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SERIES M: TMN AND NETWORK MAINTENANCE:  
INTERNATIONAL TRANSMISSION SYSTEMS,  
TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE  
AND LEASED CIRCUITS

Telecommunications management network

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**TMN management services for dedicated and reconfigurable circuits network: Connection management of pre-provisioned service link connections to form a leased circuit service**

ITU-T Recommendation M.3208.2

(Previously CCITT Recommendation)

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## **ITU-T RECOMMENDATION M.3208.2**

### **TMN MANAGEMENT SERVICES FOR DEDICATED AND RECONFIGURABLE CIRCUITS NETWORK: CONNECTION MANAGEMENT OF PRE-PROVISIONED SERVICE LINK CONNECTIONS TO FORM A LEASED CIRCUIT SERVICE**

#### **Summary**

This Recommendation is one of the series of M.3200 TMN management service Recommendations that provide descriptions of management services, goals and context for the dedicated and reconfigurable circuits network. This Recommendation provides a profile of Recommendation M.3208.1 for customer administration of leased circuit services using pre-provisioned resources (link connections). This is done by using existing function sets, functions and parameters from Recommendation M.3208.1 and adding additional semantics and restrictions.

#### **Source**

ITU-T Recommendation M.3208.2 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.

#### **Keywords**

Connection management, Dedicated and reconfigurable circuits network, Leased circuits, Leased circuit services, Telecommunications Management Network (TMN), TMN Management service.

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## **Introduction**

Recommendation M.3208.1 specifies customer management of leased circuit services. This Recommendation builds upon the management services of M.3208.1 in the case of pre-provisioned resources. Hence, the pre-service phase (from initiation of customer request to create service until service creation is completed) only involves connecting existing, pre-provisioned resources, and normally will be completed within a short period of time (nearly instantaneous).

This Recommendation builds upon the dedicated LCS create function defined in Recommendation M.3208.1 by requiring that all of the service link connections which support the LCS exist prior to the submission of the create request. Future work will address additional connection management functions.

This Recommendation supports the relationship between services and enabling transport technologies described in Recommendation M.3208.1. For convenience, the M.3208.1 statement of this relationship is quoted here. "In general, the definition of a service should be independent of the particular network used to transport the service. This allows multiple technologies to support the service. Therefore, network level information should not be presented to the service layer. However, specific service features may be defined which allow network or network element information to be presented to a service customer. In this case, an abstraction of the information appropriate to the service feature is transferred."

This X interface at the TMN service management layer allows service customers to manage pre-provisioned link connection services without a detailed knowledge of the service provider's network elements and network topology. The connection management LCS may be offered by one or more Service Providers (SP). The CM LCS is defined between a single SC and a single SP. The Service Customer (SC) may have different levels of visibility to the technology used to provide the service link connections.

Clause 6 provides the requirements for security of the CM LCS.

Clause 7 provides the requirements for customer administration. This includes configuration, status administration and testing function sets.

Appendix I shows a SONET private line service example.

Appendix II shows a North American specific ordering process for the service link connections.





## **Recommendation M.3208.2**

### **TMN MANAGEMENT SERVICES FOR DEDICATED AND RECONFIGURABLE CIRCUITS NETWORK: CONNECTION MANAGEMENT OF PRE-PROVISIONED SERVICE LINK CONNECTIONS TO FORM A LEASED CIRCUIT SERVICE**

*(Geneva, 1999)*

#### **1 Scope**

This Recommendation describes a subset of TMN management services for dedicated and reconfigurable leased circuits network identified in Recommendation M.3200 as a TMN managed area. Its main focus is on the real-time connection management of pre-provisioned service link connections. These management services may also be applicable for interactions between management systems of different service providers or within a service provider.

TMN management services in this Recommendation specify interface requirements between Operation Systems (OS) to perform customer management of LCS using pre-provisioned resources. The interfaces addressed by the TMN management services in this Recommendation are applicable to both the X interface and the Q3 interface. Support for the services described in this Recommendation is at the discretion of the service provider.

The TMN management services in this Recommendation are described using the GDMS template contained in Recommendation M.3020 and build on the management services defined in Recommendation M.3208.1.

#### **2 References and related Recommendations**

##### **2.1 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.

- ITU-T Recommendation G.805 (1995), *Generic functional architecture of transport networks*.
- CCITT Recommendation M.125 (1988), *Digital loopback mechanisms*.
- ITU-T Recommendation M.3010 (1996), *Principles for a telecommunications management network*.
- ITU-T Recommendation M.3020 (1995), *TMN interface specification methodology*.
- ITU-T Recommendation M.3200 (1997), *TMN management services and telecommunications managed areas: Overview*.
- ITU-T Recommendation M.3208.1 (1997), *TMN management services for dedicated and reconfigurable circuits network: Leased circuit services*.

- ITU-T Recommendation M.3320 (1997), *Management requirements for the TMN X-interface.*
- ITU-T Recommendation M.3400 (1997), *TMN management functions.*
- CCITT Recommendation X.721 (1992) | ISO/IEC 10165-2:1992, *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information.*
- CCITT Recommendation X.731 (1992) | ISO/IEC 10164-2:1993, *Information technology – Open Systems Interconnection – Systems Management: State management function.*

## **2.2 Related Recommendations**

- CCITT Recommendation X.734 (1992) | ISO/IEC 10164-5:1993, *Information technology – Open Systems Interconnection – Systems Management: Event report management function.*
- CCITT Recommendation X.735 (1992) | ISO/IEC 10164-6:1993, *Information technology – Open Systems Interconnection – Systems Management: Log control function.*

## **3 Definitions**

### **3.1 Service-related definitions**

This Recommendation makes use of the following terms defined and/or specialized in Recommendation M.3208.1:

- connection point;
- dedicated leased circuit service;
- diversity;
- layer network;
- leased circuit service;
- link connection;
- network connection;
- reconfigurable leased circuit service;
- service access group;
- service access point;
- service characteristic;
- service customer;
- service node;
- service provider;
- subnetwork connection;
- subnetwork;
- termination connection point.

This Recommendation defines the following terms:

**3.1.1 route:** A sequence of transport architectural entities, e.g. connection points, links, link connections, subnetworks, over which an LCS is provided. See Recommendation G.805 for the basis of this definition.

NOTE – This usage of route is not defined in the definitions clause of Recommendation M.3208.1, but only in the definition of a parameter there. That usage does not include the concept of link connection. There is a fundamental need for that concept in CM.

**3.1.2 CM schedule:** A list of time periods during which a CM LCS has an availability status of on-duty (not off-duty). The definition of availability status can be found in Recommendation X.731.

**3.1.3 service link connection:** A link connection used by connection management to construct a CM LCS.

**3.1.4 dedicated service link connection:** A service link connection which is reserved for the exclusive use of a single SC.

**3.1.5 shared service link connection<sup>1</sup>:** A service link connection which can be used by a predefined set of SCs. That is, during a specific time period, only one SC can use the SLC, and the right to use the SLC is assigned on a first come, first served basis or other priority scheme defined by a SLA.

## **3.2 Role-related definitions**

This Recommendation makes use of the following terms defined or specialized in Recommendation M.3208.1:

- service customer – alternate term for "customer" in Recommendation M.3208.1;
- service provider;
- diversity;
- service characteristic.

## **3.3 Transport network resource definitions**

This Recommendation makes use of the following terms defined in the transport network architecture, Recommendation G.805 or specialized in Recommendation M.3208.1:

- layer network;
- subnetwork;
- link;
- access group;
- access point;
- trail;
- connection point;
- termination connection point;
- link connection;
- subnetwork connection;
- network connection;
- service node.

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<sup>1</sup> The extent to which service customers using shared service link connections know the identities of other SCs using these shared service link connections is outside of the scope of this Recommendation. This matter is expected to be addressed in the service contract between the SP and SC.

## **4 Abbreviations**

This Recommendation uses the following abbreviations:

ADM	Add Drop Multiplexer
ATM	Asynchronous Transfer Mode
BLSR	Bidirectional Line Switched Ring
CM	Connection Management
CP	Connection Point
CPE	Customer Premise Equipment
DSn	Digital Signal Level n
EAO	Electronic Access Ordering
EB	Electronic Bonding
ECCKT ID	Exchange Carrier Circuit ID
GDMS	Guidelines for the Definition of TMN Managed Services
LCS	Leased Circuit Service
NE	Network Element
NML	Network Management Layer
PDH	Plesiochronous Digital Hierarchy
POP	Point of Presence
SAD	Service Access Domain
SAG	Service Access Group
SAP	Service Access Point
SC	Service Customer
SLA	Service Level Agreement
SLC	Service Link Connection
SML	Service Management Layer
SONET	Synchronous Optical Network
SP	Service Provider
TCP	Termination Connection Point
TMN	Telecommunications Management Network
UPSR	Unidirectional Path Switched Ring

## **5 Conventions**

### **5.1 Legend for the information flow tables**

The entry "See Recommendation M.3208.1" in the Notes column of an information flow table means that the entry is identical to the equivalent entry in Recommendation M.3208.1. In cases where the entry is a modified version of the M.3208.1 entry, the changes are shown using the

underscore/strikethrough editing convention. If the Notes column is blank, refer to the previous usage of the same parameter in a previous table in this Recommendation.

- m Mandatory.
- m(=) The SP must provide the same value in the response as provided in the request by the SC.
- o Optional. Optionality is subject to definition according to the service level agreement or contract between the SC and SP, i.e. a parameter listed as optional may be made mandatory by the contract.
- o(=) Return of the value by the SP is optional; however, if the SP elects to return the value, it must be the same value supplied by the SC in the request. SP is not allowed to alter this field.
- c Conditional parameter, definition of the condition will be specified in the Notes column. A numeric suffix is used to enable reuse of the conditional statements.
- c(=) If the value is provided in the request by the SC, the SP must provide the same value in the response.
- Dash A dash implies that the parameter is not applicable.

