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

Digital transmission systems – Digital networks –
Management of transport network

Computational viewpoint for pre-provisioned link management

ITU-T Recommendation G.854.12

(Previously CCITT Recommendation)

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COMPUTATIONAL VIEWPOINT FOR PRE-PROVISIONED LINK MANAGEMENT

Summary

The pre-provisioned link management service provides functionality to add/remove transport entities (link connections or connection termination points) to/from client linking entities (links/link ends). The client linking entities have to be created using the topology management community (see G.85x.3 series of Recommendations). The transport entities that could be potentially added to the client linking entity have to be provided using either the pre-provisioned adaptation management (see G.85x.8 series of Recommendations) within topological linking entities or using the link management within client linking entities.

Enterprise community actions covered by this Recommendation:

- COMMUNITY plm "pre-provisioned link management";
- "add transport entities to client linking entity";
- "remove transport entities from client linking entity";
- "report client linking entity capacity change".

Source

ITU-T Recommendation G.854.12 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

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Recommendation G.854.12

COMPUTATIONAL VIEWPOINT FOR PRE-PROVISIONED LINK MANAGEMENT

(Geneva, 1999)

1 Scope

This computational viewpoint specification is related to the pre-provisioned link management enterprise specification defined in Recommendation G.852.12 and to the pre-provisioned link management information specification defined in Recommendation G.853.12.

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.852.12 (1999), *Enterprise viewpoint for pre-provisioned link management.*
- [4] ITU-T Recommendation G.853.12 (1999), *Information viewpoint for pre-provisioned link management.*
- [5] ITU-T Recommendation G.852.8 (1999), *Enterprise viewpoint for pre-provisioned adaptation management.*
- [6] ITU-T Recommendation G.853.8 (1999), *Information viewpoint for pre-provisioned adaptation 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

layerND	Layer Network Domain
LC	Link Connection
LE	LinkEnd
LND	Layer Network Domain
ND	Network Domain
pam	Pre-provisioned Adaptation Management
plm	Pre-provisioned Link Management

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*.

In this Recommendation, when an interface is used in an ASN.1 production, the same label will be used starting with a capital letter. This complete ASN.1 production for this Query Interface (e.g. use of OBJECT IDENTIFIER, INTEGER, etc.) will be developed as part of the Engineering Viewpoint within the concerned technology.

6 Label references

Table 1/G.854.12 – Label references

Full label reference	Local label reference
<"Rec. G.853.12", INFORMATION_OBJECT:plmClientLink>	plmClientLink
<"Rec. G.853.12", INFORMATION_OBJECT:plmClientLinkEnd>	plmClientLinkEnd
<"Rec. G.853.12", INFORMATION_OBJECT:plmLayerNetworkDomain>	plmLayerNetworkDomain
<"Rec. G.853.12", INFORMATION_OBJECT:plmLinkConnection>	plmLinkConnection
<"Rec. G.853.12", INFORMATION_OBJECT:plmNetworkCTP>	plmNetworkCTP
<"Rec. G.853.12", INFORMATION_OBJECT:plmProviderLink>	plmProviderLink
<"Rec. G.853.12", INFORMATION_OBJECT:plmProviderLinkEnd>	plmProviderLinkEnd
<"Rec. G.853.1", INFORMATION_RELATIONSHIP:linkHasLink Connections>	linkHasLinkConnections
<"Rec. G.853.1", INFORMATION_RELATIONSHIP:linkEndHas NetworkCTPs>	linkEndHasNetworkCTPs
<"Rec. G.853.1", INFORMATION_RELATIONSHIP:representSame ResourceAs>	representSameResourceAs
<"Rec. G.853.8", ATTRIBUTE:pamAvailableLinkCapacity>	pamAvailableLinkCapacity

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

7 Interfaces

7.1 Query interfaces

This specification refers to interfaces that allow get access identification and properties of resources involved in the "pre-provisioned link 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 Table 2 with the information to which they allow access to.

