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

ITU-T Y.2000-series – Supplementary service scenarios for fixed-mobile convergence

ITU-T Y-series Recommendations – Supplement 14

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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.

Supplement 14 to ITU-T Y-series Recommendations

ITU-T Y.2000-series – Supplementary service scenarios for fixed-mobile convergence

Summary

One of the essential benefits of the NGN is a supporting of convergences such as a fixed-mobile convergence (called FMC), telecom-broadcasting converged service, e.g., IPTV. ITU-T produced several Recommendations on FMC and IPTV, especially in the ITU-T Y.2000 series of Recommendations. ITU-T is developing more detailed aspects of supporting the FMC, taking consideration of the fact that various services are waiting to utilize the FMC as their service infrastructure, which will extend their service coverage as well as give more benefits to the user.

This Supplement to the ITU-T Y.2000-series Recommendations on the scope of service scenarios over the FMC provides service scenarios which are used over FMC. This Supplement uses the features of involved key elements of FMC to guide how services can be provided in detail. This Supplement also introduces overall configurations and scenario models to identify service scenarios over the FMC.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T Y Suppl. 14	2011-01-28	13

Keywords

Advertisement, FMC, IPTV, NGN.

FOREWORD

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Table of Contents

Supplement 14 to ITU-T Y-series Recommendations

ITU-T Y.2000-series – Supplementary service scenarios for fixed-mobile convergence

1 Scope

This Supplement provides service scenarios over the FMC. These service scenarios are described using features of key elements of the FMC.

This Supplement covers the following:

- Features of key elements for FMC.
- Overall FMC configuration model and scenario model.
- Scenarios over the FMC such as a digital advertisement service, a targeted advertisement service, and an IPTV service.

2 References

[ITU-T Q.1702] Recommendation ITU-T Q.1702 (2002), *Long-term vision of network aspects for systems beyond IMT-2000.*

[ITU-T Q.1706] Recommendation ITU-T Q.1706/Y.2801 (2006), *Mobility management requirements for NGN.*

[ITU-T Q.1762] Recommendation ITU-T Q.1762/Y.2802 (2006), *Fixed-mobile convergence general requirements*.

[ITU-T Y.1910] Recommendation ITU-T Y.1910 (2008), *IPTV functional architecture*.

[ITU-T Y.2001] Recommendation ITU-T Y.2001 (2004), *General overview of NGN*.

[ITU-T Y.2011] Recommendation ITU-T Y.2011 (2004), *General principles and general reference model for Next Generation Networks*.

[ITU-T Y.2012] Recommendation ITU-T Y.2012 (2006), *Functional requirements and architecture of the NGN release 1.*

[ITU-T Y.2091] Recommendation ITU-T Y.2091 (2008), *Terms and definitions for Next Generation Networks*.

[ITU-T Y-Sup.5] ITU-T Y-series Recommendations – Supplement 5 (2008), *ITU-T Y.1900-series – Supplement on IPTV service use cases*.

3 Definitions

3.1 Terms defined elsewhere

This Supplement uses the following terms defined elsewhere:

3.1.1 converged services [ITU-T Q.1702]: The integration of the Internet, multimedia, e-mail, presence, instant messaging, m-commerce, etc., services with voice service.

3.1.2 fixed mobile convergence [ITU-T Q.1762]: In a given network configuration, the capabilities that provide services and application to the end user defined in [ITU-T Y.2091] regardless of the fixed or mobile access technologies being used and independent of the user's location. In the NGN environment [ITU-T Y.2011], it means to provide NGN services to end users regardless of the fixed or mobile access technologies being used.

3.1.3 quality of service [ITU-T Y.2091]:

– **absolute QoS** [ITU-T Y.2111]: Traffic delivery with numerical bounds on some or all of the QoS parameters. These bounds may be physical limits, or enforced limits such as those encountered through mechanisms like rate policing. The bounds may result from designating a class of network performance objectives for packet transfer.

– **relative QoS** [ITU-T Y.2111]: Traffic delivery without absolute bounds on the achieved bandwidth, packet delay or packet loss rates. It describes the circumstances where certain classes of traffic are handled differently from other classes of traffic, and the classes achieve different levels of QoS.

3.1.4 service [ITU-T FG IPTV Y.1910]: Service is defined as a set of functionalities enabled by a provider for end users; for example, providing IP connectivity with managed quality of service, providing an IPTV service, providing content for demanded services, etc.

3.2 Terms defined in this Supplement

This Supplement defines the following terms:

3.2.1 content mediation: A set of functions that change content metadata and content quality based on content information such as video encoding, audio encoding, resolution, etc.

3.2.2 different capability: For a terminal, it is a change of computing resources such as decoding codec, screen size, or terminal's network interface.

For a network, it is a change of access network type and network performance parameters such as bandwidth and traffic management process.

3.2.3 different quality: A change of transcoding QoS parameters, such as encoding codec, resolution (CIF, SD, HD) or frame rate.

3.2.4 digital advertisement: This service is commonly used to display the advertisement of a store at a fixed location or mobile terminals. For a fixed location, it normally uses a big screen TV combined with a networked computer to display advertisement. It plays advertisement content on a designated schedule coordinated by the shop manager. For mobile terminals, when a customer approaches the coverage of a store's POAs (point of access), the prepared advertisements are supplied to the connected customer.

3.2.5 prosumer: A prosumer is a blend of two words formed by contracting either the word professional or producer with the word consumer. The prosumer comes from a prediction that the role of producers and consumers will begin to blur and merge.

3.2.6 service platform: A service platform provides an open environment in NGN. Key features of the open environment include service creation, service execution, service provision, service management, resource management, content management, and data management.

3.2.7 targeted advertising service: A type of advertising service in which advertisements are prepared and sent to users based on various profiles such as user, device and content. Examples of user profiles are age, gender, preference, purchase history, or observed behaviour. Examples of device profiles are screen size, access network type, or computing resource. Examples of content profiles are genre, directors, actors, format, or language.

4 Abbreviations and acronyms

This Supplement uses the following abbreviations and acronyms:

AAA Authentication, Authorization, Accounting

ACK Acknowledgement

AP	Access Point
CDF	Content Delivery Function
CDN	Content Delivery Network
CIF	Common Intermediate Format
EPG	Electronic Program Guide
FMC	Fixed-Mobile Convergence
HD	High Definition
IPTV	Internet Protocol TV
NGN	Next Generation Network
POA	Point of Access
QoE	Quality of Experience
QoS	Quality of Service
SD	Standard Definition
SLA	Service Level Agreement
SMS	Simple Message Service
STB	Set-Top-Box
VoD	Video on Demand
Wi-Fi	Wireless-Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network

5 Conventions

None.

6 Key elements for FMC

There are five key elements to define: Person, Terminal, Network, Contents and Service.