## 5.2 Format of function sets follows Recommendation M.3208.1

For ease of comparison, all of the functions for the function sets analogous to those in Recommendation M.3208.1 are included, although some of them are not used at all in this Recommendation. For example, the subclauses of 7.3.3.2 in this Recommendation correspond to the subclauses of 3.3.3.2 in Recommendation M.3208.1.

## 6 Connection management service security

This clause specializes the requirements for security found in Recommendation M.3016.

Security is defined between a single SC and SP. Several security services are required to assure the proper functioning of LCS CM.

The following services are mandatory services for CM:

- a) Peer entity authentication and data origin authentication are needed to prevent spoofing attacks and uniquely identify the SC.
- b) Integrity is needed to prevent unauthorized modification of data in transit.
- c) Access control is needed to assure that one service customer does not gain access, maliciously or accidentally, to other customers' data. The SP may use the authenticated identity of the SC to provide access control.

The following three services are optional services for connection management:

- a) Confidentiality may be needed if private information is being exchanged. This security service may not be needed for all LCS management messages.
- b) Non-repudiation of origin may be needed, e.g. when a SC requests a service that may cause the service provider to invest labour and/or materials. This security service may not be needed for all LCS management messages.
- c) Non-repudiation of delivery may be needed, e.g. when a SC reports a problem. This security service may not be needed for all LCS management messages.

In addition, security management functions, per Recommendation M.3400, are needed to manage the security-related information needed to support the security services described above. The exact

nature of the security management functions depends on the selection of security mechanisms used to provide the security services. Security management is outside the scope of this Recommendation.

## **7 Customer administration management service**

### **7.1 Management service description**

This management service addresses the management interface between the SP domain and the SC domain. It is based on an abstract view of the resources underlying a particular service, a view that shields the service user from knowledge of the specific technical implementation that supports the service.

Service Customers (SCs) want mechanized, error-free, reject-free, rapid provisioning of LCSs. SCs want to go beyond the traditional service ordering process and directly reconfigure their LCSs in real-time or near real-time. One way to accomplish this (assumed in this Recommendation) is for SCs to lease service link connections from their Points of Presence (POP), their access terminals, or their end-user locations to subnetworks in the Service Provider's (SP) network. SCs would also lease service link connections between appropriate SP's subnetworks. SCs would then use the connection management functions defined in this Recommendation to create in real-time or near real-time, LCSs composed of these pre-provisioned service link connections.

A specific service link connection can be dedicated to a specific SC, or it can be sharable among a specified group of SCs. The service link connections can be ordered using existing service ordering processes or future ordering processes (for further study)<sup>2</sup>.

### **7.2 Management goals**

The goal of this management service is to provide the SC with the capability to create, modify, or delete a CM LCS using pre-provisioned link connections. This also supplements the services defined in M.3208.1 by allowing a CM LCS user to create a CM LCS by explicitly specifying the ordered set of link connections that comprise the end-to-end service, in near real-time.

#### **7.2.1 High-level service customer requirements for connection management**

- 1) An X interface at the TMN service management layer is required so that SCs can create CM LCSs without a detailed knowledge of the SP's network elements and network topology.
- 2) Because CM is not a stand-alone interface, it is required to be compatible with other leased circuit service level functions such as trouble management, service provisioning, configuration management, alarm reporting and performance monitoring.
- 3) The secure use of CM requires that unauthorized users cannot affect the management of, or obtain information concerning, CM services.
- 4) There is a requirement for dedicated service link connections between SP subnetworks or for a pool of first-come, first-served service link connections which can be shared among SCs using CM.

#### **7.2.2 Specific functional requirement**

The goal of this management service is to provide the SC with the capability to create, modify, or delete a LCS. Service providers may support a subset of the requirements addressed by this Recommendation.

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<sup>2</sup> See Appendix II for a discussion of a process for ordering service link connections.

Not all of the following specific functional requirements are within the scope of this Recommendation. See Table 1 for the identification of the requirements addressed herein. The following functional requirements are applicable to customer management of leased circuit services:

**Table 1/M.3208.2 – CM functions supported in this Recommendation**

<b>Requirement</b>	<b>Supported by this Recommendation</b>
1) Access to an inventory of dedicated and shared pre-provisioned service link connections with which to build CM LCS.	Yes
2) A service to specify service link connections and schedule a CM LCS for future use.	Yes
3) A service to assign various types of priorities to LCS. An example of a priority type is backup priority, i.e. the order in which a CM LCS should be used as a backup in case of an LCS failure.	Yes
4) A service to specify CM LCS by a sequence of service access points, connection points, and service link connections. A specific specification may, but is not required to, contain all of these elements.	Specified as a pair of SAPs or a sequence of service link connections
5) A service to select the "best" service link connection from a set of locked link connections. For example, the best link connection may be defined as one with the highest or lowest value for a specific priority type.	No
6) A service to modify LCS characteristics. LCSs should be modifiable in at least two ways, i.e. turning automatic restoration on/off and changing the value of the priority parameter.	Priority parameter is supported
7) A service to delete CM LCSs.	Yes
8) Subject to service link connection availability, a service to specify time periods during which a CM LCS will be available for use.	Yes
9) A service to restore LCSs, e.g. "automatically" restore a failed CM LCS with the "best" available locked pre-provisioned LCS.	No
10) A service to establish and terminate loopbacks on service link connections, where supported, for pre-use testing and trouble localization	Yes
11) A service to determine, for a specified CM LCS, the earliest time at which the pre-provisioned service link connections comprising this CM LCS are available to support this CM LCS.	No
12) Support for point-to-point, point-to-multipoint, and multipoint-to-multipoint services.	Point-to-point only
13) Support for unidirectional and bidirectional symmetric (same bandwidth in both directions) and asymmetric services	Symmetric services only
14) Support for CM LCS based on substrate services.	No
NOTE – The capabilities not addressed in this Recommendation are for further study.	

**7.2.3 Relationship with Recommendation M.3208.1**

The relationship with Recommendation M.3208.1 includes the following ten concepts:

- 1) The link connection configuration service function set in Recommendation M.3208.1 or some other service has been used to pre-provision link connections for use in the CM LCS service.

- 2) As noted in the definitions (clause 3, Definitions), the route has been defined to include the possibility that it might be specified in terms of link connections.
- 3) The service access domain configuration function set in Recommendation M.3208.1 or some other services may be used to manage service access domain configuration.
- 4) Creating a CM LCS is an instant service. Consequently, there is no need for the concept of a service request, the associated state model and the status administration function set, nor the link connection status administration function set.
- 5) The CM LCS involves creating and deleting a dedicated service. The extension provided here is to allow the service customer to specify the pre-provisioned dedicated link connections that are required to create the service.
- 6) There is no atomic reconfiguration function defined in the reconfigurable LCS function set in Recommendation M.3208.1. This Recommendation does not specify such a function either, but instead, uses the mechanism of create and delete identified in Recommendation M.3208.1 to assemble pre-provisioned link connections within a service access domain. Explicitly, this Recommendation permits the specification of mid-link connections in addition to the end-link connections.
- 7) Groups of end points are dedicated to a customer, and end-links can only be chosen from within that domain. However, the mid-links might be shared among several customers as provided by a Service Level Agreement (SLA).
- 8) Every instance of a CM LCS is an instance of a dedicated LCS for the period during which it is up. It is possible to share the service link connections among CM LCS if the scheduled usage does not overlap.
- 9) Scheduling link connections for use by in CM LCS is the responsibility of the service customer, because CM LCS uses pre-provisioned link connections.
- 10) In Recommendation M.3208.1, any access point may be connected to any other access point in the SC's Service Access Domain (SAD) to form an LCS. In CM, access points are bound to service link connections (end-links). In the typical case considered in CM, LCSs can only be created between a subset of the set of SAP pairs defined for a SAD because the appropriate mid-links may not be available. In CM, unrestricted connectivity between an arbitrary pair of SAPs at any time would require the SC to purchase the number of service link connections required to insure that such LCSs could be created.

### **7.3 Management context description**

#### **7.3.1 Roles**

The following roles defined in Recommendation M.3208.1 apply:

- service customer;
- service provider.

#### **7.3.2 Telecommunications services and resources**

##### **Link**

The link represents a topological relationship. It also represents the availability of transport capacity of a specific service characteristic (e.g. capacity, quality of service) between the two subnetworks or between a subnetwork and an access group.



## **End-link**

For the purpose of this Recommendation, links can be divided into two topological types: end-links and mid-links. An end-link is an association between a subset of a Service Access Group (SAG), i.e. a set of SAPS, and a subset of ports at the edge of a subnetwork.

## **End-link connection**

The end-link connection is an association between a termination connection point and a connection point.

## **Mid-link**

A mid-link is an association between subsets of ports at the edge of two subnetworks. Figure 3 illustrates a service layer network partitioned into two subnetworks with end-links and mid-links identified.

## **Mid-link connection**

A mid-link connection is an association between two connection points on different subnetworks

Figure 1 is a reproduction of Figure 6/M.3208.1 which illustrates the topology of the reconfigurable LCS. The legend has been added to clarify the figure. The concepts of service access group and service access domain have general application, despite the fact that they are introduced in the reconfigurable LCS portions of Recommendation M.3208.1. See that Recommendation for a detailed discussion of these concepts.

Figure 2 illustrates the CM perspective described in this Recommendation. It provides a general topology view of a network of link connections and introduces the idea that link connections might be divided between those that touch the edge of a SP's network and those that are totally internal. Definitions for the links and link connections follow.

