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

Digital transmission systems – Digital networks – Management of transport network

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Computational viewpoint for pre-provisioned link connection management

ITU-T Recommendation G.854.10

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION G.854.10

COMPUTATIONAL VIEWPOINT FOR PRE-PROVISIONED LINK CONNECTION MANAGEMENT

Summary

The pre-provisioned link connection management community is used to assign transport entities (link connections or connection termination points) to a caller and to control and update the available capacity of the linking entity (link or link end) that contains the transport entities. The available capacity of the linking entity contains all the unassigned transport entities. This community should be used in the case where transport entities have already been provisioned inside the linking entity using the pre-provisioned adaptation management service (See Recommendation G.853.8).

The capability of having pre-provisioned transport entities is available in technologies such as SDH or WDM.

Enterprise community actions covered by this specification:

– COMMUNITY pre-provisioned linkConnection management;

– assign transport entities;

– de-assign transport entities;

– report transport entities change.

Source

ITU-T Recommendation G.854.10 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

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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.

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Recommendation G.854.10

COMPUTATIONAL VIEWPOINT FOR PRE-PROVISIONED LINK CONNECTION MANAGEMENT

(Geneva, 1999)

1 Scope

This computational viewpoint specification is related to the pre-provisioned linkConnection management enterprise specification defined in Recommendation G.852.10 and the pre-provisioned linkConnection management information specification defined in Recommendation G.853.10.

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.852.10 (1999), *Enterprise viewpoint for pre-provisioned link connection management.*

[4] ITU-T Recommendation G.853.10 (1999), *Information viewpoint for pre-provisioned link connection management.*

3 Definitions

None.

4 Abbreviations

This Recommendation uses the following abbreviations:

ASN.1	Abstract Syntax Notation One
CTP	Connection Termination Point
Id	Identifier
Ifce	Interface
inv	invariant
ITU	International Telecommunication Union
layerND	layer Network Domain
LC	Link Connection

LE Link End

LND Layer Network Domain

pam pre-provisioned adaptation management

plcm pre-provisioned link connection management

RM-ODP Reference Model for Open Distributed Processing

5 Conventions

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

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

6 Label references

Full label reference	Local label reference
<"Rec. G.853.10", INFORMATION_OBJECT:plcmLayerNetworkDomain>	plcmLayerNetworkDomain
<"Rec. G.853.10", INFORMATION_OBJECT:plcmLink>	plcmLink
<"Rec. G.853.10", INFORMATION_OBJECT:plcmLinkConnection>	plcmLinkConnection
<"Rec. G.853.10", INFORMATION_OBJECT:plcmLinkEnd>	plcmLinkEnd
<"Rec. G.853.10", INFORMATION_OBJECT:plcmNetworkCTP>	plcmNetworkCTP
<"Rec. G.853.1", INFORMATION_RELATIONSHIP:layerNetworkDomainIsMadeOf>	layerNetworkDomainIsMadeOf
<"Rec. G.853.1", INFORMATION_RELATIONSHIP:linkHasLinkConnections>	linkHasLinkConnections
<"Rec. G.853.1", INFORMATION_RELATIONSHIP:link?EndHasNetworkCTPs>	linkEndHasNetworkCTPs
<"Rec. G.853.8", ATTRIBUTE:pamAvailableLinkCapacity>	pamAvailableLinkCapacity
<"Rec. G.853.10", ATTRIBUTE:plcmCallerId>	plcmCallerId

Full ASN.1 production reference	Local label reference
<"Rec. X.721:1992:Attribute-ASN1Module": SimpleNameType>	SimpleNameType
<"Rec. X.680:1997":INTEGER>	INTEGER

7 Interfaces

This specification do 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. There 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 identification and properties of resources involved in the "pre-provisioned linkConnection management" community. As the invocation of 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 the following table with the information they allow access to.