- Person (end user): This is a key subject for consuming services over FMC. It is characterized by the location, that is, "Same Location" or "Change Location".
- Terminal: This is a key device supporting services for the person. The person can own multiple terminal devices either fixed, mobile or wireless. The terminal can be classified into two categories (single mode and multi-mode) by the number of network connection interfaces. A single mode terminal provides a single connection to the network that is either fixed, mobile or wireless. A multi-mode terminal provides several ways of connection to the networks. In this Supplement, a dual mode terminal is used as an example of a multi-mode terminal. The dual mode terminal provides dual connections to the network that are either fixed, mobile or wireless.
- Networks: This is a key part supporting mobility and FMC of the terminal. The network is composed of an access network and a core network. We can classify the access network by its technology basis, whether it is "Fixed", "Mobile" or "Wireless".
- Contents: This is a key part that is presented by media files and media processing. The contents form services for the end user.

- Service: This is a key part for the end users providing a set of functionalities enabled by a service provider.

7 Features of key elements

7.1 Behavioural aspect of Person

A person will use a terminal device, either keeping the same location or changing location. Changing the location causes supporting of mobility if the person wishes to keep current services. So the features of the person's key element can be determined by the location, whether it is, "Same location" or "Change location".

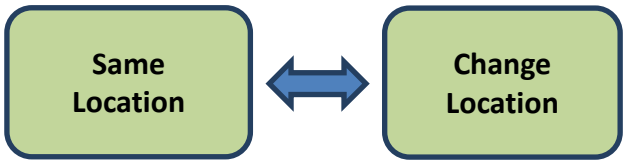

Figure 1 – Features of person

7.2 Capability aspect of Terminal

The terminal is operated following the behaviour of the person while trying to keep the service continuity. As a result of following the person's behaviour, it is decided whether the capability of the terminal should be changed or not.

For example, Figure 2 shows three cases of the terminal capability change or no-change according to the behaviour of the person.

The first case shows the situation of the person watching high quality IPTV at home. He has to go to his company and he wants to watch the programme seamlessly using his mobile phone. In this case, the capability of the terminal is changed: from single mode, fixed network TV to dual mode, wireless network mobile phone.

The second case shows the situation of the person moving his location from A (home, wireless network area) to B (company, mobile network area), while continuing the service. In this case, the capability of the terminal is changed: network mode change of mobile phone from wireless network to mobile network.

The third case shows the situation of the person moving his location from B (company, mobile network area) to C (university, mobile network area), while continuing the service. In this case, there is no terminal capability change because it is merely a change of mobile base station.

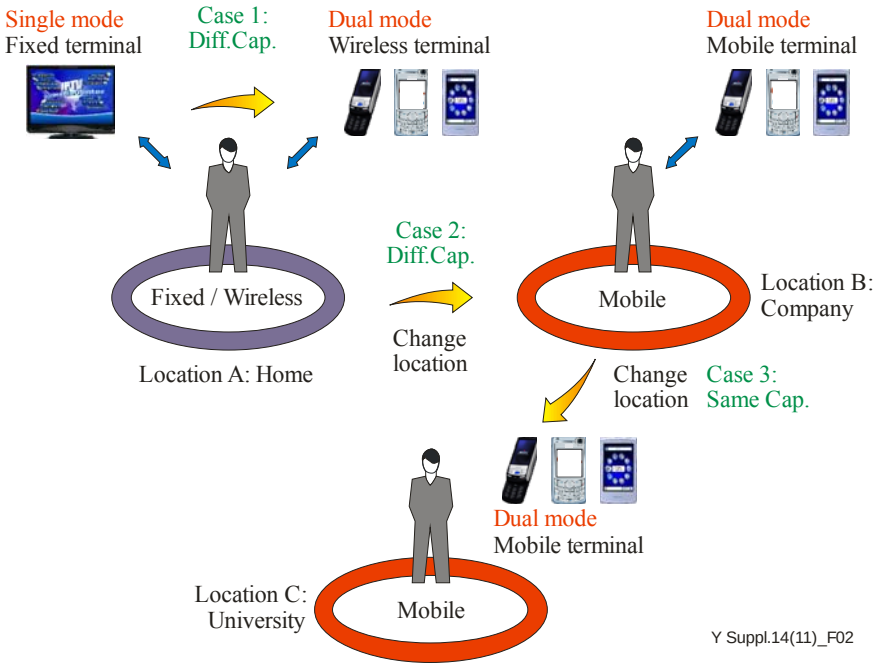

Figure 2 – Example cases of person's behaviour of terminal usage

Therefore, the features of the terminal key element can be determined by the capability, whether it is, the "Same capability" or "Different capability".

Figure 3 – Features of Terminal

7.3 Capability aspect of Network

The features of the access network need to be considered by the technology basis: fixed, mobile and wireless. For those networks, the network capability may vary from one network to another. For example, a fixed broadband network is able to support much higher bandwidth than cellular wireless.

Core network is a delivery part managing overall traffic transferring process such as re-routing, traffic congestion and failure in the routing path, etc. The core network's capability should be impacted by end user behaviour such as changing access networks. Therefore, core network features can be determined by "Same Capability" and "Different Capability".

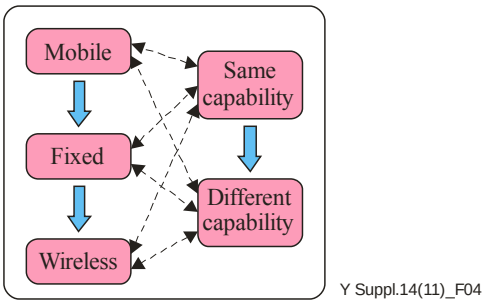

Figure 4 – Features of Network

7.4 Quality aspect of Contents

The features of the content can be determined by quality such as transcoding QoS parameters, their encoding codec, resolution (CIF, SD, HD) or frame rate:

- Same quality: This is the case in which the source of contents should maintain the quality. From the contents point of view, there is no need to change transcoding QoS parameters such as codec, resolution or frame rate.
- Different quality: This is the case in which the source of contents should change the quality. From the contents point of view, there is a need to change the transcoding QoS parameters such as codec, resolution or frame rate.

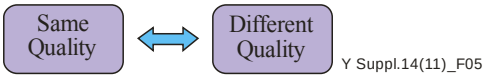

Figure 5 – Features of Contents

There are two cases for the different quality: upgrade or downgrade.

Example case for the upgrade is a handover from a mobile terminal to a TV requiring high quality video and network. The change of quality is required such as codec and resolution (CIF to HD).

Example case for the downgrade is a handover from a TV to a mobile terminal. The change of quality is required such as codec and resolution (HD to CIF).

7.5 Integration aspect of Service

Service feature can be classified by its integration, whether it is, "service" or "converged service". A converged service can be composed of several services.

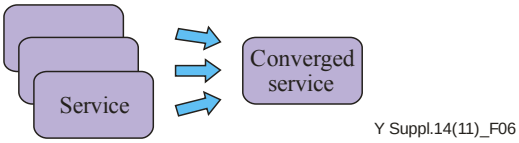

Figure 6 – Features of Service

8 Overall FMC configuration and scenario model

8.1 Overall FMC configuration model

This clause shows an overall high level configuration model over FMC. This is determined by considering the features of FMC key elements, and their characteristics.

