

INTERNATIONAL TELECOMMUNICATION UNION



TELECOMMUNICATION STANDARDIZATION SECTOR OF ITU G.7713/Y.1704

Amendment 1 (06/2004)

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

Digital terminal equipments – Operations, administration and maintenance features of transmission equipment

SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT GENERATION NETWORKS

Internet protocol aspects – Operation, administration and maintenance

Distributed call and connection management (DCM) **Amendment 1** 

ITU-T Recommendation G.7713/Y.1704 (2001) – Amendment 1

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# ITU-T Recommendation G.7713/Y.1704

## Distributed call and connection management (DCM)

## Amendment 1

#### **Summary**

This amendment contains additional material and changes to be incorporated into ITU-T Rec. G.7713/Y.1704. The additions include alignment of call and connection separation with ITU-T Rec. G.8080/Y.1304, separation of call and connection parameters, and terminology alignment with ITU-T Rec. G.8080/Y.1304.

Throughout this amendment, text that directs what additions and modifications are to be made to ITU-T Rec. G.7713/Y.1704 is italicized. Also, the clause numbering is parallel to that of ITU-T Rec. G.7713/Y.1704 so that changes can be correlated between this amendment and the Recommendation. Where there is no text following a clause heading, there are no changes to the corresponding clause contents.

#### Source

Amendment 1 to ITU-T Recommendation G.7713/Y.1704 (2001) was approved on 13 June 2004 by ITU-T Study Group 15 (2001-2004) under the ITU-T Recommendation A.8 procedure.

#### Keywords

The following keywords are added:

ASON, call control, connection management, signalling

Some keywords are replaced as indicated below:

Existing	Replacement
Exterior Network-Node Interface	External NNI
Interior Network-Node Interface	Internal NNI

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

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# ITU-T Recommendation G.7713/Y.1704

# Distributed call and connection management (DCM)

# Amendment 1

#### 1 Scope

This amendment provides updated material pertaining to the requirements of the ASON distributed call and connection management as described in ITU-T Rec. G.7713/Y.1704.

#### 2 References

*New references to be added alphanumerically are as follows:* 

- ITU-T Recommendation G.8080/Y.1304 Amendment 1 (2003), Architecture for the automatic switched optical network (ASON).
- ITU-T Recommendation Q.1901 (2000), Bearer Independent Call Control protocol.
- ITU-T Recommendation Q.2931 and Amendments, *Digital Subscriber Signalling System No. 2 – User-network interface (UNI) layer 3 specification for basic call/connection control.*
- ITU-T Recommendation Q.2982 (1999), Broadband integrated services digital network (B-ISDN) – Digital subscriber signalling system No. 2 (DSS2) – Q.2931-based separated call control protocol.

#### **3** Terms and definitions

Add the following definitions directly after the heading:

**3.1** call segment: An association between two call control entities (as per ITU-T Rec. Q.2982, which is equivalent to G.8080/Y.1304 call controllers), using a telecommunication service to concatenate a call.

**3.2** signalling controller: A signalling controller contains the functions of connection control and/or call control.

Add the following new definitions:

- a) under terms defined in ITU-T Rec. G.8080/Y.1304:
- Access Group Container
- Domain
- b) The following term is defined in ITU-T Rec. G.783:
- TPmode/PortMode

Delete the following terms from list of terms defined in ITU-T Rec. G.8080/Y.1304:

Neighbour Discovery

Subnetwork termination point

Subnetwork termination point pool

Replace the following term:

Existing	Replacement
Route Controller	Routing Controller

# 4 Abbreviations

Add the following new abbreviations alphabetically:

ACC-n	A-end CC at domain n
AGC	Access Group Container
ARC	Alarm Reporting Control (from ITU-T Rec. M.3100)
CC-a	A-end Connection Controller
CC-z	Z-end Connection Controller
CCC	Calling/Called Party Call Controller
CoS	Class of Service
GoS	Grade of Service
LC	Link Connection (from ITU-T Rec. G.805)
NCC	Network Call Controller
NCC-n	NCC in domain n
SC-a	A-end user Signalling Controller
SC-z	Z-end user Signalling Controller
TCC-n	Transit CC in domain n

