

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Y.2023

(04/2012)

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

Next Generation Networks – Frameworks and functional
architecture models

Functional requirements and architecture for the next generation network multimedia communication centre service

Recommendation ITU-T Y.2023

ITU-T Y-SERIES RECOMMENDATIONS

GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS

GLOBAL INFORMATION INFRASTRUCTURE

General	Y.100–Y.199
Services, applications and middleware	Y.200–Y.299
Network aspects	Y.300–Y.399
Interfaces and protocols	Y.400–Y.499
Numbering, addressing and naming	Y.500–Y.599
Operation, administration and maintenance	Y.600–Y.699
Security	Y.700–Y.799
Performances	Y.800–Y.899

INTERNET PROTOCOL ASPECTS

General	Y.1000–Y.1099
Services and applications	Y.1100–Y.1199
Architecture, access, network capabilities and resource management	Y.1200–Y.1299
Transport	Y.1300–Y.1399
Interworking	Y.1400–Y.1499
Quality of service and network performance	Y.1500–Y.1599
Signalling	Y.1600–Y.1699
Operation, administration and maintenance	Y.1700–Y.1799
Charging	Y.1800–Y.1899
IPTV over NGN	Y.1900–Y.1999

NEXT GENERATION NETWORKS

Frameworks and functional architecture models	Y.2000–Y.2099
Quality of Service and performance	Y.2100–Y.2199
Service aspects: Service capabilities and service architecture	Y.2200–Y.2249
Service aspects: Interoperability of services and networks in NGN	Y.2250–Y.2299
Numbering, naming and addressing	Y.2300–Y.2399
Network management	Y.2400–Y.2499
Network control architectures and protocols	Y.2500–Y.2599
Smart ubiquitous networks	Y.2600–Y.2699
Security	Y.2700–Y.2799
Generalized mobility	Y.2800–Y.2899
Carrier grade open environment	Y.2900–Y.2999
Future networks	Y.3000–Y.3099

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

Recommendation ITU-T Y.2023

Functional requirements and architecture for the next generation network multimedia communication centre service

Summary

The multimedia communication centre (MCC) provides a set of advanced services beyond traditional communication services. The MCC enables a service provider to deliver communication services to individual and enterprise customers. The objective of Recommendation ITU-T Y.2023 is to identify and describe the functional requirements, architecture and key procedures of the MCC.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T Y.2023	2012-04-22	13

Keywords

Functional architecture, master agent, MCC service, mobile agent, multimedia communication centre (MCC), NGN, RTWG, subagent.

.....

FOREWORD

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

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

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

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2012

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Table of Contents

	Page
1 Scope	1
2 References.....	1
3 Definitions	1
3.1 Terms defined elsewhere	1
3.2 Terms defined in this Recommendation.....	2
4 Abbreviations and acronyms	2
5 Conventions	4
6 Overview of the MCC in the NGN.....	4
7 Functional requirements for support of the MCC service	6
7.1 Unified service capabilities broker for the MCC	6
7.2 Agent and sub-agent management.....	6
7.3 Supporting mobile agents with a real-time web communication capability ..	6
8 Functional architecture of the next generation network (NGN) for the support of the MCC service	7
8.1 MCC functions in the NGN.....	7
8.2 Logical diagram of the MCC functions.....	8
8.3 Description of the MCC functional entities.....	10
9 Description of reference points.....	13
9.1 Reference point description for MCC functions in the NGN.....	13
9.2 Reference points description	13
10 MCC procedures and functional description	14
10.1 Communication requests queuing and distribution	14
10.2 MCC service initialization.....	15
10.3 Procedure to use the USBF.....	15
10.4 Overload control.....	16
10.5 Communication control operations for MCC agents.....	18
10.6 Management operations for supervisors.....	21
10.7 MCC agent management	23
10.8 Video sharing.....	25
10.9 Video conferencing	26
10.10 Web and application collaboration.....	27
10.11 User context information adoption.....	29
10.12 Supporting of mobile agents with real-time web communication capability	30
11 Security considerations	31
Appendix I – Multimedia communication centre layered architecture and deployment principles	32

	Page
I.1 Multimedia communication centre (MCC) hierarchical deployment principles	32
I.2 MCC layered architecture.....	34
Bibliography.....	36

iv

Recommendation ITU-T Y.2023

Functional requirements and architecture for the next generation network multimedia communication centre service

1 Scope

This Recommendation, based on [ITU-T Y.2012], covers extended features in order to support applications and services for the multimedia communication centre (MCC).