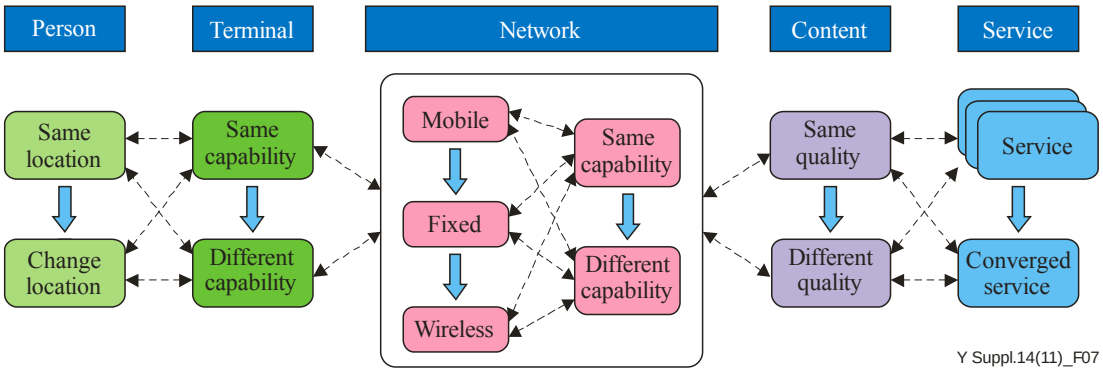

Figure 7 – Overall configuration model using features of key elements

In this figure, a person will use their terminal device either maintaining the same location or changing the location. Changing the location demands support of mobility if the person wishes to keep services while moving.

Then, a terminal device (either single mode or multiple modes) is operated to follow the behaviour of the person while keeping the network connection as much as possible. As a result of following user behaviour (handover to other terminal or change of network connection), the capability of the terminal function should be changed.

In the case of access networks, it should be continuously changed according to the end user's behaviour such as moving or changing the connection among fixed, mobile and wireless access networks. One important thing here is that changing the access network causes change in the connecting capability such as bandwidth, or the overall traffic management process.

Sources of content are influenced by the mobility because the result of mobility either caused at the terminal device or access network, requires changing the QoS (downgrading or upgrading). Therefore this can be characterized by the quality: "Same Quality" or "Different Quality".

Service providers provide several types of service such as content on demand, real-time broadcasting IPTV service, IMS-based caller ID service, information display, etc. Service providers can provide converged services by combining services such as displaying caller-ID, content related information while the customer is watching VoD.

8.2 FMC service scenario model

This clause shows a possible overall scenario model over FMC based on an overall configuration model as shown in Figure 7 in terms of changing capability to support services including its delivery.

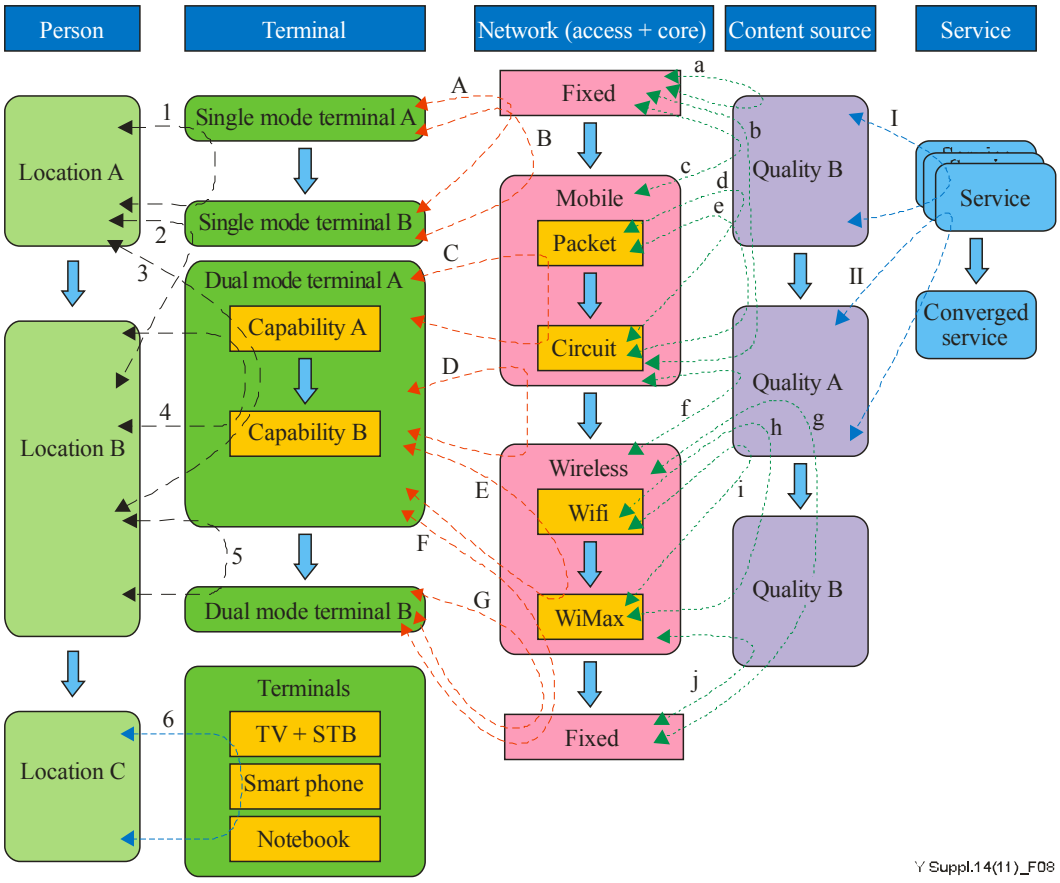

Figure 8 – Overall scenario model over FMC

Possible scenarios over FMC are described as follows:

