International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.3613

(05/2012)

SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN – Service and session control protocols – supplementary services

Signalling requirements for touch screen terminal-based interactive voice response services

Recommendation ITU-T Q.3613

ITU-T

International Telecommunication Union

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4, 5, 6, R1 AND R2	Q.120–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.799
Q3 INTERFACE	Q.800–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1699
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000	Q.1700–Q.1799
SPECIFICATIONS OF SIGNALLING RELATED TO BEARER INDEPENDENT CALL CONTROL (BICC)	Q.1900–Q.1999
BROADBAND ISDN	Q.2000–Q.2999
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR THE NGN	Q.3000–Q.3999
General	Q.3000–Q.3029
Network signalling and control functional architecture	Q.3030–Q.3099
Network data organization within the NGN	Q.3100–Q.3129
Bearer control signalling	Q.3130–Q.3179
Signalling and control requirements and protocols to support attachment in NGN environments	Q.3200–Q.3249
Resource control protocols	Q.3300–Q.3369
Service and session control protocols	Q.3400–Q.3499
Service and session control protocols – supplementary services	**Q.3600–Q.3649**
NGN applications	Q.3700–Q.3849
Testing for next generation networks	Q.3900–Q.3999

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

Recommendation ITU-T Q.3613

Signalling requirements for touch screen terminal-based interactive voice response services

Summary

Recommendation ITU-T Q.3613 specifies the signalling requirements for touch screen terminal-based interactive voice response (TS-IVR) services in the next generation network (NGN).

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T Q.3613	2012-05-22	11

Keywords

IVR, NGN, SDP, SIP, touch screen terminal.

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/.

Table of Contents

Recommendation ITU-T Q.3613

Signalling requirements for touch screen terminal-based interactive voice response services

1 Scope

This Recommendation specifies signalling requirements and signalling flows of touch screen terminal-based interactive voice response (TS-IVR) services.

The TS-IVR services, including session initiation protocol (SIP) based TS-IVR services and web based TS-IVR services, are defined in the next generation network (NGN).

The normative part of this Recommendation uses or refers to messages that are defined in and whose behaviours are described in one or more IETF RFCs. A list of all referenced messages and their origins are provided in Annex B.

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.2211] Recommendation ITU-T Y.2211 (2007), *IMS-based real-time conversational multimedia services over NGN*.

[ITU-T Y.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1*.

[IETF RFC 2616] IETF RFC 2616 (1999), *Hypertext Transfer Protocol – HTTP/1.1*.

[IETF RFC 3261] IETF RFC 3261 (2002), *SIP: Session Initiation Protocol*.

[IETF RFC 6086] IETF RFC 6086 (2011), *Session Initiation Protocol (SIP) INFO Method and Package Framework*.

3 Definitions

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AS Application Server

AS-FE Application Support Functional Entity

DTMF Dual Tone Multi-Frequency

EUF End-User Function

HTML Hypertext Markup Language

HTTP	Hypertext Transfer Protocol
I-CSC-FE	Interrogating Call Session Control Functional Entity
IMS	IP Multimedia Subsystem
IVR	Interactive Voice Response
MRC-FE	Media Resource Control Functional Entity
MRP-FE	Media Resource Processing Functional Entity
NGN	Next Generation Network
NNI	Network-to-Network Interface
P-CSC-FE	Proxy Call Session Control Functional Entity
RTP	Real-time Transport Protocol
SCF	Service Control Function
S-CSC-FE	Serving Call Session Control Functional Entity
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SUP-FE	Service User Profile Functional Entity
TS-IVR	Touch Screen terminal-based Interactive Voice Response
UNI	User-to-Network Interface
URL	Uniform Resource Locator

5 Conventions

None.

6 Service architecture

The following functions and functional entities are used or referenced throughout this Recommendation. Their descriptions and behaviours are described in [ITU-T Y.2012].

