INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.854.6

(03/99)

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

Digital transmission systems – Digital networks – Management of transport network

---

Computational viewpoint for trail management

ITU-T Recommendation G.854.6

(Previously CCITT Recommendation)

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
INTERNATIONAL ANALOGUE CARRIER SYSTEM	
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TESTING EQUIPMENTS	
TRANSMISSION MEDIA CHARACTERISTICS	G.600–G.699
DIGITAL TRANSMISSION SYSTEMS	
TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
General aspects	G.800–G.809
Design objectives for digital networks	G.810–G.819
Quality and availability targets	G.820–G.829
Network capabilities and functions	G.830–G.839
SDH network characteristics	G.840–G.849
Management of transport network	**G.850–G.859**
SDH radio and satellite systems integration	G.860–G.869
Optical transport networks	G.870–G.879
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION G.854.6

COMPUTATIONAL VIEWPOINT FOR TRAIL MANAGEMENT

Summary

Enterprise community actions covered by this specification:

- set-up point-to-point trail;
- modify trail;
- release trail;
- create trail termination point;
- delete trail termination point;
- associate trail termination point with access group;
- disassociate trail termination point from access group;
- associate trail termination point with subnetwork;
- disassociate trail termination point from subnetwork;
- report trail set-up;
- report trail release;
- report trail modification;
- report trail termination point creation;
- report trail termination point deletion;
- report association of trail termination point with access group;
- report disassociation of trail termination point from access group;
- report association of trail termination point with subnetwork;
- report disassociation of trail termination point from subnetwork.

Source

ITU-T Recommendation G.854.6 was prepared by ITU-T Study Group 4 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 26th of March 1999.

FOREWORD

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

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

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

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 term *recognized operating agency (ROA)* includes any individual, company, corporation or governmental organization that operates a public correspondence service. The terms *Administration, ROA* and *public correspondence* are defined in the *Constitution of the ITU (Geneva, 1992)*.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Recommendation G.854.6

COMPUTATIONAL VIEWPOINT FOR TRAIL MANAGEMENT

(Geneva, 1999)

1 Scope

This computational viewpoint specification is related to the trail management enterprise specification defined in Recommendation G.852.6 and the trail management information specification defined in Recommendation G.853.6.

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 G.851.1 (1996), *Management of the transport network – Application of the RM-ODP framework.*

[2] ITU-T Recommendation G.853.1 (1999), *Common elements of the information viewpoint for the management of a transport network.*

[3] ITU-T Recommendation G.852.6 (1999), *Enterprise viewpoint for trail management.*

[4] ITU-T Recommendation G.853.6 (1999), *Information viewpoint for trail management.*

3 Definitions

None.

4 Abbreviations

This Recommendation uses the following abbreviations:

ASN.1	Abstract Syntax Notation One
Id	Identifier
Ifce	Interface
inv	invariant
ITU	International Telecommunication Union
layerND	layerNetwork Domain
LC	LinkConnection
ND	Network Domain
RM-ODP	Reference Model for Open Distributed Processing

tm trail management

TTP Trail Termination Point

5 Conventions

In order to increase the readability of the behaviour in the operations:

- parameters are written in **bold**;
- elements defined in the information viewpoint specification are written in *italic*.

6 Label references

Full label reference	Local label reference
<"Rec. G.853.6", INFORMATION_OBJECT: tmAccessGroup>	tmAccessGroup
<"Rec. G.853.6", INFORMATION_OBJECT: tmLayerNetworkDomain>	tmLayerNetworkDomain
<"Rec. G.853.6", INFORMATION_OBJECT: tmNetworkTTP>	tmNetworkTTP
<"Rec. G.853.6", INFORMATION_OBJECT: tmSubnetwork>	tmSubnetwork
<"Rec. G.853.6", INFORMATION_OBJECT: tmSubnetworkConnection>	tmSubnetworkConnection
<"Rec. G.853.6", INFORMATION_OBJECT: tmSubnetworkTP>	tmSubnetworkTP
<"Rec. G.853.6", INFORMATION_OBJECT: tmTrafficDescriptor>	tmTrafficDescriptor
<"Rec. G.853.6", INFORMATION_OBJECT: tmTrail>	tmTrail
<"Rec. G.853.6", INFORMATION_OBJECT: tmTrailServiceCharacteristics>	tmTrailServiceCharacteristics
<"Rec.G.853.1", INFORMATION_RELATIONSHIP: accessGroupIsMadeOfNetworkTTPs>	accessGroupIsMadeOfNetworkTTPs
<"Rec. G.853.1", INFORMATION_RELATIONSHIP: layerNetworkDomainIsMadeOf>	layerNetworkDomainIs MadeOf
<"Rec.G.853.1", INFORMATION_RELATIONSHIP: subnetworkConnectionIsTerminatedByPointToPoint>	subnetworkConnectionIsTerminatedByPointToPoint
<"Rec.G.853.1", INFORMATION_RELATIONSHIP: subnetworkIsDelimitedBy>	subnetworkIsDelimitedBy
<"Rec.G.853.1", INFORMATION_RELATIONSHIP: subnetworkTPIsRelatedToExtremity>	subnetworkTPIsRelatedToExtremity
<"Rec. G.853.6", INFORMATION_RELATIONSHIP: tmTrailHasImmediateTrafficDescriptor>	tmTrailHasImmediateTrafficDescriptor
<"Rec.G.853.6", INFORMATION_RELATIONSHIP: tmTrailHasTSC>	tmTrailHasTSC
<"Rec.G.853.1", INFORMATION_RELATIONSHIP: trailIsTerminatedByPointToPoint>	trailIsTerminatedByPointToPoint
<"Rec. G.853.1", INFORMATION_ATTRIBUTE: directionality>	directionality
<"Rec. G.853.1", INFORMATION_ATTRIBUTE: resourceId>	resourceId
<"Rec.G.853.1", INFORMATION_ATTRIBUTE: signalIdentification>	signalIdentification
<"Rec.G.853.1", INFORMATION_ATTRIBUTE: userLabel>	userLabel
<"Rec. G.854.3", INTERFACE: commonReportResourceIdChangeIfce>	commonReportResourceIdChangeIfce
<"Rec. G.854.3", INTERFACE: commonResourceIfce>	commonResourceIfce

Full ASN.1 production reference	Local label reference
<"Rec. X.721:1992: Attribute-ASN.1 Module": SimpleNameType>	SimpleNameType
<"Rec. X.680:1997: GraphicString">	GraphicString

7 Interfaces

This specification does not define operations which change the userLabel of the resources or report this change to the notification receiver because they do not change the state of the system. Their exact signature will be developed as part of the engineering viewpoint specification with the concerned technology.

7.1 Query interfaces

This specification refers to interfaces that allow get access to identification and properties of resources involved in the "trail management" community. As the invocation of the contained operations do not modify any state, there is no interest to develop them explicitly. Their exact signature will be developed as part of the engineering viewpoint, with the concerned technology. These interfaces are listed in Table 1 with the information they allow access to.