- Between a person and a terminal device:
  - Scenario ①: This is a scenario of an end user changing their terminal device to another. An example is changing a handheld IPTV terminal device to an "HDTV quality IPTV terminal device".
  - Scenario ②: This is a scenario of an end user changing their location from one place to another which could impact the connection to the network but while keeping their terminal device. An example is the roaming case of a mobile phone.
  - Scenario ③: This is a scenario of an end user changing their location to another location. This impacts its network connection but also changes their terminal capability to meet this change of network connection. An example is the use of a mobile phone with mobile (e.g., GSM/CDMA) and WiFi capability.
  - Scenario ④: This is a scenario of an end user changing their terminal capability but keeping their current location. An example is changing the Internet connection from HSDPA to WiFi capability or vice versa in the case of using a mobile phone.
  - Scenario ⑤: This is a scenario of an end user changing their terminal device even though it is equipped with multiple capabilities, according to their service purposes. An example is the case of changing a PDA-based handled IPTV terminal to a multifunction IPTV terminal such as a PC.
  - Scenario ⑥: This is a scenario of an end user using their terminal devices while the features of service are operated on several devices synchronously. An example is the case of displaying the same content on different types of terminals converting content quality. Another scenario is of an end user using their terminal devices while the unit feature of converged service is operated on separate devices synchronously. Examples are the case of displaying VoD on TV+STB, starting VoD using EPG displayed on mobile phone, and displaying VoD related information on a Notebook.
- Between a terminal device and a network:
  - Scenario Ⓐ: This is a scenario of an end user changing their fixed terminal device to another. An example is changing a PC-based terminal connected to a fixed network to an IPTV terminal with full size display also connected to a fixed network.
  - Scenario Ⓑ: This is a scenario of an end user changing their fixed terminal device to a mobile terminal device or vice versa. An example is changing a handheld IPTV terminal device to an "HDTV quality IPTV terminal device".
  - Scenario Ⓒ: This is a scenario of an end user changing their terminal capability from one circuit based to packet based or vice versa. An example is changing terminal capability from GSM based to HSDPA based to use data over mobile environments.
  - Scenario Ⓓ: This is a scenario of an end user changing their connection to the network from mobile to wireless (e.g., WiFi(IEEE 802.11b), WiMAX(IEEE 802.16e) etc.) or vice versa with supporting capabilities from the terminal device such as using a multi-mode terminal device. An example is using a PDA-based mobile phone for Internet access from mobile changed to wireless or vice versa.
  - Scenario Ⓔ: This is a scenario of an end user changing their connection to the network from one type of wireless (e.g., WiFi) to another (e.g., WiMAX) or vice versa with supporting capabilities from the terminal device such as using a multi-mode terminal device. An example is the use of a WiFi and WiMAX equipped terminal device for Internet access changed from WiFi to WiMAX or vice versa.

– Scenario Ⓕ: This is a scenario of an end user changing their wireless terminal device to a fixed terminal device or vice versa. An example is changing a handheld IPTV terminal device equipped with WiFi/WiMAX to an "HDTV quality IPTV terminal device".

– Scenario Ⓖ: This is a scenario of an end user changing their connection to the network from wireless to fixed or vice versa, keeping the same terminal. An example is changing the network connection from WiFi to fixed for IPTV access using a PC-based terminal device.

• Between a network and content source:

– Scenario ⓐ: This is a scenario of an end user keeping their fixed connection with the same QoS. An example is the use of an "HDTV quality IPTV terminal device" in the same fixed network.

– Scenario ⓑ: This is a scenario of an end user receiving a different quality of content resulting from the change of their connection to the network from fixed to mobile or vice versa. An example is changing their terminal device from an "HDTV quality IPTV terminal device" to a handheld IPTV terminal device or vice versa.

– Scenario ⓒ: This is a scenario of an end user receiving the same quality of content even if they change their connection to the network from fixed to mobile or vice versa. An example is changing a connection from fixed to mobile or vice versa, using their PC based terminal device for internet access.

– Scenario ⓓ: This is a scenario of an end user receiving the same quality of content even if they change their connection to the network from packet-based mobile to circuit-based mobile or vice versa. An example is changing a mode of their mobile terminal device from packet to circuit or vice versa for mobile voice oriented services.

– Scenario ⓔ: This is a scenario of an end user receiving a different quality of content resulting from the change of their connection to the network from packet-based mobile to circuit-based mobile and vice versa. An example is changing a mode of their mobile terminal device from packet to circuit or vice versa for mobile data-oriented services.

– Scenario ⓕ: This is a scenario of an end user receiving the same quality of content even if they change their connection to the network from mobile to wireless or vice versa. An example is changing a mode of their mobile terminal device from mobile to wireless or vice versa for internet access.

– Scenario ⓖ: This is a scenario of an end user receiving a different quality of content resulting from the change of their connection to the network from wireless to fixed or vice versa. An example is changing their terminal device from a handheld IPTV terminal device equipped with wireless capability to an "HDTV quality IPTV terminal device" or vice versa.

– Scenario ⓗ: This is a scenario of an end user receiving the same quality of content even if they change their connection to the network from WiFi-based wireless to WiMAX-based wireless or vice versa.

  An example is changing a mode of their wireless terminal device from WiFi to WiMAX or vice versa for Internet access or voice over wireless.

– Scenario ⓘ: This is a scenario of an end user receiving a different quality of content resulting from the change of their connection to the network from WiFi-based wireless to WiMAX-based wireless or vice versa. An example is changing the mode of their wireless terminal device from WiFi to WiMAX or vice versa for IPTV services.

- Scenario ⓙ: This is a scenario of an end user receiving the same quality of content even if they change their connection to the network from wireless to fixed or vice versa. An example is changing a connection from wireless to fixed or vice versa but while using their PC-based terminal device for Internet access.

• Between content source and service:

- Scenario I: This is a scenario of a service provider making a service with one feature. An example is the use of "IPTV VoD or real time streaming" in the same fixed network.
- Scenario II: This is a scenario of a service provider providing a converged service using several services. An example is the use of "displaying caller-ID (telecommunication service) and related information (information service) while an end user is watching VoD". In this case, the services used are IMS-based caller-ID, related information display, and VoD.

9 Scenario for digital advertisement service

9.1 Overall configuration and features of digital advertisement

The roles of digital advertisement are identified by the seller, customer and service provider. The seller side recognizes customer devices through the coverage of POAs (point of access) which are, for example, AP (access point) devices such as WiFi, 3G/WiMAX Femtocell or IPTV STB equipped with WiFi. The content (may be advertisement or information) prepared by a seller can be transmitted to a customer by PUSH or PULL methods. An example of this is shown in Figure 9. The customer who has a mobile device that can connect to the network (e.g., NGN and Internet, etc.) through WiFi, 3G or WiMAX, can use the digital advertisement service. The mobile device may be capable of a single mode or dual modes like possible multiple modes. The service provider provides a system to execute services and makes individual services at the request of shops.

The advertisement content is prepared offline by a service provider at the request of a seller and is stored on a content server with related management data. The content consists of two parts: one is a multimedia file displayed on a customer's screen continuously, the other is value-added data used for display information, changed dynamically. An example of value-added data is a banner text that can be overlaid on multimedia playing showing prompt sales information. All networks and customer information used for the service should be managed by the network manager. Normally, many stores exist in one department store, so a content server and network manager are equipped in a department store.

Each store (seller) is equipped with a content manager and a POA. The content manager is in charge of content upload and minor modification of content. Normally, the sales manager in a store is also the contents manager. The sales manager uploads today's advertisement content. He or she sets the marketing banner and real-time sales information. Examples of using the digital advertisement service are department stores, restaurants, supermarkets, government organizations, theatres and so on. The role of the seller can be both producer and consumer: from the view of a service provider, the seller consumes service systems such as a service/network manager and content server. From the view of the end user, the seller provides digital advertisement services. So the role of the seller is called Prosumer.

The end user (buyer) initially sets up an agent programme on their device. The POA of the seller detects the customer's device when the customer enters the range of store's POA. The POA can be a WiFi access point or Femtocell (IEEE 802.16m), having both WiFi and WiMAX.

