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

Next Generation Networks – Frameworks and functional
architecture models

Functional architecture of multi-connection

Recommendation ITU-T Y.2027

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

Recommendation ITU-T Y.2027

Functional architecture of multi-connection

Summary

Recommendation ITU-T Y.2027 describes the functional architecture of multi-connection taking into account the requirements provided in Recommendation ITU-T Y.2251 and the next generation network (NGN) functional architecture as provided in Recommendation ITU-T Y.2012.

History

Edition	Recommendation	Approval	Study Group
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Functional architecture of multi-connection

1 Scope

As defined in [ITU-T Y.2251], multi-connection functionality provides capabilities to the user equipment and network to support simultaneous attachment to multiple access technologies. Furthermore, it controls and coordinates media sessions and components through multiple access technologies.

The user experience depends on the access technologies provided: high throughput, low delay, high security, etc. Multi-connection enables users to utilize either one of the available access technologies, or to utilize several at the same time. It is recognized that both operators and users will benefit from the harmonization of multiple connections, such as efficient utilization of network bandwidth, load balancing, high reliability of connection and continuity of services.

This Recommendation describes the functional architecture of multi-connection in terms of the overall functional requirements and the high-level overview of the multi-connection framework itself. The objective of this Recommendation is to develop the functional architecture, definitions and capabilities of the relative functional entities, and to describe the relationship between the multi-connection functional architecture and the NGN functional architecture [ITU-T Y.2012].

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.2251] Recommendation ITU-T Y.2251 (2011), *Multi-connection requirements*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 functional entity [ITU-T Y.2012]: An entity that comprises an indivisible set of specific functions. Functional entities are logical concepts, while groupings of functional entities are used to describe practical, physical implementations.

3.1.2 mediated services [ITU-T Y.2012]: Services that are based on intermediate service stratum facilities provided by one or more service providers.

3.1.3 multi-connection [ITU-T Y.2251]: The functionality which provides capability to the user equipment (UE) and network to maintain more than one access network connection simultaneously.

NOTE 1 – All connections are coordinated to provide service to higher layer entities.

NOTE 2 – In a multi-connection communications at least one UE is required to be a multi-connection UE.

3.1.4 non-mediated services [ITU-T Y.2012]: Services that are not based on intermediate service stratum facilities provided by any service provider.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 multi-connection user equipment (MUE): A user equipment which can support two or more network connections simultaneously under the control of a network enhanced for multi-connection capability.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

2G	Second Generation
3G	Third Generation
AAA	Authentication Authorization Accounting
AC-FE	Access Control FE
ADSL	Asymmetrical Digital Subscriber Line
AN	Access Network
AP	Access Point
API	Application Program Interface
BSS	Base Station Subsystem
CS	Circuit Switched
EPC	Evolved Packet Core
FE	Functional Entity
FTP	File Transfer Protocol
HO	Handover
IF	Interface
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISP	Internet Service Provider
LTE	Long Term Evolution
MAS-F	Multi-connection Application Support Function
MC-ARCH	Multi-connection Architecture
MC-FE	Multi-connection Coordination FE
MMF	Multi-connection Media Function
MPC-FE	Multi-connection Policy Control FE
MR-FE	Multi-connection Registration FE
MSISDN	Mobile Subscriber International ISDN / PSTN Number
MTC-FE	Multi-connection Terminal Control FE
MUE	Multi-connection UE

MUP-FE	Multi-connection User Profile FE
NGH	Next Generation Hotspot
NGN	Next Generation Network
OSI	Open System Interconnect reference model
P2P	Peer to Peer
PC	Personal Computer
PS	Packet Switched
QoE	Quality of Experience
QoS	Quality of Service
SCF	Service Control Functions
SDP	Session Description Protocol
SIP	Session Initial Protocol
SUE	Single connection UE
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
VoIP	Voice over IP
VPN	Virtual Private Network
WBA	Wireless Broadband Alliance
WFA	Wi-Fi Alliance
Wi-Fi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network

5 Conventions

None.

6 Overview of the multi-connection architecture

6.1 General architecture

The multi-connection architecture (MC-ARCH) enhances the NGN to support the ability of multiple concurrent sessions from a single UE in a coordinated manner. In order to achieve this, NGNs and UEs require the addition of new functions.

The general architecture for multi-connection includes the following major functions, as shown in Figure 6-1:

- 1) Deployment of the multi-connection access technology policy and maintain information (such as traffic, usage duration, bandwidth, connection status, etc.) of the available connections for MUEs;
- 2) Manage connections to initiation, transfer, release and update;
- 3) Provide mobility related services;
- 4) Provide flow-based management related services;

- 5) Provide session continuity for applications/services;
- 6) Provide QoS and relevant policy control;
- 7) Manage multi-connection applications with proper access information statically or dynamically;
- 8) Support authentication, authorization and accounting (AAA) functions for multi-connection services and assist AAA related events in each access technology;
- 9) Support mechanisms for service composition and decomposition which allow separation of one session of the relevant service (e.g., audio/video service) into several flows and vice versa;
- 10) Improve application performance by utilising available access technologies.