– Application support functional entity (AS-FE)
– End-user function (EUF)
– Interrogating call session control functional entity (I-CSC-FE)
– Media resource control functional entity (MRC-FE)
– Media resource processing functional entity (MRP-FE)
– Proxy call session control functional entity (P-CSC-FE)
– Service control function (SCF)
– Serving call session control functional entity (S-CSC-FE)
– Service user profile functional entity (SUP-FE)

6.1 General description and architecture

Touch screen terminal-based interactive voice response (TS-IVR) service is a real-time conversational multimedia service in NGN. Additional user interfaces, such as video or web, working with a touch screen terminal service, enhance user experience. Users interact with TS-IVR service by pressing keypad buttons or by touching specified areas of the screen on the terminal. The TS-IVR service can respond with pre-recorded or dynamically generated audio and/or video messages to further direct the user on how to proceed with the service. TS-IVR service can be used to control most functions where the interface can be separated into a series of simple menu choices.

TS-IVR service provides more flexibility and capability to users, such as the ability to sign a document (e.g., credit card receipt) on the screen, which is something that is not possible using the keypad.

There are two kinds of TS-IVR services that facilitate interaction between users and the touch interface of the terminal.

– SIP based: Provides TS-IVR services using multimedia call connections. Users interact with a voice and video screen using the touch interface of the terminal.

– Web based: Provides TS-IVR services using both hypertext transfer protocol (HTTP) and voice call connections. Users interact with voice and web content using the touch interface of the terminal.

TS-IVR service is defined in [ITU-T Y.2211].

Figure 6-1 shows the general architecture of TS-IVR services in NGN.

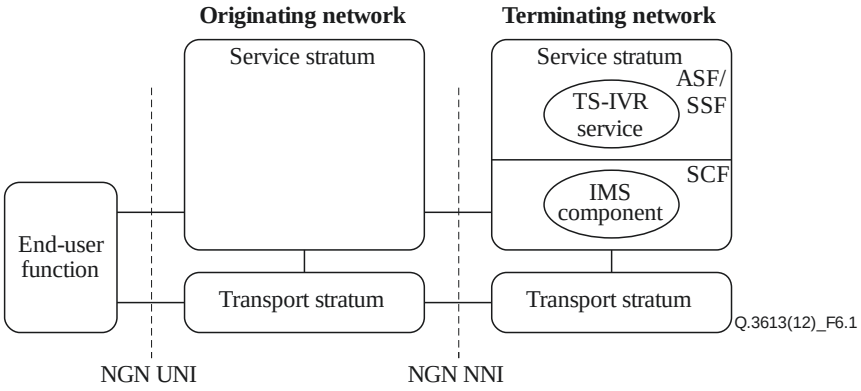

Figure 6-1 – General architecture of TS-IVR services in NGN

6.2 Functional entities involved in TS-IVR service

6.2.1 SIP based TS-IVR service

Figure 6-2 illustrates the functional entities involved in the SIP based TS-IVR services.

The end-user function (EUF) is implemented in terminals that are capable of touch screen based input/output and multimedia call connections. EUF shall be capable of receiving touch control information from AS-FE, and sending touch event information to AS-FE.

Touch control information consists of a set of bounding box coordinates and an optional DTMF digit. When the user clicks on a point within the bounding box, on the touch screen, EUF shall send the corresponding DTMF digit to AS-FE. If there is no corresponding DTMF digit, EUF shall send the coordinates of the clicked point. For example, if touch control information includes a bounding box with coordinates (10, 10, 100, 100) and the corresponding DTMF 1, and the user touches point (50, 50), EUF shall send DTMF 1 to AS-FE. If there is the same touch control information but no corresponding DTMF 1, and the user touches the same point (50, 50), then EUF shall send the coordinates (50, 50) to AS-FE.

Touch event information is a DTMF digit or coordinates that EUF sends to AS-FE when the user touches a point within a bounding box of touch control information. In the above example, touch event information is DTMF 1 or coordinates (50, 50).

