

"Played by an instance of the subnetwork information object type or subtype or by an instance of the accessGroup information object type or subtype or by an instance of the networkTPPool information object type or subtype."

Z_end

"Played by an instance of the subnetwork information object type or subtype or by an instance of the accessGroup information object type or subtype or by an instance of the networkTPPool information object type or subtype."

INVARIANT

inv_1

"One and only one instance of the role transferCapacity must participate in the relationship."

inv_2

"One and only one instance of the role A_end must participate in the relationship."

inv_3

"One and only one instance of the role Z_end must participate in the relationship."

A.3.2.13.2 Semi_formal description

linkBinds RELATIONSHIP CLASS

BEHAVIOUR

linkBindsBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE transferCapacity

COMPATIBLE WITH link AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

ROLE A_end

COMPATIBLE WITH subnetwork AND SUBCLASSES,

accessGroup AND SUBCLASSES,

networkTPPool AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

ROLE Z_end

COMPATIBLE WITH subnetwork AND SUBCLASSES,

accessGroup AND SUBCLASSES,

networkTPPool AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

Superseded by a more recent version

A.3.2.13.3 Formal description

linkBinds_Static

$linkBinds : F \text{ RELATIONSHIP}$
 $transferCapacity : RELATIONSHIP \rightarrow OBJECT$
 $A_end : RELATIONSHIP \rightarrow OBJECT$
 $Z_end : RELATIONSHIP \rightarrow OBJECT$
 $link_Static$
 $subnetwork_Static$
 $accessGroup_Static$
 $subnetworkTPPool_Static$

$linkBinds \subseteq \mathbf{dom} \ transferCapacity$

$linkBinds \subseteq \mathbf{dom} \ A_end$

$linkBinds \subseteq \mathbf{dom} \ Z_end$

$\forall R : linkBinds \bullet$
 $transferCapacity(R) \in link \wedge$
 $A_end(R) \in subnetwork \cup accessGroup \cup subnetworkTPPool \wedge$
 $Z_end(R) \in subnetwork \cup accessGroup \cup subnetworkTPPool$

linkBinds_Dynamic

$\Delta linkBinds_Static$
 $link_Dynamic$
 $subnetwork_Dynamic$
 $accessGroup_Dynamic$
 $subnetworkTPPool_Dynamic$

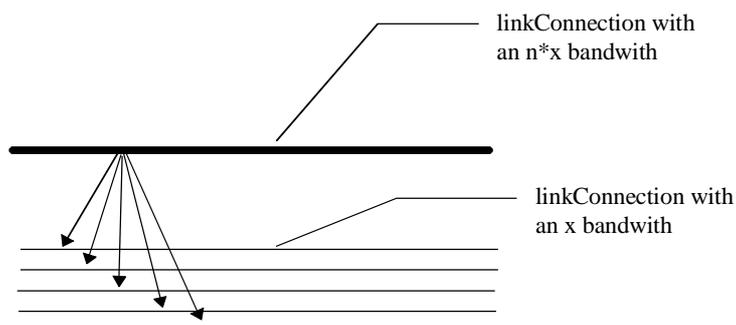
$\forall R : linkBinds \cup linkBinds' \bullet$
 $transferCapacity'(R) = transferCapacity(R) \wedge$
 $A_end'(R) = A_end(R) \wedge$
 $Z_end'(R) = Z_end(R)$

A.3.2.14 linkConnectionIsBundleOfLinkConnections

A.3.2.14.1 Informal description

DEFINITION

"The linkConnectionIsBundleOfLinkConnections relationship class describes the relationship that exists between a linkConnection and the linkConnections that are part of it. This relationship type is a subtype of setOf."



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Superseded by a more recent version

ROLE

container

"Played by an instance of the linkConnection information object type or subtype."

element

"Played by an instance of a sub-type of the linkConnection information object type or subtype."

A.3.2.14.2 Semi-formal description

linkConnectionIsBundleOfLinkConnections RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

linkConnectionIsBundleOfLinkConnectionsBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE container

COMPATIBLE WITH linkConnection AND SUBCLASSES;

ROLE element

COMPATIBLE WITH linkConnection AND SUBCLASSES;

A.3.2.14.3 Formal description

linkConnectionIsBundleOfLinkConnections_Static

linkConnectionIsBundleOfLinkConnections : F RELATIONSHIP

setOf_Static

linkConnection_Static

$linkConnectionIsBundleOfLinkConnections \subseteq setOf$

$\forall R : linkConnectionIsBundleOfLinkConnections \bullet$

$container(R) \in linkConnection \wedge elementSet(R) \subseteq linkConnection$

linkConnectionIsBundleOfLinkConnections_Dynamic

$\Delta linkConnectionIsBundleOfLinkConnections_Static$

setOf_Dynamic

linkConnection_Dynamic

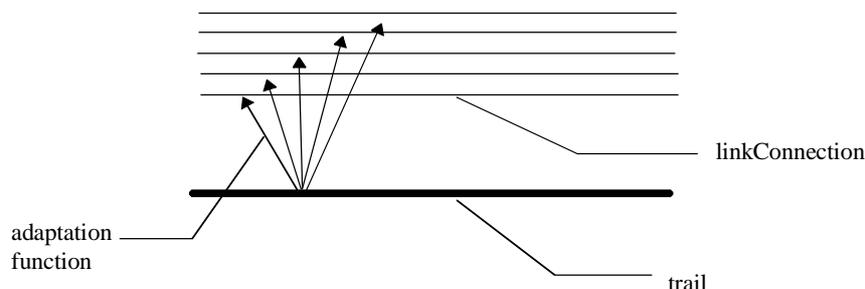
A.3.2.15 linkConnectionIsSupportedByTrail

A.3.2.15.1 Informal description

DEFINITION

"The linkConnectionIsSupportedByTrail relationship class describes the relationship that exists between linkConnections of a given layer network (known as the client layer network) and the trail that supports them in a server layer network.

This relationship type is a subtype of clientServer."



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Superseded by a more recent version

ROLE

client

"Played by instances of the linkConnection information object type or subtype."

server

"Played by an instance of the trail information object type or subtype."

A.3.2.15.2 Semi-formal description

linkConnectionIsSupportedByTrail RELATIONSHIP CLASS

DERIVED FROM clientServer;

BEHAVIOUR

linkConnectionIsSupportedByTrailBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE client

COMPATIBLE WITH linkConnection AND SUBCLASSES;

ROLE server

COMPATIBLE WITH trail AND SUBCLASSES;

A.3.2.15.3 Formal description

linkConnectionIsSupportedByTrail_Static

linkConnectionIsSupportedByTrail : F RELATIONSHIP

clientServer_Static

linkConnection_Static

trail_Static

$linkConnectionIsSupportedByTrail \subseteq clientServer$

$\forall R : linkConnectionIsSupportedByTrail \bullet clientSet(R) \subseteq linkConnection \wedge server(R) \in trail$

linkConnectionIsSupportedByTrail_Dynamic

$\Delta linkConnectionIsSupportedByTrail_Static$

clientServer_Dynamic

linkConnection_Dynamic

trail_Dynamic

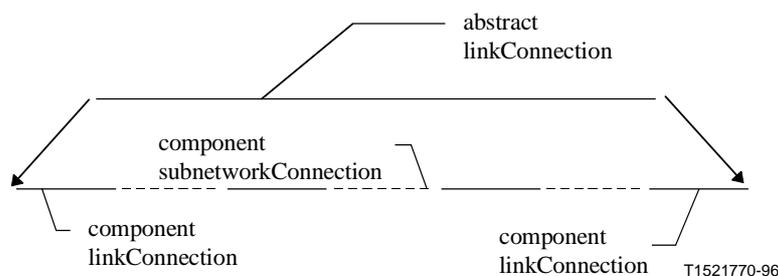
A.3.2.16 linkConnectionIsMadeOfTransportEntities

A.3.2.16.1 Informal description

DEFINITION

"The linkConnectionIsMadeOfTransportEntities relationship class describes the relationship that exists between a composite link connection and its component transport entities.

This relationship type is a subtype of transportEntitiesComposeTransportEntity."



Superseded by a more recent version

ROLE

composite

"Played by an instance of the `linkConnection` information object type or subtype."

component

"Played by an instance of the `subnetworkConnection` information object type or subtype, or `linkConnection` information object type or subtype."

INVARIANT

inv_1

"The component connections being contiguous, both the first and the last one must be instances of the `linkConnection` information object type or subtype."

A.3.2.16.2 Semi-formal description

`linkConnectionIsMadeOfTransportEntities` RELATIONSHIP CLASS

DERIVED FROM `transportEntitiesComposeTransportEntity`;

BEHAVIOUR

`linkConnectionIsMadeOfTransportEntitiesBehaviour` BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_1>;

ROLE composite

COMPATIBLE WITH `linkConnection` AND SUBCLASSES;

ROLE component

COMPATIBLE WITH `subnetworkConnection` AND SUBCLASSES,

`linkConnection` AND SUBCLASSES;

A.3.2.16.3 Formal description

`linkConnectionIsMadeOfTransportEntities_Static`

linkConnectionIsMadeOfTransportEntities : F RELATIONSHIP

transportEntitiesComposeTransportEntity_Static

linkConnection_Static

subnetworkConnection_Static

$linkConnectionIsMadeOfTransportEntities \subseteq transportEntitiesComposeTransportEntity$

$\forall R : linkConnectionIsMadeOfTransportEntities \bullet$

$composite(R) \in linkConnection \wedge$

$ran(componentSeq(R)) \subseteq subnetworkConnection \cup linkConnection$

$\forall R : linkConnectionIsMadeOfTransportEntities \bullet$

$head(componentSeq(R)) \in linkConnection \wedge$

$last(componentSeq(R)) \in linkConnection$

`linkConnectionIsMadeOfTransportEntities_Dynamic`

$\Delta linkConnectionIsMadeOfTransportEntities_Static$

transportEntitiesComposeTransportEntity_Dynamic

linkConnection_Dynamic

subnetworkConnection_Dynamic

A.3.2.17 linkConnectionIsTerminatedByPointToPoint

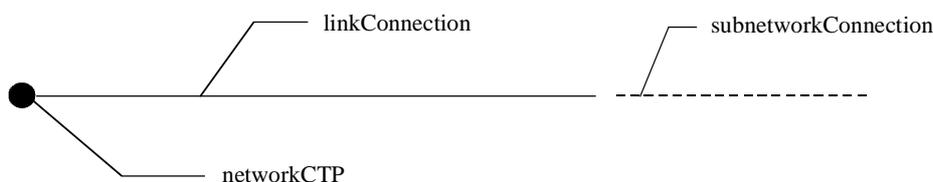
A.3.2.17.1 Informal description

DEFINITION

"The `linkConnectionIsTermPointToPoint` relationship class describes the relationship that exists between a link connection and its two extremities.

This relationship type is a subtype of `extremitiesTerminateTransportEntityPointToPoint` and `extremitiesTerminateLinkConnection`."