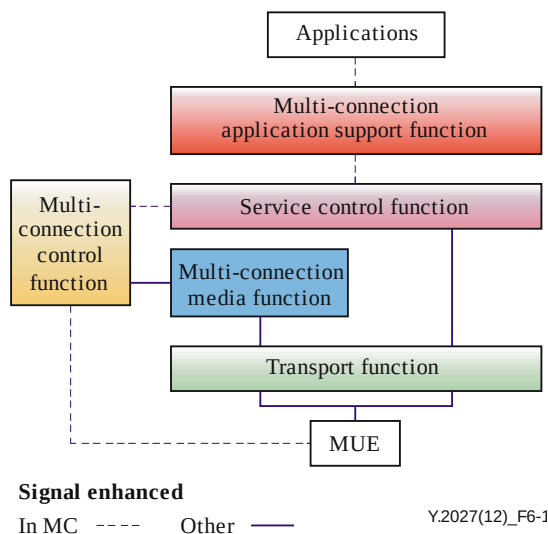


Figure 6-1 – Overview of multi-connection architecture

Figure 6-2 shows how an MUE and MC-ARCH enhanced network can align with the OSI layering. It also highlights that MC-ARCH introduces new functions in user equipment and network nodes supporting multi-connection.

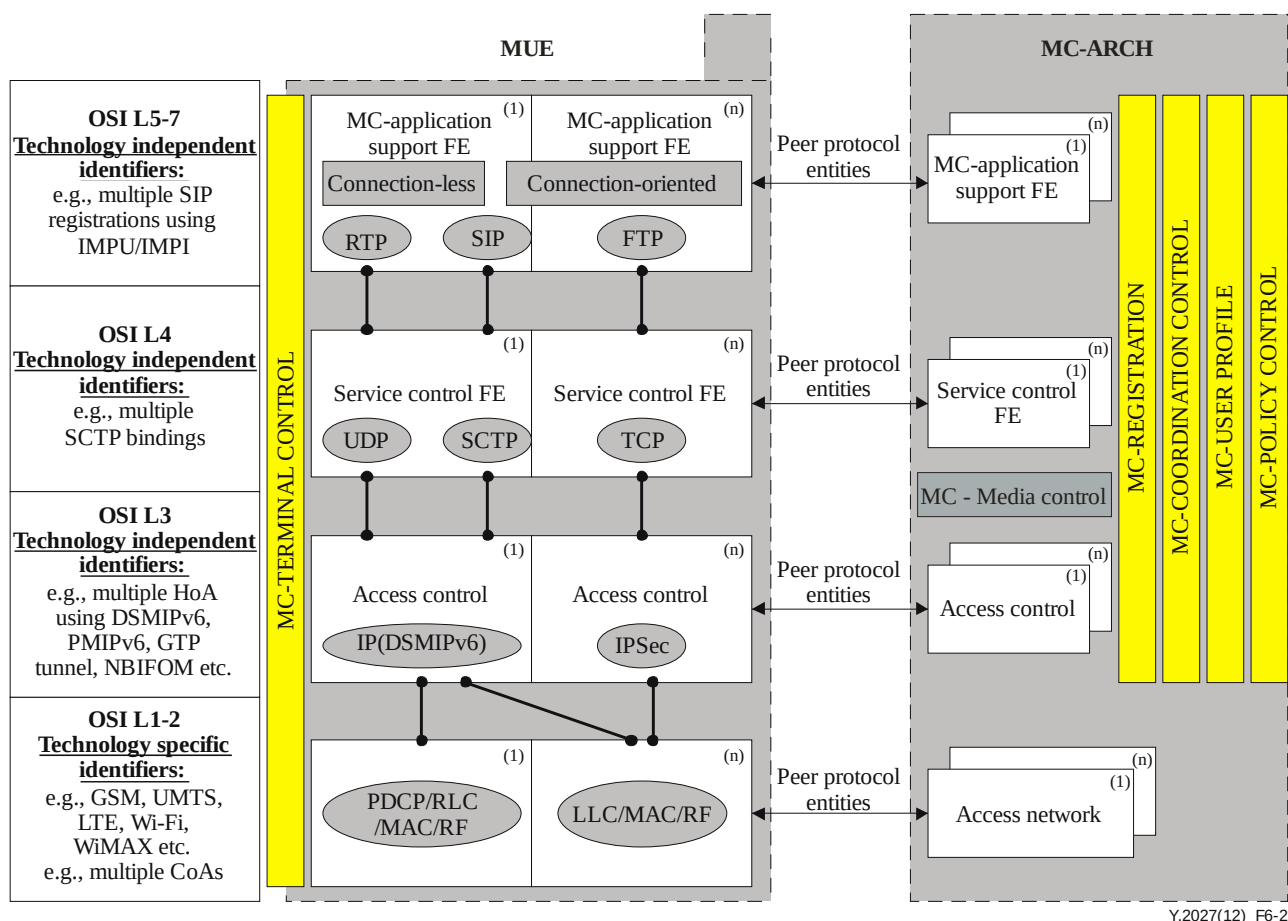


Figure 6-2 – Functional entities supporting multi-connection architecture

Figure 6-2 assumes, as an example, that the MUE has two concurrent ongoing sessions:

- The first session is a SIP based communication. In this instance, the SIP based application is enhanced for multi-connection since the service flow is decomposed between UMTS and Wi-Fi. In particular, the flow related to SIP signalling is carried over UMTS while the user plane is transported over Wi-Fi using UDP/RTP.
- The second session is a FTP session over Wi-Fi. In this case, the FTP application is not enhanced for multi-connection.

The functional entities shown in yellow, support multi-connection, both in the UE and network nodes.

Clause 6.2 provides a description of the functional groups shown in Figure 6-1 while clause 6.3 describes the functional entities used of the multi-connection architecture.

6.2 High level function descriptions

6.2.1 Transport function (TF)

The transport function provides the connectivity for all components and independent functions within NGN. The function provides support for unicast and/or multicast transfer of media, as well as the transfer of control and management signalling.