AS-FE uses the SIP based TS-IVR service logic. It shall be capable of sending touch control information to EUF, and receiving touch event information from EUF. P-CSC-FE is a general proxy server, and S-CSC-FE performs the service trigger. MRC-FE and MRP-FE support video calls. MRP-FE shall have the media resources (e.g., multimedia announcements) related to the specific TS-IVR services at its disposal.

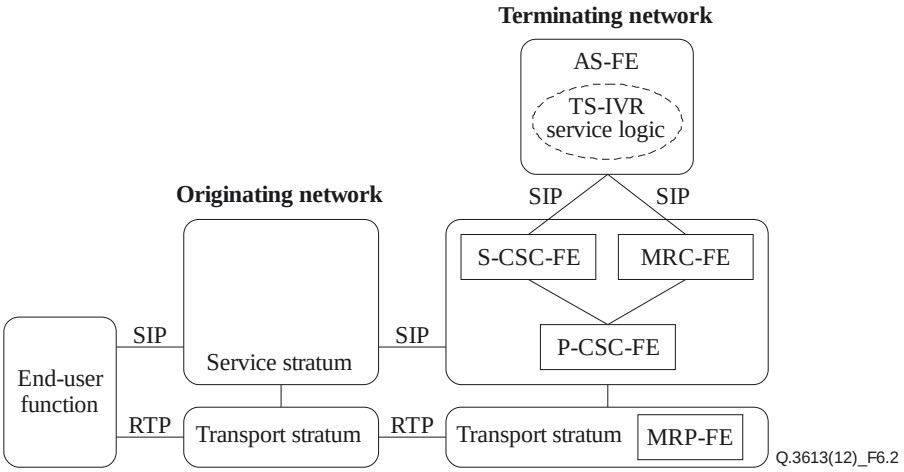

Figure 6-2 – Functional entities involved in SIP based TS-IVR services

6.2.2 Web based TS-IVR service

Figure 6-3 depicts the functional entities involved in the web based TS-IVR service.

EUF includes terminals that are capable of touch screen based input/output and have a web browser. EUF shall simultaneously browse web content and receive user input during a voice call.

AS-FE uses web based TS-IVR service logic. AS-FE shall be capable of sending web content, and receiving user responses. P-CSC-FE is a general proxy server, and S-CSC-FE performs the service trigger. MRC-FE and MRP-FE shall have media resources (e.g., audio announcements) related to the specific TS-IVR services at its disposal.

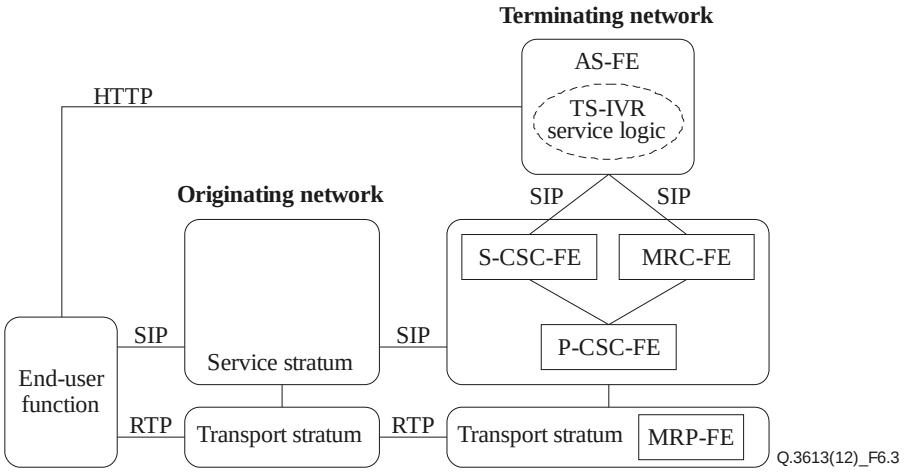

Figure 6-3 – Functional entities involved in web based TS-IVR services

7 Signalling requirements

The following clauses describe signalling requirements for providing SIP based TS-IVR and web based TS-IVR services in each functional entity.