Superseded by a more recent version



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A.3.2.17.2 Semi-formal description

linkConnectionIsTerminatedByPointToPoint RELATIONSHIP CLASS
DERIVED FROM *extremitiesTerminateTransportEntityPointToPoint*,
extremitiesTerminateLinkConnection;
BEHAVIOUR
linkConnectionIsTerminatedByPointToPointBehaviour BEHAVIOUR
DEFINED AS
 "<DEFINITION>";;

A.3.2.17.3 Formal description

linkConnectionIsTerminatedByPointToPoint_Static

linkConnectionIsTerminatedByPointToPoint : F RELATIONSHIP
extremitiesTerminateTransportEntityPointToPoint_Static
extremitiesTerminateLinkConnection_Static

linkConnectionIsTerminatedByPointToPoint
 \subseteq *extremitiesTerminateTransportEntityPointToPoint* \cup *extremitiesTerminateLinkConnection*

linkConnectionIsTerminatedByPointToPoint_Dynamic

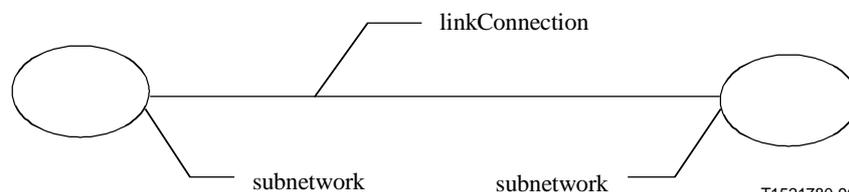
Δ *linkConnectionIsTerminatedByPointToPoint*
extremitiesTerminateTransportEntityPointToPoint_Dynamic
extremitiesTerminateLinkConnection_Dynamic

A.3.2.18 linkConnectionIsTerminatedBySubnetworks

A.3.2.18.1 Informal description

DEFINITION

"The *linkConnectionIsTerminatedBySubnetworks* relationship class describes the relationship that exists between the resources represented by a pair of sub-network objects and the link connection that may bind them. The two associated information objects are referred to as the A end and the Z end. Through a uni-directional link connection, traffic goes only from the A end to the Z end; through a bi-directional one, traffic may go from A to Z and from Z to A."



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ROLE

transportEntity

"Played by an instance of the *linkConnection* information object type or subtype."

A_end

"Played by an instance of the *subnetwork* information object type or subtype."

Z_end

"Played by an instance of the *subnetwork* information object type or subtype."

Superseded by a more recent version

INVARIANT

inv_1

"One and only one instance playing the role transportEntity must participate in the relationship."

inv_2

"One and only one instance playing the role A_end must participate in the relationship."

inv_3

"One and only one instance playing the role Z_end must participate in the relationship."

A.3.2.18.2 Semi-formal description

linkConnectionIsTerminatedBySubnetworks RELATIONSHIP CLASS

BEHAVIOUR

linkConnectionIsTerminatedBySubnetworksBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE transportEntity

COMPATIBLE WITH linkConnection AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

ROLE A_end

COMPATIBLE WITH subnetwork AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

ROLE Z_end

COMPATIBLE WITH subnetwork AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

A.3.2.18.3 Formal description

linkConnectionIsTerminatedBySubnetworks_Static

linkConnectionIsTerminatedBySubnetworks : F RELATIONSHIP

transportEntity : RELATIONSHIP → OBJECT

A_end : RELATIONSHIP → OBJECT

Z_end : RELATIONSHIP → OBJECT

linkConnection_Static

subnetwork_Static

linkConnectionIsTerminatedByPointSubnetworks ⊆ dom *transportEntity*

linkConnectionIsTerminatedByPointSubnetworks ⊆ dom *A_end*

linkConnectionIsTerminatedByPointSubnetworks ⊆ dom *Z_end*

∀ R : *linkConnectionIsTerminatedByPointSubnetworks* •

transportEntity(R) ∈ *linkConnection* ∧

A_end(R) ∈ *subnetwork* ∧

Z_end(R) ∈ *subnetwork*

linkConnectionIsTerminatedBySubnetworks_Dynamic

Δ *linkConnectionIsTerminatedBySubnetworks_Static*

linkConnection_Dynamic

subnetwork_Dynamic

∀ R : *linkConnectionIsTerminatedBySubnetworks* ∪ *linkConnectionIsTerminatedBySubnetworks* •

transportEntity'(R) = *transportEntity*(R) ∧

A_end'(R) = *A_end*(R) ∧

Z_end'(R) = *Z_end*(R)

Superseded by a more recent version

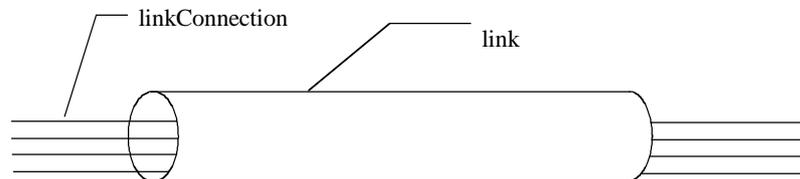
A.3.2.19 linkHasLinkConnections

A.3.2.19.1 Informal description

DEFINITION

"The linkHasLinkConnections relationship class describes the relationship that exists between a link and the linkConnections that are part of it.

This relationship type is a subtype of setOf."



T1521790-96

ROLE

container

"Played by an instance of the link information object type or subtype."

element

"Played by an instance of the linkConnection information object type or subtype."

A.3.2.19.2 Semi-formal description

linkHasLinkConnections RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

linkHasLinkConnectionsBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE container

COMPATIBLE WITH link AND SUBCLASSES;

ROLE element

COMPATIBLE WITH linkConnection AND SUBCLASSES;

A.3.2.19.3 Formal description

linkHasLinkConnections_Static

linkHasLinkConnections : F RELATIONSHIP

setOf_Static

link_Static

linkConnection_Static

$linkHasLinkConnections \subseteq setOf$

$\forall R : linkHasLinkConnections \bullet container(R) \in link \wedge elementSet(R) \subseteq linkConnection$

linkHasLinkConnections_Dynamic

$\Delta linkHasLinkConnections_Static$

setOf_Dynamic

link_Dynamic

linkConnection_Dynamic

Superseded by a more recent version

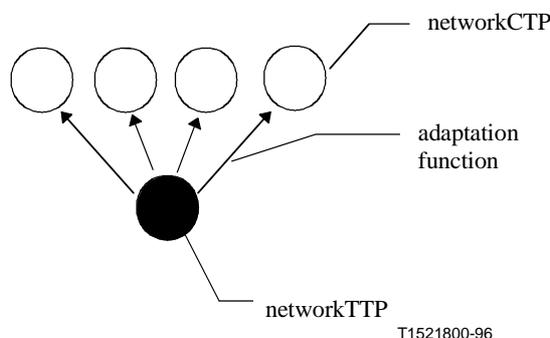
A.3.2.20 networkTTPAdaptsNetworkCTP

A.3.2.20.1 Informal description

DEFINITION

"The networkTTPAdaptsNetworkCTP relationship class describes the relationship that exists between networkCTPs of a given layer network (known as the client layer network) and the networkTTP that supports them in a server layer network.

This relationship is a subtype of clientServer."



ROLE

client

"Played by instances of a subtype of the networkCTP information object type."

server

"Played by an instance of a subtype of the networkTTP information object type."

A.3.2.20.2 Semi-formal description

networkTTPAdaptsNetworkCTP RELATIONSHIP CLASS

DERIVED FROM clientServer;

BEHAVIOUR

networkTTPAdaptsNetworkCTPBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE client

COMPATIBLE WITH networkCTP AND SUBCLASSES;

ROLE server

COMPATIBLE WITH networkTTP AND SUBCLASSES;

A.3.2.20.3 Formal description

networkTTPAdaptsNetworkCTP_Static

networkTTPAdaptsNetworkCTP : F RELATIONSHIP

clientServer_Static

networkCTP_Static

networkTTP_Static

networkTTPAdaptsNetworkCTP ⊆ clientServer

$\forall R : \text{networkTTPAdaptsNetworkCTP} \bullet \text{clientSet}(R) \subseteq \text{networkCTP} \wedge \text{server}(R) \in \text{networkTTP}$

networkTTPAdaptsNetworkCTP_Dynamic

Δ networkTTPAdaptsNetworkCTP_Static

clientServer_Dynamic

networkCTP_Dynamic

networkTTP_Dynamic

Superseded by a more recent version

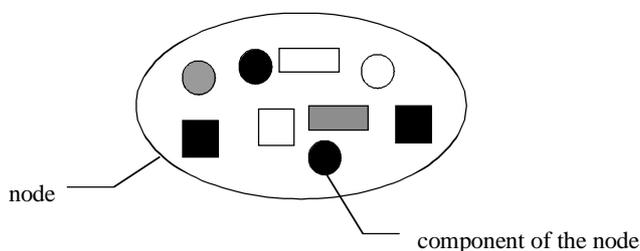
A.3.2.21 nodeIsMadeOf

A.3.2.21.1 Informal description

DEFINITION

"The nodeIsMadeOf relationship class describes the relationship that exists between a node and its components.

This relationship type is a subtype of setOf."



T1521810-96

ROLE

container

"Played by an instance of the node information object type or subtype."

element

"Played by instances of a sub-type of the networkInformationTop object type."

A.3.2.21.2 Semi-formal description

nodeIsMadeOf RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

nodeIsMadeOfBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE container

COMPATIBLE WITH node AND SUBCLASSES;

ROLE element

COMPATIBLE WITH networkInformationTop AND SUBCLASSES;

A.3.2.21.3 Formal description

nodeIsMadeOf_Static

nodeIsMadeOf : F RELATIONSHIP

*setOf*_Static

*node*_Static

*networkInformationTop*_Static

$nodeIsMadeOf \subseteq setOf$

$\forall R : nodeIsMadeOf \bullet container(R) \in node \wedge elementSet(R) \subseteq networkInformationTop$

nodeIsMadeOf_Dynamic

$\Delta nodeIsMadeOf_Static$

*setOf*_Dynamic

*node*_Dynamic

*networkInformationTop*_Dynamic

Superseded by a more recent version

A.3.2.22 oneToOne Relationship

A.3.2.22.1 Informal description

DEFINITION

"The oneToOneRelationship relationship class describes the relationship that exists between two information objects."

Explaining figure in the subclasses.

ROLE

peer

"Played by an instance of a subtype of the information object type : networkInformationTop."

INVARIANT

inv_1

"Two and only two instances of the role peer must participate in the relationship."

A.3.2.22.2 Semi-formal description

oneToOneRelationship RELATIONSHIP CLASS

BEHAVIOUR oneToOneRelationshipBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";

ROLE peer

COMPATIBLE WITH networkInformationTop AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (2..2) ;

A.3.2.22.3 Formal description

oneToOneRelationship_Static

$oneToOneRelationship : F \text{ RELATIONSHIP}$
 $peer : RELATIONSHIP \rightarrow (OBJECT \times OBJECT)$
 $networkInformationTop_Static$

$oneToOneRelationship \subseteq \text{dom } peer$

$\forall R : oneToOneRelationship \bullet$
 $first(peer(R)) \in networkInformationTop \wedge second(peer(R)) \in networkInformationTop$

oneToOneRelationship_Dynamic

$\Delta oneToOneRelationship_Static$
 $networkInformationTop_Dynamic$

$\forall R : oneToOneRelationship \cup oneToOneRelationship' \bullet peer'(R) = peer(R)$

A.3.2.23 setOf

A.3.2.23.1 Informal description

DEFINITION

"The setOf relationship class describes the relationship that exists between a set and its elements."

Explaining figure in the subclasses.

ROLE

container

"Played by an instance of a subtype of the information object type : networkInformationTop."

element

"Played by instances of a subtype of the information object type : networkInformationTop."

INVARIANT

inv_1

"One and only one instance of the role container must participate in the relationship."

inv_2

"One or more instances of the role element must participate in the relationship."

Superseded by a more recent version

inv_3

"All the instances of the role element must belong to a unique information object type or to its subtypes."

TRANSITION

tr_1

"The information objects having the role element can leave the relationship without breaking it."

tr_2

"During the lifetime of the relationship, additional information objects can enter the relationship, having the role element."