Interface name	Information object	Attributes and relationships
plcmLayerNetworkDomainQueryIfce	<plcmLayerNetworkDomain>	<resourceId> <signalIdentification> <layerNetworkDomainIsMadeOf, ROLE: element>
plcmLinkQueryIfce	<plcmLink>	<resourceId> <signalIdentification> <linkDirectionality> <pamAvailableLinkCapacity> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkHasLinkConnections, ROLE: elementLC>
plcmLinkConnectionQueryIfce	<plcmLinkConnection>	<resourceId> <signalIdentification> <directionality> <userLabel> <plcmCallerId> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkHasLinkConnections, ROLE: containerLink>
plcmLinkEndQueryIfce	<plcmLinkEnd>	<resourceId> <signalIdentification> <groupDirectionality> <pamAvailableLinkCapacity> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkEndHasNetworkCTPs, ROLE: elementCTP>
plcmNetworkCTPQueryIfce	<plcmNetworkCTP>	<resourceId> <pointDirectionality> <userLabel> <plcmCallerId> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkEndHasNetworkCTPs, ROLE: containerLE>

7.2 Operational interfaces

7.2.1 PLCM Link Connection Assignment Interface

The plcm link connection assignment interface provides functionality for assigning link connections within links to callers. It satisfies the enterprise requirements stated in <"Rec. G.852.10", COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: assign transport entities and ACTION: de-assign transport entities>.

```
COMPUTATIONAL_INTERFACE plcmAssignmentIfce {
        OPERATION       <assignLinkConnectionOnLink>;
        OPERATION       <de-assignLinkConnectionOnLink>; }
```

7.2.1.1 assign Link Connection on Link

<COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: assign transport entities>

OPERATION assignLinkConnectionOnLink {

INPUT_PARAMETERS
layerND: layerNetworkDomainIfce ::= PlcmLayerNetworkDomainQueryIfce
requestingCaller: plcmCallerId
involvedLink: PlcmLinkId
requestedLinkConnections: PlcmRequestedLinkConnectionChoice;

OUTPUT_PARAMETERS
providedLinkConnections: SetOfLinkConnections;

RAISED_EXCEPTIONS
linkAndLinkConnectionNotCompatible: involvedLink;
invalidLinkConnection: linkConnection;
notEnoughLinkConnections: numberOfLC ::= INTEGER;
linkConnectionAlreadyAssigned: linkConnection;
inconsistentSignalIdentification: NULL;
inconsistentDirectionality: NULL;
failureToSetLinkConnectionCallerId: NULL;
failureToDecreaseCapacity: NULL;

BEHAVIOUR

SEMI_FORMAL

PARAMETER_MATCHING
layerND: <INFORMATION OBJECT plcmLayerNetworkDomain>;
requestingCaller: <INFORMATION ATTRIBUTE plcmCallerId>;
involvedLink: <INFORMATION OBJECT plcmLink>;
requestedLinkConnections ELEMENTS: <INFORMATION OBJECT plcmLinkConnection>;
providedLinkConnections ELEMENTS: <INFORMATION OBJECT plcmLinkConnection>;
linkConnection: <INFORMATION OBJECT plcmLinkConnection>;

PRE_CONDITIONS
inv_linkAndLinkConnectionCompatible
"**involvedLink** and **requestedLinkConnections** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_existingRequestedLinkConnections
"**requestedLinkConnections** refers to *elementLC* in a <*linkHasLinkConnections*> relationship where **involvedLink** refers to *containerLink*."