Table 2/G.854.12 – Correspondence between interface names, information objects, attributes and relationships

Interface name	Information object	Attributes and relationships
plmClientLinkQueryIfce	<plmClientLink>	<resourceId> <signalIdentification> <linkDirectionality> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkHasLinkConnections, ROLE: elementLC>
plmClientLinkEndQueryIfce	<plmClientLinkEnd>	<resourceId> <signalIdentification> <topologicalEndDirection> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkEndHasNetworkCTPs, ROLE: elementCTP>
plmLayerNetworkDomainQueryIfce	<plmLayerNetworkDomain>	<resourceId> <signalIdentification> <layerNetworkDomainIsMadeOf, ROLE: element>
plmLinkConnectionQueryIfce	<plmLinkConnection>	<resourceId> <signalIdentification> <directionality> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkHasLinkConnections, ROLE: containerLink>
plmNetworkCTPQueryIfce	<plmNetworkCTP>	<resourceId> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkEndHasNetworkCTPs, ROLE: containerLE>

Table 2/G.854.12 – Correspondence between interface names, information objects, attributes and relationships (*concluded*)

Interface name	Information object	Attributes and relationships
plmProviderLinkQueryIfce	<plmProviderLink>	<resourceId> <signalIdentification> <linkDirectionality> <pamAvailableLinkCapacity> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkHasLinkConnections, ROLE: elementLC>
plmProviderLinkEndQueryIfce	<plmProviderLinkEnd>	<resourceId> <signalIdentification> <topologicalEndDirection> <pamAvailableLinkCapacity> <layerNetworkDomainIsMadeOf, ROLE: containerLND> <linkEndHasNetworkCTPs, ROLE: elementCTP>

7.2 Operational interfaces

7.2.1 Pre-provisioned link management interface

The pre-provisioned link management interface provides functionality for adding and removing link connections within links (arc-oriented view). It satisfies the enterprise requirements stated in <"Rec. G.852.12", COMMUNITY: Pre-provisioned Link Management, ACTION: add transport entities to client linking entity and ACTION: remove transport entities from client linking entity>.

```
COMPUTATIONAL_INTERFACE plmLinkManagementIfce {
    OPERATION <addLinkConnectionToLink>;
    OPERATION <removeLinkConnectionFromLink>; }
```

7.2.1.1 add linkConnection to link

<COMMUNITY:Pre Provisioned Link Management, ACTION: add transport entities to client linking entity>

```
OPERATION addLinkConnectionToLink {
    INPUT_PARAMETERS
        layerND: layerNetworkDomainIfce ::= PlmLayerNetworkDomainQueryIfce
        involvedClientLink: PlmClientLinkId;
        involvedProviderLink: PlmProviderLinkId;
        requestedLinkConnections: PlmRequestedLinkConnectionChoice;

    OUTPUT_PARAMETERS
        providedLinkConnections: SetOfPLMLinkConnections;

    RAISED_EXCEPTIONS
        clientLinkDoNotExist: plmClientLink;
        providerLinkDoNotExist: plmProviderLink;
        linkAndLinkConnectionNotCompatible: plmLinkConnection;
        notEnoughLinkConnections: number ::= INTEGER;
        noLinkCapacity: NULL;
        failureToAddLinkConnections: NULL;
        failureToIncreaseCapacity: NULL;
```

BEHAVIOUR

SEMI_FORMAL

PARAMETER_MATCHING

layerND: <INFORMATION OBJECT plmLayerNetworkDomain>;
involvedClientLink: <INFORMATION OBJECT plmClientLink>;
involvedProviderLink: <INFORMATION OBJECT plmProviderLink>;
setOfPLMLinkConnections ELEMENTS: <INFORMATION OBJECT
plmLinkConnection>;

PRE_CONDITIONS

inv_clientLinkAvailable

"**involvedClientLink** shall refer to *element* of the <layerNetworkDomainIsMadeOf> relationship where **layerND** refers to *containerLND*."

inv_providerLinkAvailable

"**involvedProviderLink** shall refer to *element* of the <layerNetworkDomainIsMadeOf> relationship where **layerND** refers to *containerLND*."

inv_linkAndLinkConnectionCompatible

"**requestedLinkConnections** shall refer to *elementLC* of the <linkHasLinkConnections> relationship where **involvedProviderLink** refers to *containerLink*."

inv_requestedNumberOfLinkConnectionsAvailable

"the number of available (available means: the requested link connections shall not participate in any <representSameResourceAs> relationship) linkConnections in <pamAvailableLinkCapacity> of **involvedProviderLink** has to be greater than or equal to the number of requested linkConnections referred to by **requestedLinkConnections**."

inv_linkCapacityNotEmpty

"the number of available link connections in <pamAvailableLinkCapacity> of **involvedProviderLink** has to be greater than zero."