A.3.2.23.2 Semi-formal description

setOf RELATIONSHIP CLASS

BEHAVIOUR

setOfBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,
<inv_3>"

ROLE container

COMPATIBLE WITH networkInformationTop AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1) ;

ROLE element

COMPATIBLE WITH networkInformationTop AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..N)
BIND-SUPPORT
UNBIND-SUPPORT;

A.3.2.23.3 Formal description

setOf_Static

setOf : F RELATIONSHIP
container : RELATIONSHIP → OBJECT
elementSet RELATIONSHIP → F OBJECT
networkInformationTop_Static

$setOf \subseteq dom\ container$

$setOf \subseteq dom\ elementSet$

$\forall R : setOf \bullet container(R) \in networkInformationTop \wedge elementSet(R) \subseteq networkInformationTop$

$\forall R : setOf \bullet \#(elementSet(R)) \geq 1$

setOf_Dynamic

$\Delta setOf_Static$
networkInformationTop_Dynamic

$\forall R : setOf \cup setOf' \bullet container'(R) = container(R)$

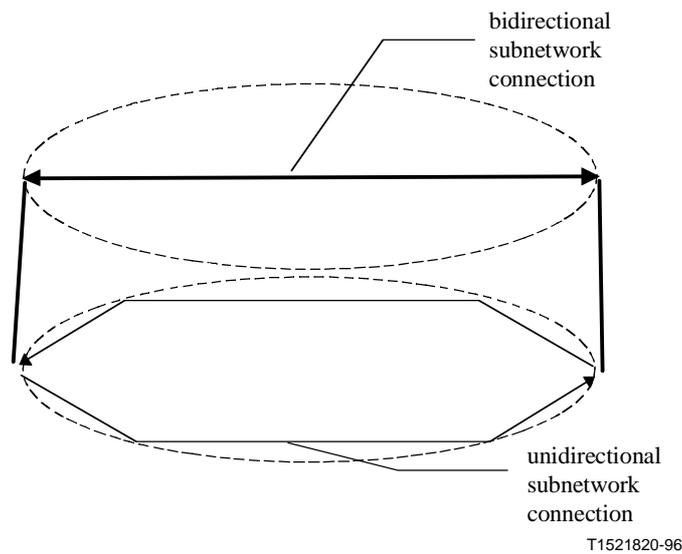
A.3.2.24 snCBidIsSupportedByUnis

A.3.2.24.1 Informal description

DEFINITION

"The snCBidIsSupportedByUnis relationship class describes the relationship that exists between a bi-directional subnetworkConnection instance and the two uni-directional (co- and contra-directional with regard to an orientation reference) subnetworkConnection instances that together provide bi-directionality (e.g. case of a uni-directional SDH ring)."

Superseded by a more recent version



ROLE

bid

"Played by an instance of the subnetworkConnection information object type or subtype."

uni1

"Played by an instance of the subnetworkConnection information object type or subtype."

uni2

"Played by an instance of the subnetworkConnection information object type or subtype."

INVARIANT

inv_1

"One and only one instance of the role uni1 must participate in the relationship."

inv_2

"One and only one instance of the role uni2 must participate in the relationship."

inv_3

"One and only one instance of the role bid must participate in the relationship."

inv_4

"The instance of the role uni1 and the instance of the role uni2 must be both uni-directional, the first one co-directional and the second one contra-directional with regard to an orientation reference."

A.3.2.24.2 Semi-formal description

snCBidIsSupportedByUnis RELATIONSHIP CLASS

BEHAVIOUR

snCBidIsSupportedByUnisBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_4>";;

ROLE bid

COMPATIBLE WITH subnetworkConnection AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

ROLE uni1

COMPATIBLE WITH subnetworkConnection AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

ROLE uni2

COMPATIBLE WITH subnetworkConnection AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

Superseded by a more recent version

A.3.2.24.3 Formal description

snCBidIsSupportedByUnis_Static

$snCBidIsSupportedByUnis : F \text{ RELATIONSHIP}$
 $bid : \text{RELATIONSHIP} \rightarrow \text{OBJECT}$
 $uni1 : \text{RELATIONSHIP} \rightarrow \text{OBJECT}$
 $uni2 : \text{RELATIONSHIP} \rightarrow \text{OBJECT}$
 $subnetworkConnection_Static$
 $extremitiesTerminateSubnetworkConnection_Static$

$snCBidIsSupportedByUnis \subseteq \text{dom } bid$

$snCBidIsSupportedByUnis \subseteq \text{dom } uni1$

$snCBidIsSupportedByUnis \subseteq \text{dom } uni2$

$\forall R : snCBidIsSupportedByUnis \bullet$

$bid(R) \in subnetworkConnection \wedge$
 $uni1(R) \in subnetworkConnection \wedge$
 $uni2(R) \in subnetworkConnection$

$\forall R : snCBidIsSupportedByUnis \bullet$

$directionality(uni1(R)) = unidirectional \wedge directionality(uni2(R)) = unidirectional \wedge$
 $(\exists R1, R2 : extremitiesTerminateSubnetworkConnection \bullet$
 $uni1(R) = transportEntity(R1) \wedge$
 $uni2(R) = transportEntity(R2) \wedge$
 $A_endSet(R1) = Z_endSet(R2) \wedge$
 $Z_endSet(R1) = A_endSet(R2))$

snCBidIsSupportedByUnis_Dynamic

$\Delta snCBidIsSupportedByUnis_Static$
 $subnetworkConnection_Dynamic$
 $extremitiesTerminateSubnetworkConnection_Dynamic$

$\forall R : snCBidIsSupportedByUnis \cup snCBidIsSupportedByUnis' \bullet$

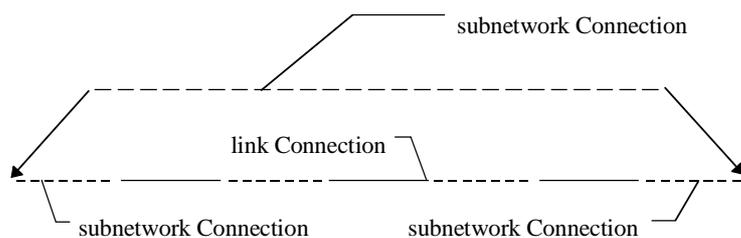
$bid'(R) = bid(R) \wedge uni1'(R) = uni1(R) \wedge uni2'(R) = uni2(R)$

A.3.2.25 subnetworkConnectionIsMadeOfTransportEntities

A.3.2.25.1 Informal description

DEFINITION

"The subnetworkConnectionIsMadeOfTransportEntities relationship class describes the relationship that exists between a composite sub-network connection and its component transport entities. This relationship type is a subtype of transportEntitiesComposeTransportEntity."



T1521830-96

Superseded by a more recent version

ROLE

composite

"Played by an instance of the subnetworkConnection information object type or subtype."

component

"Played by instances of the subnetworkConnection information object type or subtype, or linkConnection information object type or subtype."

INVARIANT

inv_1

"The component transport entities being contiguous, both the first and the last one must be instances of the subnetworkConnection information object type or of one of its subtypes."

A.3.2.25.2 Semi-formal description

subnetworkConnectionIsMadeOfTransportEntities RELATIONSHIP CLASS

DERIVED FROM transportEntitiesComposeTransportEntity;

BEHAVIOUR

subnetworkConnectionIsMadeOfTransportEntitiesBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_1>;

ROLE composite

COMPATIBLE WITH subnetworkConnection AND SUBCLASSES;

ROLE component

COMPATIBLE WITH subnetworkConnection AND SUBCLASSES,

linkConnection AND SUBCLASSES;

A.3.2.25.3 Formal description

subnetworkConnectionIsMadeOfTransportEntities_Static

subnetworkConnectionIsMadeOfTransportEntities : F RELATIONSHIP

transportEntitiesComposeTransportEntity_Static

subnetworkConnection_Static

linkConnection_Static

$subnetworkConnectionIsMadeOfTransportEntities \subseteq transportEntitiesComposeTransportEntity$

$\forall R : subnetworkConnectionIsMadeOfTransportEntities \bullet$

$composite(R) \in subnetworkConnection \wedge$

$ran(componentSeq(R)) \subseteq subnetworkConnection \cup linkConnection$

$\forall R : subnetworkConnectionIsMadeOfTransportEntities \bullet$

$head(componentSeq(R)) \in subnetworkConnection \wedge$

$last(componentSeq(R)) \in subnetworkConnection$

subnetworkConnectionIsMadeOfTransportEntities_Dynamic

$\Delta subnetworkConnectionIsMadeOfTransportEntities$

transportEntitiesComposeTransportEntity_Dynamic

subnetworkConnection_Dynamic

linkConnection_Dynamic

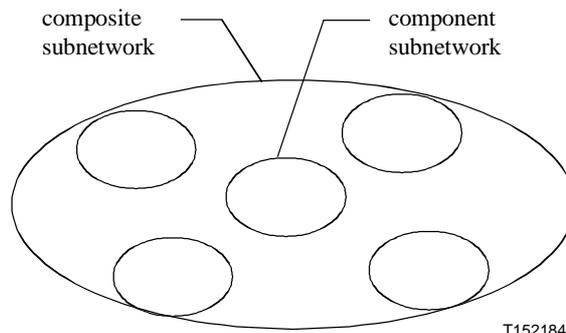
A.3.2.26 sNIsPartitionedBySn

A.3.2.26.1 Informal description

DEFINITION

"The sNIsPartitionedBySn relationship class describes the relationship that exists between a subnetwork and the smaller subnetwork (or subclasses) instances that are part of its decomposition due to partitioning."

Superseded by a more recent version



T1521840-96

ROLE

composite

"Played by an instance of the subnetwork information object type or subtype".

component

"Played by an instance of the subnetwork information object type or subtype".

INVARIANT

inv_1

"At least one instance of the role component must participate in the relationship."

inv_2

"One and only one instance of the role composite must participate in the relationship."

TRANSITION

tr_1

"The information objects playing the role component, provided one remains, can leave the relationship without breaking it."

tr_2

"During the lifetime of the relationship, additional information objects can enter the relationship, playing the role component."

A.3.2.26.2 Semi-formal description

snIsPartitionedBySn RELATIONSHIP CLASS

BEHAVIOUR

sNIsPartitionedBySnBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE composite

COMPATIBLE WITH subnetwork AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1);

ROLE component

COMPATIBLE WITH subnetwork AND SUBCLASSES

PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..N)

BIND-SUPPORT

UNBIND-SUPPORT;

A.3.2.26.3 Formal description

snIsPartitionedBySn_Static

$snIsPartitionedBySn : F \text{ RELATIONSHIP}$

$composite : \text{RELATIONSHIP} \rightarrow \text{OBJECT}$

$componentSet : \text{RELATIONSHIP} \rightarrow F \text{ OBJECT}$

$subnetwork_Static$

$snIsPartitionedBySn \subseteq \text{dom } composite$

$snIsPartitionedBySn \subseteq \text{dom } componentSet$

$\forall R : snIsPartitionedBySn \bullet composite(R) \in subnetwork \wedge componentSet(R) \in subnetwork$

$\forall R : snIsPartitionedBySn \bullet \#(componentSet(R)) \geq 1$

Superseded by a more recent version

_____snIsPartitionedBySn_Dynamic_____

Δ snIsPartitionedBySn_Static
subnetwork_Dynamic

$\forall R : snIsPartitionedBySn \cup snIsPartitionedBySn' \bullet$
 $composite'(R) = composite(R)$

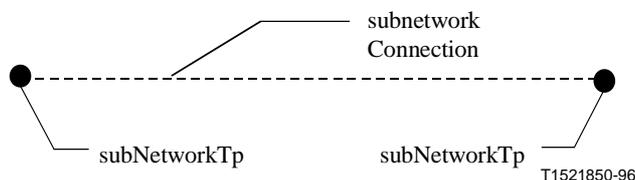
A.3.2.27 subnetworkConnectionIsTerminatedByPointToPoint

A.3.2.27.1 Informal description

DEFINITION

"The subnetworkConnectionIsTerminatedByPointToPoint relationship class describes the relationship that exists between a subnetwork connection and its two terminations.