The service access points shown in Figure 1 are further decomposed in Figure 2 to indicate the termination of a link connection in a TCP.

Figure 3 shows a service layer network, with service access groups and subnetworks, along with the links connecting them. Again, it shows that links can be classified as end-links and mid-links. These links are the carriers of the link connections (shown in Figure 2) that are the focus of this Recommendation.

In order to create CM LCSs, the SC need not be aware of the details of the SP's network. The specific transport systems, cross-connect elements, multiplexers, etc., are replaced by the concept of contiguous service link connections and a set of compatibility requirements on adjacent link connections.

Figure 4 illustrates these concepts. It expands Figure 3 by showing the link connections that comprise the links. This example assumes that the link connections shown are pre-provisioned link connections which the SC has leased or purchased and that the subnetwork connections can be made and broken by management processes. In Figure 4, a CM LCS between a SAP in Service Access Group 1 and one in Service Access Group 3 is composed of the following sequence of entities:

- 1) the service link connection between TCP1 and CP1;
- 2) the service subnetwork connection between CP1 and CP2;
- 3) the service link connection between CP2 and CP3;
- 4) the service subnetwork connection between CP3 and CP4;
- 5) the service link connection between CP4 and TCP2.

In CM, the same LCS can be specified by a sequence of service link connections or by the SAPs at the end points of the LCS. For example, the sequence of service link connections which correspond to the LCS highlighted in Figure 4 are:

- 1) End-link connection 1;
- 2) Mid-link connection 1;
- 3) End-link connection 2.

The SC is unaware of the nature of Subnetworks 1 and 2 and does not explicitly request subnetwork connections.

Two alternative specifications for a CM LCS between SAG 1 and SAG 3 are:

- 1) TCP1;
- 2) TCP2;

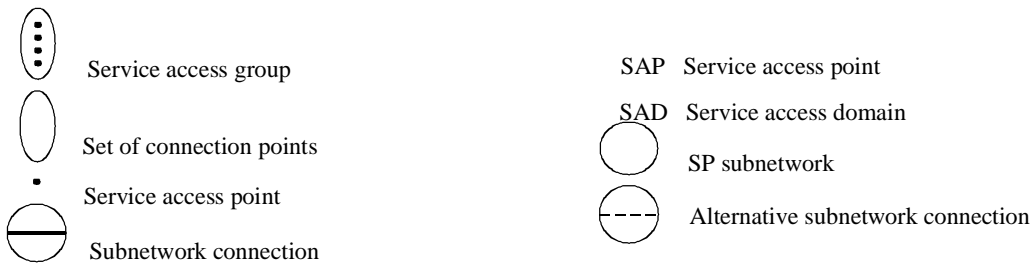
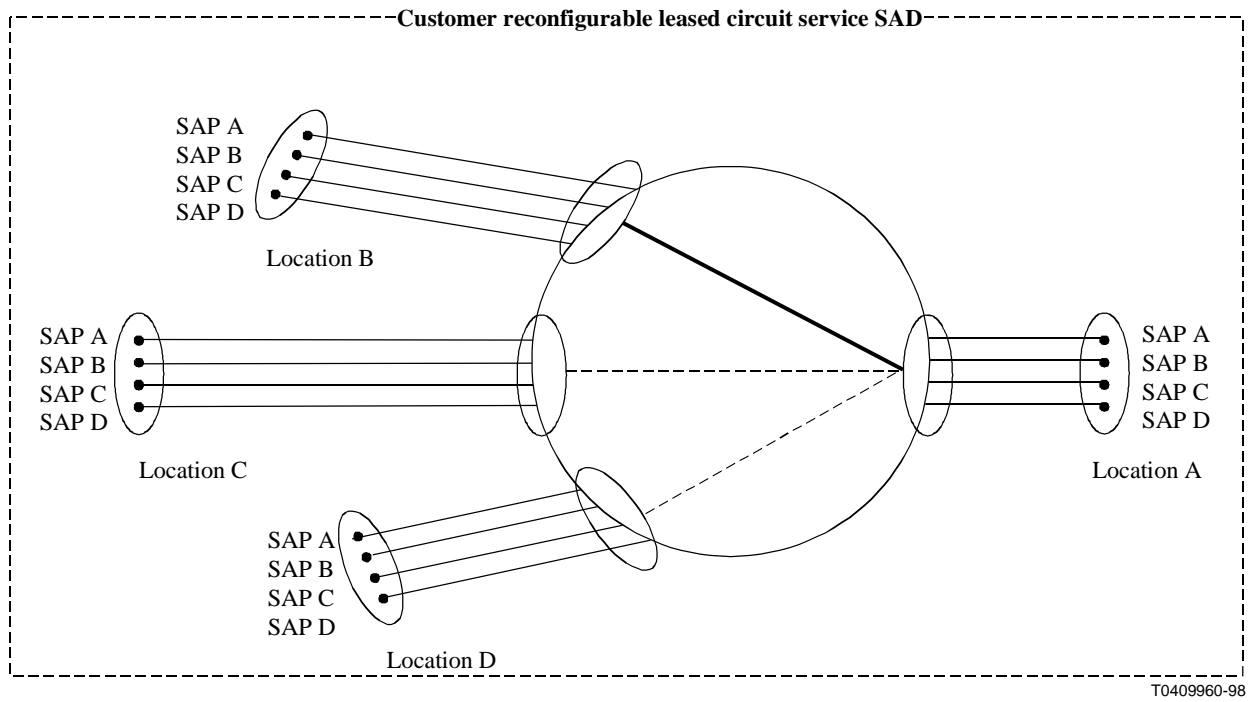
or

- 1) TCP1;
- 2) <one or more intervening connection points>;
- 3) TCP2.

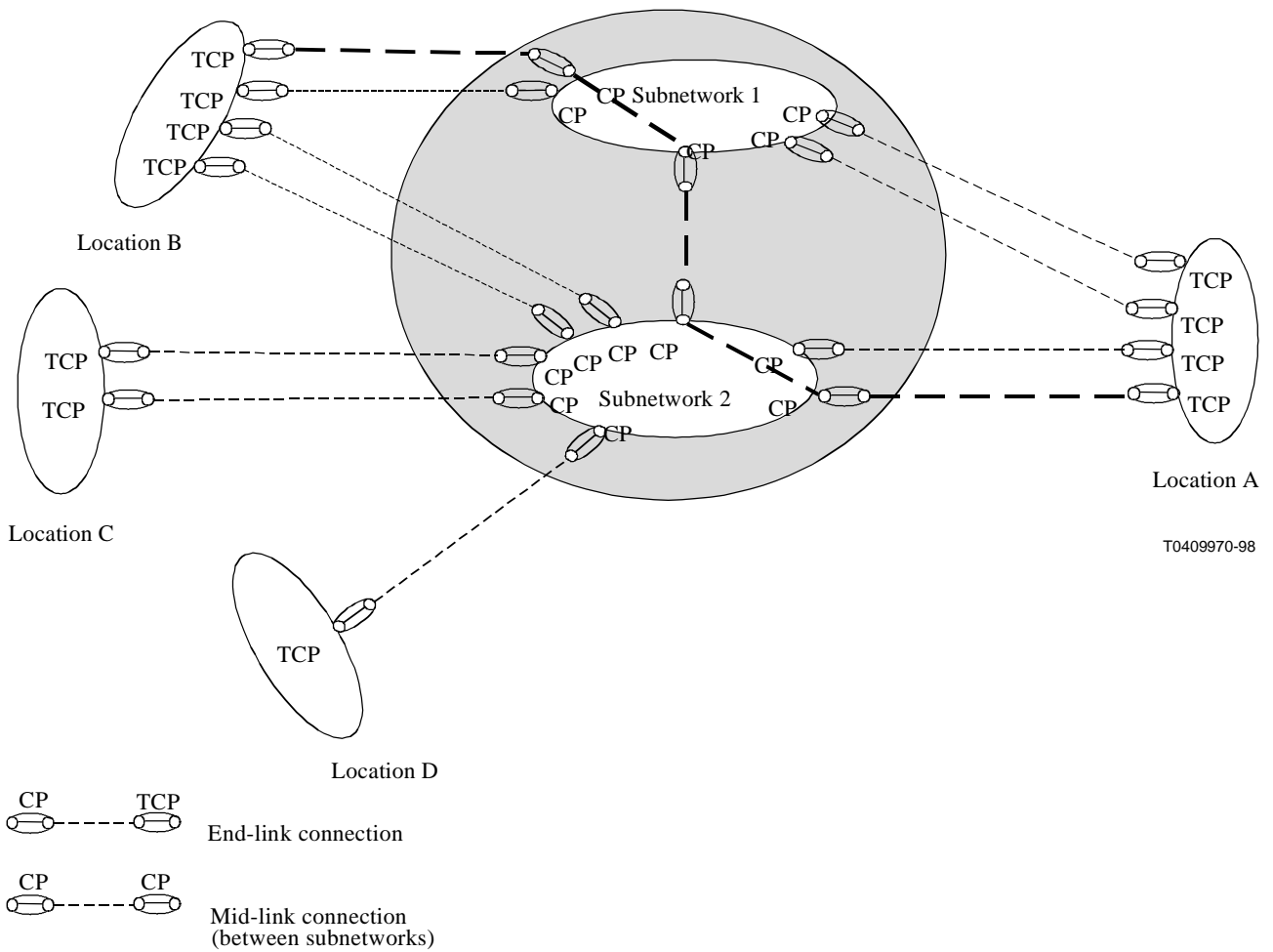
Pre-provisioned service link connections are the building blocks from which service customers can construct a CM LCS. Appendix II discusses a process by which SCs obtain pre-provisioned service link connections.