ZCC-n Z-end CC at domain n

Replace abbreviations as indicated below:

	Existing	Replacement
ANSN-n	A-end Network SubNetwork-domain n	ASN-n A-end SN in domain n
ARA	A-end Requester Agent	CCC-a A-end CCC
ASC-n	A-end Subnetwork Controller-domain n	ASC-n A-end Signalling Controller in domain n
AUSN	A-end User SubNetwork	AGC-a A-end AGC
INSN-n	Intermediate Network SubNetwork- domain n	TSN-n Transit SN in domain n
ISC-n	Intermediate SubNetwork Controller- domain n	TSC-n Transit Signalling Controller in domain n
PNNI	Private Network-to-Network Interface	PNNI Private NNI
ZNSN-n	Z-end Network SubNetwork-domain n	ZSN-n Z-end SN in domain n
ZRA	Z-end Requester Agent	CCC-z Z-end CCC
ZSC-n	Z-end SubNetwork Controller-domain n	ZSC-n Z-end Signalling Controller in domain n
ZUSN	Z-end User SubNetwork	AGC-z Z-end AGC

Delete the following abbreviations:

- RA Requester Agent
- ND Neighbour Discovery

#### 5 Conventions

*Replace Figure 5-1 and its legend with the following new figure. Delete the NOTE following the original diagram.* 



#### Figure 5-1/G.7713/Y.1704 – Reference diagram for distributed connection management

#### Add the following new text after Figure 5-1 to explain the terms used:

Transport plane components in Figure 5-1 are the various subnetworks and access group containers (AGCs). These define the locality to which the control plane functions are associated. They are labelled in Figure 5-1 as AGC-a, ASN-1, TSN-1, ZSN-1, ASN-n, ZSN-n, and AGC-z.

Distributed call and connection management is also known as "signalling" and this Recommendation will also use this convention. Call-related functions at end users are known as Calling/Called Party Call Controllers, or CCCs. An originating CCC is a "CCC-a" and destination CCC is a "CCC\_z". Call controllers associated with a subnetwork are Network Call Controllers (NCC) and for a particular domain n, is an "NCC-n".

Connection control for end users is identified as CC-a, and CC-z. Within a domain n, the A-end, transit, and Z-end connection controllers are known as ACC-n, TCC-n, and ZCC-n.

A signalling controller contains the functions of connection control and/or call control. For end users, this is denoted as SC-a and SC-z. Within domain n, the A-end, transit, and Z-end signalling controllers are known as ASC-n, TSC-n, and ZSC-n. Note that TSCs usually do not have call control as shown in Figure 5-1.

An address for signalling control is assigned to the signalling controller and is used by protocol controller to exchange information between call controllers or between connection controllers. The signalling controller address is a control address, and the signalling channel will be identified by two adjacent signalling controller names. The signalling channel is provided by DCN communication.

### 6 **DCM requirements**

*Throughout this clause, abbreviations and terms require changing as indicated in the table in clause 4 of this amendment. This affects text and Figures 6-1, 6-4, 6-5, 6-6, 6-7, 6-8, 6-9, 6-10, 6-11, 6-12, 6-13, 6-14, 6-15, 6-16, 6-17, 6-18, 6-19, 6-20, 6-21, 6-22, 6-23, and 6-24.* 

### 6.1 Distributed Call and Connection Management Operations procedures

Replace the first bullet in this clause as follows:

Existing	Replacement
Route Controller (RC): Route Controller provides route information as queried by the CC	Routing Controller (RC): Routing Controller provides route information as queried by the CC

#### Prior to the paragraph in 6.1

"As the communication between the controllers are defined as an external interface in ITU-T Rec. G.8080/Y.1304, messages are defined in this Recommendation to help the exchange of information."

#### Insert the following new text and figure:

As described in ITU-T Rec. G.8080/Y.1304, the calling party call controller interacts with a called party call controller by means of one or more intermediate network call controllers (NCC). The NCC function is provided at the network edge (i.e., UNI reference point) and may also be provided at gateways between domains (i.e., E-NNI reference points). The functions performed by NCCs at the network edge are defined by the policies associated by interactions between users and network, and the functions performed by NCCs at domain boundaries are defined by the policies associated by the interactions between the domains. As such, an end-to-end call is considered to consist of multiple **call segments**, when the call traverses multiple domains. Each call segment could have one or more connections (LC or SNC) associated with it. This allows for flexibility in the choices of signalling, protection and recovery paradigms in different domains.