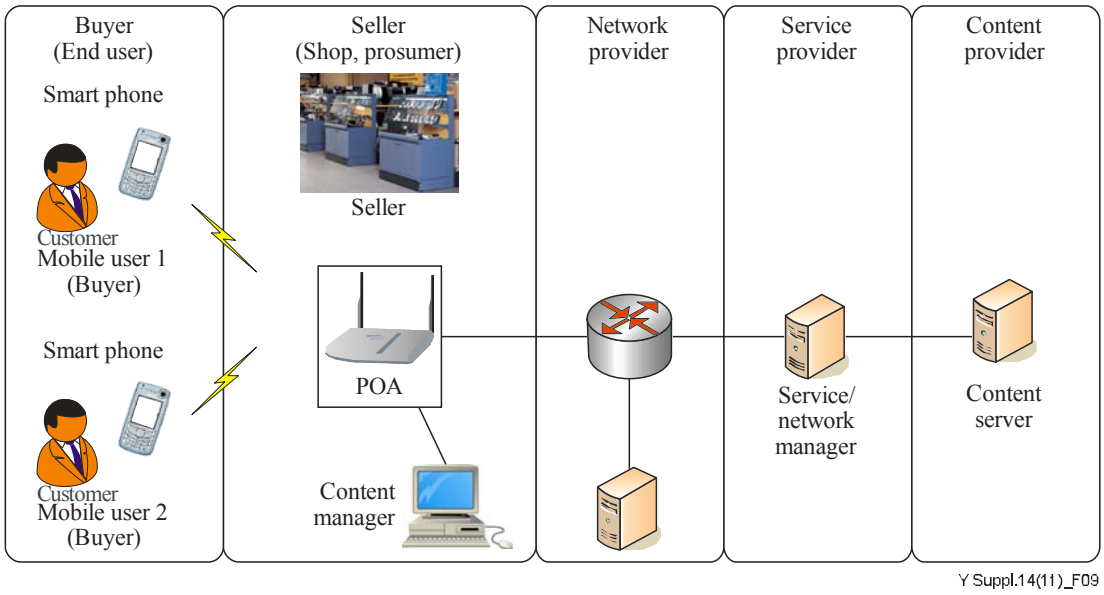

Figure 9 – Overall configuration of digital advertisement over FMC

9.2 Digital advertisement service scenarios

1) [Sales Manager → Service Provider: making an advertisement] The sales manager in a shop wants to provide his or her shop's advertisement using digital advertisement. He or she sends a service subscription request to the service provider. The subscription request will consist of advertisement content, initial information displayed with advertisement content, shop information, and so on.

2) [Service Provider <-> Content Provider: storing content] The service provider makes a requested advertisement content (media file + value-added data) then stores it in the content server. The service information needed to execute the seller's specific digital advertisement service is stored in the network/service manager server.

3) [Service Provider → Shop owner: providing advertisement service] The service provider stores value-added data of the service in the content server and the seller can modify the value-added data using the content manager. An example of this value-added data is text displayed in the form of banner overlaid on advertisement media. The sales manager can change the banner text at any time when a special notification such as urgent sales information is needed. In this case, the advertisement content and banner are services and the digital advertisement service is a converged service.

4) [Shop owner → End user (Terminal): providing advertisement service] When the end user approaches shop A, the POA of shop A detects the end user's device. The POA sends a notification to the end user (PUSH service model) asking the user's consent to show the main advertisement. In case the user agrees to accept advertisement in advance by service SLA, the advertisement is shown to the end user instantly when the end user is detected by POA. Shop A's POA is operated in WiFi mode.

5) [End user (Terminal) → Shop owner: selecting ads] There are many shops in a department store, so the end user can be detected by many shop's POAs. When those POAs want to send an advertisement message to the user, the advertisement list is displayed in the user's device and then the user can select ads by his or her preference (PULL service model).

6) [Service Provider → Network Provider → Shop owner: transferring ads] The requested content; the advertisement media of shop A, is transferred to the end user. The media is transferred through the network provider's CDN server.

7) [End user (Terminal): connection re-establishment] When the user approaches shop B, the connection with shop A is disconnected and a new connection is established with shop B's POA, and the advertisement of shop B is displayed. Shop B's POA is Femtocell operated in WiMAX mode. The user's terminal is equipped with a dual model of WiMAX and WiFi. The connection to shop B will be made using the WiMAX mode. By looking at ads from the shop, the seller may provide several minutes of free Internet connection to the user as compensation, that is a kind of business model of digital advertisement. If users are interested in the content of shop B, they store that advertisement into their device.

8) [End user (Terminal): advertisement services at home] When the user comes back home he or she displays the stored ads through a TV equipped with IPTV STB, and explains the ads to his or her family.

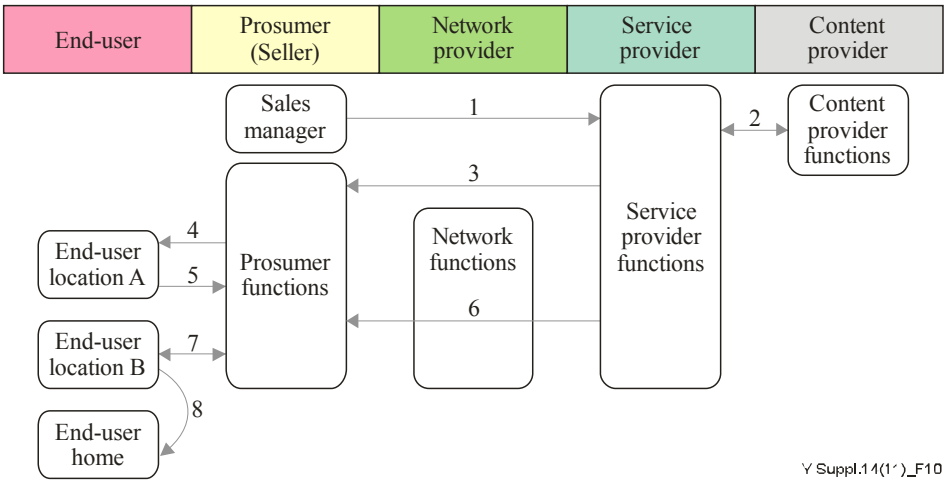

Figure 10 – Service scenario of digital advertisement

9.3 Mapping digital advertisement scenarios with FMC scenarios

The following are mappings of digital advertisement service scenarios with FMC scenarios which are described in clause 8.2. These mappings help to identify the features of each scenario with details for supporting digital advertisement service over FMC.