As indicated in Figures 1 to 4, pre-provisioned end-link connections are dedicated to a particular SC. Pre-provisioned mid-link connections can be dedicated to a particular SC or can be in a shared pool of resources which are used by SCs on a first-come, first-served basis.

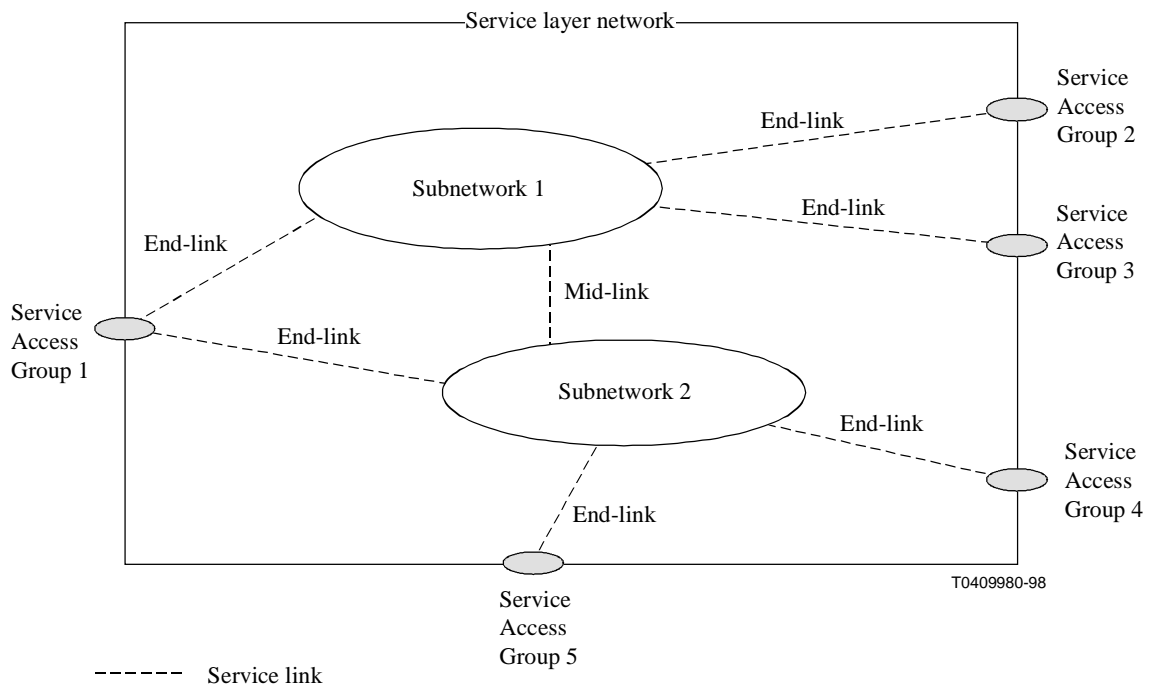
The service level link connection model applies equally well a number of network technologies, e.g. ATM, SDH, or PDH-based LCS, or services that are a hybrid of two or more.



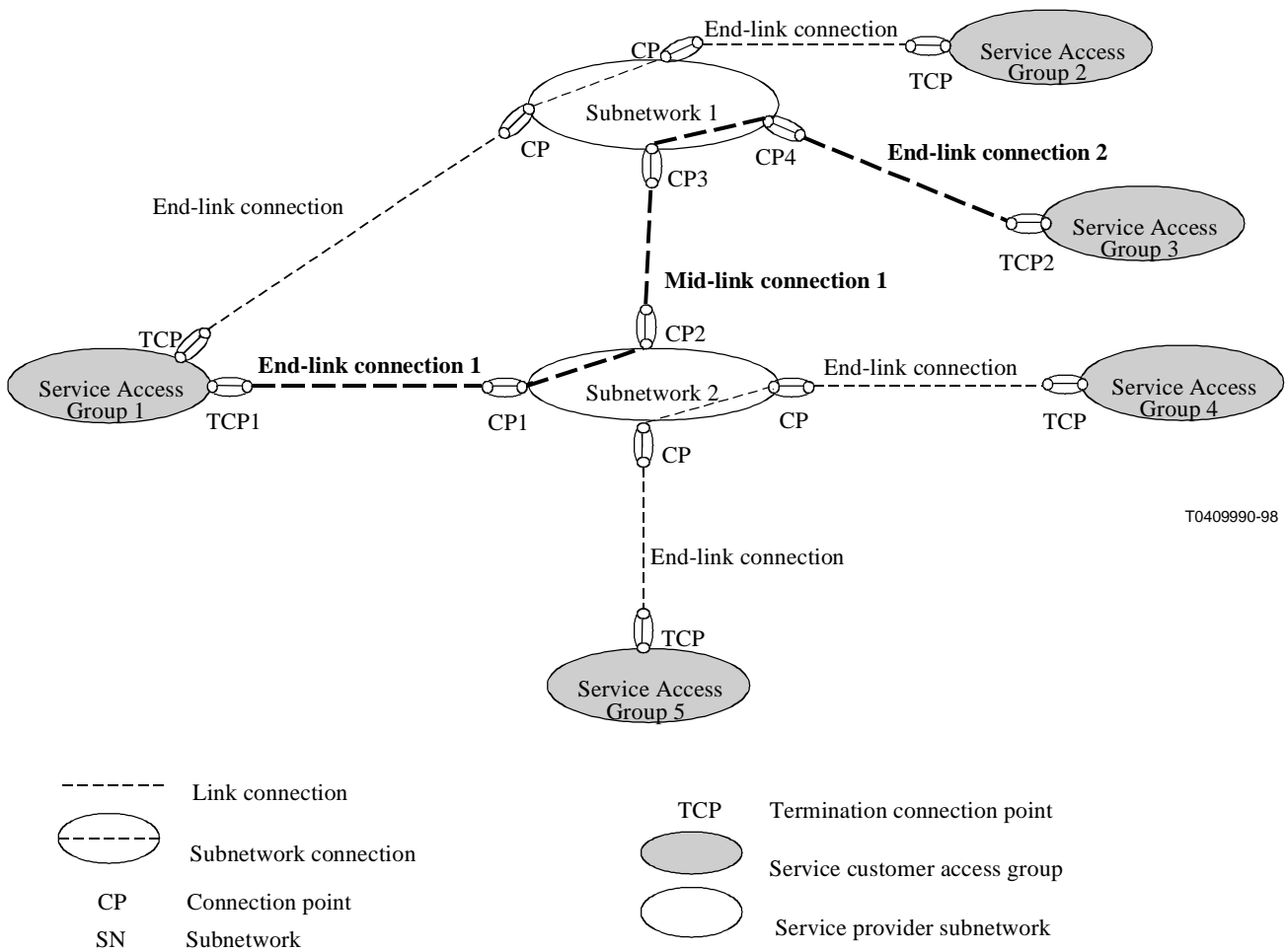
**Figure 1/M.3208.2 – Example topology of the reconfigurable LCS**



**Figure 2/M.3208.2 – Example topology for the CM LCS**



**Figure 3/M.3208.2 – Illustration of the topology of a service layer network**



**Figure 4/M.3208.2 – Relationship between link services and leased circuit services**

### 7.3.3 Management functions

Table 2 contains the management functions sets specified in Recommendation M.3208.1 for the customer administration management service and indicates which function sets contain functions specialized in this Recommendation.

**Table 2/M.3208.2 – M.3208.1 function sets specialized in CM**

<b>M.3208.1 function sets</b>	<b>Function sets specialized in this Recommendation<sup>a)</sup></b>
Dedicated LCS configuration function set	See 7.3.3.1
Dedicated LCS status administration function set	See 7.3.3.2
Link connection configuration service function set	Outside the scope of this Recommendation
Link connection status administration function set	Outside the scope of this Recommendation
Reconfigurable LCS configuration function set	Outside the scope of this Recommendation
Reconfigurable LCS function set	Outside the scope of this Recommendation
Service access domain configuration function set	Outside the scope of this Recommendation
Reconfigurable LCS administration function set	Outside the scope of this Recommendation
Access equipment status administration function set	Outside the scope of this Recommendation
<sup>a)</sup> Not all of the functions contained in the indicated function sets are specialized or required in this Recommendation.	

In addition to the function sets specialized from Recommendation M.3208.1, the following functions and function sets in Table 3 are used in this Recommendation.

**Table 3/M.3208.2 – New function sets and functions**

<b>M.3208.1 function sets</b>	<b>Reference</b>
Dedicated LCS configuration function set: Replace a failed CM LCS function	See 7.3.3.1.5
Dedicated LCS status administration function set: Identify locked LCS function	See 7.3.3.2.10
Leased circuit service test function set: Initiate loopback of end-of-link connection function Terminate loopback of end-of-link connection function	See 7.3.3.4

### **7.3.3.1 CM leased circuit service configuration function set**

The SC must be able to request the creation and deletion of a CM LCS, as well as the modification of the dedicated leased circuits, and be notified of the completion or rejection of the creation, deletion, or modification request. The functions in this set are:

- 1) Create CM leased circuit service;
- 2) Delete CM leased circuit service;
- 3) Modify CM leased circuit service;
- 4) (Not applicable for CM) Cancel CM leased circuit service request.

#### **7.3.3.1.1 Create CM leased circuit service function**

##### **7.3.3.1.1.1 Summary**

Recommendation M.3208.1 provides the SC a general mechanism to request the creation of dedicated LCS from the SP. According to Recommendation M.3208.1, the response from the SP must be one of the following three types:

- 1) The create request has been rejected with a reason code indicating probable cause.