This Recommendation describes functional requirements, architecture, and entities of the MCC in order to support next generation network (NGN) service requirements and capabilities.

This Recommendation covers:

- support of requirements and capabilities defined in [ITU-T Y.2216] from an architectural viewpoint;
- functional requirements of the NGN architecture to support applications and services of the MCC;
- functional architecture, entities extensions, and procedures for applications and services of the MCC.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; 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. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T Y.2012] Recommendation ITU-T Y.2012 (2010), *Functional requirements and architecture of next generation networks*.
- [ITU-T Y.2216] Recommendation ITU-T Y.2216 (2010), *NGN capability requirements to support the multimedia communication centre service*.
- [ITU-T Y.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1*.
- [ITU-T Y.2702] Recommendation ITU-T Y.2702 (2008), *Authentication and authorization requirements for NGN release 1*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 customer [b-ITU-T M.3050.1]: The customer buys products and services from the enterprise or receives free offers or services. A customer may be a person or a business.

NOTE – In the MCC service, the customers can experience advanced customer services offered by enterprises by communicating through the NGN.

3.1.2 enterprise [ITU-T Y.2216]: The enterprise is responsible for delivering products and services to the customer.

NOTE – In MCC service by using the multimedia communication centre capabilities provided by NGN, each enterprise can provide its own advanced customer services, such as business consultation, sale promotion, etc.

3.1.3 MCC agent [ITU-T Y.2216]: An MCC agent is an NGN end-user who acts as an enterprise's agent in the MCC service. The MCC agent uses an NGN terminal to communicate with customers and perform communication control operations, such as holding or transferring communications, etc.

3.1.4 MCC applications [ITU-T Y.2216]: MCC applications are a set of applications provided and deployed by an enterprise in order to support its MCC service offer to its customers.

NOTE – The MCC applications organize and manage the mechanisms set and controlled by each enterprise in the MCC service. For example, the mechanisms can allow policy control of communication requests queuing, and management of media resources, etc. MCC applications interact with NGN entities to provide MCC service to customers.

3.1.5 MCC service [ITU-T Y.2216]: A service that enables customers to have multimedia communications through the NGN with enterprises by multiple means and that provides advanced features for the customer-enterprise interaction.

NOTE – The multiple means can be multimedia conversational communications, web and application collaboration, content push and sharing, etc. Advanced features include enhanced communication control, communication queuing, etc.

3.1.6 service enabler [ITU-T Y.2240]: A function or closely related set of functions made available over one or more well-defined interfaces to other consuming software applications.

NOTE – In the MCC, a service enabler refers to certain types of service capabilities that can be invoked by MCC functions and resides outside of the MCC (e.g., location server function, presence server function).

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 master agent: A type of multimedia communication centre (MCC) agent which creates agents and manages the created agents accordingly.

3.2.2 mobile agent: A type of multimedia communication centre (MCC) agent which provides the MCC service in a mobile way. The mobile agent usually installs agent software on the mobile terminal (e.g., smartphone).

3.2.3 real-time web communication gateway: A Web gateway that enables message conversion and real-time media stream transcoding through Internet for a mobile multimedia communication centre (MCC) agent.

3.2.4 sub-agent: A type of multimedia communication centre (MCC) agent which is created by a master agent. The sub-agent and the master agent work together for providing the MCC service to customers.

3.2.5 supervisor: A type of multimedia communication centre (MCC) agent which provides the MCC service to MCC customers and monitors other MCC agents.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ANI	Application Network Interface
API	Application Programming Interface
AS	Application Server

BGW	Border Gateway
BSS	Business Support System
COLLF	Collaboration Function
CONF	Conference Function
CPE	Customer Premises Equipment
CRM	Customer Relationship Management
CSCF	Call Session Control Function
CTIF	Communication Telephony Integration Function
DB	Data Base
DTMF	Dual Tone Multi Frequency
HTTP	Hypertext Transfer Protocol
ID	Identifier
IM	Instant Message
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IVR	Interactive Voice Response
IVVR	Interactive Voice and Video Response
LAN	Local Area Network
LCSF	Location Server Function
LSF	Location Service Function
MCC	Multimedia Communication Centre
MCDF	Multimedia Call Distribution Function
MGCF	Media Gateway Control Function
MGW	Media Gateway
MLP	Mobile Location Protocol
MMRF	MCC Media Resource Function
MSC	Mobile Switching Centre
NGN	Next Generation Network
NMS	Network Management System
NNI	Network to Network Interface
OA	Office Automation
OAM	Operations, Administration and Maintenance
OCF	Overload Control Function
OSS	Operation Support System
PSF	Presence Server Function
RWCG	Real-time Web Communication Gateway
SCMF	Software Control Management Function