- FMC Scenario ②: Digital Advertisement Scenario 4, 5
- FMC Scenario ③: Digital Advertisement Scenario 7
- FMC Scenario ⑤: Digital Advertisement Scenario 8
- FMC Scenario Ⓓ: Digital Advertisement Scenario 7
- FMC Scenario Ⓕ: Digital Advertisement Scenario 8
- FMC Scenario Ⓖ: Digital Advertisement Scenario 8
- FMC Scenario ⓑ: Digital Advertisement Scenario 8
- FMC Scenario ⓕ: Digital Advertisement Scenario 7
- FMC Scenario I : Digital Advertisement Scenario 2, 3, 6
- FMC Scenario II : Digital Advertisement Scenario 3, 6

Mapping in the view of Digital Advertisement Scenario:

- Digital Advertisement Scenario 2: FMC Scenario I
- Digital Advertisement Scenario 3: FMC Scenario I, II
- Digital Advertisement Scenario 4: FMC Scenario ②

- Digital Advertisement Scenario 5: FMC Scenario ②
- Digital Advertisement Scenario 6: FMC Scenario I, II
- Digital Advertisement Scenario 7: FMC Scenario ③, Ⓓ, ⓕ
- Digital Advertisement Scenario 8: FMC Scenario ⑤, Ⓕ, Ⓖ, ⓑ

Mapping in table view:

FMC\DA	2	3	4	5	6	7	8
②			O	O			
③						O	
⑤							O
Ⓓ						O	
Ⓕ							O
Ⓖ							O
ⓑ							O
ⓕ						O	
I	O	O			O		
II		O			O		

10 Scenario for targeted advertising service

10.1 Overall configuration and features of targeted advertising service

One major benefit of the targeted advertising service is that users consider advertisement to be information rather than spam messages. On watching IPTV content, users may be interested in commercial products on TV and be willing to request targeted advertising services related to them. Service providers determine proper advertisement media for each end user based on user profiles such as user age, gender, preference, purchase history, or observed behaviour, device profiles such as screen size, access network type, or computing resources, and content profiles such as genre, directors, actors, format, or language. Consequently, different advertisement media is transferred to different end users. If needed, service providers can combine advertisement media with other value-added content. Even if the users are watching TV, it is obvious that they would prefer to receive the advertisement on their personal devices such as a mobile phone. The network providers have the ability to maintain multiple connections for TV and mobile phones.

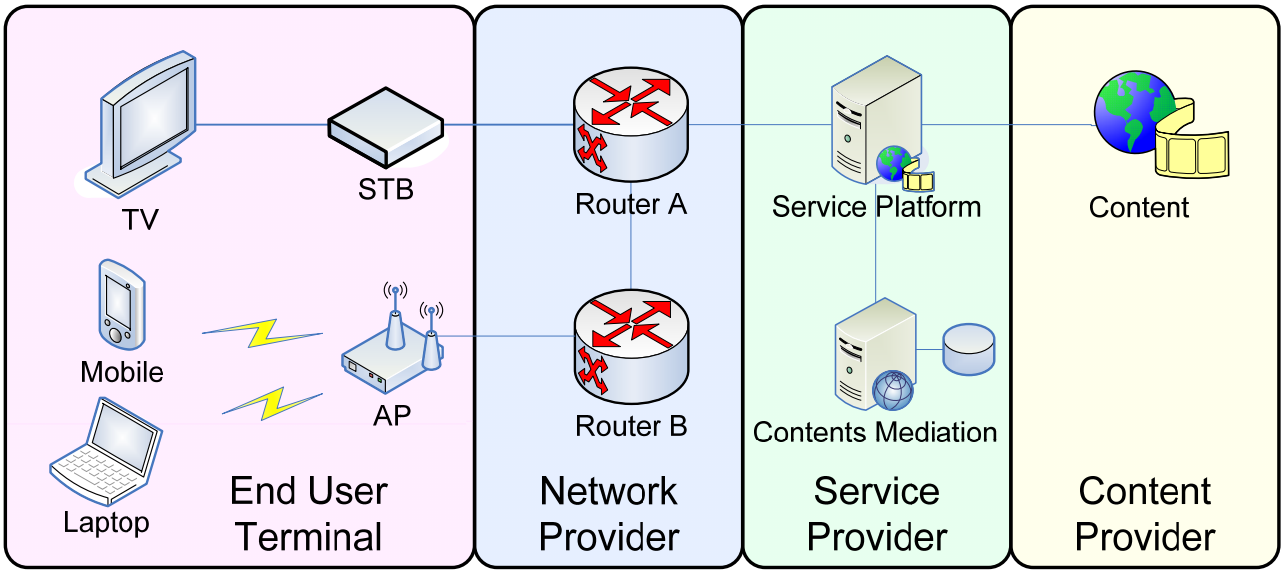

Figure 11 – Overall configuration of targeted advertising

10.2 Targeted advertising service scenarios

1) [IPTV service provider → End user: providing IPTV service] End users are watching IPTV content, provided by content delivery functions of a service provider via network functions of a network provider using terminal A (for example, TV with set-top box). The network provider provides different network capabilities such as fixed, wireless and mobile. IPTV service descriptions and usage cases are described in [ITU-T Y-Sup.5]. After setting up a service session, the requested content is delivered from CDF to end users.

2) [End user → IPTV service provider: requesting targeted advertising service] The end users might be willing to receive targeted advertising services on their personal communication devices, Terminal B, C, and so on (for example, a mobile phone) while watching IPTV content. The end-user function of each end user initiates a targeted advertising service to the service control functions and prepares for the connection to the content delivery functions. Service control functions decide the targeted terminal and the end user.

3) [Service provider → Content provider: requesting advertisement media] Application functions of the service provider may know a suitable advertisement media for each end user and contact the proper content providers.

4) [Service provider → Content provider: making converged service if possible] If possible, Application functions add other content to advertisement media to provide converged services.

5) [Service provider itself: caching advertisement media] Content delivery functions receive advertisement media from application functions and cache it.

6) [IPTV service provider → End user: providing targeted advertising service] Content delivery functions deliver advertisement media to the personal device of each end user, Terminal B, C, and so on via network functions, while IPTV content keeps going over existing connection to TVs with set-top boxes, Terminal A. Each advertisement media transferred to different end users is determined based on user profiles, device profiles, and content profiles.

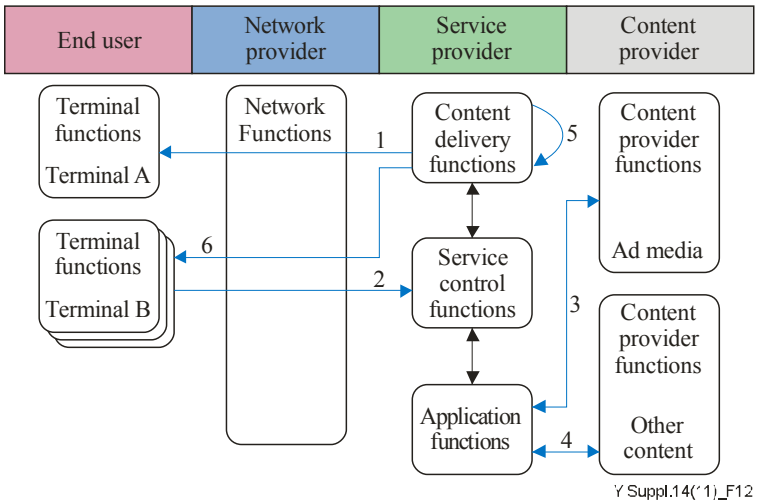

Figure 12 – Service scenario of targeted advertising

10.3 Mapping targeted advertising scenarios with FMC scenarios

The following are mappings of targeted advertising service scenarios with FMC scenarios which are described in clause 8.2. These mappings help to identify the features of each scenario with details for supporting targeted advertising services over FMC.