- 2) A completion response indicating that the create function request has been processed coincident with receipt of the request. All information required to be provided to the SC is contained in the completion response.
- 3) An acknowledgement to the SC that the request has been received, is being processed, and that completion of the request will be reported to the SC at a later time.

One of the requirements of this Recommendation is that the SC can create LCS in real-time or near real-time. Consequently, the SC is required to have pre-provisioned service link connections which are used to create the CM LCS. Given this requirement, only responses 1 and 2 are possible in this Recommendation. For this reason the service request state model is not used.

### 7.3.3.1.1.2 Information flow

**Table 4/M.3208.2 – Information flow for create CM leased circuit service function**

Information element	Rec. M.3208.1		This Recommendation		Notes
	Service customer	Service provider	Service customer	Service provider	
Service name	m	o	m	o	See Recommendation M.3208.1.
Service class	o	c	o	c	See Recommendation M.3208.1.
Bandwidth	o	c	o	c	o – Support of bandwidth specification is subject to SLA. c – If the requested bandwidth cannot be provided by the SP, the SP shall return the value together with a reason code indicating that the bandwidth is not available. <del>If the response is not indicating a completion, the SP, may report an error condition with a reason code indicating that the available service differs from the customers initial service request.</del>
Quantity	o	c	–	–	At most one CM LCS is created per Create command.
Service termination date	o	c	o	c	See Recommendation M.3208.1.
Schedule	o	c	o	c	See Recommendation M.3208.1.
Service availability date	o	m	–	–	This parameter is not required as services are provided in real-time or near real-time.
Service request state	–	c	–	–	This parameter is not required as services are provided in real-time or near real-time.
Service administrative state	o	o(=)	o	o(=)	See Recommendation M.3208.1.

**Table 4/M.3208.2 – Information flow for create CM leased circuit service function (continued)**

Information element	Rec. M.3208.1		This Recommendation		Notes
	Service customer	Service provider	Service customer	Service provider	
Service operational state	–	o	–	o	See Recommendation M.3208.1.
Diversity	o	c	–	–	The complexity of the diversity arrangements can be handled in the original provisioning of the link connections.
Link connection selection criteria	–	–	c1	c1(=)	c1 – This parameter is only valid when the CM LCS is requested with SAPs and the route is specified by the SP. If the SC specifies all the components of the CM LCS, there is no freedom for the SP to try to find diverse link connections. The SC may specify constraints on the pre-provisioned service link connections to be used: 1) No restrictions; 2) Survivable link connections only; 3) Survivable and dedicated link connections only; 4) Dedicated link connections only and survivable link connections preferred; 5) Dedicated and survivable link connections preferred.
Route	o	o	c2	c2(=)	c2 – Either the route or the originating and terminating SAPs must be present in the service request. If pre-provisioned link connections are specified, this is the field that contains the ordered set-of-link connections.
Originating location	m	o(=)	–	–	The requirement that pre-provisioned SAPs or a route must be specified precludes asking for service to a street address.



**Table 4/M.3208.2 – Information flow for create CM leased circuit service function (continued)**

Information element	Rec. M.3208.1		This Recommendation		Notes
	Service customer	Service provider	Service customer	Service provider	
Terminating location	m	o(=)	–	–	The requirement that pre-provisioned SAPs or a route must be specified precludes asking for service to a street address.
Originating location CPE type	o	o(=)	o	o(=)	See Recommendation M.3208.1.
Terminating location CPE type	o	o(=)	o	o(=)	See Recommendation M.3208.1.
Customer contact	m	o(=)	m	o(=)	See Recommendation M.3208.1.
Provider request number	–	m	–	–	This parameter is not required as services are provided in real-time or near real-time.
Customer request number	o	o(=)	–	–	This parameter is not required as services are provided in real-time or near real-time.
Alias name	o	o(=)	o	o(=)	Customer supplied circuit identifier.
Originating location service access point	o	o	c2	m(=)	If a value is specified for this attribute, then this value is returned. If no value is specified, then the value of the SAP associated with an end-link connection is returned.
Terminating location service access point	o	o	c2	m(=)	If a value is specified for this attribute, then this value is returned. If no value is specified, then the value of the SAP associated with an end-link connection is returned.
Circuit number	–	c	–	m	This is the reference number that the service customer will use to manage the CM LCS. Because this is a real-time service, the circuit number must be returned if the request is successful. If the CM LCS is specified in terms of the SAPs, the circuit number returned may be that of a previously created, but locked CM LCS.
SP contact	–	m	–	m	See Recommendation M.3208.1.

**Table 4/M.3208.2 – Information flow for create CM leased circuit service function (concluded)**

Information element	Rec. M.3208.1		This Recommendation		Notes
	Service customer	Service provider	Service customer	Service provider	
Selection priority	–	–	o	o(=)	Specifies the SC's relative ranking of CM LCSs between the same set of SAPs. Priority can only be assigned if the intermediate link connections are specified. The criteria for assignment of priority are an SC matter. For example, priority might be assigned based on relative cost, quality of service, or physical length of the CM LCS.
Error and reason code		c		c	c – This parameter is present if the request is rejected because of one or more of the following reasons: <ul style="list-style-type: none"> <li>– Unknown service class;</li> <li>– Unknown service name;</li> <li>– Requested bandwidth not available;</li> <li>– Resources unavailable;</li> <li>– Underlying link connection operational state disabled;</li> <li>– Invalid schedule conflict;</li> <li>– Contract violation;</li> <li>– Invalid parameter value;</li> <li>– Required parameter not supplied;</li> <li>– Non-existent SAP.</li> </ul>

**7.3.3.1.2 Delete CM leased circuit service function**

**7.3.3.1.2.1 Summary**

This function permits the SC to delete a CM LCS. Before this can be done, the service administrative state of the CM LCS must be locked using the modify function in 7.3.3.1.3. The SC shall identify the circuit number of the CM LCS to be deleted in the request. When the CM LCS is deleted, it will disappear.

### 7.3.3.1.2.2 Information flow

**Table 5/M.3208.2 – Information flow for delete CM leased circuit service function**

Information element	Rec. M.3208.1		This Recommendation		Notes
	Service customer	Service provider	Service customer	Service provider	
Circuit number	m	c	m	c	See Recommendation M.3208.1.
Service request state	–	c	–	–	This parameter is not required as services are provided in real-time or near real-time.
Service provider contact	–	o	–	o	See Recommendation M.3208.1.
Service termination date	o	o(=)	–	–	This parameter is not required as the delete function is provided in real-time or near real-time.
Provider request number	–	c	–	–	This parameter is not required as services are provided in real-time or near real-time.
Customer request number	o	o(=)	–	–	This parameter is not required as services are provided in real-time or near real-time.
Error		c		c	c – This parameter is present if the request is rejected. Valid error codes are: <ul style="list-style-type: none"> <li>– Already deleted;</li> <li>– Invalid circuit number;</li> <li>– Not being in appropriate service administrative state;</li> <li>– Contract violation.</li> </ul>

### 7.3.3.1.3 Modify CM leased circuit service function

The modify CM LCS function enables an SC to request the modification of a number of applicable parameters of the established CM LCS.

#### 7.3.3.1.3.1 Summary

Table 6 summarizes the information flows associated with modifying CM LCS parameters.

Whenever the administrative state attribute of a CM LCS is changed to locked, this condition should be reflected in the relationship with the underlying link connections supporting the service. However, the link connections are still reserved for the use of the CM LCS, according to its schedule, as long as it continues to exist.

### 7.3.3.1.3.2 Information flow

**Table 6/M.3208.2 – Information flow for modify CM leased circuit service function**

Information element	Rec. M.3208.1		This Recommendation		Notes
	Service customer	Service provider	Service customer	Service provider	
Originating location CPE type	o	o(=)	o	o(=)	
Terminating location CPE type	o	o(=)	o	o(=)	
Customer contact	o	o(=)	o	o(=)	
Originating location service access point	c	o	–	–	This was changeable in Recommendation M.3208.1 because the information might have been added to a pending request. This parameter is not applicable because services are provided in real-time or near real-time.
Terminating location service access point	c	o	–	–	This was changeable in Recommendation M.3208.1 because the information might have been added to a pending request. This parameter is not applicable because services are provided in real-time or near real-time.
Circuit number	c	o	m	m(=)	This is different from Recommendation M.3208.1 because the M.3208.1 Provider Request Number is not a possible choice in this Recommendation.
Provider request number	c1	c2	–	–	This parameter is not required as services are provided in real-time or near real-time.
Request sequence number	–	c	–	–	This parameter is not required as services are provided in real-time or near real-time.
Bandwidth	c3	o(=)	c3	o(=)	See Recommendation M.3208.1.
Route	c3	c	–	–	Once the CM LCS is established by using pre-provisioned link connections, changing the route is not valid.

**Table 6/M.3208.2 – Information flow for modify CM leased circuit service function (concluded)**

Information element	Rec. M.3208.1		This Recommendation		Notes
	Service customer	Service provider	Service customer	Service provider	
Schedule	c3	c	c3	o(=)	c3 – The presence of this optional parameter is controlled by the value specified in Service Name and Service Class.  If the requested schedule is not available, the modify request will be rejected with a reason code.
Service request state	–	c	–	–	This parameter is not required as services are provided in real-time or near real-time.
Service termination date	o	o	o	o(=)	If the requested service termination date cannot be met, the modify request will be rejected with a reason. If the service termination date is changed to the present date or a date in the past, the service will be deleted.
Service availability date	c	c	–	–	This parameter is not required as services are provided in real-time or near real-time.
Service administrative state	o	o	o	o	See Recommendation M.3208.1.
Alias name	o	o(=)	o	o(=)	See Recommendation M.3208.1.
Error		c		c	c – This parameter is present if the request is rejected. Valid error codes are: <ul style="list-style-type: none"> <li>– Invalid CPE type.</li> <li>– Required bandwidth not available.</li> <li>– Invalid schedule.</li> <li>– Invalid circuit number.</li> <li>– Contract violation.</li> <li>– Resource unavailable.</li> <li>– Invalid alias name.</li> <li>– Service link connection(s) unavailable for the requested schedule.</li> </ul>

#### **7.3.3.1.4 Cancel CM leased circuit service request function**

This function is not applicable within the scope of this Recommendation as LCS are provided in real-time or near real-time.