7.1 Signalling requirements for the EUF

7.1.1 SIP based TS-IVR

EUF shall include a SIP based TS-IVR indication that EUF is a touch screen device and capable of multimedia TS-IVR services, when it sends the INVITE message.

EUF shall support INFO package framework [IETF RFC 6086].

EUF shall receive an INFO message with touch control information from AS-FE, and send an INFO message with touch event information to AS-FE.

7.1.2 Web based TS-IVR

EUF shall include a web based TS-IVR indication that EUF is a touch screen device and capable of web based TS-IVR services, when it sends the INVITE message.

EUF shall fetch web contents via HTTP [IETF RFC 2616].

7.2 Signalling requirements for P-CSC-FE

No special requirements.

7.3 Signalling requirements for S-CSC-FE

No special requirements.

7.4 Signalling requirements for AS-FE

7.4.1 SIP based TS-IVR

AS-FE shall send the 200 OK message, including the "SIP based TS-IVR Notification", if it receives the INVITE message including the "SIP based TS-IVR Indication" from EUF. The notification informs EUF that AS-FE has a SIP based TS-IVR service.

AS-FE shall send the INFO message with touch control information related to the current service step. If AS-FE receives the INFO message with touch event information, then AS-FE makes the transition to the next service step according to the received touch event information.

AS-FE shall provide services based on the received touch event information.

7.4.2 Web based TS-IVR

AS-FE shall send the 200 OK message, including the "Web based TS-IVR Notification" and an initiating uniform resource locator (URL), if it receives the INVITE message including the "Web based TS-IVR Indication" from EUF. The notification informs EUF that AS-FE has a web based TS-IVR service. The URL is for initiating a specific web based TS-IVR service.

AS-FE shall provide HTML documents and images which comprise the screen contents of a specific web based TS-IVR service. The web browser of EUF fetches the HTML documents and images to display the screen contents.

7.5 Signalling requirements for MRC-FE

No special requirements.

7.6 Signalling requirements for MRP-FE

No special requirements.

8 Security considerations

TS-IVR service is required to use appropriate security mechanisms to meet the general security requirements of NGN [ITU-T Y.2701].

Annex A

Signalling flows

(This annex forms an integral part of this Recommendation.)

A.1 Signalling flows for SIP based TS-IVR

Figure A.1 shows the signalling flows for SIP based TS-IVR.