- FMC Scenario ①, ⑤, ⑥: Targeted Advertising Scenario 1, 6
- FMC Scenario Ⓑ, Ⓕ: Targeted Advertising Scenario 2
- FMC Scenario ⓑ, ⓖ: Targeted Advertising Scenario 5
- FMC Scenario I: Targeted Advertising Scenario 3
- FMC Scenario II: Targeted Advertising Scenario 3, 4

Mapping in the view of Digital Advertisement Scenario:

- Targeted Advertising Scenario 1: FMC Scenario ①, ⑤, ⑥
- Targeted Advertising Scenario 2: FMC Scenario Ⓑ, Ⓕ
- Targeted Advertising Scenario 3: FMC Scenario I, II
- Targeted Advertising Scenario 4: FMC Scenario II
- Targeted Advertising Scenario 5: FMC Scenario ⓑ, ⓖ
- Targeted Advertising Scenario 6: FMC Scenario ①, ⑤, ⑥

Mapping in table view:

FMC\TA	1	2	3	4	5	6
①	O					O
⑤	O					O
⑥	O					O
Ⓑ		O				
Ⓕ		O				
ⓑ					O	
ⓖ					O	
I			O			
II			O	O		

11 Scenario for IPTV service

11.1 Overall configuration and features of IPTV

The end users may have various fixed or wireless mobile terminals with multi-connections or a single connection. The service provider may have the functions to transcode IPTV content suitably, considering access network conditions and device profiles. The network provider supplies different access network bandwidths to the end user according to the user's requirements. That is, routers with different performance and network capability are supplied by the network provider. For example, the network provider owns access networks based on fixed and wireless-fidelity (Wi-Fi) within service areas. The device profiles include supported video/audio codecs, resolution sizes, and supported access connection information, etc. Content mediation functions transcode origin content and metadata into new content and metadata, which are suitable to the capability of the end user's device. The content mediation functions are located in application functions. The device profile and content mediation functions are handled by the IPTV service platform of the service provider. A content provider supplies origin content to the IPTV service platform regularly or occasionally. If the end user without a set-top-box (STB) connects to the network via access point (AP), the end user has the ability to decode content, playback converted content in browsers or web applications and sometimes install an electronic program guide (EPG) adapted to the mobile device.

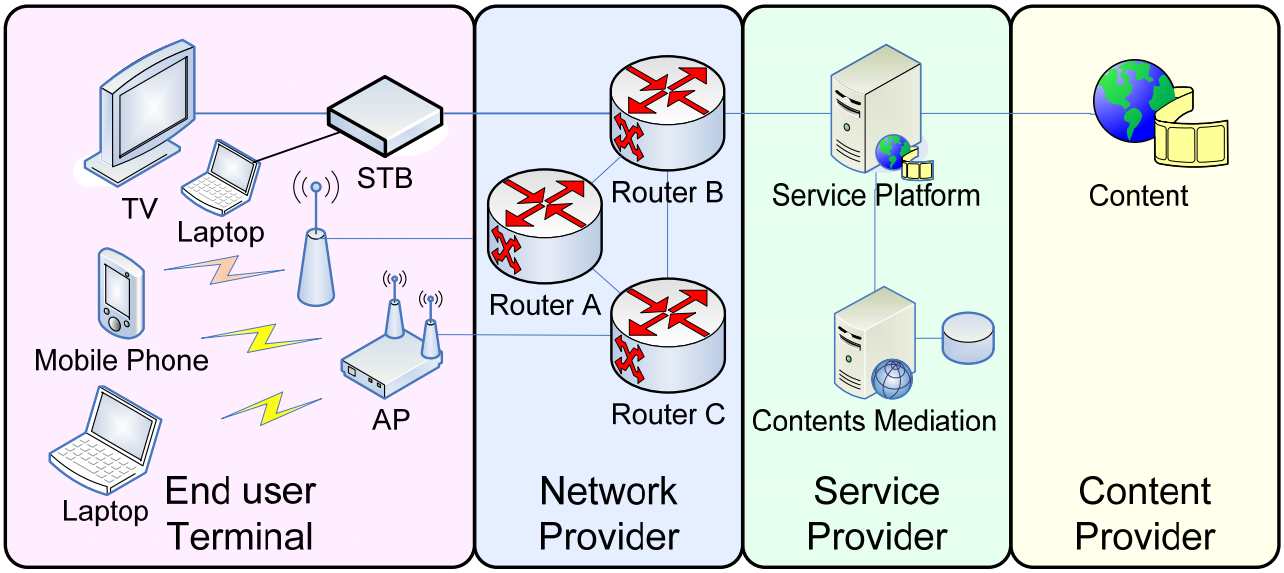

Figure 13 – Overall configuration of IPTV over FMC

Two cases for FMC-based IPTV service scenarios are explained. One is the case when the location is not changed, but the terminal is [ITU-T Y-Sup.5]. For example, FMC Scenario ①, ⑤ and ⑥ belong to this case. The other is that the location is changed, but the terminal is not. For instance, FMC Scenario ③ belongs to this latter case.

11.2 FMC-based IPTV service scenarios: keeping the same location

1) [Content provider → Service provider: delivering VoD] Video on demand (VoD) content and its metadata and content protection data, produced and managed by the content provider, is delivered to the service provider.

2) [Service provider → End user (Terminal functions): preparing the content] The service provider provides the network functions with the content access information and then the end user may receive the VoD content.

3) [End user (Terminal functions) <-> Service provider: requesting terminal change] The request for changing the terminal of the end user functions is sent to the service provider.

4) [Service provider → Network provider: reserving network resources] This procedure may be the same as step 4.

5) [Service provider → Service provider: transcoding content] When content suitable for the new terminal does not exist, the service control functions may optionally request content mediation functions to transcode origin content into suitable content.

6) [Service provider → Service provider: delivering converted content] The content mediation functions deliver the converted content to the content delivery functions.

7) [Service provider → End user (Terminal functions): sending VoD] This procedure may be the same as step 5.

8) [End user (Terminal functions) <-> Service provider: terminating service session] The service session between the end user functions and the service control functions is terminated.

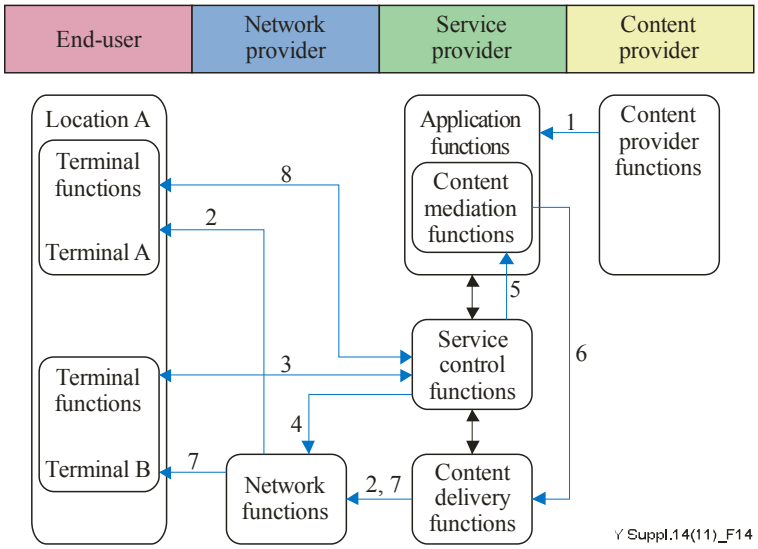

Figure 14 – Service scenario of IPTV with the same location

11.3 Mapping IPTV scenarios with FMC scenarios: keeping the same location

This service assumes that terminal A can be a STB and terminal B can be a mobile phone. The following are mappings of IPTV service scenarios keeping the same location with the overall FMC service scenario model which is described in clause 8.2. This mapping helps to identify features of each scenario with details for supporting IPTV service over FMC.