#### **7.3.3.1.5 Replace a failed CM leased circuit service function**

This function is newly introduced in this Recommendation.

##### **7.3.3.1.5.1 Summary**

The SC may choose to restore a failed CM LCS. To restore a failed CM LCS, the administrative state of the failed CM LCS must be locked and the administrative state of a backup CM LCS must be changed to unlocked. This assumes that the SC has created a set of locked CM LCSs which can be used to restore the failed CM LCS. In the event that no such set exists, the SC must create a new CM LCS. The existence of a replacement CM LCS is not guaranteed, but depends on the SC's pre-provisioned service link connections and their schedules.

The requirement for a function to identify the best locked CM LCS based on values of the Selection Priority attribute of the eligible CM LCSs, and to unlock that CM LCS is for further study.

##### **7.3.3.1.5.2 Information flow**

The information flow defined for the modify function in Recommendation 7.3.3.1.3 is applicable here. However, the only parameter that can be changed is the administrative state of the failed and backup CM LCS. See Table 6 for details.

#### **7.3.3.2 CM leased circuit service status administration function set**

This function set includes functions that allow the service provider to inform the service customer of service administrative functions and for the service customer to monitor administrative information related to the requested CM LCS. This function set contains status administration functions from Recommendation M.3400 and augments them with additional new functions.

- 1) (Not applicable for CM.) Report creation of CM leased circuit service to service customer function.
- 2) Report deletion of CM leased circuit service to service customer function.
- 3) (This function is needed to report parameter changes, but there is no specialization from Recommendation M.3208.1.) Report configuration changes of CM leased circuit service parameters to service customer function.
- 4) (Not applicable for CM.) Report change of CM leased circuit service: service request parameters function.
- 5) (Not applicable for CM.) Control the service administrative state of the CM leased circuit service by the service customer function.
- 6) (This function is needed to retrieve parameter information, but there is no specialization from Recommendation M.3208.1.) Retrieve service parameter values function.
- 7) (Not applicable for CM.) Monitor progress of the service request function.
- 8) (Not applicable for CM.) Report the progress of the leased circuit service request function.
- 9) (Not applicable for CM.) Retrieve leased circuit service request parameters function.
- 10) (This is a new function not in Recommendation M.3208.1.) Identifying locked CM leased circuit service function.

### 7.3.3.2.1 Report creation of CM leased circuit service to service customer function

#### 7.3.3.2.1.1 Summary

There is a requirement for confirmation of the creation, not for a separate notification of the completion of a delayed request. The requirement for confirmation appears to be contained in the completion response requirement of Recommendation 7.3.3.1.1. The function described here is not needed.

### 7.3.3.2.2 Report deletion of CM leased circuit service to service customer function

#### 7.3.3.2.2.1 Summary

This function is used to report the deletion of a CM LCS to the service customer. This function is used in conjunction with the request to delete the service in Recommendation M.3208.1, and is not needed here for that purpose. However, this function is used to report the deletion of a CM LCS resulting from the expiration of a service termination date parameter.

#### 7.3.3.2.2.2 Information flow

**Table 7/M.3208.2 – Information flow for report deletion of CM leased circuit service to service customer function**

Information element	Rec. M.3208.1	This Recommendation	Notes
Circuit number	m	m	
Service provider contact	m	m	
Service termination date	o	o	

### 7.3.3.2.3 Report configuration changes of leased circuit service parameters to service customer

There is no specialization here of the analogous function in Recommendation M.3208.1.

### 7.3.3.2.4 Report change of leased circuit service: service request parameters

This function is not applicable within the scope of this Recommendation as CM LCSs are provided and managed in real-time or near real-time.

### 7.3.3.2.5 Control administrative state of the CM leased circuit service by the service customer function

There is no specialization here of the analogous function in Recommendation M.3208.1.

#### 7.3.3.2.5.1 Summary

This function is used by the service customer to control the availability of the CM LCS or the ability of a CM LCS to be modified.

### 7.3.3.2.6 Retrieve service parameters by the service customer

#### 7.3.3.2.6.1 Summary

There is no specialization here of the analogous function in Recommendation M.3208.1.

#### **7.3.3.2.7 Monitor progress of the service request**

This function is not applicable within the scope of this Recommendation as LCSs are provided and managed in real-time or near real-time.

#### **7.3.3.2.8 Report progress of the service request**

This function is not applicable within the scope of this Recommendation as LCSs are provided and managed in real-time or near real-time.

#### **7.3.3.2.9 Retrieve service request parameters by the service customer**

This function is not applicable within the scope of this Recommendation as LCSs are provided and managed in real-time or near real-time.

#### **7.3.3.2.10 Identify locked LCS function**

This function is not inherited from Recommendation M.3208.1.

##### **7.3.3.2.10.1 Summary**

This function is used whenever an SC creates an inventory of locked CM leased circuit services. They serve as a collection of unused pre-provisioned CM LCSs which can be activated, by the SC with a minimum amount of effort and analysis. The inventoried pre-provisioned LCSs may also be used by the SC to restore service to a failed CM LCS subsection.

The selection priority values will be returned for all CM LCSs that were created by specifying intermediate link connections. A locked CM LCS can be unlocked if there is no conflict between its scheduled on-duty times and the periods during which the service link connections comprising the CM LCS are scheduled to be used by existing CM LCSs.

This function is the same as retrieval using the retrieve service parameter values function in 7.3.3.2.6. There are special requirements on the selection criteria here. The minimum criterion is that the service administrative state must be locked. Any of the attributes that can be retrieved using the retrieve service parameter values function can be retrieved here.

#### **7.3.3.3 Link connection status administration function set**

The link connection status administration function set as defined in Recommendation M.3208.1 can be used by the CM LCS customer to manage the link connections.

There is no specialization of this function set from Recommendation M.3208.1.

#### **7.3.3.4 Leased circuit service test function set**

This function set will be added to Recommendation M.3400 in future work, and will contain a number of other functions related to testing LCS. Recommendation M.125 defines loopback mechanisms.

##### **7.3.3.4.1 Initiate and terminate loopback of end of link connection function**

CM allows the service customer to control the creation of LCSs. However, the SC may also wish to test the LCS before it is used. The SC needs the ability to loopback service link connections at either end to do pre-use testing and to do a limited amount of problem segmentation. Since loopback is an optional feature of many NEs, this capability will be available only if supported by the equipment.

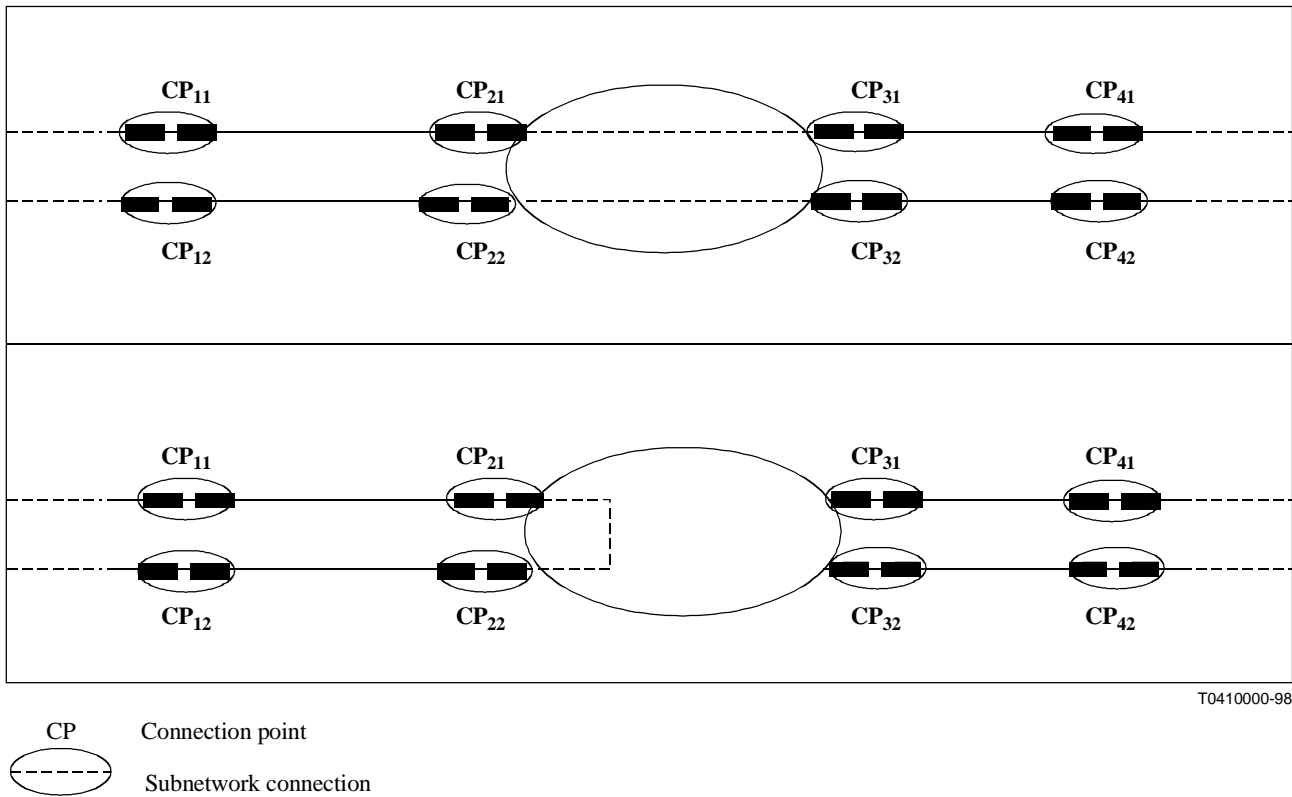
##### **7.3.3.4.1.1 Summary**

The loopback function assumes that a service link connection is composed of two complementary unidirectional link connections. For a specified LCS and for a specified SLC within this LCS, a



loopback request is a request to bind the unidirectional output port of the specified SLC to its corresponding unidirectional input port. Figure 5 illustrates these concepts. When such a binding has been accomplished, the LCS is said to be looped back at the specified SLC.