The number of connections associated with call segments may not be the same even in one end-toend call. In Figure 6-Amd.1-1, the UNI call segment has one LC associated, the subnetwork call segment for domain 1 has 2 associated SNCs. This allows the network to have different policies in their domain.

Note that both calls and connections could be across intra-carrier E-NNI reference points. The concept of call segments and call/connection separation enables the following applications:

- Domain-based protection. The number of SNCs could be different between domains.
- Domain-based restoration. SNC failure may not cause an LC to go down, and a rerouting procedure could be provided by network to restore the failed SNC (refer to ITU-T Rec. G.8080/Y.1304 Amendment 1).



Figure 6-Amd.1-1/G.7713/Y.1704 – Call segments and connections

The NCC at domain boundaries will also allow each domain to have independent functions, e.g., one domain could have 1+1 protection capability while another does not.

The NCC and CC at network edge and boundaries perform different functions.

The call controllers perform the following:

- The NCC correlates the SNCs to the call.
- The NCC works with the Calling/Called Party Call Controller at network edge to correlate LC(s) to the call.
- The NCC works with its peer NCC at domain boundaries to correlate LC(s) to a call.
- The NCC correlates the LC and SNCs that are associated with the same call.

The CC establishes the connections that are associated to each call segment.

#### 6.1.1 Process for Call Request

#### 6.1.1.1 Setting Up a Call

Replace this clause and its Figure 6-4 with the following:

Figure 6-4 illustrates the setup of a call, and the associated signal flows between the relevant components.



Figure 6-4/G.7713/Y.1704 – Call setup request processing: Logical request progression

For a call request to set up a call, the steps include:

- The Calling Party Call Controller (CCC-a) requests call setup. At the ingress NCC-1, processes are initiated to check the call request (this may include checking for authentication and integrity of the request, as well as constraints placed by policy decisions). The request is also sent to the intermediate Network Call Controllers. Processes included in the egress NCC (NCC-n associated with ZCC-n in Figure 6-4) may include verifying that the call request is accepted end-to-end (e.g., request for CCC-z call verification).
- Upon successful checking, the Calling Party Call Controller (CCC-a) continues the call setup request by initiating a connection setup request to the CC. The process for connection setup request is described in 6.1.2. Note that, based on different protocol design decisions, initiation of connection setup request may occur in a different order as shown in Figure 6-4. The requirement is that a network connection is set up before the call is completed.
- Upon successful indication by the connection setup request process (across all call segments), the call setup request is successfully completed, and transfer of user characteristic information may begin.

If the connection setup request process was unsuccessful, a call denied notification is sent to the user.

### 6.1.1.2 Releasing a Call

Replace Figure 6-5 with the following:



Figure 6-5/G.7713/Y.1704 – Call release request processing: Logical request progression

#### Replace the 3 bullet paragraphs and their immediately preceding sentence with:

For a call release request originating from the calling party call controller as in Figure 6-5:

- Check the call release request at the ingress Network Call Controller (ingress NCC-1). This
  may include checking for authentication and integrity of the request, as well as constraints
  placed by policy decisions.
- Upon successful checking, the call release request continues by initiating a connection release request. The process for connection release request is described in 6.1.2. Note that, based on different protocol design decisions, initiation of connection release request may occur in different orders as shown in Figure 6-5. The requirement is that a connection is released before a call is released. If there are multiple connections associated with a call segment, all of them are released.
- Upon indication by the connection release request process(es), the call release request is successfully completed.

#### 6 ITU-T Rec. G.7713/Y.1704 (2001)/Amd.1 (06/2004)

## Replace the NOTE with the following:

NOTE – Depending on the "characteristics" of the transport network (e.g., whether monitoring and trace is enabled), race conditions may occur between the call release request message and the connection release request. Based on this race condition between the signalling progression from CCC-a to CCC-z, and the transport signal (e.g., unequipped or OCI) progression from AGC-a to AGC-z, certain alarms may be raised at downstream subnetworks. To support such an environment, a mechanism is needed to allow for disabling/enabling of the monitoring/trace capabilities associated with the call prior to de-allocation of connections. For example, this may include initiation of ARC or TPmode/PortMode process prior to any initiation of connection release request. Defect reporting suppression may be needed to prevent triggering the protection/restoration process.