Table 1/G.854.6 – Query interfaces

Interface name	Information object	Attributes and relationships
tmAccessGroupQueryIfce	<tmAccessGroup>	<resourceId> <signalIdentification> <topologicalEndDirection> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <accessGroupIsMadeOfNetworkTTPs, ROLE: elementTTP>
tmLayerNetworkDomainQueryIfce	<tmLayerNetworkDomain>	<resourceId> <signalIdentification> <layerNetworkDomainIsMadeOf, ROLE: element>
tmNetworkTTPQueryIfce	<tmNetworkTTP>	<resourceId> <signalIdentification> <userLabel> <pointDirectionality> <accessGroupIsMadeOfNetworkTTPs, ROLE: containerAG> <trailIsTerminatedByPointToPoint, ROLE: transportEntityTrail> <subnetworkTPIsRelatedToExtremity, ROLE: abstractionSNTP> <layerNetworkDomainIsMadeOf, ROLE: containerLND>
tmSubnetworkConnectionQueryIfce	<tmSubnetworkConnection>	<resourceId> <signalIdentification> <directionality> <subnetworkConnectionIsTerminatedBy PointToPoint, ROLE: a_endSNTP, ROLE: z_endSNTP> <layerNetworkDomainIsMadeOf, ROLE: containerLND>
tmSubnetworkQueryIfce	<tmSubnetwork>	<resourceId> <signalIdentification> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <subnetworkIsDelimitedBy, ROLE: elementSNTP>

Table 1/G.854.6 – Query interfaces *(concluded)*

Interface name	Information object	Attributes and relationships
tmSubnetworkTPQueryIfce	<tmSubnetworkTP>	<resourceId> <signalIdentification> <pointDirectionality> <subnetworkTPIsRelatedToExtremity, ROLE: extremity> <layerNetworkDomainIsMadeOf, ROLE: ContainerLND> <subnetworkIsDelimitedBy, ROLE: containerSN> <subnetworkConnectionIsTerminatedBy PointToPoint, ROLE: transportEntitySNC>
tmTrafficDescriptorQueryIfce	<tmTrafficDescriptor>	<signalIdentification> <tmTrailHasImmediateTrafficDescriptor, ROLE: trailTD>
tmTrailQueryIfce	<tmTrail>	<resourceId> <signalIdentification> <userLabel> <directionality> <trailIsTerminatedByPointToPoint, ROLE: a_endNTTP, ROLE: z_endNTTP> <tmTrailHasTSC, ROLE: transportQualifierTSC> <tmTrailHasImmediateTrafficDescriptor, ROLE: immediateTrafficDescriptorTrail> <layerNetworkDomainIsMadeOf, ROLE: containerLND>
tmTrailServiceCharacteristicsQueryIfce	<tmTrailServiceCharacteristics>	<resourceId> <signalIdentification> <tmTrailHasTSC, ROLE: transportQualifiedTrail>

7.2 Operational interfaces

7.2.1 Trail provisioning interface

The trail provisioning interface manages the immediate set-up, release and modification of point-to-point trails as well as the creation and deletion of network TTPs and the association and disassociation of network TTPs with/from access groups and subnetworks. The interface is required to satisfy the enterprise requirements stated in:

<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: setup point-to-point trail>,
<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: release trail>,
<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: modify trail>,
<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: create trail termination point>,
<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: delete trail termination point>,
<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: associate trail termination point with access group>,
<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: disassociate trail termination point from access group>,
<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: associate trail termination point with subnetwork>,
<"Recommendation G.852.6, "COMMUNITY trail management, ACTION: disassociate trail termination point from subnetwork>

By inheriting the properties of the commonResourceIfce, the trailProvisioningIfce provides the capability to change the resource identifier of the resources involved.

```
COMPUTATIONAL INTERFACE trailProvisioning Ifce{
        DERIVED FROM <commonResourceIfce>
        OPERATION {
                <setupPointToPointTrail>;
                <releaseTrail>;
                <modifyTrail>;
                <createNetworkTTP>;
                <deleteNetworkTTP>
                <associateNetworkTTPWithAccessGroup>;
                <disassociateNetworkTTPFromAccessGroup>;
                <associateNetworkTTPWithSubnetwork>;
                <disassociateNetworkTTPFromSubnetwork>;
}
}
```

7.2.1.1 Set-up point-to-point trail

```
<COMMUNITY: trail management, ACTION: setup point-to-point trail>
OPERATION setupPointToPointTrail {
        INPUT_PARAMETERS
                aEnd: AEndChoice ::= CHOICE {
                                networkTTP NetworkTTPChoice,
                                accessGroup AccessGroupChoice};
                zEnd: ZEndChoice ::= CHOICE {
                                networkTTP NetworkTTPChoice,
                                accessGroup AccessGroupChoice};
                layerND: LayerNetworkDomainChoice;
                dir: Directionality;
                suppliedUserIdentifier: UserIdentifier;
                                -- zero length string or 0 implies none supplied.
                serviceCharacteristics: TrailServiceCharacteristicsId;
                                -- reference can be used to determine any QOS or routing characteristics;
                trafficDescriptor: ImmediateTrafficDescriptorId;
                suppliedUserLabel: GraphicString;
                                -- zero length string implies none supplied

        OUTPUT_PARAMETERS
                newTrail: TrailChoice;
                connectedAEndNetworkTTP: NetworkTTPChoice;
                connectedZEndNetwrkTTP: NetworkTTPChoice;

        RAISED_EXCEPTIONS
                networkTTPsNotPartOfLayerND: SequenceOf  NetworkTTPChoice;
                                -- the list contains one element when only one point is incorrect, i.e. is not part of the
                                -- layerNetworkDomain.
                aEndNetworkTTPConnected:NetworkTTPChoice;
                networkTTPsInAEndAccessGroupConnected: AccessGroupChoice;
                zEndNetworkTTPConnected: NetworkTTPChoice;
                networkTTPsInZEndAccessGroupConnected: AccessGroupChoice;
                userIdentifierNotUnique: UserIdentifier;
                failureToSetUserIdentifier: NULL;
                failureToCreateTrail: NULL;
                invalidTransportServiceCharacteristics: NULL;
                invalidTrafficDescriptor: NULL;
```

BEHAVIOUR
SEMI_FORMAL

PARAMETER_MATCHING

networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;
accessGroup: <INFORMATION OBJECT: tmAccessGroup>;
layerND: <INFOMATION OBJECT: tmLayerNetworkDomain>;
dir: <INFORMATION ATTRIBUTE: Directionality>;
suppliedUserIdentifier: <INFORMATION ATTRIBUTE: resourceId>;
serviceCharacteristics: <INFORMATION OBJECT: tmTrailServiceCharacteristics>;
trafficDescriptor: <INFORMATION OBJECT: tmTrafficDescriptor>;
suppliedUserLabel: <INFORMATION ATTRIBUTE: userLabel>;
newTrail: <INFORMATION OBJECT: tmTrail>;
connectedAEndNetworkTTP: <INFORMATION OBJECT: tmNetworkTTP>;
connectedZEndNetworkTTP: <INFORMATION OBJECT: tmNetworkTTP>;

PRE_CONDITIONS

inv_layerNDContainment

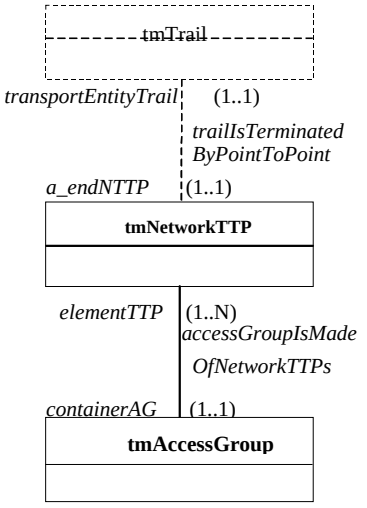
"**aEnd** and **zEnd** are referring to element in a <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_freeAEndNetworkTTP