The means for specifying the location of a loopback within a LCS are discussed in 7.3.3.4.1.1.2.



**Figure 5/M.3208.2 – Top: LCS without loopback; Bottom: LCS with loopback**

#### 7.3.3.4.1.1 Uses and support for the loopback function

Some of the uses a SC may make of the loopback function are to:

- 1) test LCSs prior to their use;
- 2) measure the performance of segments of the LCS;
- 3) support fault isolation within the LCS;
- 4) assess the suitability of an LCS to support new SC needs.

Support for the loopback function is a SP option. When supported, a SP is not required to support the loopback function for all SLCs and for all LCSs.

The loopback function is directed at a SLC contained within a specified LCS. The use of the loopback function requires that the LCS be in an unlocked state. Except for the receipt of the loopback request, the SP has no information from which to determine if a SC is using a LCS to carry SC traffic or if the SC is using it to carry SC selected test and evaluation signals<sup>3</sup>. The loopback request does not require the SP to perform any actions for the SC beyond establishing the loopback.

<sup>3</sup> The test and evaluation signals used by the SC are limited to the payload segment of the transmitted signal.

### 7.3.3.4.1.1.2 Loopback specification

All LCSs within the scope of this Recommendation contain two end-link connections and zero or more mid-link connections. Consequently, any LCSs within the scope of this Recommendation can be represented as a sequence of contiguous, compatible SLCs which begin and finish with end-link connections. For example, in Figure 6, LCS1 consists of SLC1, SLC5, SLC2, SLC3, and SLC4 where SLC1 and SLC5 are end-link connections and SLC2, SLC3, and SLC4 are mid-link connections. In this case, SLC<sub>n</sub> and SLC<sub>m</sub> are contiguous, compatible link connection for  $n - m = \pm 1$ .

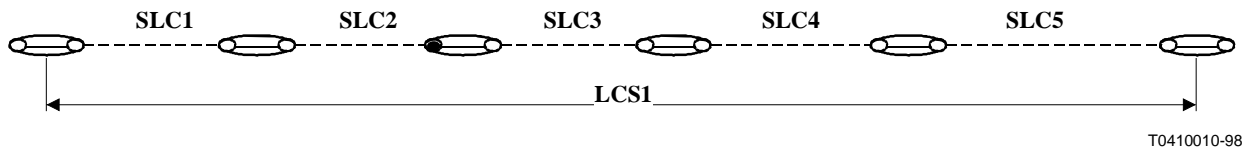


Figure 6/M.3208.2 – LCS defined in terms of SLCs

The terms defined in the following paragraphs are used to specify loopbacks.

*Ordered SLC list* – An ordered SLC list is a list of the contiguous SLC which comprise the LCS. The first and last items in the list are end-links.

*Orienting SLC* – An orienting SLC is an end-link connection which defines the first SLC in an ordered LCS list.

Because two ordered SLC lists may be constructed for any LCS, an orienting SLC is used to uniquely specify an ordered SLC list. For example, in Figure 6, when SLC1 is the orienting SLC, the resulting ordered LCS list is:

SLC1, SLC2, SLC3, SLC4, SLC5.

When SLC5 specifies the orienting SLC, the resulting ordered SLC list is:

SLC5, SLC4, SLC3, SLC2, SLC1.

### 7.3.3.4.1.1.3 Location of the loopback

For a given LCS, the location of the loopback is specified by means of an orienting SLC and an SLC where the loopback is to be applied. By definition, the location of the loopback is found from the ordered SLC list by dividing the SLC list into two parts, where one part contains the orienting SLC, and the SLC to be looped back. This part is called the primary sublist. The other part of the list, called the secondary sublist, contains the remaining SLCs. The loopback is applied at the tail end of the primary sublist.

One additional aspect of the loopback function requires definition, namely the loopback status of the segment of the LCS represented by the secondary sublist. For this segment of the LCS, a loopback may be established at the head end of the secondary sublist. The head end is that end of the LCS contained in the secondary sublist which was contiguous to the looped back SLC in the specified ordered SLC list.

Two options are possible. In option 1, the SP determines whether or not a loopback at the head end of the secondary sublist is established. The choice may be made each time a loopback is requested. That is, for a given loopback request, the SP's decision to provide a loopback at the head end of the secondary sublist is independent of the choice made by the SP for the previous request.

In option 2 the SP performs, for all loopback requests on a given LCS, a pre-defined action at the head end of the secondary sublist. That is, the SP will always create a loopback in the secondary sublist or the SP will never establish these loopbacks.

**7.3.3.4.1.1.4 Loopback time out**

There are two proposed options for specifying the time period during which a loopback is to remain in place. In option 1, the loopback remains in place until the SC requests that it be removed. In option 2, the loopback request will contain a time period during which the loopback is to be in place. At the end of this period, the loopback will automatically be removed by the SP.

**7.3.3.4.1.2 Information flow**

**Table 8/M.3208.2 – Information flow for delete loopback of end of link connection function**

<b>Information element</b>	<b>Service customer</b>	<b>Service provider</b>	<b>Notes</b>
Circuit number	m	m(=)	
Loopback primary sublist	m	m(=)	An ordered list of link connections leading from the orienting SLC to the SLC to be looped back.
Loopback termination time	o	c(=)	If a termination time is not provided, the SP may choose to provide one. Otherwise the absence of a termination time means that the loopback will remain until it is deleted by the SC.
SP contact	–	m	This may be a different contact from the SP contact.
Error messages	–	c	c – This parameter is present if the request is rejected. Valid error codes are: – LCS unavailable; – LCS is off-duty; – Loopback not supported by equipment.

### 7.3.3.4.1.3 Information flow

**Table 9/M.3208.2 – Information flow for delete loopback of end of link connection function**

Information element	Service customer	Service provider	Notes
Circuit number	m	m(=)	
Loopback primary sublist	o	c(=)	An ordered list of link connections leading from the orienting SLC to the SLC to be looped back. The SC must distinguish between the two possible loopbacks that might exist from both ends of the CM LCS. A delete request with no loopback primary sublist will cause any loopbacks on the CM LCS to be restored to normal operation.
SP contact	–	m	This may be a different contact from the SP contact.
Error messages	–	c	c – This parameter is present if the request is rejected. Valid error codes are: – No loopback available for deletion.

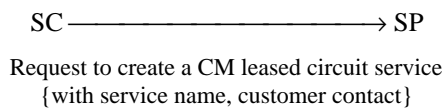
## 8 Management scenarios

Management scenarios are described for examination of the relationships among roles, resources and functions of which management context are composed. For this purpose, scenarios show interactions between the service customer role and the service provider role, using the telecommunications services or resources and functions. Based on the purpose of examining the relationships among management context, management scenarios only show representative examples of interactions between service customer role and service provider role, but do not cover whole of cases.

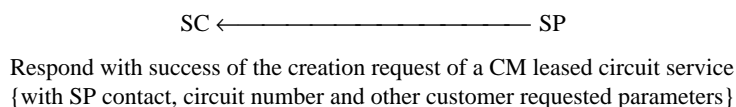
### 8.1 Scenarios for connection management functions

#### 8.1.1 Scenarios for CM leased circuit service creation

The SC shall identify the service to be provisioned, the service name and the customer contact within the organization, which are mandatory information.

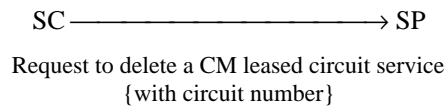


If the service is established as requested, the SP may inform the SC of the SP contact, circuit number that is unique for the duration of the leased circuit service and, if any, other customer requested parameters for the confirmation.

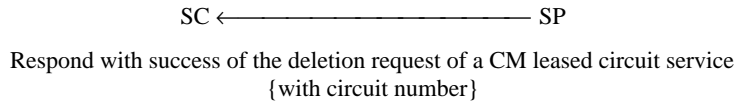


### 8.1.2 Scenarios for CM leased circuit service deletion

The SC shall uniquely identify an existing dedicated leased circuit service, which is desired to be released.

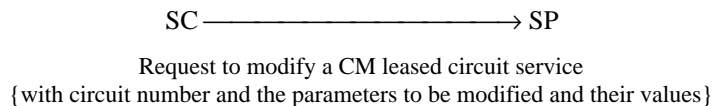


When the deletion request is completed and the leased circuit service instance was terminated, the SP notifies the SC of the deletion.