POST_CONDITIONS

inv_addLinkConnections

"every link connection of **requestedLinkConnections** is an *elementLC* in a <linkHasLinkConnections> relationship where **involvedClientLink** refers to *containerLink*."

inv_capacityIncrease

"<pamAvailableLinkCapacity> of <plmLink> referred to by **involvedClientLink** has been increased by the number of <plmLinkConnections> that have been requested to be added in **requestedLinkConnections**."

EXCEPTIONS

IF PRE_CONDITION inv_clientLinkAvailable NOT_VERIFIED

RAISE_EXCEPTION clientLinkDoNotExist;

IF PRE_CONDITION inv_providerLinkAvailable NOT_VERIFIED

RAISE_EXCEPTION providerLinkDoNotExist;

IF PRE_CONDITION inv_linkAndLinkConnectionCompatible NOT_VERIFIED

RAISE_EXCEPTION linkAndLinkConnectionNotCompatible;

IF PRE_CONDITION inv_requestedNumberOfLinkConnectionsAvailable

NOT_VERIFIED RAISE_EXCEPTION notEnoughLinkConnections;

IF PRE_CONDITION inv_linkCapacityNotEmpty NOT_VERIFIED

RAISE_EXCEPTION noLinkCapacity;

IF POST_CONDITION inv_addLinkConnections NOT_VERIFIED

RAISE_EXCEPTION failureToAddLinkConnections;

IF POST_CONDITION inv_capacityIncrease NOT_VERIFIED RAISE_EXCEPTION

failureToIncreaseCapacity;

; }

7.2.1.2 remove LinkConnection from Link

<COMMUNITY: Pre Provisioned Link Management, ACTION: remove transport entities from client linking entity>

OPERATION removeLinkConnectionFromLink {

INPUT_PARAMETERS

layerND: layerNetworkDomainIfce ::= PlmLayerNetworkDomainQueryIfce
involvedClientLink: PlmClientLinkId;
involvedLinkConnections: SetOfPlmLinkConnections;

OUTPUT_PARAMETERS

-- none

RAISED_EXCEPTIONS

linkDoNotExist: plmClientLink;
invalidLinkConnection: plmLinkConnection;
failureToRemoveLCs: NULL;
failureToDecreaseCapacity: NULL;

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING

layerND: <INFORMATION OBJECT plmLayerNetworkDomain>;
involvedClientLink: <INFORMATION OBJECT plmClientLink>;
involvedLinkConnections ELEMENTS: <INFORMATION OBJECT plmLinkConnection>;

PRE_CONDITIONS

inv_linkAvailable

"**involvedClientLink** shall refer to *element* of the <layerNetworkDomainIsMadeOf> relationship
where **layerND** refers to *containerLND*."

inv_existingLinkConnections

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

POST_CONDITIONS

inv_LinkConnectionsRemoved

"None of the **involvedLinkConnections** refer to *elementLC* in a <linkHasLinkConnections>
relationship where **involvedClientLink** refers to *containerLink*."

inv_capacityDecrease

"<pamAvailableLinkCapacity> of <plmLink> referred to by **involvedClientLink** has been decreased
by the number of <plmLinkConnections> in **involvedLinkConnections** that have been requested to be
removed.";

EXCEPTIONS

IF PRE_CONDITION inv_linkAvailable NOT_VERIFIED RAISE_EXCEPTION linkDoNotExist;

IF PRE_CONDITION inv_existingLinkConnections NOT_VERIFIED RAISE_EXCEPTION
invalidLinkConnection;

IF POST_CONDITION inv_LinkConnectionsRemoved NOT_VERIFIED RAISE_EXCEPTION
failureToRemoveLCs;

IF POST_CONDITION inv_capacityDecrease NOT_VERIFIED RAISE_EXCEPTION
failureToDecreaseCapacity;

}

7.2.2 Pre-provisioned link end management interface

The pre-provisioned link end management interface provides functionality for adding and removing CTPs within link ends (point-oriented view). It satisfies the enterprise requirements stated in <"Rec. G.852.12", COMMUNITY: Pre-provisioned Link Management, ACTION: add transport entities to client linking entity and ACTION: remove transport entities from client linking entity>.