SDP	Session Description Protocol
SIMPLE	SIP for Instant Messaging and Presence Leveraging Extensions
SIP	Session Initiation Protocol
SOAP	Simple Object Access Protocol
SSF	Service Support Function
TDM	Time-division multiplexing
TTS	Text to Speech
UNI	User to Network Interface
URI	Uniform Resource Identifier
USBF	Unified Service Broker Function
VLR	Visitor Location Register
WSF	Web-enabled Service Function
XDM	XML Document Management

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus this requirement needs not be present to claim conformance.

The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. These terms are not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

6 Overview of the MCC in the NGN

Based on the MCC requirements specified in [ITU-T Y.2216], the MCC provides a set of capabilities for offering intelligent, context-aware MCC services to customers and facilitates agile and flexible development of communication centre applications.

In addition to the MCC requirements specified in [ITU-T Y.2216], this Recommendation also includes additional capabilities supported by the MCC. There are two sets of capabilities specified in this Recommendation:

- MCC service-related capabilities:
 - communication request queuing;
 - communication control operations for MCC agents;
 - management operations for supervisors;
 - charging;
 - quality of Service;
 - MCC agent management;
 - video sharing between an MCC agent and customers;

Copyright © 2012 ITU-T. All rights reserved.

- video conferencing;
- web and application collaboration handling;
- user context information;
- communication congestion handling;
- mobile agent;
- master agent and sub-agent.
- MCC capabilities related to NGNs:
 - MCC application support;
 - communication request queuing;
 - communication request distribution;
 - communication control operations for MCC agents;
 - MCC agent's terminal management;
 - web and application collaboration handling;
 - communication congestion handling;
 - MCC media resource management.

Figure 1 shows the impacts of the MCC on the NGN architecture [ITU-T Y.2012]. Functions "MCC application and service support" and "MCC service control" are new functions introduced for the support of the MCC service, while functions "Service user profile", "Media resource management" and "Communication control" are functions of the NGN which are modified when the MCC service is supported. These functions are required to support the above-listed capabilities related to support of the MCC.