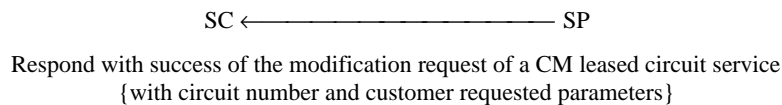


### 8.1.3 Scenarios for CM leased circuit service modification

The SC may request to modify the service parameters such as customer contact, alias name, originating location CPE type, and terminating location CPE type, bandwidth, schedule, service termination date and service administrative state, depending on service name, service class and the contract. These can be also technology specific. In the case the SC would modify the parameters of the activated leased circuit service, the SC uses circuit number to identify the leased circuit service.



If the modification request is done as requested, the SP informs the SC of the circuit number and customer requested parameters for confirmation.



## 8.2 Scenarios for CM leased circuit service status administration

Scenarios for CM leased circuit service status administration are described by using the following TMN management roles, telecommunication services and TMN management functions.

Those TMN management roles are:

- service customer role; and
- service provider role.

That telecommunication service is:

- leased circuit service.

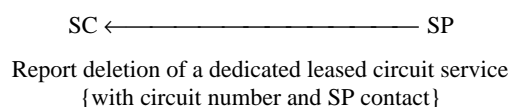
Those TMN management functions are identified in 7.3.3.2.

The functions identified in 7.3.3.1 may also be referred.

The following examples show administration flows for CM leased circuit service.

### 8.2.1 Scenarios for report deletion of CM leased circuit service to service customer

A management scenario using the report deletion of leased circuit service to service customer is described in 3.4.1.2 and others. Refer to those subclauses.



### 8.2.2 Scenario for loopback creation

The SC may request the SP to loopback a LCS. The SC shall identify a LCS, the location of the loopback and optionally the duration of the loopback.

SC → SP  
Request to create a loopback a LCS  
{with location of the loopback}

If the loopback is established as requested the SP informs the SC of the circuit number and the loopback conformation.

SP → SC  
Respond with success of a create loopback request  
{with circuit number and SP contact}

### 8.2.3 Scenario for loopback deletion

The SC may request the SP to delete a loopback on a LCS. The SC shall identify a LCS and the location of the loopback.

SC → SP  
Request to delete a loopback on a LCS  
{with location of the loopback}

If the loopback is deleted as requested, the SP informs the SC of the circuit number and the delete loopback conformation.

SP → SC  
Respond with success of a delete loopback request  
{with circuit number}

### 8.2.4 Scenario for loopback modification

The SC may request the SP to modify the time period where the loopback is in place. The SC shall identify a loopback and the new duration of the loopback.

SC → SP  
Request to modify a loopback on an LCS  
{with location of the loopback and new duration}

If the new loopback duration is established as requested, the SP informs the SC of the circuit number and the loopback conformation.

SP → SC  
Respond with success of a modify loopback request  
{with circuit number and SP contact}

### 8.2.5 Scenario for locked LCSs identifying

The SC may request the SP to provide an inventory of locked CM LCSs. The SC shall identify the service name and the administrative state.

SC → SP  
Request to provide an inventory of locked  
{with service name, administrative state and other optional things}

When the processing is completed, the SP shall inform the SC about administrative state, all dedicated SLCs, schedule, selection priority, service customer contact, service class, service name, start time and stop time.

SC ←————— SP

Respond with success of provision of an inventory of locked LCSs  
{with administrative state, all dedicated SLCs, schedule, selection priority, service customer contact, service class,  
service name, start time and stop time}

### 8.2.6 Scenario for failed LCS restoration

The SC may request to restore a failed CM LCS. First, the SC has to request the SP to lock the administrative state of the failed LCS.

SC —————→ SP

Request to lock the failed CM LCS  
{with circuit number and the administrative state}

In the response the SP informs the SC of the circuit number and administrative state.

SC ←————— SP

Respond with success of the lock failed CM LCS  
{with circuit number and the administrative state}

If a backup CM LCS is available, the SC requests the SP to unlock CM LCS.

SC —————→ SP

Request to unlock the backup CM LCS  
{with circuit number and the administrative state}

In the response the SP informs the SC of the circuit number and administrative state of the backup CM LCS.

SC ←————— SP

Respond with success of the unlock backup CM LCS  
{with circuit number and the administrative state}

If no backup CM LCS the SC must request the SP to create a new CM LCS. (See 8.1.1.)

## 9 Architecture

### 9.1 Functional architecture

The architecture is described in Recommendation M.3010. Applicable reference points are x, and q3, between SML and SML, and q3 between SML and NML.

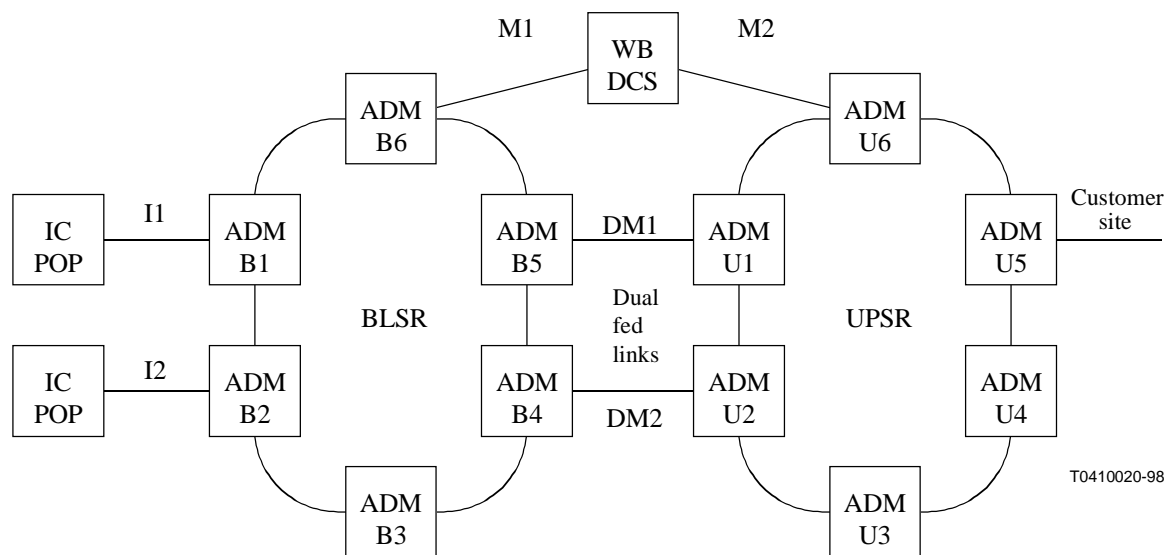
### 9.2 Physical architecture

The architecture is described in Recommendation M.3010. Applicable interfaces are X and Q3.

## APPENDIX I

### A SONET private line service example

A SONET Bidirectional Line Switched Ring (BLSR) can be modelled as a series of link connections across the ring. A SONET Unidirectional Path Switched Ring (UPSR) can be modelled as a set of link connections between two ADMs on the ring. A typical SONET-based private line service is shown in Figure I.1.



End-link connections

I1  
I2  
I1/I2

Mid-link connections

B1-B2      M1  
B2-B3      M2  
B3-B4      DM1/DM2  
B4-B5  
B5-B6  
B6-B1  
.  
.  
.

End-link connections

U1-U2-U3-U4-U5-U6-U1  
.  
.  
.

**Figure I.1/M.3208.2 – CM model for SONET-based services**

Figure I.1 illustrates the following service link connections. The first is a service level end-link connection, e.g. I1, which is dedicated to the service customer. Next, there are the service level mid-link connections, e.g. B1-B6, B6-B5, which are supported by a shared inter-office SONET BLSR ring. Following these are additional service level mid-link connections, e.g. M1 and M2, or DM1/DM2. Lastly, there is a service level end-link connection, e.g. U1-U2-U3-U4-U5-U6, supported by a shared customer access SONET UPSR ring.

NOTE – Since one connection consumes its allocated bandwidth around the entire UPSR ring, UPSR service level link connections must be modelled as virtual links with multiple termination points. BLSR service link connections can be modelled as independent service link connections, e.g. B1-B2, B2-B3, B3-B4, except for B4-B5 which is consumed to support dual ring interconnection.



## APPENDIX II

### Ordering processes for service link connections

The ordering function being defined for the Electronic Access Ordering (EAO) process is a function that provides SCs with a mechanized service ordering and inquiry interface which will, when complete, permit SCs to directly request service link connections.

Currently, SCs order service capacity between their POPs and multiplexer locations in the SP network. Today this service capacity is commonly provided on DS1 and DS3 facilities. In the future the service capacity is expected to include high-capacity SONET facilities. SCs also order end-to-end, i.e. POP to Ultimate End User, services that use a SC-specified channel supported by the provisioned service capacity. However, the SC has no control over the SP's facilities between the multiplexer location and the end user location.

The EAO ordering function is a new EB functional area designed to mechanize the service capacity ordering process. When used with connection management, SCs can use the EAO ordering function to provision the service link connection used by connection management.

In the case the provisioned service capacity represents a channelized DS3 service and the channels support DS1 services, a SC would use CM to create LCSs using the service link connections which represent the DS1 services as well as using other service link connections. If the SC's DS1 service was partitioned into DS0 services by the SC, the DS0 services would be considered a subrate service. The use of subrate services as CM service link connections is for further study.

The Exchange Carrier Circuit ID (ECCKT ID) is commonly used today for a service name or identifier. When used, the ECCKT ID is assigned by the service provider when the service order/service activation process is completed.

The ECCKT ID is a very important parameter in electronic bonding. In addition to naming service objects created via the EAO ordering function, it may be used to report troubles, to identify alarm reporting, protection switching event, threshold crossing, and alert notifications, and to retrieve historical performance monitoring data. The ECCKT ID may be used for the serviceID attribute defined for CM.



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