COMPUTATIONAL_INTERFACE plmLinkEndManagementIfce {

OPERATION <addNetworkCTPToLinkEnd>;

OPERATION <removeNetworkCTPFromLinkEnd>;

7.2.2.1 add NetworkCTP to Link End

<COMMUNITY:Pre Provisioned Link Management, ACTION: add transport entities to client linking entity>

OPERATION addNetworkCTPToLinkEnd {

INPUT_PARAMETERS

layerND: layerNetworkDomainIfce ::= PlmLayerNetworkDomainQueryIfce
involvedClientLinkEnd: PlmClientLinkEndId;
involvedProviderLinkEnd: PlmProviderLinkEndId;
requestedNetworkCTPs: PlmRequestedNetworkCTPChoice;

OUTPUT_PARAMETERS

providedNetworkCTPs: SetOfPLMNetworkCTPs;

RAISED_EXCEPTIONS

clientLinkEndDoNotExist: plmClientLinkEnd;
providerLinkEndDoNotExist: plmProviderLinkEnd;
linkEndAndNetworkCTPNotCompatible: plmNetworkCTP;
notEnoughNetworkCTPs: number ::= INTEGER;
noLinkEndCapacity: NULL;
failureToAddNetworkCTPs: NULL;
failureToIncreaseCapacity: NULL;

BEHAVIOUR

SEMI_FORMAL

PARAMETER_MATCHING

layerND: <INFORMATION OBJECT plmLayerNetworkDomain>;
involvedClientLinkEnd: <INFORMATION OBJECT plmClientLinkEnd>;
involvedProviderLinkEnd: <INFORMATION OBJECT plmProviderLinkEnd>;
setOfPLMNetworkCTPs ELEMENTS: <INFORMATION OBJECT plmNetworkCTP>;

PRE_CONDITIONS

inv_clientLinkEndAvailable

"**involvedClientLinkEnd** shall refer to *element* of the <layerNetworkDomainIsMadeOf> relationship where **layerND** refers to *containerLND*."

inv_providerLinkEndAvailable

"**involvedProviderLinkEnd** shall refer to *element* of the <layerNetworkDomainIsMadeOf> relationship where **layerND** refers to *containerLND*."

inv_linkEndAndNetworkCTPCompatible

"**requestedNetworkCTPs** shall refer to *elementCTP* of the <linkEndHasNetworkCTPs> relationship where **involvedProviderLinkEnd** refers to *containerLE*."

inv_requestedNumberOfNetworkCTPsAvailable

"the number of available (available means: the requested networkCTPs shall not participate in any <representSameResourceAs> relationship) networkCTPs in <pamAvailableLinkCapacity> of **involvedProviderLinkEnd** has to be greater than or equal to the number of requested networkCTPs referred to by **requestedNetworkCTPs**."

inv_linkEndCapacityNotEmpty

"the number of available networkCTPs in <pamAvailableLinkCapacity> of **involvedProviderLinkEnd** has to be greater than zero."

POST_CONDITIONS

inv_addNetworkCTPs

"every networkCTP of **requestedNetworkCTPs** refers to *elementCTP* in a <linkEndHasNetworkCTPs> relationship where **involvedClientLinkEnd** refers to *containerLE*."