-- *NOTE – The following invariant is only needed when the numberOfLC choice is used for the requestedLinkConnections by the caller*.

inv_requestedLinkConnectionsAvailable
"the number of available linkConnections in <*pamAvailableLinkCapacity*> of **involvedLink** has to be greater than or equal to the number of requested linkConnections referred to by **requestedLinkConnections**."

inv_freeLinkConnections
"<*plcmCallerId*> of <*plcmLinkConnections*> referred to by **requestedLinkConnections** must be equal to NULL.";

POST_CONDITIONS

inv_assignedLinkConnections

"<*plcmCallerId*> of <*plcmLinkConnections*> referred to by **requestedLinkConnections** must be set to the identifier of the caller referred to by **requestingCaller**."

inv_capacityDecrease

"<*pamAvailableLinkCapacity*> of <*plcmLink*> referred to by involvedLink has been decreased by the number (size of 'SET OF' in**requestedLinkConnections**) of <*plcmLinkConnections*> that have been requested to be assigned.";

EXCEPTIONS

IF PRE_CONDITION inv_linkAndLinkConnectionCompatible NOT_VERIFIED RAISE_EXCEPTION linkAndLinkConnectionNotCompatible;

IF PRE_CONDITION inv_existingRequestedLinkConnections NOT_VERIFIED RAISE_EXCEPTION invalidLinkConnection;

IF PRE_CONDITION inv_requestedLinkConnectionsAvailable NOT_VERIFIED RAISE_EXCEPTION notEnoughLinkConnections;

IF PRE_CONDITION inv_freeLinkConnections NOT_VERIFIED RAISE_EXCEPTION linkConnectionAlreadyAssigned;

IF PRE_CONDITION <*INFORMATION_RELATIONSHIP: linkHasLinkConnections, INVARIANT: inv_signalIdentification*> NOT_VERIFIED RAISE_EXCEPTION inconsistentSignalIdentification;

IF PRE_CONDITION <*INFORMATION_RELATIONSHIP: linkHasLinkConnections, INVARIANT: inv_directionality*> NOT_VERIFIED RAISE_EXCEPTION inconsistentDirectionality;

IF POST_CONDITION inv_assignedLinkConnections NOT_VERIFIED RAISE_EXCEPTION failureToSetLinkConnectionCallerId;

IF POST_CONDITION inv_capacityDecrease NOT_VERIFIED RAISE_EXCEPTION failureToDecreaseCapacity;

; }

7.2.1.2 de-assign Link Connection on Link

<COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: de-assign transport entities>

OPERATION de-assignLinkConnectionOnLink {

INPUT_PARAMETERS

layerND: layerNetworkDomainIfce ::= PlcmLayerNetworkDomainQueryIfce

requestingCaller: plcmCallerId

involvedLink: PlcmLinkId

involvedLinkConnections: SetOfLinkConnections;

OUTPUT_PARAMETERS

-- *none*

RAISED_EXCEPTIONS

linkAndLinkConnectionNotCompatible: involvedLink;

invalidLinkConnection: linkConnection;

notAssignedToCaller: linkConnection;

failureToDe-assignLinkConnection: NULL;

failureToIncreaseCapacity: NULL;

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING

layerND: <INFORMATION OBJECT plcmLayerNetworkDomain>;

requestingCaller: <INFORMATION ATTRIBUTE plcmCallerId>;

involvedLink: <INFORMATION OBJECT plcmLink>;

involvedLinkConnections ELEMENTS: <INFORMATION OBJECT plcmLinkConnection>;

linkConnection: <INFORMATION OBJECT plcmLinkConnection>;

PRE_CONDITIONS

inv_linkAndLinkConnectionCompatible

"**involvedLink** and **involvedLinkConnections** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_existingDe-assignedLinkConnections

"**involvedLinkConnections** refers to *elementLC* in a <*linkHasLinkConnections*> relationship where **involvedLink** refers to *containerLink*."

inv_callerAssignedLinkConnections

"<*plcmCallerId*> of <*plcmLinkConnections*> referred to by **involvedLinkConnections** must be equal to the identifier of **requestingCaller**."