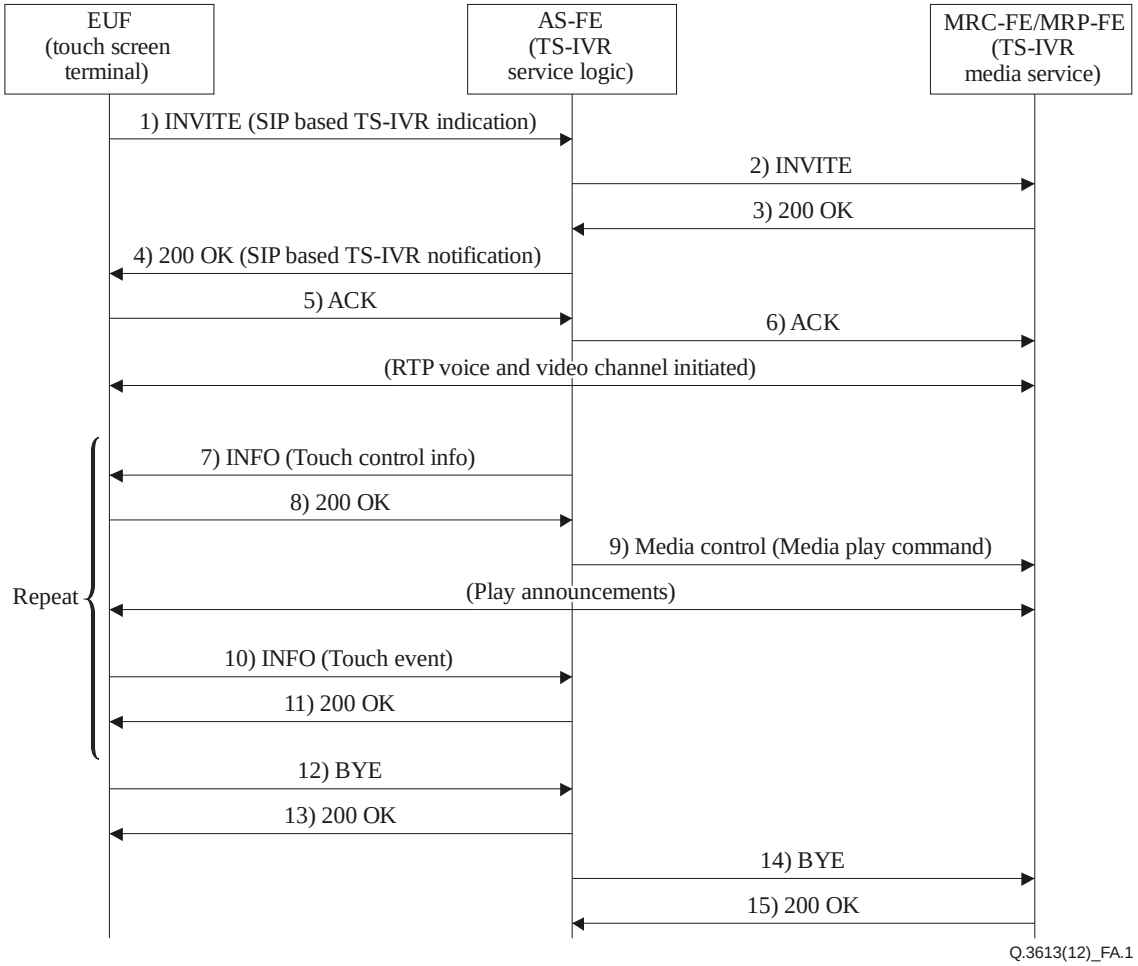

Figure A.1 – Signalling flows for SIP based TS-IVR

1) A user dials a service number. EUF sends the INVITE message with "SIP based TS-IVR Indication" that EUF has a touch screen device and is capable of multimedia TS-IVR service calls.

   AS-FE receives the INVITE message from S-CSC-FE, based on the called party's identity (service number). AS-FE recognizes that EUF is a terminal that supports SIP based TS-IVR service and multimedia calls.

2) AS-FE sends MRC-FE the INVITE message with session description protocol (SDP) payload of EUF in order to set up the video call.

3) MRC-FE sends the 200 OK message.

4) AS-FE forwards the 200 OK message to EUF, including the "SIP based TS-IVR Notification" information. This message informs EUF that AS-FE has a SIP based TS-IVR service.

5-6) EUF sends the ACK message. Next, real-time transport protocol (RTP) voice and video channels are initiated and opened between EUF and MRC-FE/MRP-FE.

7-8) AS-FE sends the INFO message with a specific Content-Type header (e.g., "application/tspkg"), which includes touch control information related to the current service step. EUF enables its touch screen by receiving the INFO request that has the specific Content-Type header.

9) AS-FE exchanges media control messages with MRC-FE. These messages contain media play commands including voice and video. For example, [b-IETF RFC 4240], [b-IETF RFC 5022] or [b-IETF RFC 5552] can be applied. MRP-FE plays the announcement according to the command.

10-11) When the user touches a point in the specific region of the screen, EUF shall send AS-FE the corresponding DTMF or the coordinates of the touched point. AS-FE makes the transition to the next service step according to the touch event information.

Repeat Steps 7 through 11 until the user hangs up.

12-13) The user terminates the call. The service session is released.

14-15) AS-FE sends the BYE message to MRC-FE and disconnects the media connection.

A.2 Signalling flows for web based TS-IVR

Figure A.2 shows the signalling flows for web based TS-IVR.