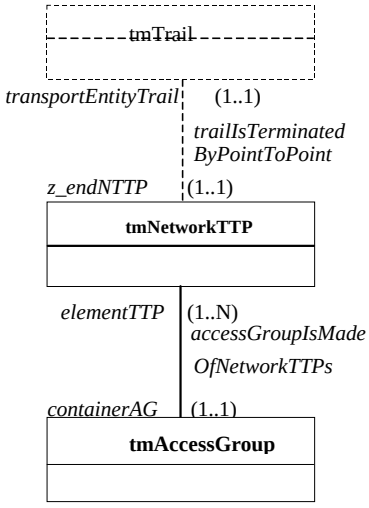
"If **aEnd** is a networkTTP, this networkTTP must not refer to *a_endNTTP* or *z_endNTTP* in any <*trailIsTerminatedByPointToPoint*> relationship."

inv_freeAEndAccessGroupMember

"If **aEnd** is an accessGroup, at least one networkTTP referring to *elementTTP* in an <*accessGroupIsMadeOfNetworkTTPs*> relationship where this accessGroup refers to *containerAG*, must not refer to *a_endNTTP* or *z_endNTTP* in any <*trailIsTerminatedByPointToPoint*> relationship."



inv_freeAEndAccessGroupMember



inv_freeZEndAccessGroupMember

inv_freeZEndNetworkTTP

"If **zEnd** is a networkTTP, this networkTTP must not refer to *a_endNTTP* or *z_endNTTP* in any <*trailIsTerminatedByPointToPoint*> relationship."

inv_freeZEndAccessGroupMember

"If **zEnd** is an accessGroup, at least one networkTTP referring to *elementTTP* in an <*accessGroupIsMadeOfNetworkTTPs*> relationship where this accessGroup refers to *containerAG*, must not refer to *a_endNTTP* or z_endNTTP in any <*trailIsTerminatedByPointToPoint*> relationship."

inv_uniqueUserIdentifier
"**suppliedUserIdentifier** shall not be equal to <*resourceId*> of any element in the <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

POST_CONDITIONS
inv_agreedUserIdentifier
"<*resourceId*> of <*tmTrail*> referred to by **newTrail** is equal to **suppliedUserIdentifier**, if it is supplied."

inv_connectedTrail
"**connectedAEndNetworkTTP**, **connectedZEndNetworkTTP** and **newTrail** must respectively refer to *a_endNTTP*, *z_endNTTP* and *transportEntityTrail* in a <*trailIsTerminatedByPointToPoint*> relationship."

inv_transportServiceCharacteristics
"**newTrail** and **serviceCharacteristics** must refer to *transportQualifiedTrail* and *transportQualifierTSC* in a <*tmTrailHasTSC*> relationship."

inv_trafficDescriptor
"**newTrail** and **trafficDescriptor** must refer to *trailTD* and *immediateTrafficDescriptorTrail* in a <*tmTrailHasImmediateTrafficDescriptor*> relationship."

EXCEPTIONS
IF PRE_CONDITION inv_layerNDContainment NOT_VERIFIED RAISE_EXCEPTION
networkTTPsNotPartOfLayerND;
IF PRE_CONDITION inv_freeAEndNetworkTTP NOT_VERIFIED RAISE_EXCEPTION
aEndNetworkTTPConnected ;
IF PRE_CONDITION inv_freeAEndAccessGroupMember NOT_VERIFIED
RAISE_EXCEPTION networkTTPsInAEndAccessGroupConnected ;
IF PRE_CONDITION inv_freeZEndNetworkTTP NOT_VERIFIED RAISE_EXCEPTION
zEndNetworkTTPConnected ;
IF PRE_CONDITION inv_freeZEndAccessGroupMember NOT_VERIFIED
RAISE_EXCEPTION networkTTPsInZEndAccessGroupConnected ;
IF PRE_CONDITION inv_uniqueUserIdentifier NOT_VERIFIED RAISE_EXCEPTION
userIdentifierNotUnique;
IF POST_CONDITION inv_agreedUserIdentifier NOT VERIFIED RAISE_EXCEPTION
failureToSetUserIdentifier;
IF POST_CONDITION inv_connectedTrail NOT_VERIFIED RAISE_EXCEPTION
failureToCreateTrail;
IF POST_CONDITION inv_transportServiceCharacteristics NOT_VERIFIED
RAISE_EXCEPTION invalidTransportServiceCharacteristics;
IF POST_CONDITION inv_trafficDescriptor NOT_VERIFIED RAISE_EXCEPTION
invalidTrafficDescriptor;
}

7.2.1.2 Release trail

<COMMUNITY: trail management, ACTION: release trail>
OPERATION releaseTrail {
INPUT_PARAMETERS
trail: TrailChoice;
layerND: LayerNetworkDomainChoice;

OUTPUT_PARAMETERS
trail: TrailChoice;

RAISED_EXCEPTIONS
unknownTrail: TrailChoice;
trailConnected: NULL;
failureToReleaseTrail: NULL;

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
trail: <INFORMATION OBJECT: tmTrail>;
layerND: <INFOMATION OBJECT: tmLayerNetworkDomain>;

PRE_CONDITIONS
inv_existingTrail
"**trail** must refer to *element* in the <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_trailConnected
"**trail** must not refer to *transportEntityTrail* in a <*trailIsTerminatedByPointToPoint*> relationship."

POST_CONDITIONS
inv_trailReleased
"**trail** must not refer to any *element* in a <*layerNetworkDomainIsMadeOf*> relationship."

EXCEPTIONS
IF PRE_CONDITION inv_existingTrail NOT_VERIFIED RAISE_EXCEPTION
unknownTrail;
IF PRE_CONDITION inv_trailConnected NOT_VERIFIED RAISE_EXCEPTION
trailConnected;
IF POST_CONDITION inv_trailReleased NOT_VERIFIED RAISE_EXCEPTIONfailureToReleaseTrail;
}

7.2.1.3 Modify trail

<COMMUNITY: trail management, ACTION: modify trail>
OPERATION modifyTrail {
INPUT_PARAMETERS
trail: TrailChoice;
layerND: LayerNetworkDomainChoice;
newTrafficDescriptor: ImmediateTrafficDescriptorId;
newServiceCharacteristics: TrailServiceCharacteristicsId;

OUTPUT_PARAMETERS
agreedTrafficDescriptor: ImmediateTrafficDescriptorId;
-- *The old trafficDescriptor is maintained if the new one cannot be supported*
agreedServiceCharacteristics: TrailServiceCharacteristicsId;
-- *The old serviceCharacteristics is maintained if the new one cannot be supported*

RAISED_EXCEPTIONS
unknownTrail: TrailChoice;
invalidServiceCharacteristicsRequested: NULL;
invalidTrafficDescriptorRequested: NULL;

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
trail: <INFORMATION OBJECT: tmTrail>;
layerND: <INFOMATION OBJECT: tmLayerNetworkDomain>;
newTrafficDescriptor: <INFORMATION OBJECT: tmTrafficDescriptor>;
newServiceCharacteristics: <INFORMATION OBJECT: tmTrailServiceCharacteristics>;
agreedTrafficDescriptor: <INFORMATION OBJECT: tmTrafficDescriptor>;
agreedServiceCharacteristics: <INFORMATION OBJECT: tmTrailServiceCharacteristics>;

PRE_CONDITIONS
inv_existingTrail
"**trail** must refer to element in a <layerNetworkDomainIsMadeOf> relationship where **layerND** being the containerLND."

POST_CONDITIONS
inv_agreedServiceCharacteristics
"**trail** and **agreedServiceCharacteristics** must be involved as *transportQualifiedTrail* and t*ransportQualifierTSC* in a <*tmTrailHasTSC*> relationship."

inv_agreedTrafficDescriptor
"**trail** and **agreedTrafficDescriptor** must be involved as *trailTD* and *immediateTrafficDescriptorTrail* in a <*tmTrailHasImmediateTrafficDescriptor*> relationship."