This relationship type is a subtype of extremitiesTerminateTransportEntityPointToPoint and extremitiesTerminateSubnetworkConnection."



A.3.2.27.2 Semi-formal description

subnetworkConnectionIsTerminatedByPointToPoint RELATIONSHIP CLASS

DERIVED FROM extremitiesTerminateTransportEntityPointToPoint,
extremitiesTerminateSubnetworkConnection;

BEHAVIOUR

subnetworkConnectionIsTerminatedByPointToPointBehaviour **BEHAVIOUR**

DEFINED AS

"<DEFINITION>";;

A.3.2.27.3 Formal description

_____subnetworkConnectionIsTerminatedByPointToPoint_Static_____

subnetworkConnectionIsTerminatedByPointToPoint : F RELATIONSHIP
extremitiesTerminateTransportEntityPointToPoint_Static
extremitiesTerminateSubnetworkConnection_Static

subnetworkConnectionIsTerminatedByPointToPoint

\sqsubseteq extremitiesTerminateTransportEntityPointToPoint \cup extremitiesTerminateSubnetworkConnection

_____subnetworkConnectionIsTerminatedByPointToPoint_Dynamic_____

Δ subnetworkConnectionIsTerminatedByPointToPoint_Static
extremitiesTerminateTransportEntityPointToPoint_Dynamic
extremitiesTerminateSubnetworkConnection_Dynamic

A.3.2.28 subnetworkHasSubnetworkConnections

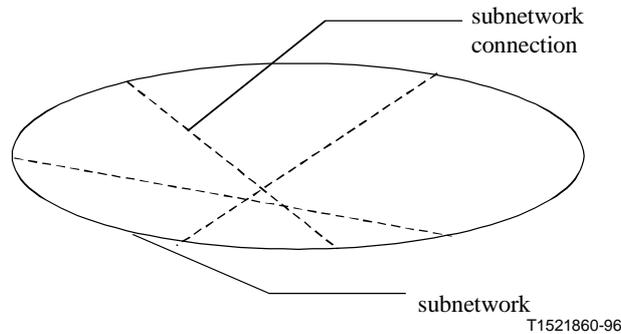
A.3.2.28.1 Informal description

DEFINITION

"The subnetworkHasSubnetworkConnections relationship class describes the relationship that exists between a subnetwork and the subnetworkConnections that are part of it.

This relationship type is a subtype of setOf."

Superseded by a more recent version



ROLE

container

"Played by an instance of the subnetwork information object type or subtype".

element

"Played by an instance of the subnetworkConnection information object type or subtype".

A.3.2.28.2 Semi-formal description

subnetworkHasSubnetworkConnections RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

subnetworkHasSubnetworkConnectionsBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE container

COMPATIBLE WITH subnetwork AND SUBCLASSES;

ROLE element

COMPATIBLE WITH subnetworkConnection AND SUBCLASSES;

A.3.2.28.3 Formal description

subnetworkHasSubnetworkConnections_Static

subnetworkHasSubnetworkConnections : F RELATIONSHIP

setOf_Static

subnetwork_Static

subnetworkConnection_Static

$subnetworkHasSubnetworkConnections \subseteq setOf$

$\forall R : subnetworkHasSubnetworkConnections \bullet$

$container(R) \in subnetwork \wedge elementSet(R) \subseteq subnetworkConnection$

subnetworkHasSubnetworkConnections_Dynamic

$\Delta subnetworkHasSubnetworkConnections_Static$

setOf_Dynamic

subnetwork_Dynamic

subnetworkConnection_Dynamic

A.3.2.29 subnetworkIsDelimitedBy

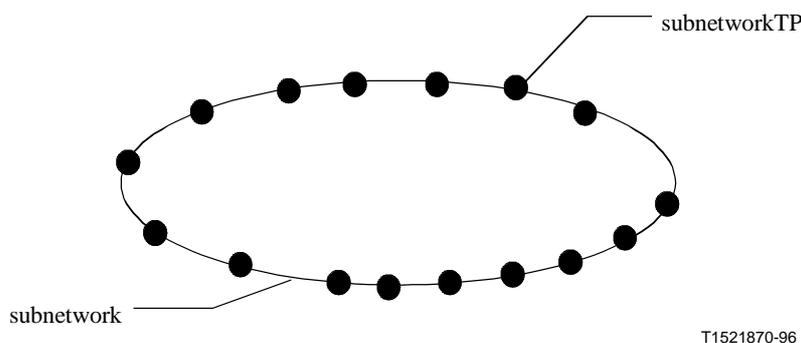
A.3.2.29.1 Informal description

DEFINITION

"The subnetworkIsDelimitedBy relationship class describes the relationship that exists between a subnetwork and the subnetworkTPs that delimit it.

This relationship type is a subtype of topologicalComponentIsDelimitedBy."

Superseded by a more recent version



ROLE

container

"Played by an instance of the subnetwork information object type or a subtype."

element

"Played by an instance of a subtype of the subnetworkTP information object type."

A.3.2.29.2 Semi-formal description

subnetworkIsDelimitedBy RELATIONSHIP CLASS

DERIVED FROM topologicalComponentIsDelimitedBy;

BEHAVIOUR

subnetworkIsDelimitedByBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE container

COMPATIBLE WITH subnetwork AND SUBCLASSES;

ROLE element

COMPATIBLE WITH subnetworkTP AND SUBCLASSES;

A.3.2.29.3 Formal description

subnetworkIsDelimitedBy_Static

subnetworkIsDelimitedBy : F RELATIONSHIP

topologicalComponentIsDelimitedBy_Static

subnetwork_Static

subnetworkTP_Static

$subnetworkIsDelimitedBy \subseteq topologicalComponentIsDelimitedBy$

$\forall R : subnetworkIsDelimitedBy \bullet container(R) \in subnetwork \wedge elementSet \subseteq subnetworkTP$

subnetworkIsDelimitedBy_Dynamic

$\Delta subnetworkIsDelimitedBy_Static$

topologicalComponentIsDelimitedBy_Dynamic

subnetwork_Dynamic

subnetworkTP_Dynamic

A.3.2.30 subnetworkTPIsBundleOfSubnetworkTPs

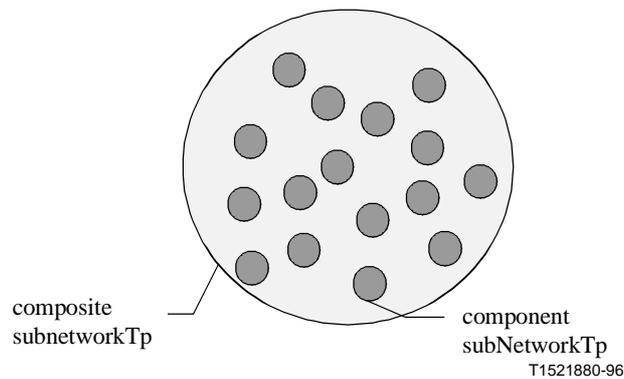
A.3.2.30.1 Informal description

DEFINITION

"The subnetworkTPIsBundleOfSubnetworkTPs relationship class describes the relationship that exists between a subnetworkTP and the subnetworkTPs that are part of it. (This relationship is similar to the information specification of the M.3100 gtp managed object class).

This relationship type is a subtype of setOf."

Superseded by a more recent version



ROLE

container

"Played by an instance of a subtype of the subnetworkTP information object type."

element

"Played by an instance of a subtype of the subnetworkTP information object type."

INVARIANT

inv_1

"In a given relationship instance of subnetworkTPsBundleOfNetworkTPs, the information objects having the role element must be related all to networkTTPs or all to networkCTPs."

A.3.2.30.2 Semi-formal description

subnetworkTPsBundleOfSubnetworkTPs RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

subnetworkTPsBundleOfSubnetworkTPsBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_1>";;

ROLE container

COMPATIBLE WITH subnetworkTP AND SUBCLASSES;

ROLE element

COMPATIBLE WITH subnetworkTP AND SUBCLASSES;

A.3.2.30.3 Formal description

subnetworkTPsBundleOfSubNetworkTPs_Static

subnetworkTPsBundleOfSubNetworkTPs : F RELATIONSHIP

setOf_Static

subnetworkTP_Static

networkCTP_Static

networkTTP_Static

subnetworkTPsRelatedToExtremity_Static

subnetworkTPsBundleOfSubNetworkTPs \subseteq *setOf*

$\forall R : \text{subnetworkTPsBundleOfSubNetworkTPs} \bullet$
container(R) \in *subnetworkTP* \wedge *elementSet* \subseteq *subnetworkTP*

$\forall R : \text{subnetworkTPsBundleOfSubNetworkTPs} \bullet$
 (*elementSet*(R) \subseteq *abstraction*(/SetsubnetworkTPsRelatedToExtremity/) \wedge
extremity(/abstractionSet~(/elementSet(R)/)) \subseteq *networkCTP* \cup *networkTTP*)

Superseded by a more recent version

subnetworkTPIsBundleOfSubNetworkTPs_Dynamic

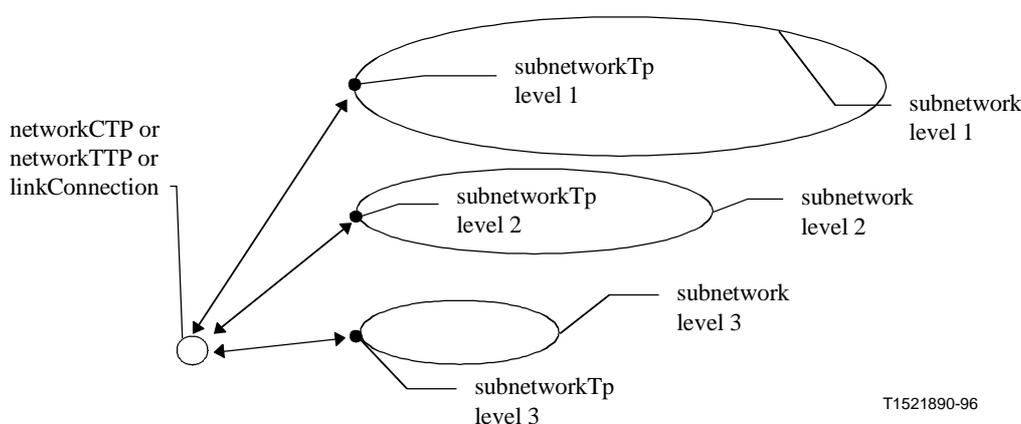
Δ subnetworkTPIsBundleOfSubNetworkTPs
 setOf_Dynamic
 subnetworkTP_Dynamic
 networkCTP_Dynamic
 networkTTP_Dynamic
 subnetworkTPIsRelatedToExtremity_Dynamic

A.3.2.31 subnetworkTPIsRelatedToExtremity

A.3.2.31.1 Informal description

DEFINITION

"The subnetworkTPIsRelatedToExtremity relationship class describes the relationship that exists between subnetworkTPs a different level of partitioning and the extremity to which they are related."



ROLE

extremity

"Played by an instance of the networkTTP, networkCTP sub-types or linkConnection type or subtype".

abstraction

"Played by instances of the subnetworkTP sub-types."