### 6.1.2 Process for Connection Request

### 6.2 Signalling Network Resilience

- 6.2.1 User signalling defect
- 6.2.2 Network signalling defect
- 6.3 DCM Signal Flow Exception Handling

### 6.3.1 Setup Connection

### 6.3.1.1 A-end CCC UNI defect (request message)

*Title is changed from* "ARA UNI defect (request message)".

### 6.3.1.2 A-end CCC UNI defect (response message)

Title is changed from "ARA UNI defect (response message)".

### 6.3.1.3 Intra-domain and Inter-domain defects

## 6.3.1.4 Z-end CCC UNI defect

Title is changed from "ZRA UNI defect".

#### 6.3.2 Existing Calls

6.3.3 Call Release

## 6.3.3.1 A-end CCC or Z-end CCC initiated call release defect (request message)

Title is changed from "ARA or ZRA initiated call release defect (request message)".

## 6.3.3.2 A-end CCC or Z-end CCC initiated call release defect (response message)

Title is changed from "ARA or ZRA initiated call release defect (response message)".

# 7 DCM Attributes List

#### Replace the first paragraph of this clause with the following:

The DCM attributes list may be separated into attributes associated with the call and attributes associated with the connection. Tables 7-1, 7-2 and 7-3 summarize a list of attributes that are considered for UNI, I-NNI and E-NNI signalling processing.

- UNI signalling processing includes call attributes, and also connection attributes for setting up Link Connection(s) on user-to-network access links.
- I-NNI signalling processing includes connection attributes. Call attributes must be exchanged between Call Controllers (e.g., ASC-n to ZSC-n in Figure 5-1). Many mechanisms used to achieve this are not part of this architecture. I-NNI signalling might be

used to exchange call attributes by piggybacking them on connection-related messages but, if so, they do not form part of I-NNI processing.

• E-NNI signalling processing includes call attributes, and also connection attributes for setting up Link Connection(s) on network-to-network access links.

All attributes represent the logical information that is exchanged across the respective interfaces to support the CCC/NCC, CC, and LRM. Note that protocol design decisions may result in aggregation (or segmentation) of some of this logical information; however, the functions supported by the information shall be present.

Replace Table 7-1 with the following:

	Attributes	Scope	Call vs Connection
	Calling UNI Transport Resource Address	End-to-end	call
	Called UNI Transport Resource Address	End-to-end	call
Identity attributes	Initiating CC/CallC name	Local	connection
	Terminating CC/CallC name	Local	connection
	Connection name	Local	connection
	Call name	End-to-end	call
	Calling AGC SNP ID	Local	connection
	Calling AGC SNPP ID	Local	connection
Service attributes	Called AGC SNP ID	Local at remote end	connection
	Called AGC SNPP ID	Local at remote end	connection
	Directionality	Local	call/connection
Policy attributes	CoS	End-to-end (Note)	call
	GoS	End-to-end (Note)	call
	Security	Local	call/connection
NOTE – Although CoS and GoS are end-to-end in scope, their values may be changed as they cross domains. However, the policy associated with the requested service should be met.			

Table 7-1/G.7713/Y.1704 – UNI Attributes List

	Attributes	Scope	Call vs Connection
	Calling UNI Transport Resource Address	Carry transparently	call
	Called UNI Transport Resource Address	Carry transparently	call
Identity attributes	Initiating CC name	Local	connection
	Terminating CC name	Local	connection
	Connection name	Global in one domain	connection
	Call name	End-to-end	call
	SNP ID	Local	connection
	SNPP ID	Local	connection
Service attributes	Called AGC SNP ID	Carry transparently	connection
	Called AGC SNPP ID	Carry transparently	connection
	Directionality	Global in one domain	Call/connection
	CoS	Carry transparently	call
Policy attributes	GoS	Carry transparently	call
	Connection CoS	Global in one domain	connection
	Connection GoS	Global in one domain	connection
	Explicit resource list	Global in one domain	connection
	Recovery	Global in one domain	connection