EXCEPTIONS
IF PRE_CONDITION inv_existingTrail NOT_VERIFIED RAISE_EXCEPTION
unknownTrail;
IF POST_CONDITION inv_agreedServiceCharacteristics NOT_VERIFIED RAISE_EXCEPTION
invalidServiceCharacteristicsRequested;
IF POST_CONDITION inv_agreedTrafficDescriptor NOT_VERIFIED RAISE_EXCEPTION
invalidTrafficDescriptorRequested;
}

7.2.1.4 Create networkTTP

<COMMUNITY: trail management, ACTION: create trail termination point>
OPERATION createNetworkTTP {
INPUT_PARAMETERS
layerND: LayerNetworkDomainChoice;
pointDir: PointDirectionality;
suppliedUserIdentifier: UserIdentifier;
-- *zero length string or 0 implies none supplied*.
suppliedUserLabel: GraphicString;
-- *zero length implies none supplied*.

OUTPUT_PARAMETERS
networkTTP: NetworkTTPChoice;

RAISED_EXCEPTIONS
userIdentifierNotUnique: UserIdentifier;
failureToCreateNetworkTTP: NULL;
failureToSetUserIdentifier:NULL;

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
layerND: INFORMATION OBJECT: tmLayerNetworkDomain>;
suppliedUserIdentifier: <INFORMATION ATTRIBUTE: resourceId>;
pointDir: <INFORMATION ATTRIBUTE: pointDirectionality>;
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;
suppliedUserLabel: <INFORMATION ATTRIBUTE: userLabel>;

PRE_CONDITIONS
inv_uniqueUserIdentifier
"**suppliedUserIdentifier** shall not be equal to *resourceId* of any *element* in a <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

POST_CONDITIONS
inv_existingNetworkTTP
"**networkTTP** and **layerND** must respectively refer to *element* and *containerLND* in a <*layerNetworkDomainIsMadeOf*> relationship."

inv_agreedUserIdentifier
"*resourceId* of *tmNetworkTTP* referenced by **networkTTP** is equal to **suppliedUserIdentifier**, if it is supplied."

EXCEPTIONS
IF PRE_CONDITION inv_uniqueUserIdentifier NOT_VERIFIED RAISE_EXCEPTION
userIdentifierNotUnique;
IF POST_CONDITION inv_existingNetworkTTP NOT_VERIFIED RAISE_EXCEPTION
failureToCreateNetworkTTP;
IF POST_CONDITION inv_agreedUserIdentifier NOT_VERIFIED RAISE_EXCEPTION
failureToSetUserIdentifier;
}

7.2.1.5 Delete networkTTP

<COMMUNITY: trail management, ACTION: delete trail termination point>
OPERATION deleteNetworkTTP {
INPUT_PARAMETERS
layerND:LayerNetworkDomainChoice;
networkTTP: NetworkTTPChoice;

OUTPUT_PARAMETERS
-- *none*

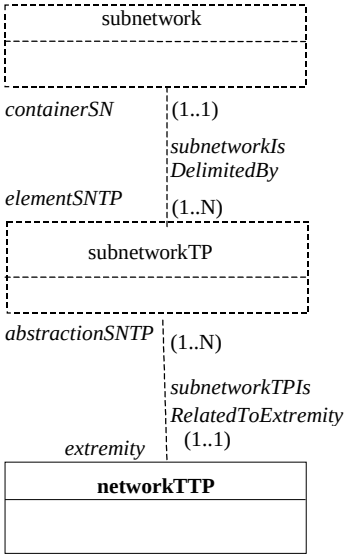
RAISED_EXCEPTIONS
invalidNetworkTTP: NetworkTTPChoice;
networkTTPTerminatesTrail: NetworkTTPChoice;
networkTTPAssociatedWithSubnetwork: NetworkTTPChoice;
networkTTPAssociatedWithAccessGroup: NetworkTTPChoice;
failureToDeleteNetworkTTP: NULL;

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;

PRE_CONDITIONS
inv_existingNetworkTTP
"**networkTTP** must refer to *element* in a <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_noTrailTermination
"**networkTTP** may not refer to a_*endNTTP* or z_*endNTTP* in any <*trailIsTerminatedByPointToPoint*> relationship."

inv_noSubnetworkAssociation
"The **networkTTP** shall not refer to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP* references *elementSNTP* of a <*subnetworkIsDelimitedBy*> relationship.



inv_noSubnetworkAssociation "

inv_noAccessGroupAssociation
"**networkTTP** may not refer to *elementTTP* in an <*accessGroupIsMadeOfNetworkTTPs*> relationship."

POST_CONDITIONS
inv_noNetworkTTP
"**networkTTP** does not refer to *element* in any <*layerNetworkDomainIsMadeOf*> relationship ."

EXCEPTIONS
IF PRE_CONDITION inv_existingNetworkTTP NOT_VERIFIED RAISE_EXCEPTION
invalidNetworkTTP;
IF PRE_CONDITION inv_noTrailTermination NOT_VERIFIED RAISE_EXCEPTION
networkTTPTerminatesTrail;
IF PRE_CONDITIONinv_noSubnetworkAssociation NOT_VERIFIED RAISE_EXCEPTION
networkTTPAssociatedWithSubnetwork;
IF PRE_CONDITION inv_noAccessGroupAssociation NOT_VERIFIED RAISE_EXCEPTION
networkTTPAssociatedWithAccessGroup;
IF POST_CONDITION inv_noNetworkTTP NOT_VERIFIED RAISE_EXCEPTION
failureToDeleteNetworkTTP;
}

7.2.1.6 Associate networkTTP with access group

<COMMUNITY: trail management, ACTION: associate trail termination point with access group>
OPERATION associateNetworkTTPWithAccessGroup{
INPUT_PARAMETERS
layerND: LayerNetworkDomainChoice;
accessGroup: AccessGroupChoice;
networkTTP: NetworkTTPChoice;

OUTPUT_PARAMETERS
-- *none*

RAISED_EXCEPTIONS
networkTTPAndAccessGroupNotCompatible: NULL;
networkTTPAlreadyAssociated: NULL;
failureToAssociateNetworkTTP: NULL;

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
accessGroup: <INFORMATION OBJECT: tmAccessGroup>;
networkTTP:<INFORMATION OBJECT: tmNetworkTTP>;

PRE_CONDITIONS
inv_networkTTPAndAccessGroupExistingAndCompatible
"**networkTTP** and **accessGroup** shall refer to *element* of the same *<layerNetworkDomainIsMadeOf>* relationship where **layerND** refers to *containerLND*."

inv_networkTTPNotAlreadyAssociated
"**networkTTP** shall not refer to *elementTTP in* any *<accessGroupIsMadeOfNetworkTTPs>* relationship."

POST_CONDITIONS
inv_networkTTPAssociated
"**networkTTP** refers to *elementTTP* in an *<accessGroupIsMadeOfNetworkTTPs>* relationship where **accessGroup** refers to *containerAG*."