INVARIANT

inv_1

"The following constraints on the types of related object have to be respected:

role: extremity	role: abstraction
networkCTPSink	subnetworkTPSource
networkTTPSource	subnetworkTPSource
linkConnection with directionality=uni	subnetworkTPSource
networkCTPSource	subnetworkTPSink
networkTTPSink	subnetworkTPSink
linkConnection with directionality=uni	subnetworkTPSink
networkCTPBidirectional	subnetworkTPBidirectional
networkTTPBidirectional	subnetworkTPBidirectional
linkConnection with directionality=bid	subnetworkTPBidirectional

Superseded by a more recent version

TRANSITION

tr_1

"The information objects having the role abstraction can leave the relationship without breaking it."

tr_2

"During the lifetime of the relationship, additional information objects having the role abstraction can enter the relationship."

tr_3

"The information objects having the role extremity can leave the relationship without breaking it."

A.3.2.31.2 Semi-formal description

subnetworkTPIsRelatedToExtremity RELATIONSHIP CLASS

BEHAVIOURsubnetworkTPIsRelatedToExtremityBehaviour BEHAVIOUR

DEFINED AS "<DEFINITION>,"

<inv_1>";;

ROLE extremity

COMPATIBLE WITH networkTTP AND SUBCLASSES,
networkCTP AND SUBCLASSES, linkConnection AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1),
UNBIND;

ROLE abstraction

COMPATIBLE WITH subnetworkTP AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..N),
BIND-SUPPORT
UNBIND-SUPPORT;

A.3.2.31.3 Formal description

subnetworkTPIsRelatedToExtremity_Static

subnetworkTPIsRelatedToExtremity : \notin RELATIONSHIP

extremity : RELATIONSHIP ' OBJECT

abstractionSet : RELATIONSHIP ' \notin OBJECT

linkConnection_Static

networkCTP_Static

networkTTP_Static

subnetworkTP_Static

networkCTPSink_Static

networkCTPSource_Static

networkCTPBidirectional_Static

networkTTPSink_Static

networkTTPSource_Static

networkTTPBidirectional_Static

subnetworkTPSink_Static

subnetworkTPSource_Static

subnetworkTPBidirectional_Static

subnetworkTPIsRelatedToExtremity " dom *extremity*

subnetworkTPIsRelatedToExtremity \subseteq dom *abstractionSet*

$\forall R : \text{subnetworkTPIsRelatedToExtremity} \bullet$
 $\text{extremity}(R) \in \text{linkConnection} \cup \text{networkCTP} \cup \text{networkTTP} \wedge$
 $\text{abstractionSet}(R) \subseteq \text{subnetworkTP}$

$\forall R : \text{subnetworkTPIsRelatedToExtremity} \bullet \#(\text{abstractionSet}(R)) \geq 1$

$\forall R : \text{subnetworkTPIsRelatedToExtremity} \bullet \text{let } e == \text{extremity}(R); aSet == \text{abstractionSet}(R) \bullet$
 $(e \in \text{networkCTPSink} \wedge aSet \subseteq \text{subnetworkTPSource}) \vee$
 $(e \in \text{networkTTPSource} \wedge aSet \subseteq \text{subnetworkTPSource}) \vee$
 $(e \in \text{linkConnection} \wedge \text{directionality}(e) = \text{unidirectional} \vee aSet \subseteq \text{subnetworkTPSource}) \vee$
 $(e \in \text{networkCTPSource} \wedge aSet \subseteq \text{subnetworkTPSink}) \vee$

Superseded by a more recent version

$(e \in \text{networkTTPSink} \wedge \text{aSet} \subseteq \text{subnetworkTPSink}) \vee$
 $(e \in \text{linkConnection} \wedge \text{directionality}(e) = \text{unidirectional} \vee \text{aSet} \subseteq \text{subnetworkTPSink}) \vee$
 $(e \in \text{networkCTPBidirectional} \wedge \text{aSet} \subseteq \text{subnetworkTPBidirectional}) \vee$
 $(e \in \text{networkTTPBidirectional} \wedge \text{aSet} \subseteq \text{subnetworkTPBidirectional}) \vee$
 $(e \in \text{linkConnection} \wedge \text{directionality}(e) = \text{bidirectional} \vee \text{aSet} \subseteq \text{subnetworkTPBidirectional})$

_____subnetworkTPIsRelatedToExtremity_Dynamic_____

Δ subnetworkTPIsRelatedToExtremity_Static
linkConnection_Dynamic
networkCTP_Dynamic
networkTTP_Dynamic
subnetworkTP_Dynamic
networkCTPSink_Dynamic
networkCTPSource_Dynamic
networkCTPBidirectional_Dynamic
networkTTPSink_Dynamic
networkTTPSource_Dynamic
networkTTPBidirectional_Dynamic
subnetworkTPSink_Dynamic
subnetworkTPSource_Dynamic
subnetworkTPBidirectional_Dynamic

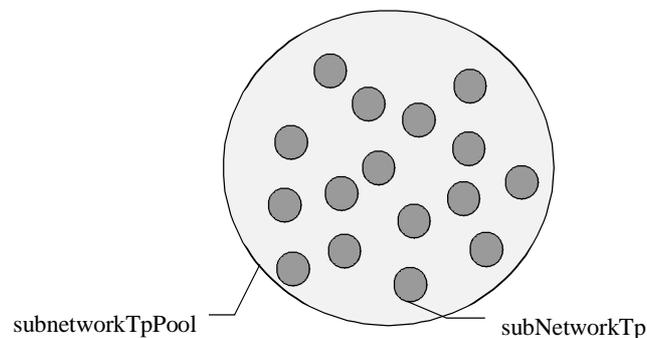
A.3.2.32 subnetworkTPPoolIsMadeOfSubnetworkTP

A.3.2.32.1 Informal description

DEFINITION

"The subnetworkTPPoolIsMadeOfSubnetworkTP relationship class describes the relationship that exists between a subnetworkTPPool and the SubnetworkTPs that are part of it.

This relationship is a subtype of setOf."



T1521900-96

ROLE

container

"Played by an instance subnetworkTPPool the information object type or subtype".

element

"Played by instances of a subtype of the SubnetworkTP information object type: networkInformationTop."

INVARIANT

inv_1

"In a given relationship instance of subnetworkTPPoolIsMadeOfSubnetworkTP, the information objects playing the role element must have all the same signalIdentification value."

Superseded by a more recent version

A.3.2.32.2 Semi-formal description

subnetworkTPPoolIsMadeOfSubnetworkTP RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

subnetworkTPPoolIsMadeOfSubnetworkTP Behaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_1>";;

ROLE container

COMPATIBLE WITH subnetworkTPPool AND SUBCLASSES;

ROLE element

COMPATIBLE WITH SubnetworkTP AND SUBCLASSES;

A.3.2.32.3 Formal description

subnetworkTPPoolIsMadeOfSubNetworkTPs_Static

subnetworkTPPoolIsMadeOfSubNetworkTPs : F RELATIONSHIP

setOf_Static

subnetworkTPPool_Static

subnetworkTP_Static

$subnetworkTPPoolIsMadeOfSubNetworkTPs \subseteq setOf$

$\forall R : subnetworkTPPoolIsMadeOfSubNetworkTPs \bullet$

$container(R) \in subnetworkTPPool \wedge elementSet(R) \subseteq subnetworkTP$

subnetworkTPPoolIsMadeOfSubNetworkTPs_Dynamic

$\Delta subnetworkTPPoolIsMadeOfSubNetworkTPs_Static$

setOf_Dynamic

subnetworkTPPool_Dynamic

subnetworkTP_Dynamic

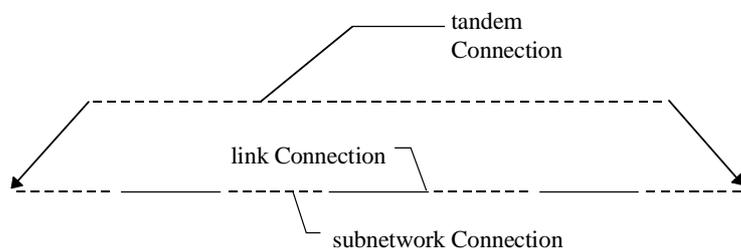
A.3.2.33 tandemConnectionIsMadeOfTransportEntities

A.3.2.33.1 Informal description

DEFINITION

"The tandemConnectionIsMadeOfTransportEntities relationship class describes the relationship that exists between a tandem connection and its component transport entities.

This relationship type is a subtype of transportEntitiesComposeTransportEntity."



T1521910-96

ROLE

composite

"Played by an instance of the tandem connection information object type or subtype."

component

"Played by an instance of the subnetworkConnection information object type or subtype, or linkConnection information object type or subtype."

Superseded by a more recent version

A.3.2.33.2 Semi-formal description

tandemConnectionIsMadeOfTransportEntities RELATIONSHIP CLASS
DERIVED FROM **transportEntitiesComposeTransportEntity**;
BEHAVIOUR
tandemConnectionIsMadeOfTransportEntitiesBehaviour BEHAVIOUR
DEFINED AS
"<DEFINITION>";;
ROLE **composite**
COMPATIBLE WITH **tandemConnection** AND SUBCLASSES;
ROLE **component**
COMPATIBLE WITH **subnetworkConnection** AND SUBCLASSES,
linkConnection AND SUBCLASSES;

A.3.2.33.3 Formal description

<p><i>tandemConnectionIsMadeOfTransportEntities_Static</i></p> <hr/> <p><i>tandemConnectionIsMadeOfTransportEntities</i> : F RELATIONSHIP <i>transportEntitiesComposeTransportEntity_Static</i> <i>tandemConnection_Static</i> <i>linkConnection_Static</i> <i>subnetworkConnection_Static</i></p> <hr/> <p>$tandemConnectionIsMadeOfTransportEntities \subseteq transportEntitiesComposeTransportEntity$</p> <p>$\forall R : tandemConnectionIsMadeOfTransportEntities \bullet$ $composite(R) \in tandemConnection \wedge$ $ran(componentSeq(R)) \subseteq subnetworkConnection \cup linkConnection$</p> <hr/>
<p><i>tandemConnectionIsMadeOfTransportEntities_Dynamic</i></p> <hr/> <p>Δ <i>tandemConnectionIsMadeOfTransportEntities_Static</i> <i>transportEntitiesComposeTransportEntity_Dynamic</i> <i>tandemConnection_Dynamic</i> <i>linkConnection_Dynamic</i> <i>subnetworkConnection_Dynamic</i></p> <hr/>

A.3.2.34 topologicalComponentIsDelimitedBy

A.3.2.34.1 Informal description

DEFINITION

"The **topologicalComponentIsDelimitedBy** relationship class describes the relationship that exists between a **topological component** and the **subnetworkTPs / networkConnectivities** that delimit it.
This relationship type is a subtype of **setOf**."

Explaining figure in the subclasses.

ROLE

container

"Played by an instance of the **layerNetworkDomain** information object type or subtype, or the **subnetwork** information object type or subtype."

element

"Played by an instance of a sub-type of: **subnetworkTP**, **networkTTP** or **transportConnection**."

INVARIANT

inv_1

"In a given relationship instance of **topologicalComponentIsDelimitedBy**, the information objects having the role **element** must be either all **subnetworkTPs** subtype or all **transportConnections** subtype."