POST_CONDITIONS

inv_de-assignedLinkConnections

"<*plcmCallerId*> of <*plcmLinkConnections*> referred to by involvedLinkConnections is equal to NULL."

inv_capacityIncrease

"<*pamAvailableLinkCapacity*> of <*plcmLink*> referred to by **involvedLink** has been increased by the number (size of 'SET OF' in**involvedLinkConnections**) of <*plcmLinkConnections*> that have been requested to be de-assigned.";

EXCEPTIONS

IF PRE_CONDITION inv_linkAndLinkConnectionCompatible NOT_VERIFIED RAISE_EXCEPTION linkAndLinkConnectionNotCompatible;

IF PRE_CONDITION inv_existingDe-assignedLinkConnections NOT_VERIFIED RAISE_EXCEPTION invalidLinkConnection;

IF PRE_CONDITION inv_callerAssignedLinkConnections NOT_VERIFIED RAISE_EXCEPTION notAssignedToCaller;

IF POST_CONDITION inv_de-assignedLinkConnections NOT_VERIFIED RAISE_EXCEPTION failureToDe-assignLinkConnection;

IF POST_CONDITION inv_capacityIncrease NOT_VERIFIED RAISE_EXCEPTION failureToIncreaseCapacity;

;}

7.2.2 PLCM NetworkCTP Assignment Interface

The plcm networkCTP assignment interface provides functionality for assigning network CTPs within link ends to callers. It satisfies the enterprise requirements stated in <"Rec. G.852.10", COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: assign transport entities and ACTION: de-assign transport entities>.

COMPUTATIONAL_INTERFACE plcmNetworkCTPAssignmentIfce {

OPERATION <assignNetworkCTPOnLinkEnd>;

OPERATION <de-assignNetworkCTPOnLinkEnd>; }

7.2.2.1 assign NetworkCTP on LinkEnd

<COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: assign transport entities>

OPERATION assignNetworkCTPOnLinkEnd {

INPUT_PARAMETERS

layerND: layerNetworkDomainIfce ::= PlcmLayerNetworkDomainQueryIfce

requestingCaller: plcmCallerId

involvedLinkEnd: PlcmLinkEndId

requestedNetworkCTPs: PlcmRequestedNetworkCTPChoice;

OUTPUT_PARAMETERS
providedNetworkCTPs: SetOfNetworkCTPs;

RAISED_EXCEPTIONS
linkEndAndNetworkCTPNotCompatible: involvedLinkEnd;
invalidNetworkCTP: networkCTP;
notEnoughNetworkCTPs: numberOfNetworkCTPs ::= INTEGER;
networkCTPAlreadyAssigned: networkCTP;
inconsistentSignalIdentification: NULL;
inconsistentDirectionality: NULL;
failureToSetNetworkCTPCallerId: NULL;
failureToDecreaseCapacity: NULL;

BEHAVIOUR

SEMI_FORMAL

PARAMETER_MATCHING
layerND: <INFORMATION OBJECT plcmLayerNetworkDomain>;
requestingCaller: <INFORMATION ATTRIBUTE plcmCallerId>;
involvedLinkEnd: <INFORMATION OBJECT plcmLinkEnd>;
requestedNetworkCTPs ELEMENTS: <INFORMATION OBJECT plcmNetworkCTP>;
providedNetworkCTPs ELEMENTS: <INFORMATION OBJECT plcmNetworkCTP>;
networkCTP: <INFORMATION OBJECT plcmNetworkCTP>;

PRE_CONDITIONS
inv_linkEndAndNetworkCTPCompatible
"**involvedLinkEnd** and **requestedNetworkCTPs** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_existingRequestedNetworkCTPs
"**requestedNetworkCTPs** refers to *elementCTP* in a <*linkEndHasNetworkCTPs*> relationship where **involvedLinkEnd** refers to *containerLE*."