EXCEPTIONS
IF PRE_CONDITION inv_networkTTPAndAccessGroupExistingAndCompatible NOT_VERIFIED
RAISE_EXCEPTION
networkTTPAndAccessGroupNotCompatible;
IF PRE_CONDITION inv_networkTTPNotAlreadyAssociated NOT_VERIFIED_RAISE_EXCEPTION
networkTTPAlreadyAssociated;
IF POST_CONDITION inv_networkTTPAssociated NOT_VERIFIED RAISE_EXCEPTION
failureToAssociateNetworkTTP;
}

7.2.1.7 Disassociate networkTTP from access group

<COMMUNITY: trail management, ACTION: disassociate trail termination point from access group>
OPERATION disassociateNetworkTTPfromAccessGroup {
INPUT_PARAMETERS
layerND: LayerNetworkDomainChoice;
accessGroup: AccessGroupChoice;
networkTTP: NetworkTTPChoice;

OUTPUT_PARAMETERS
-- *none*

RAISED_EXCEPTIONS
networkTTPAndAccessGroupNotCompatible: NULL;
networkTTPNotAssociated: NULL;
failureToDisassociate: NULL;

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
accessGroup: <INFORMATION OBJECT: tmAccessGroup>;
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;

PRE_CONDITIONS
inv_networkTTPAssociated
"**networkTTP** refers to *elementTTP* of *<accessGroupIsMadeOfNetworkTTPs>* relationship where **accessGroup** refers to *containerAG*."

POST_CONDITIONS
inv_networkTTPDisassociated
"**networkTTP** shall not refer to *elementTTP* in an <*accessGroupIsMadeOfNetworkTTPs*> relationship where **accessGroup** refers to *containerTTP*."

EXCEPTIONS
IF PRE_CONDITION inv_networkTTPAndAccessGroupExistingAndCompatible NOT_VERIFIED RAISE_EXCEPTION
networkTTPAndAccessGroupNotCompatible;
IF PRE_CONDITION inv_networkTTPAssociated NOT_VERIFIED RAISE_EXCEPTION
networkTTPNotAssociated;
IF POST_CONDITION inv_networkTTPDisassociated NOT_VERIFIED RAISE_EXCEPTION
failureToDisassociate;
}

7.2.1.8 Associate networkTTP with subnetwork

<COMMUNITY: trail management, ACTION: associate trail termination point with subnetwork>
OPERATION associateNetworkTTPWithSubnetwork {
INPUT_PARAMETERS
layerND: LayerNetworkDomainChoice;
subnetwork: SubnetworkChoice;
networkTTP: NetworkTTPChoice;

OUTPUT_PARAMETERS
-- *none*

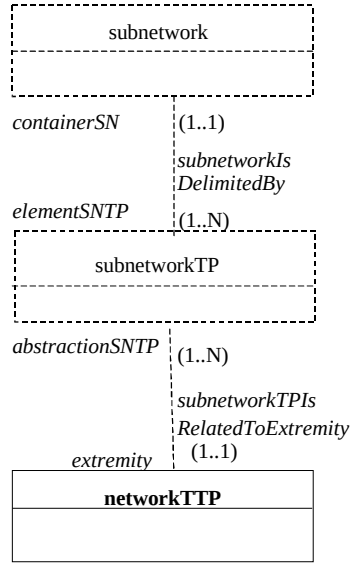
RAISED_EXCEPTIONS
networkTTPAndSubnetworkNotCompatible: NULL;
networkTTPAssociated: NetworkTTPChoice;
failureToAssociateNetworkTTP: NULL;

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
subnetwork: <INFORMATION OBJECT: tmSubnetwork>;
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;

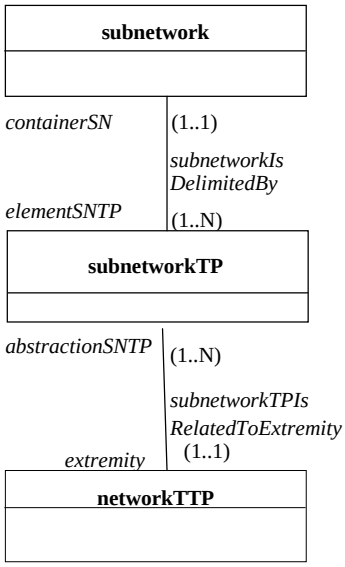
PRE_CONDITIONS
inv_networkTTPAndSubnetworkExistingAndCompatible
"**networkTTP** and **subnetwork** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_networkTTPNotAssociated
"The **networkTTP** shall not refer to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP* references *elementSNTP* of a <*subnetworkIsDelimitedBy*> relationship."

POST_CONDITIONS
inv_networkTTPAssociated
"**networkTTP** refers to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP*, which is a **subnetworkTP**, is also referencing *elementSNTP* of a <*subnetworkIsDelimitedBy*> relationship where **subnetwork** refers to *containerSN*.



inv_networkTTPNotAssociated



inv_networkTTPAssociated "

EXCEPTIONS
IF PRE_CONDITION inv_networkTTPAndSubnetworkExistingAndCompatible NOT_VERIFIED
RAISE_EXCEPTION
networkTTPAndSubnetworkNotCompatible;
IF PRE_CONDITIONinv_networkTTPNotAssociated NOT_VERIFIED_RAISE_EXCEPTION
networkTTPAssociated;
IF POST_CONDITION inv_networkTTPAssociated NOT_VERIFIED RAISE_EXCEPTION
failureToAssociateNetworkTTP;
}

7.2.1.9 Disassociate networkTTP from subnetwork

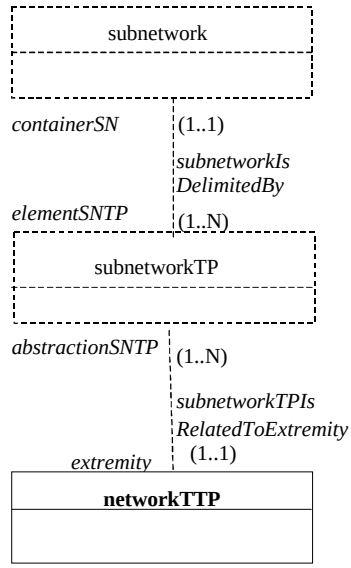
<COMMUNITY: trail management, ACTION: disassociate trail termination point from subnetwork>
OPERATION disassociateNetworkTTPfromSubnetwork {
INPUT_PARAMETERS
layerND: LayerNetworkDomainChoice;
subnetwork: SubnetworkChoice;
networkTTP: NetworkTTPChoice;

OUTPUT_PARAMETERS
-- none

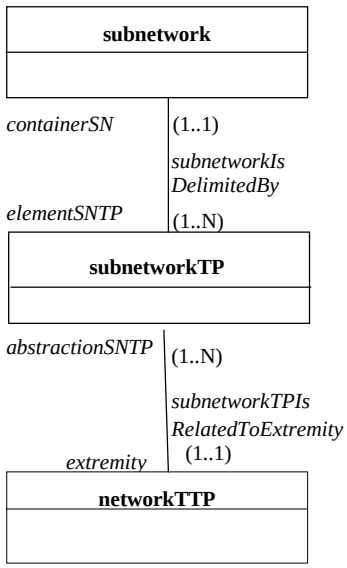
RAISED_EXCEPTIONS
networkTTPAndSubnetworkNotCompatible: NULL;
networkTTPNotAssociated: NTTPId
networkTTPConnected: NULL;
failureToDisassociate: NULL;

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
subnetwork: <INFORMATION OBJECT: tmSubnetwork>
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;

PRE_CONDITIONS
inv_networkTTPAssociated
"**networkTTP** refers to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP*, which is a **subnetworkTP**, is also *elementSNTP* of a <*subnetworkIsDelimitedBy*> relationship where **subnetwork** refers to *containerSN*.