Superseded by a more recent version

A.3.2.34.2 Semi-formal description

topologicalComponentIsDelimitedBy RELATIONSHIP CLASS

DERIVED FROM setOf;

BEHAVIOUR

topologicalComponentIsDelimitedByBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

<inv_1>";;

ROLE container

COMPATIBLE WITH subnetwork AND SUBCLASSES,

layerNetworkDomain AND SUBCLASSES;

ROLE element

COMPATIBLE WITH subnetworkTP AND SUBCLASSES,

transportConnection AND SUBCLASSES,

networkTTP AND SUBCLASSES;

A.3.2.34.3 Formal description

_____topologicalComponentIsDelimitedBy_Static_____

topologicalComponentIsDelimitedBy : F RELATIONSHIP

setOf_Static

layerNetworkDomain_Static

subnetwork_Static

subnetworkTP_Static

networkTTP_Static

transportConnection_Static

topologicalComponentIsDelimitedBy \subseteq *setOf*

$\forall R : \text{topologicalComponentIsDelimitedBy} \bullet$

$\text{container}(R) \in \text{layerNetworkDomain} \cup \text{subnetwork} \wedge$

$\text{elementSet}(R) \subseteq \text{subnetworkTP} \cup \text{networkTTP} \cup \text{transportConnection}$

$\forall R : \text{topologicalComponentIsDelimitedBy} \bullet$

$\text{elementSet}(R) \subseteq \text{subnetworkTP} \vee \text{elementSet}(R) \subseteq \text{transportConnection}$

_____topologicalComponentIsDelimitedBy_Dynamic_____

Δ *topologicalComponentIsDelimitedBy_Static*

setOf_Dynamic

layerNetworkDomain_Dynamic

subnetwork_Dynamic

subnetworkTP_Dynamic

networkTTP_Dynamic

transportConnection_Dynamic

A.3.2.35 trailIsMadeOfTransportEntities

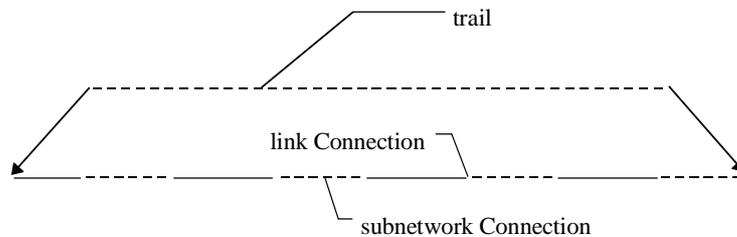
A.3.2.35.1 Informal description

DEFINITION

"The trailIsMadeOfTransportEntities relationship class describes the relationship that exists between a trail and its component transport entities.

This relationship type is a subtype of transportEntitiesComposeTransportEntity."

Superseded by a more recent version



T1521920-96

ROLE

composite

"Played by an instance of the trail information object type or subtype."

component

"Played by an instance of the subnetworkConnection information object type or subtype, or linkConnection information object type or subtype."

A.3.2.35.2 Semi-formal description

trailsMadeOfTransportEntities RELATIONSHIP CLASS

DERIVED FROM transportEntitiesComposeTransportEntity;

BEHAVIOUR

trailsMadeOfTransportEntitiesBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

ROLE composite

COMPATIBLE WITH trail AND SUBCLASSES;

ROLE component

COMPATIBLE WITH subnetworkConnection AND SUBCLASSES,
linkConnection AND SUBCLASSES;

A.3.2.35.3 Formal description

trailsMadeOfTransportEntities_Static

trailsMadeOfTransportEntities : F RELATIONSHIP
transportEntitiesComposeTransportEntity_Static
trail_Static
linkConnection_Static
subnetworkConnection_Static

$trailsMadeOfTransportEntities \subseteq transportEntitiesComposeTransportEntity$

$\forall R : trailsMadeOfTransportEntities \bullet$
 $composite(R) \in trail \wedge ran(componentSeq(R)) \subseteq subnetworkConnection \cup linkConnection$

trailsMadeOfTransportEntities_Dynamic

Δ *trailsMadeOfTransportEntities_Static*
transportEntitiesComposeTransportEntity_Dynamic
trail_Dynamic
linkConnection_Dynamic
subnetworkConnection_Dynamic

A.3.2.36 trailsTerminatedByPointToPoint

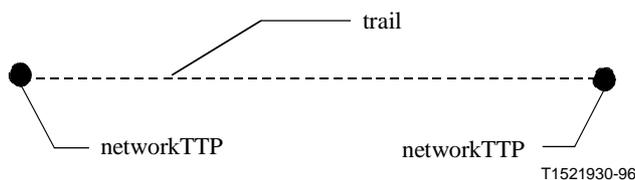
A.3.2.36.1 Informal description

DEFINITION

"The trailsTerminatedByPointToPoint relationship class describes the relationship that exists between a trail and its two extremities.

This relationship type is a subtype of extremitiesTerminateTransportEntityPointToPoint and extremitiesTerminateTrail."

Superseded by a more recent version



A.3.2.36.2 Semi-formal description

trailIsTerminatedByPointToPoint RELATIONSHIP CLASS

DERIVED FROM *extremitiesTerminateTransportEntityPointToPoint*,
extremitiesTerminateTrail;

BEHAVIOUR

trailIsTerminatedByPointToPointBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>";;

A.3.2.36.3 Formal description

$\underline{\text{trailIsTerminatedByPointToPoint_Static}}$
<i>trailIsTerminatedByPointToPoint</i> : F RELATIONSHIP <i>extremitiesTerminateTransportEntityPointToPoint_Static</i> <i>extremitiesTerminateTrail_Static</i>
<i>trailIsTerminatedByPointToPoint</i> $\subseteq \text{extremitiesTerminateTransportEntityPointToPoint} \cup \text{extremitiesTerminateTrail}$
$\underline{\text{trailIsTerminatedByPointToPoint_Dynamic}}$
Δ <i>trailIsTerminatedByPointToPoint_Static</i> <i>extremitiesTerminateTransportEntityPointToPoint_Dynamic</i> <i>extremitiesTerminateTrail_Dynamic</i>

A.3.2.37 transportEntitiesComposeTransportEntity

A.3.2.37.1 Informal description

DEFINITION

"The *transportEntitiesComposeTransportEntity* relationship class describes the relationship that exists between a composite transport entity and its component transport entities."

Explaining figure in the subclasses.

ROLE

composite

"Played by an instance of a subtype of the information object type : *transportConnection*."

component

"Played by an instance of a subtype of the information object type : *transportConnection*."

INVARIANT

inv_1

"One and only one instance of the role *composite* must participate in the relationship."

inv_2

"At least, one instance of the role *component* must participate in the relationship."

inv_3

"If the information object playing the role *composite* is bi-directional, then all the information objects playing the role *component* must be bi-directional."

TRANSITION

tr_1

"The information objects playing the role *component*, provided one remains, can leave the relationship without breaking it."

tr_2

"During the lifetime of the relationship, additional information objects can enter the relationship, playing the role *component*."

Superseded by a more recent version

A.3.2.37.2 Semi-formal description

transportEntitiesComposeTransportEntity RELATIONSHIP CLASS
BEHAVIOUR
transportEntitiesComposeTransportEntityBehaviour BEHAVIOUR
DEFINED AS

"<DEFINITION>,
<inv_3>"

ROLE composite

COMPATIBLE WITH transportConnection AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..1) ;

ROLE component

COMPATIBLE WITH transportConnection AND SUBCLASSES
PERMITTED-ROLE-CARDINALITY-CONSTRAINT (1..N)
BIND-SUPPORT
UNBIND-SUPPORT;

A.3.2.37.3 Formal description

transportEntitiesComposeTransportEntity_Static

$transportEntitiesComposeTransportEntity : F$ RELATIONSHIP
 $composite : RELATIONSHIP \rightarrow OBJECT$
 $componentSeq : RELATIONSHIP \rightarrow seq$ OBJECT
 $transportConnection_Static$

$transportEntitiesComposeTransportEntity \subseteq dom$ composite

$transportEntitiesComposeTransportEntity \subseteq dom$ componentSeq

$\forall R : transportEntitiesComposeTransportEntity \bullet$
 $composite(R) \in transportConnection \wedge ran(componentSeq(R)) \subseteq transportConnection$

$\forall R : transportEntitiesComposeTransportEntity \bullet \#(componentSeq(R)) \geq 1$

$\forall R : transportEntitiesComposeTransportEntity \bullet$
 $directionality(composite(R)) = bidirectional \Rightarrow$
 $(\forall c : ran\ componentSeq(R) \bullet directionality(c) = bidirectional)$

transportEntitiesComposeTransportEntity_Dynamic

Δ $transportEntitiesComposeTransportEntity_Static$
 $transportConnection_Dynamic$

$\forall R : transportEntitiesComposeTransportEntity \cup transportEntitiesComposeTransportEntity' \bullet$
 $composite'(R) = composite(R)$

A.4 Attribute types definition

A.4.1 directionality

A.4.1.1 Informal description

DEFINITION

"The directionality attribute characterises the ability of the associated resource to carry traffic in one or two directions. The semantic of this attribute is imported from M.3100:1994 directionality attribute."

INVARIANT

inv_1

"The directionality associated with an information object must not change during its whole lifetime."

Superseded by a more recent version

STATE

unidirectional

"The resource is able to carry the signal in only one direction."

bidirectional

"The resource is able to carry the signal in two directions."

A.4.1.2 Semi-formal description

directionality ATTRIBUTE

BEHAVIOUR

DEFINED AS

"<DEFINITION>

INVARIANT

inv_1;

STATES

unidirectional,

bidirectional;

"";

A.4.1.3 Formal description

Directionality ::= unidirectional | bidirectional

directionality_Static

directionality : OBJECT → Directionality

directionality_Dynamic

Δ *directionality_Static*

\forall object : **dom** *directionality* \cap **dom** *directionality'* •

directionality'(object) = *directionality*(object)

A.4.2 signalIdentification

A.4.2.1 Informal description

DEFINITION

"The signalIdentification attribute represents the specific format of signal that the resource carries. The specific formats will be defined in the technology specific extensions."

INVARIANT

Invariants depend on transmission technology.

STATE

States depend on transmission technology.

TRANSITION

Transitions depends on transmission technology.

A.4.2.2 Semi-formal description

signalIdentification ATTRIBUTE

BEHAVIOUR

DEFINED AS

"<DEFINITION>,"

INVARIANT

;

STATES

;

"";

A.4.2.3 Formal description

[SignalIdentification]

Superseded by a more recent version

signalIdentification_Static

signalIdentification : OBJECT → *SignalIdentification*

signalIdentification_Dynamic

Δ *signalIdentification_Invariant*

A.5 Static Schema definition

None.

A.6 Dynamic Schema definition

None.

ANNEX B

Attributes definition

B.1 operationalState

B.1.1 Informal description

DEFINITION

"The operationalState attribute characterises the operability of the associated resource. The semantic of this attribute is imported from X.721:1992 operationalState attribute."

STATE

disabled

"The resource is totally inoperable and unable to provide service to the user(s)."

enabled

"The resource is partially or fully operable and available for use."

B.1.2 Semi-formal description

operationalState ATTRIBUTE

BEHAVIOUR

DEFINED AS

"DEFINITION

STATES

disabled,

enabled";;

B.1.3 Formal description

OperationalState ::= enabled | disabled

operationalState_Static

operationalState: OBJECT → *OperationalState*

operationalState_Dynamic

Δ *operationalState_Static*

Superseded by a more recent version

B.2 userLabel

B.2.1 Informal description

DEFINITION

"The userLabel attribute type assigns a userfriendly name to the associated resource. The semantic of this attribute is imported from M.3100:1994 userLabel attribute."