## Table 7-2/G.7713/Y.1704 – I-NNI Attributes list

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	Attributes	Scope	Call vs Connection
	Calling UNI Transport Resource Address	End-to-end or Carry transparently	call
Identity attributes	Called UNI Transport Resource Address	End-to-end or Carry transparently	call
	Initiating CC/CallC name	Local	connection
	Terminating CC/CallC name	Local	connection
	Connection name	Local	connection
	Call name	End-to-end	call
	SNP ID	Local	connection
	SNPP ID	Local	connection
Service attributes	Called AGC SNP ID	Carry transparently	connection
	Called AGC SNPP ID	Carry transparently	connection
	Directionality	Local	Call/connection
	CoS	End-to-end	call
	GoS	End-to-end	call
Policy attributes	Security	Local	call/connection
	Explicit resource list	Local	connection
	Recovery	Local	connection

Table 7-3/G.7713/Y.1704 – E-NNI Attributes List

## 7.1 UNI Attributes List

## 7.1.1 Identity Attributes

## 7.1.1.1 Calling UNI Transport Resource Address

Title changed from "A-end user name".

Replace the text as follows:

This attribute is the G.8080/Y.1304 UNI Transport Resource Address used to reach the A-end Call Controller. The value of this attribute has to be globally unique and assigned by the service provider. For example, a user name may be an NSAP address assigned by service provider #1, while another user name may be an IPv6 address assigned by service provider #2. As the user name provides a globally unique identification of the users, different formats may co-exist.

## 7.1.1.2 Called UNI Transport Resource Address

Title changed from "Z-end user name".

*Replace the text as follows:* 

This attribute is the G.8080/Y.1304 UNI Transport Resource Address used to reach the Z-end Call Controller. Characteristics are the same as that specified for the Calling UNI Transport Resource Address.

## 7.1.1.3 Initiating CC/CallC name

### 7.1.1.4 Terminating CC/CallC name

7.1.1.5 Connection name

### 7.1.1.6 Call name

### 7.1.2 Service Attributes

## 7.1.2.1 SNP ID

Add the following text at the end of existing paragraph:

The SNP ID in signalling messages include:

- Calling AGC SNP ID This ID is used to setup the LC on the calling AGC to network element access links.
- Called AGC SNP ID This ID is used to setup the LC on the called AGC to network element access links.
- SNP ID This ID is used to setup a LC on network element to network element access links.

## 7.1.2.2 SNPP ID

*Add the following text at the end of existing paragraph:* 

The SNPP ID in signalling messages include:

- Calling AGC SNPP ID This ID is used to setup the LC on the calling AGC to network element access links.
- Called AGC SNPP ID This ID is used to setup the LC on the called AGC to network element access links.
- SNPP ID This ID is used to setup a LC on the network element to network element access links.

## 7.1.2.3 Directionality

#### 7.1.3 Policy Attributes

## 7.1.3.1 CoS and Connection CoS

Title changed from "Class of Service".

Add the following before the last sentence:

This call CoS attribute is part of the Service Level Agreement (SLA) of the calling party to specify the CoS. A translation function that translates the call CoS to a domain-specific CoS (connection CoS) value is required.

The connection CoS might be different from domain-to-domain, but the connection CoS in each domain has to meet the SLA to support end-to-end CoS requests.

## 7.1.3.2 GoS and Connection GoS

Title changed from "Grade of Service".

Add the following before the last sentence (Example list ...):

This call GoS attribute is part of the Service Level Agreement (SLA) of the calling party to specify the GoS. At the domain boundary a translation function that translates call GoS to domain-specific GoS (connection GoS) value is required.

The connection GoS will be different from domain-to-domain, but the connection GoS in each domain has to meet the SLA to support end-to-end GoS requests.

### 7.1.3.3 Security

## 7.1.4 Status Attributes

- 7.2 I-NNI Attributes List
- 7.2.1 Identity Attributes

### 7.2.1.1 Calling UNI Transport Resource Address

Title changed from "A-end user name".