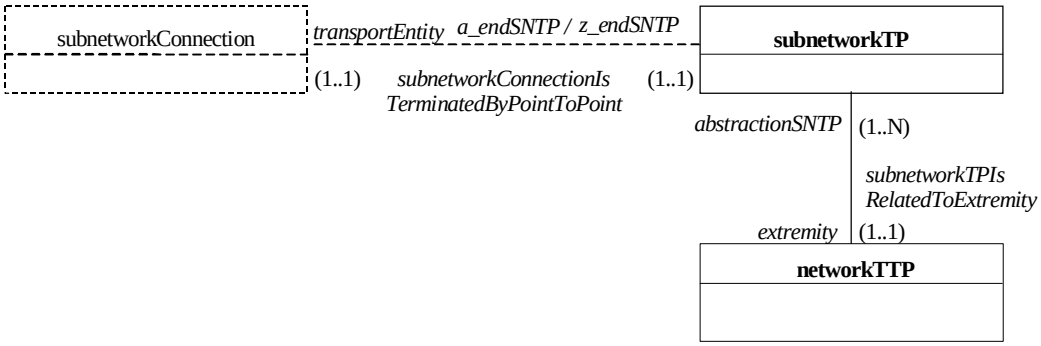
inv_networkTTPNotAssociated



inv_networkTTPAssociated "

inv_networkTTPNotAssociated

"abstractionSNTP (which is a **subnetworkTP**) of a <subnetworkTPIsRelatedToExtremity> relationship where **networkTTP** refers to extremity, shall not reference a_endSNTP or z_endSNTP of a <subnetworkConnectionIsTerminatedByPointToPoint> relationship.



inv_networkTTPNotConnected

"

POST_CONDITIONS

inv_networkTTPNotAssociated

<"**networkTTP** shall not refer to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP* references *elementSNTP* of a <*subnetworkIsDelimitedBy*> relationship. "

EXCEPTIONS

IF PRE_CONDITION inv_networkTTPAndSubnetworkExistingAndCompatible NOT_VERIFIED
RAISE_EXCEPTION
networkTTPAndSubnetworkNotCompatible;
IF PRE_CONDITIONinv_networkTTPAssociated NOT_VERIFIED RAISE_EXCEPTION
networkTTPNotAssociated;
IF PRE_CONDITION inv_networkTTPNotConnected NOT_VERIFIED RAISE_EXCEPTION
networkTTPConnected;
IF POST_CONDITION inv_networkTTPNotAssociated NOT_VERIFIED RAISE_EXCEPTION
failureToDisassociate;

}

7.3 Reporting interfaces

7.3.1 Trail provisioning reporting interface

The trail provisioning reporting interface reports the immediate set-up, release and modification of point-to-point trails as well as the creation and deletion of network TTPs and the association and disassociation of network TTPs with access groups and subnetworks. The interface is required to satisfy the enterprise requirements stated in:

<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report trail setup>,
<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report trail release>,
<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report trail modification>,
<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report trail termination point creation>,
<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report trail termination point deletion>,
<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report association of trail termination point with access group>,
<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report disassociation of trail termination point from access group>,
<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report association of trail termination point with subnetwork>,
<"Recommendation G.852.6,"COMMUNITY trail management, ACTION: report disassociation of trail termination point from subnetwork>.

By inheriting the properties of the <commonReportResourceIdChangeIfce> the trailProvisioningReportingIfce provides the capability of reporting the change of the resource identifier of the resources involved.

```
COMPUTATIONAL INTERFACEtrailProvisioningReportingIfce {
        DERIVED FROM        <commonReportResourceIdChangeIfce>
    OPERATION {
            <reportPointToPointTrailSet_up>;
            <reportTrailRelease>;
            <reportTrailModification>;
            <reportNetworkTTPCreation>;
            <report networkTTPDeletion>;
            <reportAssociationOfNetworkTTPWithAccessGroup>;
            <reportDisassociationOfNetworkTTPFromAccessGroup>;
            <reportAssociationOfNetworkTTPWithSubnetwork>;
            <reportDisassociationOfNetworkTTPFromSubnetwork>;
}

}
```

7.3.1.1 Report point-to-point trail set-up

```
<COMMUNITY: trail management, ACTION: report trail setup>
OPERATION reportPointToPointTrailSet_up{
    INPUT_PARAMETERS
        newTrail: TrailChoice;
        connectedAEndNetworkTTP: NetworkTTPChoice;
        connectedZEndNetworkTTP: NetworkTTPChoice;
    layerND: LayerNetworkDomainChoice;

    OUTPUT_PARAMETERS
        -- none

    RAISED EXCEPTIONS
        -- none
```

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
newTrail: <INFORMATION OBJECT: tmTrail>;
connectedAEndNetworkTTP: <INFORMATION OBJECT: tmNetworkTTP>;
connectedZEndNetworkTTP: <INFORMATION OBJECT: tmNetworkTTP>;
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;

TRIGGERING CONDITIONS
PRE_CONDITIONS
inv_layerNDContainment
"**connectedAEndNetworkTTP** and **connectedZEndNetworkTTP** are referencing *element* in a *<layerNetworkDomainIsMadeOf>* relationship where **layerND** is referencing *containerLND*."

POST_CONDITIONS
inv_connectedTrail
"**connectedAEndNetworkTTP**, **connectedZEndNetworkTTP** and **newTrail** respectively reference a*_endNTTP*, z*_endNTTP* and *transportEntityTrail* in a *<trailIsTerminatedByPointToPoint>* relationship."

EXCEPTIONS
-- *none*
}

7.3.1.2 Report trail release

<COMMUNITY: trail management, ACTION: report trail release>
OPERATION reportTrailRelease {
INPUT_PARAMETERS
trail: TrailChoice;
layerND: LayerNetworkDomainChoice;

OUTPUT_PARAMETERS
-- *none*

RAISED EXCEPTIONS
-- *none*

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
trail: <INFORMATION OBJECT: tmTrail>;
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;

TRIGGERING CONDITIONS
PRE_ CONDITIONS
inv_connectedTrail
"**trail** must refer to *transportEntityTrail* in a *<trailIsTerminatedByPointToPoint>* relationship."

POST_CONDITIONS
inv_disconnectedTrail
"**trail** is not allowed participating in a *<trailIsTerminatedByPointToPoint>* relationship referencing *transportEntityTrail*. "

EXCEPTIONS
-- none
}

7.3.1.3 Report trail modification

<COMMUNITY: trail management, ACTION: report trail modification>
OPERATION reportTrailModification {
INPUT_PARAMETERS
trail: TrailChoice;
layerND: LayerNetworkDomainChoice;
newTrafficDescriptor: ImmediateTrafficDescriptorId ;
newServiceCharacteristics: TrailServiceCharacteristicsId;
agreedTrafficDescriptor: ImmediateTrafficDescriptorId ;
agreedServiceCharacteristics: TrailServiceCharacteristicsId;

OUTPUT_PARAMETERS
-- *none*

RAISED EXCEPTIONS
-- *none*

BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
trail: <INFORMATION OBJECT: tmTrail>;
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
newTrafficDescriptor: <INFORMATION OBJECT: tmTrafficDescriptor>;
newServiceCharacteristics: <INFORMATION OBJECT: tmTrailServiceCharacteristics>;
agreedTrafficDescriptor: <INFORMATION OBJECT: tmTrafficDescriptor>;
agreedServiceCharacteristics: <INFORMATION OBJECT: tmTrailServiceCharacteristics>;

TRIGGERING CONDITIONS
PRE_ CONDITIONS
inv_newServiceCharacteristics
"**trail** and **newServiceCharacteristics** must not be involved as *transportQualifiedTrail* and *transportQualifierTSC* in a <*tmTrailHasTSC*> *relationship*."

inv_newTrafficDescriptor
"**trail** and **newTrafficDescriptor** must not be involved as *trailTD* and *immediateTrafficDescriptorTrail* in a <*tmTrailHasImmediateTrafficDescriptor*> relationship."