B.2.2 Semi-formal description

userLabel ATTRIBUTE

BEHAVIOUR

DEFINED AS

"DEFINITION";

B.2.3 Formal description

[UserLabel]

userLabel _Static

$userLabel: OBJECT \rightarrow UserLabel$

operationalState _Dynamic

$\Delta userLabel_Static$

$\forall object : OBJECT \mid object \in dom\ userLabel \cup dom\ userLabel' \bullet$
 $userLabel'(object) = userLabel(object)$

APPENDIX I

Use of the G.805 concepts in the context of the Common Information Viewpoint

This appendix provides a summary of the major architectural and functional concepts that are defined in Recommendation G.805 that are used in the description of a transport network.

I.1 G.805 concepts

A telecommunications network is a complex network which can be described in a number of different ways depending on the particular purpose of the description. Recommendation G.805 describes the network as a transport network from the viewpoint of the information transfer capability. More specifically, the functional and structural architecture of transport networks are described independently of networking technology.

Recommendation G.805 describes the functional architecture of transport networks in a technology independent way, with the use of two major concepts: layering and partitioning.

I.2 Architectural components

The term subnetwork is used to represent a set of ports which are available for the purpose of transferring a signal. Associations between the ports at the edge of a subnetwork (subnetwork connection) may be made and broken by a layer network management process.

A link represents the topological relationship and available transport capacity between sets of ports on a pair of subnetworks, with the purpose of transferring characteristic information. A link connection is capable of transferring information across a link.

Superseded by a more recent version

I.3 Layering concept

The transport network can be decomposed into a number of independent layer networks with a client/server relationship between adjacent layer networks. A layer network describes the generation, transport and termination of a particular characteristic information (i.e. specific protocol and rate).

The client/server relationship between adjacent layer networks is one where a link connection in the client layer network is supported by a trail in the server layer network. This is illustrated in Figure I.1. Figure I.2 demonstrates the mapping between G.805 concepts and Common Information Viewpoint objects.

The concept of adaptation is introduced to describe how the client layer network characteristic information is modified so that it can be transported over a trail in the server layer network. A trail has end-to-end integrity information associated with it (e.g. bipolar parity counts).

From a transport network functional viewpoint, the adaptation function falls between the layer networks. All the reference points belonging to a single layer network (e.g. having the same rate and format) can be visualized as lying on a single plane as illustrated in Figure I.3 (Example of layer network bounded by access groups).

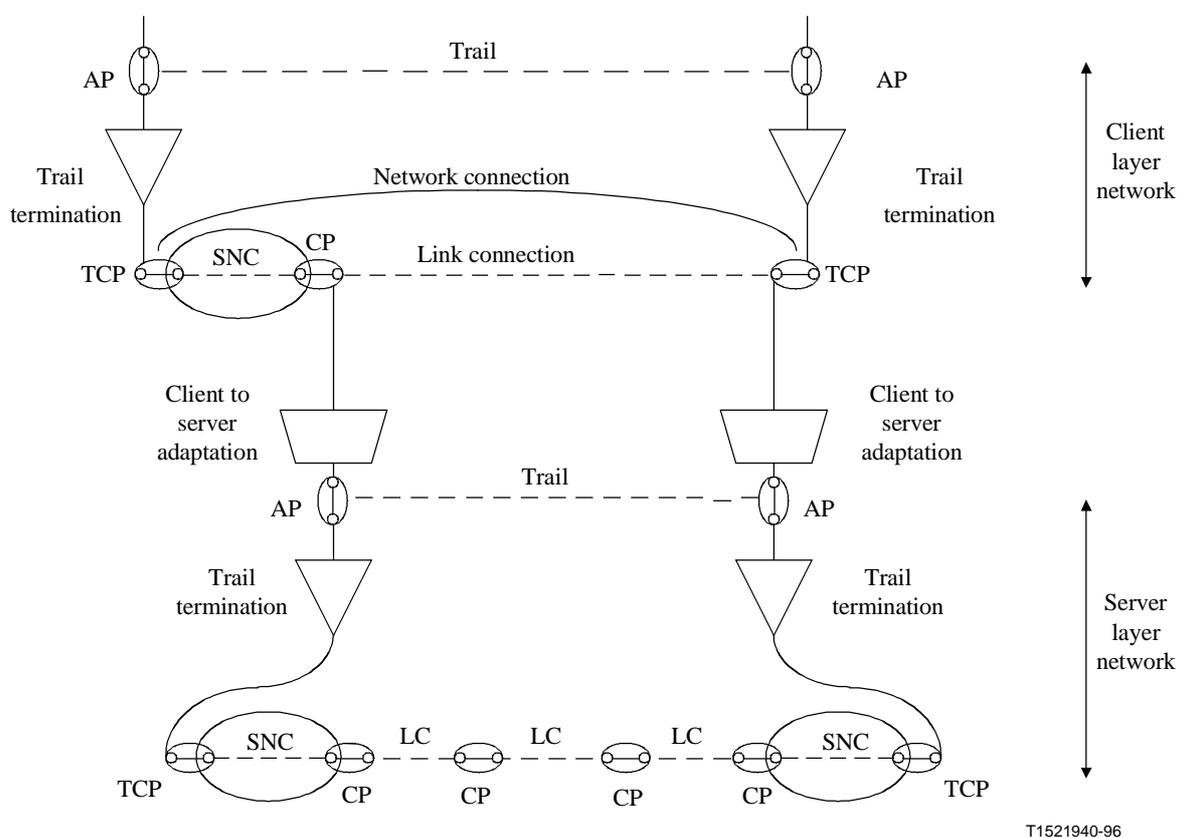


Figure I.1/G.853.1 – Layer network

Superseded by a more recent version

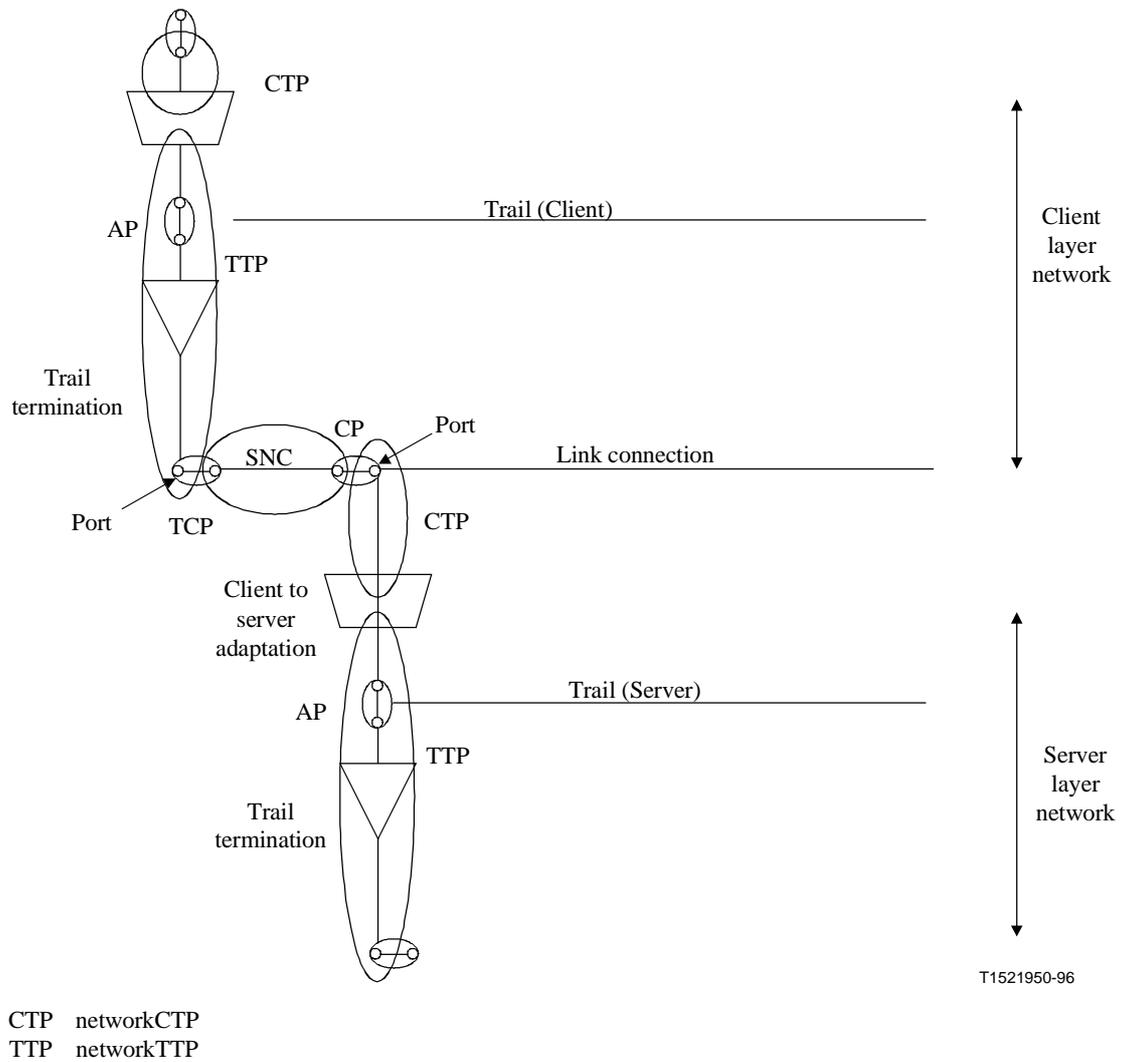


Figure I.2/G.853.1 – Mapping from G.805 to Information Viewpoint Objects

Superseded by a more recent version

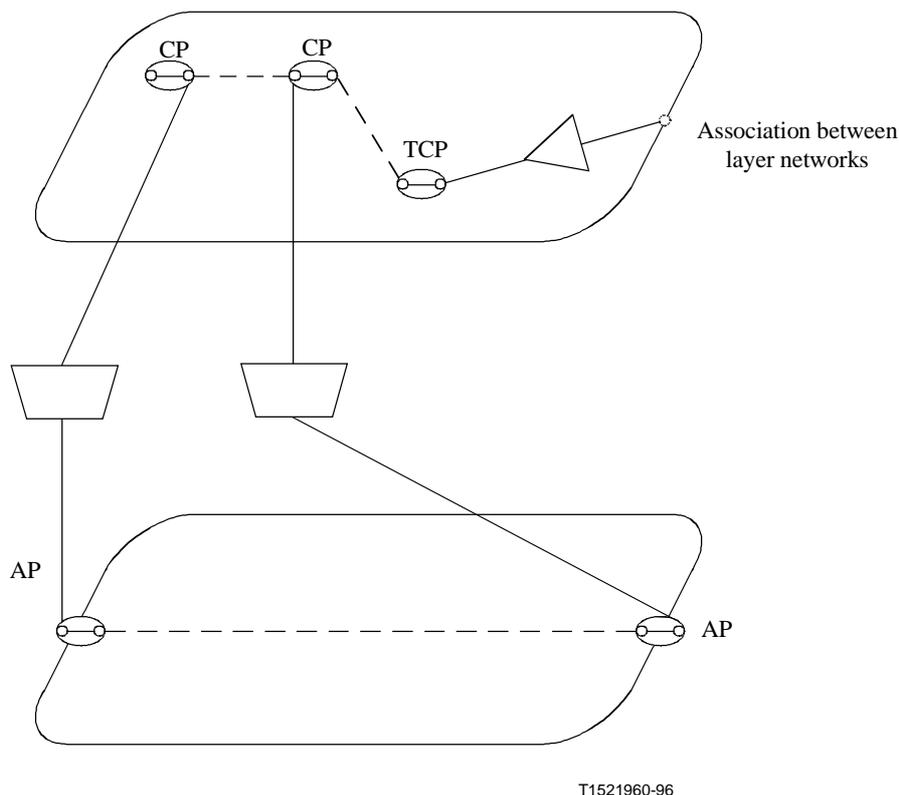


Figure I.3/G.853.1 – Relationship between layer networks

I.4 Partitioning concept

In general, a subnetwork is constructed by representing the physical implementation as links and subnetworks, starting from the matrix [that is the smallest (indivisible) subnetwork]. A collection of subnetworks (matrices) and links may be abstracted into a containing subnetwork.