-- *NOTE – The following invariant is only needed when the numberOfNetworkCTPs choice is used for the requestedNetworkCTPs by the caller*.

inv_requestedNetworkCTPsAvailable
"the number of available NetworkCTPs in <*pamAvailableLinkCapacity*> of **involvedLinkEnd** has to be greater than or equal to the number of requested NetworkCTPs referred to by **requestedNetworkCTPs**."

inv_freeNetworkCTPs
"<*plcmCallerId*> of <*plcmNetworkCTPs*> referred to by **requestedNetworkCTPs** must be equal to NULL.";

POST_CONDITIONS
inv_assignedNetworkCTPs
"<*plcmCallerId*> of <*plcmLinkConnection*> referred to by **requestedNetworkCTPs** must be set to the identifier of the caller referred to by **requestingCaller**."

inv_capacityDecrease
"<*pamAvailableLinkCapacity*> of <*plcmLinkEnd*> referred to by **involvedLinkEnd** has been decreased by the number (size of 'SET OF' in**requestedNetworkCTPs**) of plcmNetworkCTPs that have been requested to be assigned.";

EXCEPTIONS
IF PRE_CONDITION inv_linkEndAndNetworkCTPCompatible NOT_VERIFIED RAISE_EXCEPTION linkEndAndNetworkCTPNotCompatible;
IF PRE_CONDITION inv_existingRequestedNetworkCTPs NOT_VERIFIED RAISE_EXCEPTION invalidNetworkCTP;
IF PRE_CONDITION inv_requestedNetworkCTPsAvailable NOT_VERIFIED RAISE_EXCEPTION notEnoughNetworkCTPs;
IF PRE_CONDITION inv_freeNetworkCTPs NOT_VERIFIED RAISE_EXCEPTION networkCTPAlreadyAssigned;
IF PRE_CONDITION <*INFORMATION_RELATIONSHIP: linkEndHasNetworkCTPs, INVARIANT: inv_signalIdentification*> NOT_VERIFIED RAISE_EXCEPTION inconsistentSignalIdentification;
IF PRE_CONDITION <*INFORMATION_RELATIONSHIP: linkEndHasNetworkCTPs, INVARIANT: inv_directionality*> NOT_VERIFIED RAISE_EXCEPTION inconsistentDirectionality;
IF POST_CONDITION inv_assignedNetworkCTPs NOT_VERIFIED RAISE_EXCEPTION failureToSetNetworkCTPCallerId;
IF POST_CONDITION inv_capacityDecrease NOT_VERIFIED RAISE_EXCEPTION failureToDecreaseCapacity;
; }

7.2.2.2 de-assign NetworkCTP on LinkEnd

<COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: de-assign transport entities>

OPERATION de-assignNetworkCTPOnLinkEnd {

INPUT_PARAMETERS
layerND: layerNetworkDomainIfce ::= PlcmLayerNetworkDomainQueryIfce
requestingCaller: plcmCallerId
involvedLinkEnd: PlcmLinkEndId
involvedNetworkCTPs: SetOfNetworkCTPs;

OUTPUT_PARAMETERS
-- *none*

RAISED_EXCEPTIONS
linkEndAndNetworkCTPNotCompatible: involvedLinkEnd;
invalidNetworkCTP: networkCTP;
notAssignedToCaller: networkCTP;
failureToDe-assignNetworkCTP: NULL;
failureToIncreaseCapacity: NULL;

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING
layerND: <INFORMATION OBJECT plcmLayerNetworkDomain>;
requestingCaller: <INFORMATION ATTRIBUTE plcmCallerId>;
involvedLinkEnd: <INFORMATION OBJECT plcmLinkEnd>;
involvedNetworkCTPs ELEMENTS: <INFORMATION OBJECT plcmNetworkCTP>;
networkCTP: <INFORMATION OBJECT plcmNetworkCTP>;

PRE_CONDITIONS
inv_linkEndAndNetworkCTPCompatible
"**involvedLinkEnd** and **involvedNetworkCTPs** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_existingDe-assignedNetworkCTPs
"**involvedNetworkCTPs** refers to *elementCTP* in a <*linkEndHasNetworkCTPs*> relationship where **involvedLinkEnd** refers to *containerLE*."

inv_callerAssignedNetworkCTPs
"<*plcmCallerId*> of <*plcmNetworkCTP*> referred to by **involvedNetworkCTPs** must be equal to the identifier of **requestingCaller**."