inv_capacityIncrease

"<pamAvailableLinkCapacity> of <plmLinkEnd> referred to by **involvedClientLinkEnd** has been increased by the number of <plmNetworkCTPs> that have been requested to be added in **requestedNetworkCTPs**.";

```

EXCEPTIONS
  IF PRE_CONDITION inv_clientLinkEndAvailable NOT_VERIFIED RAISE_EXCEPTION
    clientLinkEndDoNotExist;
  IF PRE_CONDITION inv_providerLinkEndAvailable NOT_VERIFIED RAISE_EXCEPTION
    providerLinkEndDoNotExist;
  IF PRE_CONDITION inv_linkEndAndNetworkCTPCompatible NOT_VERIFIED RAISE_EXCEPTION
    linkEndAndNetworkCTPNotCompatible;
  IF PRE_CONDITION inv_requestedNumberOfNetworkCTPsAvailable NOT_VERIFIED
    RAISE_EXCEPTION notEnoughNetworkCTPs;
  IF PRE_CONDITION inv_linkEndCapacityNotEmpty NOT_VERIFIED RAISE_EXCEPTION
    noLinkEndCapacity;
  IF POST_CONDITION inv_addNetworkCTPs NOT_VERIFIED RAISE_EXCEPTION
    failureToAddNetworkCTPs;
  IF POST_CONDITION inv_capacityIncrease NOT_VERIFIED RAISE_EXCEPTION
    failureToIncreaseCapacity;

; }

```

7.2.2.2 remove NetworkCTP from Link End

<COMMUNITY: Pre Provisioned Link Management, ACTION: remove transport entities from client linking entity>

OPERATION removeNetworkCTPFromLinkEnd {

INPUT_PARAMETERS

layerND: layerNetworkDomainIfce ::= PlmLayerNetworkDomainQueryIfce
involvedClientLinkEnd: PlmClientLinkEndId;
involvedNetworkCTPs: SetOfPlmNetworkCTPs;

OUTPUT_PARAMETERS

-- none

RAISED_EXCEPTIONS

linkEndDoNotExist: plmClientLinkEnd;
invalidNetworkCTP: plmNetworkCTP;
failureToRemoveNetworkCTPs: NULL;
failureToDecreaseCapacity: NULL;

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING

layerND: <INFORMATION OBJECT plmLayerNetworkDomain>;
involvedClientLinkEnd: <INFORMATION OBJECT plmClientLinkEnd>;
involvedNetworkCTPs ELEMENTS: <INFORMATION OBJECT plmNetworkCTP>;

PRE_CONDITIONS

inv_linkEndAvailable

"**involvedClientLinkEnd** shall refer to *element* of the <layerNetworkDomainIsMadeOf> relationship where **layerND** refers to *containerLND*."

inv_existingNetworkCTPs

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

POST_CONDITIONS

inv_networkCTPsRemoved

"None of the **involvedNetworkCTPs** shall refer to *elementCTP* in a <linkEndHasNetworkCTPs> relationship where **involvedLinkEnd** refers to *containerLE*."

inv_capacityDecrease

"<plmAvailableLinkCapacity> of <plmLinkEnd> referred to by **involvedLinkEnd** has been decreased by the number of <plmNetworkCTPs> in **involvedNetworkCTPs** that have been requested to be removed.";

EXCEPTIONS

IF PRE_CONDITION inv_linkEndAvailable NOT_VERIFIED RAISE_EXCEPTION
linkEndDoNotExist;

```

    IF PRE_CONDITION inv_existingNetworkCTPs NOT_VERIFIED
        RAISE_EXCEPTION invalidNetworkCTP;
    IF POST_CONDITION inv_networkCTPsRemoved NOT_VERIFIED
        RAISE_EXCEPTION failureToRemoveNetworkCTPs;
    IF POST_CONDITION inv_capacityDecrease NOT_VERIFIED RAISE_EXCEPTION
        failureToDecreaseCapacity;
}

```

7.3 Report interfaces

7.3.1 Pre-provisioned link management reporting interface

The pre-provisioned link management reporting interface provides functionality for the reporting of the adding/removing of link connections to/from links (arc-oriented view). It satisfies the enterprise requirements stated in <"Rec. G.852.10", COMMUNITY: Pre-provisioned Link Management, ACTION: report client linking entity capacity change>.

```

COMPUTATIONAL_INTERFACE plmLinkManagementReportingIfce {
    OPERATION <reportLinkConnectionAddedToLink>;
    OPERATION <reportLinkConnectionRemovedFromLink>; }

```

7.3.1.1 Report Link Connection Added To Link

<COMMUNITY: Pre Provisioned Link Connection Management, ACTION: report client linking entity capacity change>

```

OPERATION reportLinkConnectionAddedToLink {
    INPUT PARAMETERS
        layerND: layerNetworkDomainIfce ::= PlmLayerNetworkDomainQueryIfce
        involvedClientLink: PlmClientLinkId;
        addedLinkConnections: SetOfPlmLinkConnections;