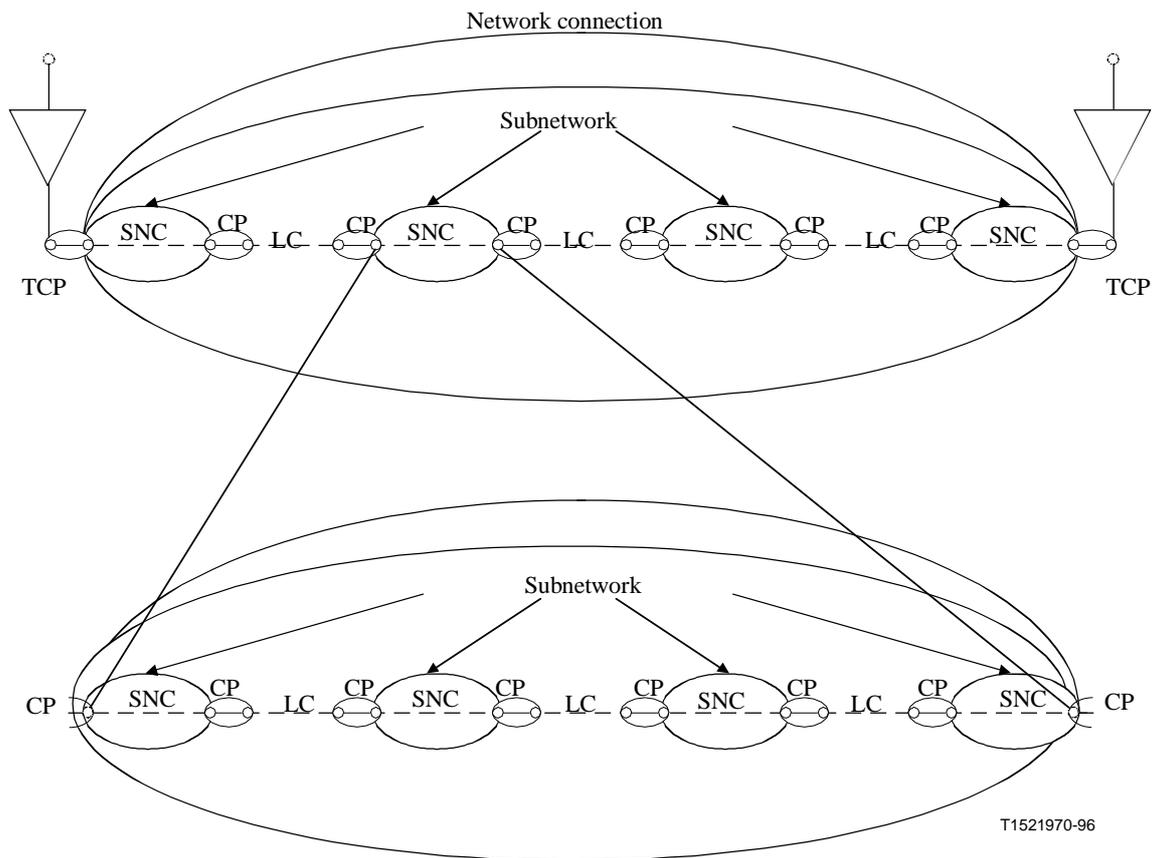
The way in which the contained subnetworks are interconnected by links describes the topology of the containing subnetwork. The ports at the boundary of the containing subnetwork and the interconnection capability represents the connectivity supported by the contained subnetworks and links.

From a management perspective, the topology within a subnetwork is hidden from its containing subnetwork. The subnetwork shows only the connection points into and out of the subnetwork at a given layer. Subnetworks are recursive in that subnetworks contain other subnetworks interconnected by links. At the lowest level of recursion within the layer, a subnetwork is an NE with connectable points. This degenerate case yields nodal visibility.

Figures I.4 (Partitioning of a layer network) and I.5 (Example of subnetwork partitioning) illustrate the partitioning concept.

When a subnetwork is partitioned, the subnetwork connections (across this subnetwork) are represented by the concatenation of a series of contiguous link connections and subnetwork connections. A network connection or subnetwork connection may be decomposed into a concatenation of other transport entities (link or subnetwork connection) which reflects the partitioning of a subnetwork.

Superseded by a more recent version



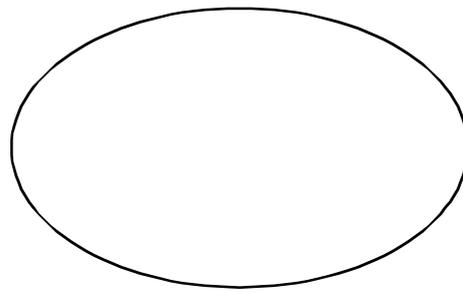
- CP Connection Point
- LC Link Connection
- SNC Subnetwork Connection
- TCP Termination Connection Point

Figure I.4/G.853.1 – Partitioning of a layer network

Superseded by a more recent version

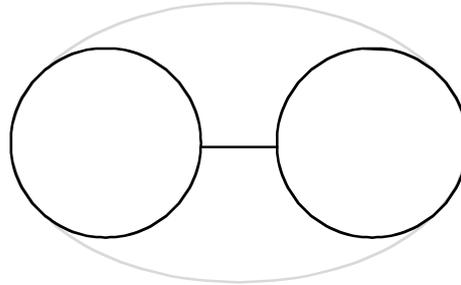
Partitioning of a given
Telecom Network layer

- A Layer Network can be partitioned into subnetworks.



Level 1
e.g. National 2-MBit network

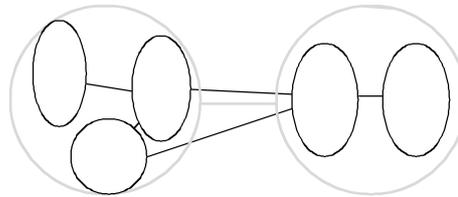
- A subnetwork can be recursively partitioned into further subnetworks.



Level 2
e.g. National 2-MBit east
and west subnetworks

- The partitioning may be application dependent.

- The more detailed view stops at the view of the node (a node cannot be broken down into further subnetworks), called a matrix.



Level 3

T1521980-96

Figure I.5/G.853.1 – Example of the application of partitioning

I.5 Layering and partitioning in a managed network

The concepts of partitioning and layering orthogonal, together they provide the ability to "divide" up networks according to multiplex structure, to identify the connection points which operate in each layer, and to link these points to other points in the network.

The relationship between the layering and partitioning is illustrated in Figure I.6.

Superseded by a more recent version

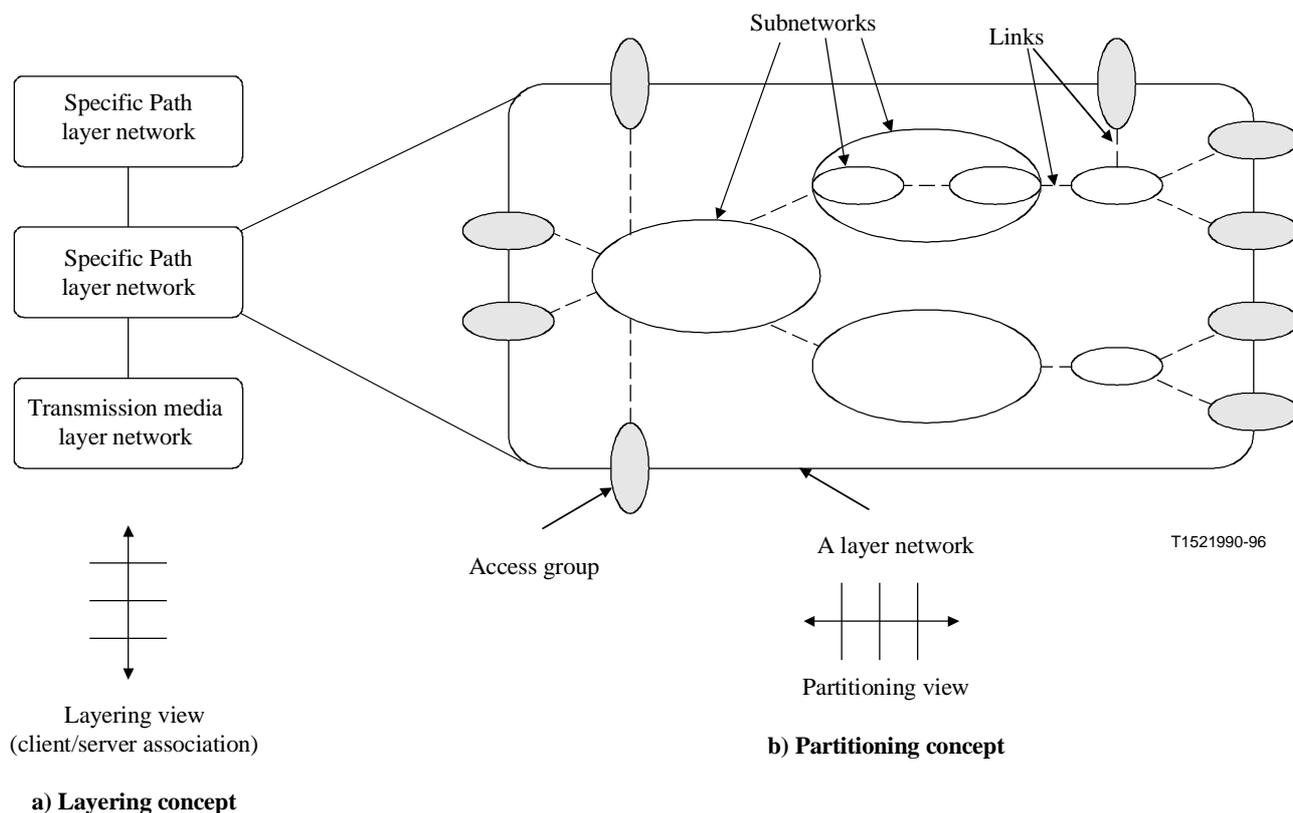
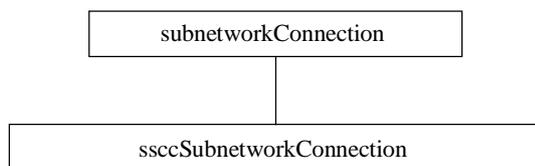


Figure I.6/G.853.1 – The relationship between layering and partitioning

APPENDIX II

Example of using the Common Information Viewpoint to Derive Information Objects in a Management Application Specific Information Viewpoint

Diagrams of information object and relationship classes



Inheritance diagram

T1522000-96

sscSubnetwork

Informal description

DEFINITION

"This object class is derived from subnetwork."

RELATIONSHIP

"<subnetworkIsDelimitedBy>,
<subnetworkHasSubnetworkConnections>"

Superseded by a more recent version

Semi-formal description

ssccSubnetwork INFORMATION OBJECT CLASS

DERIVED FROM G.853.1: subnetworkConnection;

CHARACTERIZED BY

ssccSubnetworkConnectionPackagePACKAGE

BEHAVIOUR

ssccsubnetworkConnectionBehaviour BEHAVIOUR

DEFINED AS

"<DEFINITION>,

<subnetworkIsDelimitedBy>

<subnetworkHasSubnetworkConnections>"

;;

Superseded by a more recent version

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Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communication
Series Z	Programming languages