POST_CONDITIONS
inv_de-assignedNetworkCTPs
"<*plcmCallerId*> of <*plcmNetworkCTP*> referred to by **involvedNetworkCTPs** is equal to NULL."

inv_capacityIncrease
"<*pamAvailableLinkCapacity*> of <*plcmLinkEnd*> referred to by **involvedLinkEnd** has been increased by the number (size of 'SET OF' in**involvedNetworkCTPs**) of plcmNetworkCTPs that have been requested to be de-assigned.";

EXCEPTIONS
IF PRE_CONDITION inv_linkEndAndNetworkCTPCompatible NOT_VERIFIED RAISE_EXCEPTION linkEndAndNetworkCTPNotCompatible;
IF PRE_CONDITION inv_existingDe-assignedNetworkCTPs NOT_VERIFIED RAISE_EXCEPTION invalidNetworkCTP;
IF PRE_CONDITION inv_callerAssignedNetworkCTPs NOT_VERIFIED RAISE_EXCEPTION notAssignedToCaller;
IF POST_CONDITION inv_de-assignedNetworkCTPs NOT_VERIFIED RAISE_EXCEPTION failureToDe-assignNetworkCTP;
IF POST_CONDITION inv_capacityIncrease NOT_VERIFIED RAISE_EXCEPTION failureToIncreaseCapacity;
;}

7.3 Report interfaces

7.3.1 PLCM Reporting Arcview Interface

The plcm reporting arcview interface provides functionality for the reporting of the assignment of link connections to callers and for the de-assignment from callers. It satisfies the enterprise requirements stated in <"Rec. G.852.10", COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: report transport entities change>.

```
COMPUTATIONAL_INTERFACE plcmReportingArcviewIfce {
    OPERATION       <reportLinkConnectionAssignedOnLink>;
    OPERATION       <reportLinkConnectionDesssignOnLink>; }
```

7.3.1.1 Report Link Connection Assigned On Link

<COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: report transport entities change>

OPERATION reportLinkConnectionAssignedOnLink {

INPUT_PARAMETERS
layerND: layerNetworkDomainIfce ::= PlcmLayerNetworkDomainQueryIfce
involvedCaller: plcmCallerId
involvedLink: PlcmLinkId
assignedLinkConnections: SetOfLinkConnections;

OUTPUT_PARAMETERS
-- *none*

RAISED_EXCEPTIONS
-- *none*

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING
layerND: <INFORMATION OBJECT plcmLayerNetworkDomain>;
involvedCaller: <INFORMATION ATTRIBUTE plcmCallerId>;
involvedLink: <INFORMATION OBJECT plcmLink;
assignedLinkConnections ELEMENTS: <INFORMATION OBJECT plcmLinkConnection>;

TRIGGERING_CONDITIONS

PRE-CONDITIONS

inv_linkAndLinkConnectionExistingAndCompatible
"**involvedLink** and **assignedLinkConnections** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_involvedLinkAndAssignedLinkConnectionsCompatible
"**assignedLinkConnections** refers to *elementLC* in a <*linkHasLinkConnections*> relationship where **involvedLink** refers to *containerLink*."

inv_freeLinkConnections
"<*plcmCallerId*> of <*plcmLinkConnection*> referred to by **assignedLinkConnections** must be equal to NULL.";

POST_CONDITIONS
inv_assignedLinkConnection
"<*plcmCallerId*> of <*plcmLinkConnection*> referred to by **assignedLinkConnections** must be set to the identifier of the caller referred to by **involvedCaller**."

inv_capacityDecrease
"<*pamAvailableLinkCapacity*> of <*plcmLink*> referred to by **involvedLink** has been decreased by the number of plcmLinkConnections that have been requested to be assigned.";