```

```

    OUTPUT PARAMETERS
        -- none

```

```

    RAISED EXCEPTIONS
        -- none

```

BEHAVIOUR

SEMI-FORMAL

```

PARAMETER_MATCHING
    layerND: <INFORMATION OBJECT plmLayerNetworkDomain>;
    involvedClientLink: <INFORMATION OBJECT plmClientLink>;
    addedLinkConnections ELEMENTS: <INFORMATION OBJECT plmLinkConnection>;

```

TRIGGERING CONDITIONS

```

PRE-CONDITIONS
    inv_linkAndLinkConnectionExistingAndCompatible
        "involvedClientLink and addedLinkConnections shall refer to element of the same
        <layerNetworkDomainIsMadeOf> relationship where layerND refers to containerLND."
    inv_notInLink
        "None of the link connections in addedLinkConnections shall refer to elementLC in a
        <linkHasLinkConnections> relationship where involvedClientLink refers to containerLink."
POST_CONDITIONS
    inv_inLink
        "Every link connection in addedLinkConnections shall refer to elementLC in a
        <linkHasLinkConnections> relationship where involvedClientLink refers to containerLink."

```

```

EXCEPTIONS
    -- none

```

```

;}

```

7.3.1.2 Report Link Connection Removed From Link

<COMMUNITY: Pre Provisioned Link Connection Management, ACTION: report client linking entity capacity change>

OPERATION reportLinkConnectionRemovedFromLink {

INPUT PARAMETERS

layerND: layerNetworkDomainIfce ::= PlmLayerNetworkDomainQueryIfce

involvedClientLink: PlmClientLinkId;

removedLinkConnections: SetOfPlmLinkConnections;

OUTPUT PARAMETERS

-- none

RAISED EXCEPTIONS

-- none

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING

layerND: <INFORMATION OBJECT plmLayerNetworkDomain>;

involvedClientLink: <INFORMATION OBJECT plmClientLink>

removedLinkConnections ELEMENTS: <INFORMATION OBJECT plmLinkConnection>

TRIGGERING CONDITIONS

PRE-CONDITIONS

inv_linkAndLinkConnectionExistingAndCompatible

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

inv_inLink

"Every link connection in **removedLinkConnections** shall refer to *elementLC* in a
<linkHasLinkConnections> relationship where **involvedClientLink** refers to *containerLink*."

POST_CONDITIONS

inv_notInLink

"None of the link connections in **removedLinkConnections** shall refer to *elementLC* in a
<linkHasLinkConnections> relationship where **involvedClientLink** refers to *containerLink*."

EXCEPTIONS

-- none

;}

7.3.2 Pre-provisioned link end management reporting interface

The pre-provisioned link end management reporting interface provides functionality for the reporting of the adding/removing of networkCTPs to/from link ends (point-oriented view). It satisfies the enterprise requirements stated in <"Rec. G.852.10", COMMUNITY: Pre-provisioned Link Management, ACTION: report client linking entity capacity change>.

COMPUTATIONAL_INTERFACE plmLinkEndManagementReportingIfce {

OPERATION <reportNetworkCTPAddedToLinkEnd>;

OPERATION <reportNetworkCTPRemovedFromLinkEnd>; }

7.3.2.1 Report NetworkCTP Added To Link End

<COMMUNITY: Pre Provisioned Link Connection Management, ACTION: report client linking entity capacity change>

OPERATION reportNetworkCTPAddedToLinkEnd {

INPUT PARAMETERS

layerND: layerNetworkDomainIfce ::= PlmLayerNetworkDomainQueryIfce

involvedClientLinkEnd: PlmClientLinkEndId;

addedNetworkCTPs: SetOfPlmNetworkCTPs;

OUTPUT PARAMETERS

-- none

RAISED EXCEPTIONS

-- none

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING

layerND: <INFORMATION OBJECT plmLayerNetworkDomain>;
involvedClientLinkEnd: <INFORMATION OBJECT plmClientLinkEnd>;
addedNetworkCTPs ELEMENTS: <INFORMATION OBJECT plmNetworkCTP>;

TRIGGERING CONDITIONS

PRE-CONDITIONS

inv_linkEndAndNetworkCTPExistingAndCompatible
"involvedClientLinkEnd and addedNetworkCTPs shall refer to *element* of the same
<layerNetworkDomainIsMadeOf> relationship where **layerND** refers to *containerLND*."

inv_notInLinkEnd
"None of the networkCTPs in **addedNetworkCTPs** shall refer to *elementCTP* of a
<linkEndHasNetworkCTPs> relationship where **involvedClientLinkEnd** refers to *containerLE*."