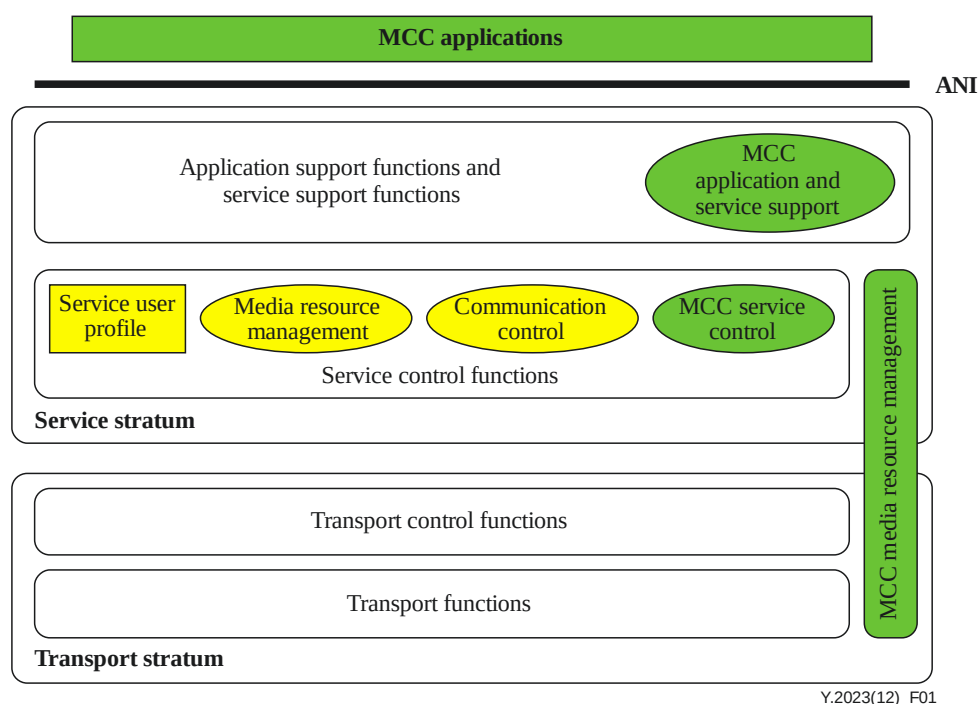


Figure 1 – Support of the MCC in the NGN

In the "MCC applications" layer above the application network interface (ANI), specific MCC service logics and applications are provided by invoking MCC service capabilities in the NGN, including automatic applications (e.g., interactive voice response (IVR)) and manual applications (e.g., agent-based services). In order to support the MCC services specified in [ITU-T Y.2216],

some relevant capabilities are also included in "MCC applications" layer, including presence capability, location capability and web-enabled capability.

In the NGN service stratum, two specific groups of functions are needed for the support of the MCC: MCC application support functions and service support functions, and MCC service control functions. Besides, some other existing functions defined in the NGN [ITU-T Y.2012] are also modified, including the functions related to the service-user profile, media resource management and communication control.

- The MCC application support functions and service support functions include functions which can be invoked by the "MCC applications" layer, using the ANI reference point. Supported functions include communication request queuing and communication request distribution, which can be invoked by other functions and which can receive service responses from other functions;
- The MCC service control functions include service control and call session control functions required for support of the MCC services;
- Other NGN functions, including functions related to the service user profile, media resource management, and communication control, need to be enhanced in order to support MCC services accordingly.

7 Functional requirements for support of the MCC service

7.1 Unified service capabilities broker for the MCC

In order to provide intelligent and customized MCC services, multiple functions have to invoke various different types of service enablers residing outside of the MCC, such as the location server function (LCSF) and the presence server function (PSF). Since these different types of service capability have different application programming interfaces (APIs), the complexity of MCC functions invoking these service capabilities is increased since each MCC function needs to maintain the knowledge of multiple different and various APIs.

In order to simplify the use of different services capabilities and to focus on the service logic implementation, the MCC architecture is required to support the following functional requirement:

- 1) The MCC architecture is required to support unified service capabilities broking.

7.2 Agent and sub-agent management

In the MCC, agents can register to the MCC platform and specify their skills. When providing MCC services to customers, one agent can be occupied by one or several customers simultaneously, especially in text-based chat scenarios.

In order to enhance the capability of agents to provide MCC services to customers, with an appropriate quality of experience, the MCC architecture is required to support the following functional requirement:

- 1) The MCC architecture is required to provide functions that allow MCC agents to create sub-agents which can co-work with the master agent (creator agent) in a group. In this case, the agent works as the master agent which can manage and monitor the sub-agents.

7.3 Supporting mobile agents with a real-time web communication capability

The MCC supports the access of multimedia mobile agents which can provide MCC services in real-time using web communication tools. In order to support such a mobile agent with real-time web communication capabilities, a mobile agent component in the mobile terminal and a real-time web communication gateway (RWCG) in the network are required to be supported.

In order to support mobile agents with a real-time web communication capability, the MCC architecture has the following functional requirements:

- The mobile agent component is required to acquire the communication address of the RWCG from a web server which stores the RWCG address.
- The mobile agent component is required to establish a connection with the corresponding RWCG which is acquired by the mobile agent component on its start-up for multimedia call handling.
- The RWCG is required to support two-way real-time multimedia communications through the connection established with the mobile agent component.

8 Functional architecture of the next generation network (NGN) for the support of the MCC service

8.1 MCC functions in the NGN

Figure 2 shows the functions involved in the support of the MCC service by the NGN. This figure is based on Figure 7-1 of [ITU-T Y.2012] and Figure 1.

NOTE 1 – The majority of the functions shown in Figure 2 are explained in [ITU-T Y.2012]. Functions specific to the MCC are described below.