EXCEPTIONS
-- *none*
;}

7.3.1.2 Report Link Connection De-Assigned On Link

<COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: report transport entities change>

OPERATION reportLinkConnectionDe-assignOnLink {

INPUT_PARAMETERS
layerND: layerNetworkDomainIfce ::= PlcmLayerNetworkDomainQueryIfce
involvedLink: PlcmLinkId
de-assignedLinkConnections: SetOfLinkConnections;

OUTPUT_PARAMETERS
-- none

RAISED_EXCEPTIONS
-- none

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING
layerND: <INFORMATION OBJECT plcmLayerNetworkDomain>;
involvedLink: <INFORMATION OBJECT plcmLink>*;*
de-assignedLinkConnections ELEMENTS: <INFORMATION OBJECT plcmLinkConnection>;

TRIGGERING_CONDITIONS

PRE-CONDITIONS
inv_linkAndLinkConnectionExistingAndCompatible
"**involvedLink** and **de-assignedLinkConnections** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_involvedLinkAndDe-assignedLinkConnectionsCompatible
"**de-assignedLinkConnections** refers to *elementLC* in a <*linkHasLinkConnections*> relationship where **involvedLink** refers to *containerLink*."

inv_assignedLinkConnections
"<*plcmCallerId*> of <*plcmLinkConnection*> referred to by **de-assignedLinkConnections** is different from NULL.";

POST_CONDITIONS
inv_de-assignedLinkConnections
"<*plcmCallerId*> of <*plcmLinkConnection*> referred to by **de-assignedLinkConnections** is equal to NULL."

inv_capacityIncrease
"<*pamAvailableLinkCapacity*> of <*plcmLink*> referred to by **involvedLink** has been increased by the number of plcmLinkConnections that have been requested to be de-assigned.";

EXCEPTIONS
-- none
;}

7.3.2 PLCM Reporting Pointview Interface

The plcm reporting pointview interface provides functionality for the reporting of the assignment of network CTPs to callers and for the de-assignment from callers. It satisfies the enterprise requirements stated in <"Rec. G.852.10", COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: report transport entities change>

COMPUTATIONAL_INTERFACE plcmReportingPointviewIfce {
OPERATION <reportNetworkCTPAssignedOnLink>;
OPERATION <reportNetworkCTPDesssignOnLink>; }

7.3.2.1 Report Network CTP Assigned On Link End

<COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: report transport entities change>

OPERATION reportNetworkCTPAssignedOnLinkEnd {

INPUT_PARAMETERS
layerND: layerNetworkDomainIfce ::= PlcmLayerNetworkDomainQueryIfce
involvedCaller: plcmCallerId
involvedLinkEnd: PlcmLinkEndId
assignedNetworkCTPs: SetOfNetworkCTPs;

OUTPUT_PARAMETERS
-- *none*

RAISED_EXCEPTIONS
-- *none*

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING
layerNDId: <INFORMATION OBJECT plcmLayerNetworkDomain>;
involvedCaller: <INFORMATION ATTRIBUTE plcmCallerId>;
involvedLinkEnd: <INFORMATION OBJECT plcmLinkEnd>;
assignedNetworkCTPs ELEMENTS: <INFORMATION OBJECT plcmNetworkCTP>;

TRIGGERING_CONDITIONS

PRE-CONDITIONS

inv_linkAndLinkConnectionExistingAndCompatible
"**involvedLinkEnd** and **requestedNetworkCTPs** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_involvedLinkEndAndAssignedNetworkCTPsCompatible
"**assignedNetworkCTPs** refers to *elementCTP* in a <*linkEndHasNetworkCTPs*> relationship where **involvedLinkEnd** refers to *containerLE*."

inv_freeNetworkCTPs
"<*plcmCallerId*> of <*plcmNetworkCTP*> referred to by **assignedNetworkCTPs** must be equal to NULL.";