POST_CONDITIONS

inv_inLinkEnd
"Every networkCTP in **addedNetworkCTPs** shall refer to *elementCTP* in a
<linkEndHasNetworkCTPs> relationship where **involvedClientLinkEnd** refers to an *containerLE*."

EXCEPTIONS

-- none

;}

7.3.2.2 Report NetworkCTP Removed From Link End

<COMMUNITY: Pre Provisioned Link Connection Management, ACTION: report client linking entity capacity change>

OPERATION reportNetworkCTPRemovedFromLinkEnd {

INPUT PARAMETERS

layerND: layerNetworkDomainIfce ::= PlmLayerNetworkDomainQueryIfce
involvedClientLinkEnd: PlmClientLinkEndId;
removedNetworkCTPs: SetOfPlmNetworkCTPs;

OUTPUT PARAMETERS

-- none

RAISED EXCEPTIONS

-- none

BEHAVIOUR

SEMI-FORMAL

PARAMETER_MATCHING

layerND: <INFORMATION OBJECT plmLayerNetworkDomain>;
involvedClientLinkEnd: <INFORMATION OBJECT plmClientLinkEnd>;
removedNetworkCTPs ELEMENTS: <INFORMATION OBJECT plmNetworkCTP>;

TRIGGERING CONDITIONS

PRE-CONDITIONS

inv_linkEndAndNetworkCTPExistingAndCompatible
"involvedClientLinkEnd and removedNetworkCTPs shall refer to *element* of the same
<layerNetworkDomainIsMadeOf> relationship where **layerND** refers to *containerLND*."

```

    inv_inLinkEnd
        "Every networkCTP in removedNetworkCTPs shall refer to elementCTP in a
        <linkEndHasNetworkCTPs> relationship where involvedClientLinkEnd refers to containerLE."

    POST_CONDITIONS
        inv_notInLinkEnd
            "None of the networkCTPs in removedNetworkCTPs refer to elementCTP of a
            <linkEndHasNetworkCTPs> relationship where involvedClientLinkEnd refers to containerLE."

    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.

```

PlmClientLinkEndId ::= CHOICE {
    clientLinkEndQueryInterface          PlmClientLinkEndQueryInterface,
    userIdentifier                       SimpleNameType }

PlmClientLinkId ::= CHOICE {
    clientLinkQueryInterface             PlmClientLinkQueryInterface,
    userIdentifier                       SimpleNameType }

PlmProviderLinkEndId ::= CHOICE {
    providerLinkEndQueryInterface        PlmProviderLinkEndQueryInterface,
    userIdentifier                       SimpleNameType }

PlmProviderLinkId ::= CHOICE {
    providerLinkQueryInterface           PlmProviderLinkQueryInterface,
    userIdentifier                       SimpleNameType }

PlmRequestedLinkConnectionChoice ::= CHOICE {
    plmLinkConnectionIds                SetOfPlmLinkConnections,
    numberOfLinkConnections             INTEGER,
    allAvailableLinkConnections         NULL }

PlmRequestedNetworkCTPChoice ::= CHOICE {
    plmNetworkCTPIDs                   SetOfPlmNetworkCTPs,
    numberOfNetworkCTPs                INTEGER,
    allAvailableNetworkCTPs            NULL }

SetOfPlmLinkConnections ::= SET OF CHOICE {
    linkConnectionId                   PLMLinkConnectionQueryIfce,
    userIdentifier                     SimpleNameType }

SetOfPlmNetworkCTPs ::= SET OF CHOICE {
    networkCTPIDPlmNetworkCTPQueryIfce,
    userIdentifier                     SimpleNameType }

```

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