- FMC Scenario ①: IPTV Scenario 2, 7
- FMC Scenario Ⓑ: IPTV Scenario 2, 4, 7
- FMC Scenario ⓑ, ⓒ: IPTV Scenario 3, 5, 6
- FMC Scenario I: IPTV Scenario 1

Mapping in the view of IPTV Scenario:

- IPTV Scenario 1: FMC Scenario I
- IPTV Scenario 2: FMC Scenario ①, Ⓑ
- IPTV Scenario 3: FMC Scenario ⓑ, ⓒ
- IPTV Scenario 4: FMC Scenario Ⓑ

- IPTV Scenario 5: FMC Scenario ⓑ
- IPTV Scenario 6: FMC Scenario ⓑ
- IPTV Scenario 7: FMC Scenario ①, Ⓑ

Mapping in table view:

FMC\IPTV	1	2	3	4	5	6	7
①		O					O
Ⓑ		O		O			O
ⓑ			O		O	O	
ⓒ			O				
I	O						

11.4 FMC-based IPTV service scenarios: changing the location

1) [Service provider → End user: delivering IPTV contents] The end user is watching IPTV content provided by the content delivery functions of a service provider via network functions in location A. The end user may have a plan to vertically hand over from location A to location B.
2) [End user (Terminal functions) <-> Network provider: requesting L2 association] The end user functions request L2 association, router solicitation, and router advertisement to access the transport function of the network provider. After the progress, the end user function requests a binding update to access the transport function.
3) [Network provider <-> Network provider: requesting AAA] The access transport function requests AAA to the core transport function. The AAA response is sent to the access transport function.
4) [End user (Terminal functions) <-> Network provider: receiving binding update ACK] The end user function receives a binding update ACK.
5) [Network provider → Network provider: creating tunnel] A tunnel between the access transport function and the core transport function in location B is created.
6) [Network provider <-> Service provider: vertical handover] The service control function recognizes the vertical handover.
7) [Content provider → Service provider: transcoding content] Considering changed access network resources (e.g., bandwidths, device capabilities, etc.), the service control functions request may optionally transcode the origin content into a suitable content.
8) [Service provider → Service provider: delivering converted contents] The contents mediation functions deliver the converted content to the content delivery functions.
9) [Service provider → End user (Terminal functions): delivering new content] The new content is delivered to the end user function via the tunnel of the network functions in location B.

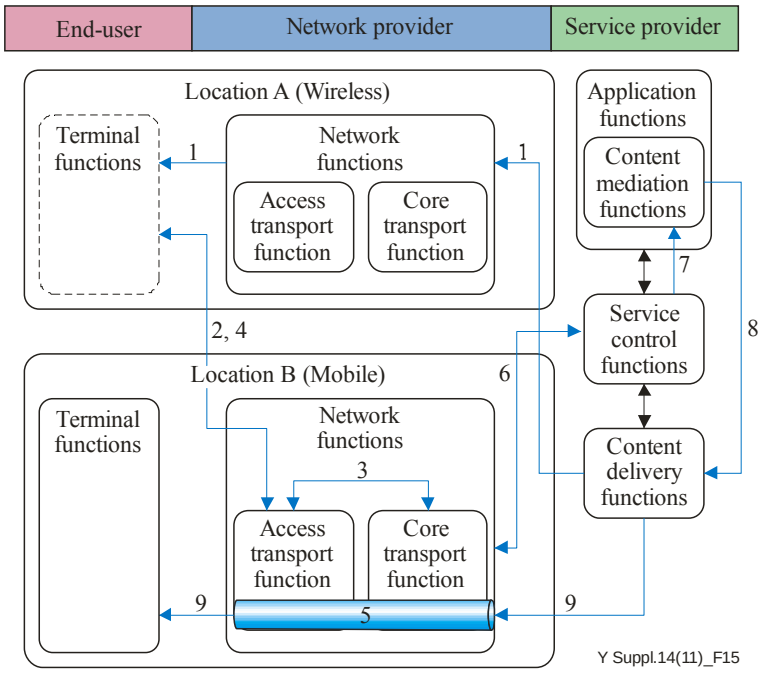

Figure 15 – Service scenario of IPTV changing the location

11.5 Mapping IPTV scenarios with FMC scenarios: changing the location

This service assumes that terminal A can be a mobile phone with WLAN and terminal B can be a mobile phone with WiMAX. The following are mappings of IPTV service scenarios changing the location with the overall FMC service scenario model which is described in clause 8.2. This mapping helps to identify features of each scenario with details for supporting IPTV service over FMC.

- FMC Scenario ③: IPTV Scenario 1, 9
- FMC Scenario Ⓔ: IPTV Scenario 1, 2, 3, 4, 5, 6, 9
- FMC Scenario ⓗ, ⓘ: IPTV Scenario 1, 7, 8, 9
- FMC Scenario I: IPTV Scenario 1

Mapping in the view of IPTV Scenario:

- IPTV Scenario 1: FMC Scenario ③, Ⓔ, ⓗ, ⓘ, I
- IPTV Scenario 2: FMC Scenario Ⓔ
- IPTV Scenario 3, 4, 5, 6: FMC Scenario Ⓔ
- IPTV Scenario 7, 8: FMC Scenario ⓗ, ⓘ
- IPTV Scenario 9: FMC Scenario ③, Ⓔ, ⓗ, ⓘ

Mapping in table view:

FMC\IPTV	1	2	3	4	5	6	7	8	9
③	O								O
Ⓔ	O	O	O	O	O	O			O
ⓗ	O								O
ⓘ	O						O	O	O
I	O								

12 Security considerations

This Supplement conforms to Recommendation ITU-T Y.2701 for security aspects. No specific security considerations have been identified.

Bibliography

[b-IEEE 802.11b] IEEE 802.11B-1999, *IEEE Standard for Local and Metropolitan Area Networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Higher-Speed Physical Layer Extension in the 2.4 GHz Band*.

[b-IEEE 802.16e] IEEE 802.16e-2005, *IEEE Standard for Local and Metropolitan Area Networks – Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems*.

[b-IEEE 802.16m] IEEE 802.16m-2011, *IEEE Standard for Local and Metropolitan Area Networks – Part 16: Air Interface for Broadband Wireless Access Systems – Amendment 3: Advanced Air Interface*.

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