POST_CONDITIONS
inv_assignedNetworkCTP
"<*plcmCallerId*> of <*plcmNetworkCTP*> referred to by **assignedNetworkCTPs** must be set to the identifier of the caller referred to by **involvedCaller**."

inv_capacityDecrease
"<*pamAvailableLinkCapacity*> of <*plcmLinkEnd*> referred to by **involvedLinkEnd** has been decreased by the number of plcmNetworkCTPs that have been requested to be assigned.";

EXCEPTIONS
-- *none*
;}

7.3.2.2 Report network CTP de-assigned on link end

<COMMUNITY: Pre-provisioned LinkConnection Management, ACTION: report transport entities change>

OPERATION reportNetworkCTPDe-assignOnLinkEnd {

INPUT_PARAMETERS
layerND: layerNetworkDomainIfce ::= PlcmLayerNetworkDomainQueryIfce
involvedLinkEnd: PlcmLinkEndId
de-assignedNetworkCTPs: SetOfNetworkCTPs;

OUTPUT_PARAMETERS
-- *none*

RAISED_EXCEPTIONS
-- *none*

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING
layerNDId: <INFORMATION OBJECT plcmLayerNetworkDomain>;
involvedLinkEnd: <INFORMATION OBJECT plcmLinkEnd>;
de-assignedNetworkCTPs ELEMENTS: <INFORMATION OBJECT plcmNetworkCTP>;

TRIGGERING_CONDITIONS

PRE-CONDITIONS
inv_linkAndLinkConnectionExistingAndCompatible
"**involvedLinkEnd** and **de-assignedNetworkCTPs** shall refer to *element* of the same <*layerNetworkDomainIsMadeOf*> relationship where **layerND** refers to *containerLND*."

inv_involvedLinkEndAndDe-assignedNetworkCTPsCompatible
"**de-assignedNetworkCTPs** refers to *elementCTP* in a <*linkEndHasNetworkCTPs*> relationship where **involvedLinkEnd** refers to *containerLE*."

inv_assignedNetworkCTPs
"<*plcmCallerId*> of <*plcmNetworkCTP*> referred to by **de-assignedNetworkCTPs** is different from NULL.";

POST_CONDITIONS
inv_de-assignedNetworkCTPs
"<*plcmCallerId*> of <*plcmNetworkCTP*> referred to by **de-assignedNetworkCTPs** is equal to NULL."

inv_capacityIncrease
"<*pamAvailableLinkCapacity*> of <*plcmLinkEnd*> referred to by **involvedLinkEnd** has been increased by the number of plcmNetworkCTPs that have been requested to be de-assigned.";

EXCEPTIONS
-- *none*
;}

7.4 ASN.1 supporting productions

This subclause defines the ASN.1 productions which are used within other ASN.1 productions in the operations.

In this Recommendation, 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.

```
PlcmLinkEndId ::= CHOICE {
        linkEndQueryInterface       PlcmLinkEndQueryInterface,
        userIdentifier              SimpleNameType };

PlcmLinkId ::= CHOICE {
        linkQueryInterface          PlcmLinkQueryInterface,
        userIdentifier              SimpleNameType };

PlcmRequestedLinkConnectionChoice ::= CHOICE {
        plcmLinkConnections         SetOfLinkConnections,
        numberOfLC                  INTEGER };

PlcmRequestedNetworkCTPChoice ::= CHOICE {
        plcmNetworkCTPs             SetOfNetworkCTPs,
        numberOfNetworkCTPs         INTEGER };

SetOfLinkConnections ::= SET OF CHOICE {
        linkConnectionId            PlcmLinkConnectionQueryIfce,
        userIdentifier              SimpleNameType }

SetOfNetworkCTPs ::= SET OF CHOICE {
        networkCTPId                PlcmNetworkCTPQueryIfce,
        userIdentifier              SimpleNameType}
```

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