POST_CONDITIONS
inv_agreedServiceCharacteristics
"**trail** and **agreedServiceCharacteristics** must be involved as *transportQualifiedTrail* and *transportQualifierTSC* in a <*tmTrailHasTSC*> *relationship*."

inv_agreedTrafficDescriptor
"**trail** and **agreedTrafficDescriptor** must be involved as *trailTD* and *immediateTrafficDescriptorTrail* in a <*tmTrailHasImmediateTrafficDescriptor*> relationship."

EXCEPTIONS
-- *none*
}

7.3.1.4 Report networkTTP creation

<COMMUNITY: trail management , ACTION: report trail termination point creation>
OPERATION reportNetworkTTPCreation {
INPUT_PARAMETERS
networkTTP: NetworkTTPChoice;
layerND: LayerNetworkDomainChoice;
pointDir: PointDirectionality;

OUTPUT_PARAMETERS
-- *none*

RAISED_EXCEPTIONS
-- *none*

BEHAVIOUR
SEMI-FORMAL
PARAMETER_MATCHING
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
pointDir: <INFORMATION ATTRIBUTE: pointDirectionality>;

TRIGGERING_CONDITIONS
PRE_CONDITIONS
-- *none*

POST_CONDITIONS
inv_existingNetworkTTP
"**networkTTP** must refer to *element* in a <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND.*"

EXCEPTIONS
-- *none*
}

7.3.1.5 Report networkTTP deletion

<COMMUNITY: trail management , ACTION: report trail termination point deletion>
OPERATION reportNetworkTTPDeletion {
INPUT_PARAMETERS
networkTTP: NetworkTTPChoice;
layerND: LayerNetworkDomainChoice;

OUTPUT_PARAMETERS
-- *none*

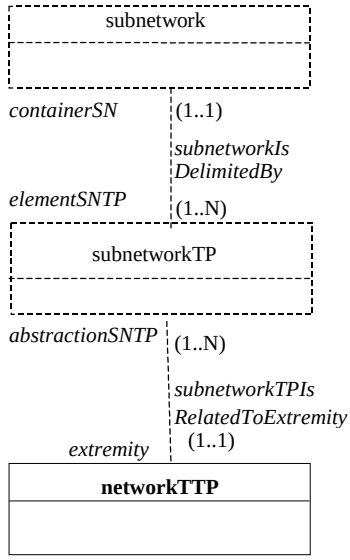
RAISED_EXCEPTIONS
-- *none*

BEHAVIOUR
SEMI-FORMAL
PARAMETER_MATCHING
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;

TRIGGERING_CONDITIONS
PRE_CONDITIONS
inv_existingNetworkTTP
"**networkTTP** must refer to *element* in a <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_noTrailTermination
"**networkTTP** may not refer to *a_endNTTP or z_endNTTP* in any <*trailIsTerminatedByPointToPoint*> relationship."

inv_noSubnetworkAssociation
"**networkTTP** shall not refer to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP* references *elementSNTP* of a <*subnetworkIsDelimitedBy*> relationship.



inv_noSubnetworkAssociation "

inv_noAccessGroupAssociation
"**networkTTP** may not refer to *elementTTP* in an <*accessGroupIsMadeOfNetworkTTPs*> relationship."

POST_CONDITIONS
inv_noNetworkTTP
"**networkTTP** does not refer to *element* in a <*layerNetworkDomainIsMadeOf*> relationship."

EXCEPTIONS
-- *none*
}

7.3.1.6 Report association of networkTTP with access group

<COMMUNITY: trail management , ACTION: report association of trail termination point with access group>
OPERATION reportAssociationOfNetworkTTPWithAccessGroup {
INPUT_PARAMETERS
layerND: LayerNetworkDomainChoice;
accessGroup: AccessGroupChoice;
networkTTP: NetworkTTPChoice;

OUTPUT PARAMETERS
-- *none*

RAISED EXCEPTIONS
-- *none*

BEHAVIOUR
SEMI-FORMAL
PARAMETER_MATCHING
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
accessGroup: <INFORMATION OBJECT: tmAccessGroup>;
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;

TRIGGERING_CONDITIONS
PRE_CONDITIONS
inv_networkTTPAndAccessGroupExistingAndCompatible
"**networkTTP** and **accessGroup** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_networkTTPNotAlreadyAssociated
"**networkTTP** shall not refer to *elementTTP* in any <*accessGroupIsMadeOfNetworkTTPs*> relationship."

POST_CONDITIONS
inv_networkTTPAssociated
"**networkTTP** refers to *elementTTP* of an <*accessGroupIsMadeOfNetworkTTPs*> relationship where **accessGroup** refers to *containerAG*."

EXCEPTIONS
-- *none*
}

7.3.1.7 Report disassociation of networkTTP from access group

<COMMUNITY: trail management , ACTION: report disassociation of trail termination point from accessGroup>
OPERATION reportDisassociationOfNetworkTTPFromAccessGroup {
INPUT_PARAMETERS
layerND: LayerNetworkDomainChoice;
accessGroup: AccessGroupChoice;
networkTTP: NetworkTTPChoice;

OUTPUT_PARAMETERS
-- *none*

RAISED_EXCEPTIONS
-- *none*

BEHAVIOUR
SEMI-FORMAL
PARAMETER_MATCHING
layerND: <INFORMATION OBJECT: tmLayerNetworkDomain>;
accessGroup: <INFORMATION OBJECT: tmAccessGroup>;
networkTTP: <INFORMATION OBJECT: tmNetworkTTP>;

TRIGGERING_CONDITIONS
PRE_CONDITIONS
inv_networkTTPAssociated
"**networkTTP** refers to *elementTTP* of an <*accessGroupIsMadeOfNetworkTTPs*> relationship where **accessGroup** refers to *containerAG*."

POST_CONDITIONS
inv_networkTTPDisassociated
"**networkTTP** shall not refer to *elementTTP* in an <*accessGroupIsMadeOfNetworkTTPs*> relationship where **accessGroup** refers to *containerAG*."

EXCEPTIONS
-- *none*
}

7.3.1.8 Report association of networkTTP with subnetwork

<COMMUNITY: trail management , ACTION: report association of trail termination point with subnetwork>
OPERATION reportAssociationOfNetworkTTPWithSubnetwork {
INPUT_PARAMETERS
layerND: LayerNetworkDomainChoice;
subnetwork: SubnetworkChoice;
networkTTP: NetworkTTPChoice;

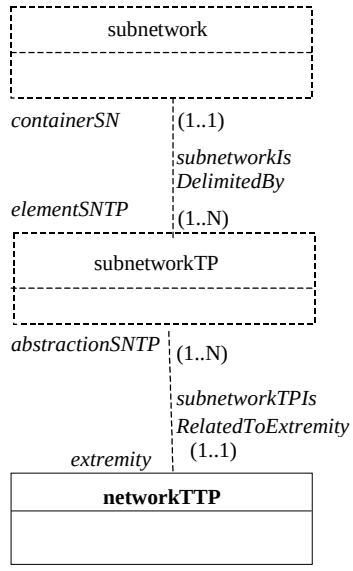
OUTPUT PARAMETERS
-- *none*

RAISED EXCEPTIONS
-- *none*

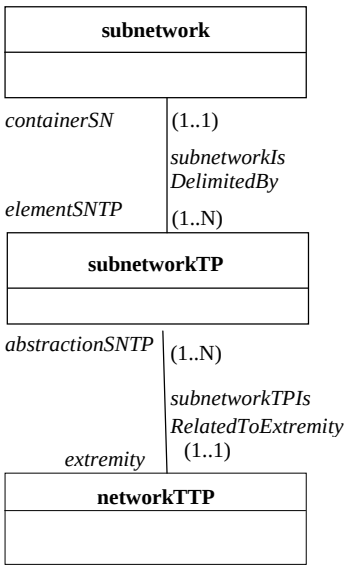
BEHAVIOUR
SEMI_FORMAL
PARAMETER_MATCHING
layerND: <INFORMATION OBJECT tmLayerNetworkDomain>;
subnetwork: <INFORMATION OBJECT tmSubnetwork>;
networkTTP: <INFORMATION OBJECT tmNetworkTTP>;