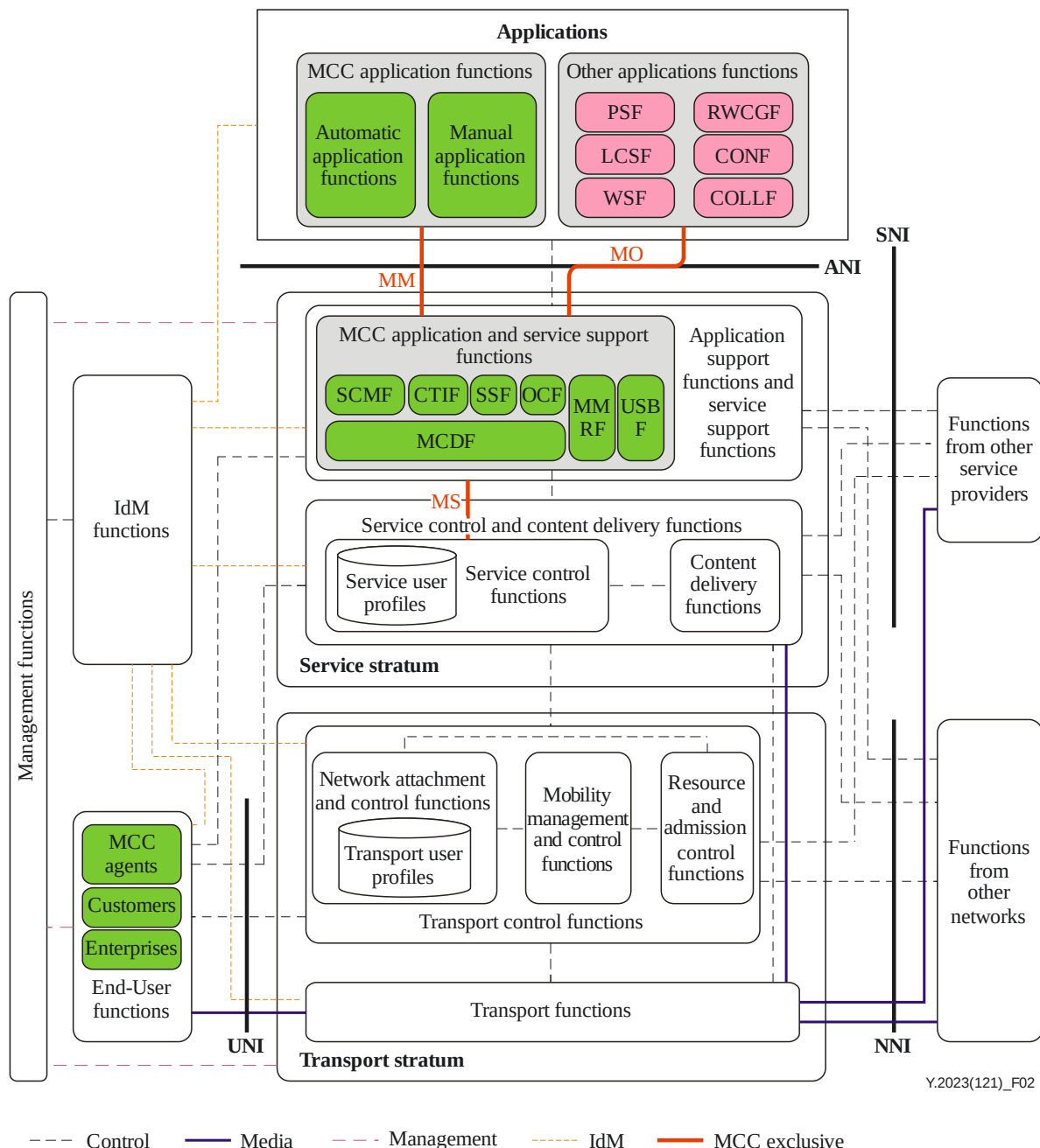


Figure 2 – MCC functions in the NGN

8.2 Logical diagram of the MCC functions

The following figure, based on Figure 2, illustrates the detailed MCC logical architecture and relationships between MCC functions, including the multimedia call distribution function (MCDF), software control management function (SCMF), communication telephony integration function (CTIF), overload control function (OCF), unified service broker function (USBF), service support function (SSF), MCC media resource function (MMRF), MCC application functions, and other application functions. In the architecture, MCC functions are connected by reference points.

In the MCC logical architecture, MCC functions are shown in green while functions in pink are assistant functions providing service support for MCC services. The latter functions are out of the scope of the MCC.