### 7.2.1.2 Called UNI Transport Resource Address

Title changed from "Z-end user name".

#### 7.2.1.3 Initiating CC/CallC name

- 7.2.1.4 Terminating CC/CallC name
- 7.2.1.5 Connection name
- 7.2.1.6 Call name
- 7.2.2 Service Attributes
- 7.2.3 Policy Attributes

### 7.2.3.1 CoS and Connection CoS

Title changed from "CoS".

### 7.2.3.2 GoS and Connection GoS

Title changed from "GoS".

- 7.2.3.3 Explicit resource list
- 7.2.3.4 Recovery
- 7.2.4 Status Attributes
- 7.3 E-NNI Attributes List

## 7.3.1 Identity Attributes

## 7.3.1.1 Calling UNI Transport Resource Address

Title changed from "A-end user name".

## 7.3.1.2 Called UNI Transport Resource Address

Title changed from "Z-end user name".

## 7.3.1.3 Initiating CC/CallC name

- 7.3.1.4 Terminating CC/CallC name
- 7.3.1.5 Connection name
- 7.3.1.6 Call name
- 7.3.2 Service Attributes
- 7.3.3 Policy Attributes

### 7.3.4 Status Attributes

- 8 DCM Message Sets
- 8.1 UNI Messages
- 8.1.1 Call Setup
- 8.1.1.1 Request: Setup Call

Replace Table 8-4 with the following:

#### Table 8-4/G.7713/Y.1704 – UNI Call Setup Request Message

User sent attributes	Network sent attributes
Calling UNI Transport Resource Address	Calling UNI Transport Resource Address
Called UNI Transport Resource Address	Called UNI Transport Resource Address
Initiating CallC name	Initiating CC/CCC name
Terminating CallC name	Terminating CC/CCC name
Calling AGC SNP ID	Calling AGC SNP ID
Calling AGC SNPP ID	Calling AGC SNPP ID
Called AGC SNP ID	Called AGC SNP ID
Called AGC SNPP ID	Called AGC SNPP ID
Directionality	Directionality
CoS	CoS
GoS	GoS
Security	Security
connName	connName
	callName

- 8.1.1.2 Indication: Setup Call
- 8.1.1.3 Confirm: Setup Call
- 8.1.2 Call Release
- 8.1.3 Call Query
- 8.1.4 Notification
- 8.2 I-NNI Messages
- 8.2.1 Connection Setup

## 8.2.1.1 Request: Setup Connection

*Replace Table 8-14 with the following:* 

Table 8-14/G.7713/Y.1704 – I-NNI Connection
Setup Request Message

Attributes
Calling UNI Transport Resource Address
Called UNI Transport Resource Address
Initiating CC name
Terminating CC name
connName
callName
Local SNP ID
Local SNPP ID
Called AGC SNP ID
Called AGC SNPP ID
Directionality
CoS
GoS
Connection CoS
Connection GoS
Explicit resource list
Recovery

## 8.2.1.2 Indication: Setup Connection

## 8.2.1.3 Confirm: Setup Connection

- 8.2.2 Connection Release
- 8.2.3 Connection Query
- 8.2.4 Notification
- 8.3 E-NNI Messages
- 8.3.1 Connection Setup

### 8.3.1.1 Request: Setup Connection

Replace Table 8-24 with the following:

#### Table 8-24/G.7713/Y.1704 – E-NNI Connection Setup Request Message

Attributes
Calling UNI Transport Resource Address
Called UNI Transport Resource Address
Initiating CC/NCC name
Terminating CC/NCC name
connName
callName
Local SNP ID
Local SNPP ID
Called AGC SNP ID
Called AGC SNPP ID
Directionality
CoS
GoS
Explicit resource list
Recovery

#### 8.3.1.2 Indication: Setup Connection

#### 8.3.1.3 Confirm: Setup Connection

#### 8.3.2 Connection Release

- 8.3.3 Connection Query
- 8.3.4 Notification

#### 9 DCM State Diagrams

No changes other than replacement of terms and abbreviations as indicated in clause 4 of this amendment.

#### 10 Management of the Call and Connection Controller Function

No changes other than replacement of terms and abbreviations as indicated in clause 4 of this amendment.

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