TRIGGERING_CONDITIONS
PRE_CONDITIONS
inv_networkTTPAndSubnetworkExistingAndCompatible
"**networkTTP** and **subnetwork** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_networkTTPNotAssociated
"**networkTTP** shall not refer to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP* references *elementSNTP* of a <*subnetworkIsDelimitedBy*> *relationship*.



inv_networkTTPNotAssociated



inv_networkTTPAssociated

"

POST_CONDITIONS

inv_networkTTPAssociated

"**networkTTP** refers to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP*, which is a **subnetworkTP**, is also *elementSNTP* of a <*subnetworkIsDelimitedBy*> relationship where **subnetwork** refers to *containerSN*."

EXCEPTIONS

-- *none*

}

7.3.1.9 Report disassociation of networkTTP from subnetwork

<COMMUNITY: trail management , ACTION: report disassociation of trail termination point from subnetwork>
OPERATION reportDisassociationOfNetworkTTPFromSubnetwork {

INPUT_PARAMETERS

layerND: LayerNetworkDomainChoice;
subnetwork: SubnetworkChoice;
networkTTP: NetworkTTPChoice;

OUTPUT_PARAMETERS

-- *none*

RAISED_EXCEPTIONS

-- *none*

BEHAVIOUR
SEMI-FORMAL

PARAMETER_MATCHING

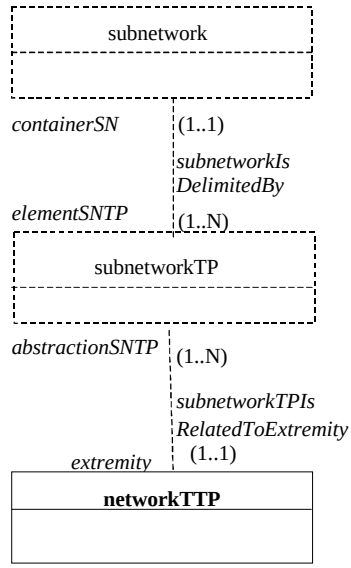
layerND: <INFORMATION OBJECT tmLayerNetworkDomain>;
subnetwork: <INFORMATION OBJECT tmSubnetwork>;
networkTTP: <INFORMATION OBJECT tmNetworkTTP>;

TRIGGERING_CONDITIONS

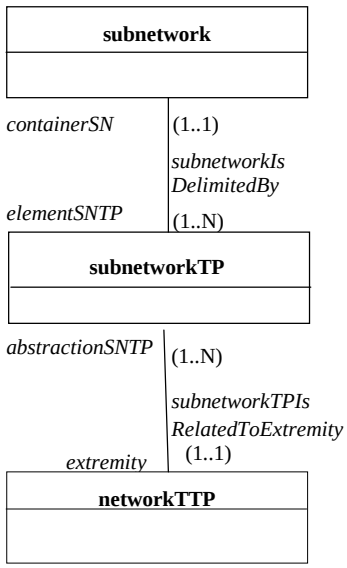
PRE_CONDITIONS

inv_networkTTPAssociated

"**networkTTP** refers to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP*, which is a **subnetworkTP**, is also *elementSNT*Pof a <*subnetworkIsDelimitedBy*> relationship where **subnetwork** refers to *containerSN*.



inv_networkTTPNoAssociated

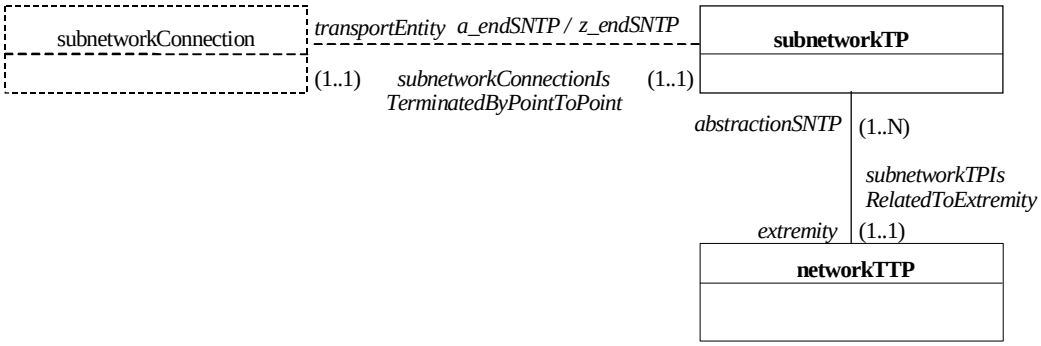


inv_networkTTPAssociated

"

inv_networkTTPNotConnected

"abstractionSNTP (which is a **subnetworkTP**) of a <subnetworkTPIsRelatedToExtremity> relationship where **networkTTP** refers to extremity, shall not reference a_endSNTP or z_endSNTP of a <*subnetworkConnectionIsTerminatedByPointToPoint*> relationship.



inv_networkTTPNotConnected

"

POST_CONDITIONS

inv_networkTTPNotAssociated

"**networkTTP** shall not refer to *extremity* of a <*subnetworkTPIsRelatedToExtremity*> relationship where *abstractionSNTP* references *elementSNTP* of a <*subnetworkIsDelimitedBy*> relationship."

EXCEPTIONS

-- *none*

}

7.4 ASN.1 supporting productions

In this specification, when an interface name is used within an ASN.1 production, the same label will be used, starting with a capital letter. The complete ASN.1 type definition for this query interface (e.g. use of ObjectIdentifier, INTEGER, ...) will be developed as part of the engineering viewpoint, with the concerned technology.

```
AccessGroupChoice ::= CHOICE {
        tmAccessGroupQueryifce          TmAccessGroupQueryIfce,
        userIdentifier                  UserIdentifier } ;

ImmediateTrafficDescriptorId ::= TmTrafficDescriptorQueryIfce;

LayerNetworkDomainChoice ::= CHOICE {
        tmLayerNetworkDomainQueryIfce TmLayerNetworkDomainQueryIfce,
        userIdentifier                      UserIdentifier };

NetworkTTPChoice ::= CHOICE {
        tmNetworkTTPQueryIfce           TmNetworkTTPQueryIfce,
        userIdentifier                  UserIdentifier};

SequenceOfNetworkTTPChoice ::=  SEQUENCE OF {
        a_endNetworkTTP             NetworkTTPChoice,
        z_endNetworkTTP             NetworkTTPChoice };

SubnetworkChoice ::= CHOICE {
        tmSubnetworkQueryIfce           TmSubnetworkQueryIfce,
        userIdentifier                  UserIdentifier};

TrailChoice ::= CHOICE {
        tmTrailQueryIfce TmTrailQueryIfce,
        userIdentifier              UserIdentifier};

TrailServiceCharacteristicsId ::= TmTrailServiceCharcteristisQueryIfce;

UserIdentifier ::= SimpleNameType;
```

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	**Transmission systems and media, digital systems and networks**
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
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 communications
Series Y	Global information infrastructure
Series Z	Languages and general software aspects for telecommunication systems