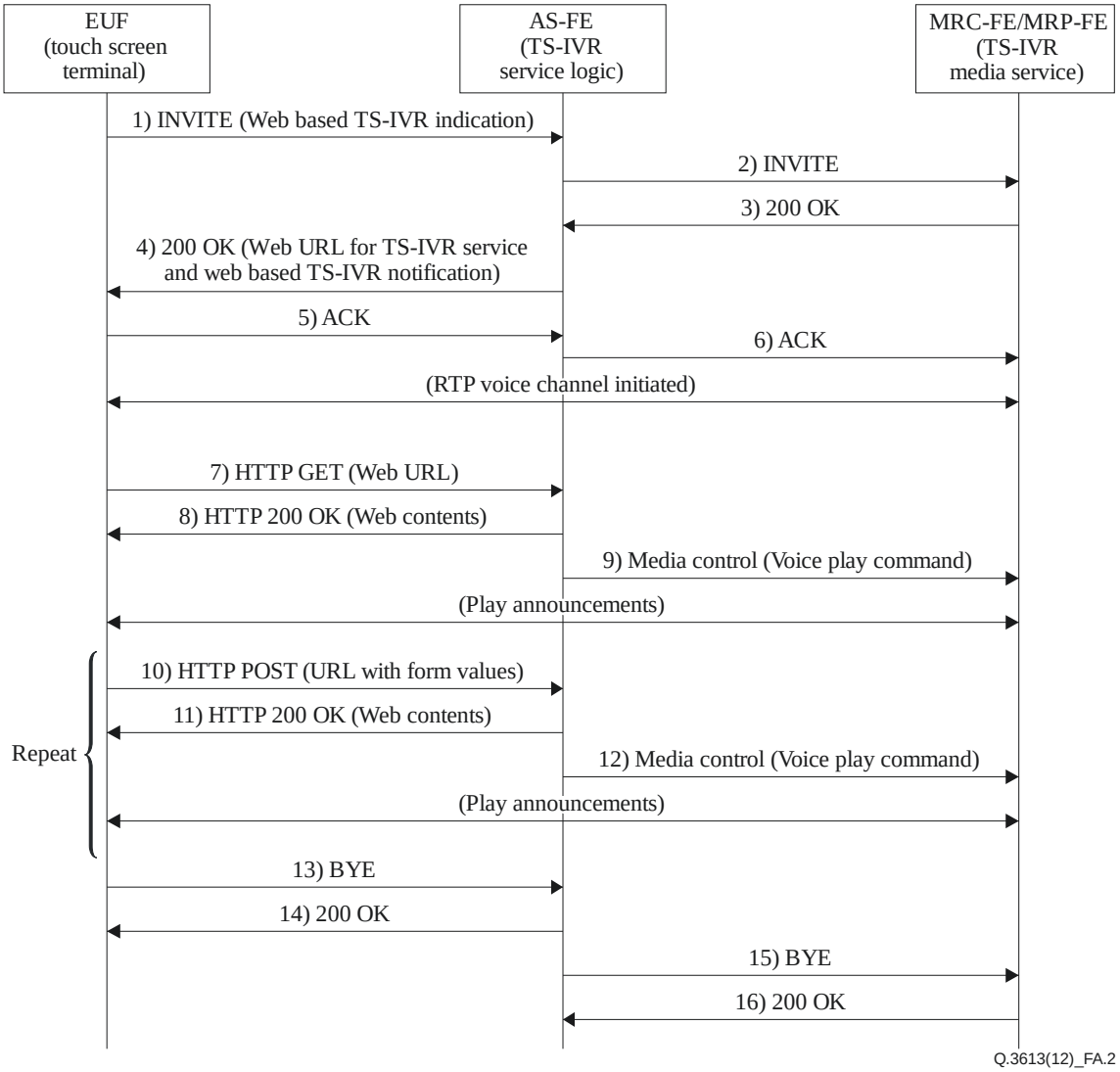

Figure A.2 – Signalling flows for web based TS-IVR

1) A user dials a service number. EUF sends the INVITE message with "Web based TS-IVR Indication" that EUF has a touch screen device and accepts web based TS-IVR services.

   AS-FE receives the INVITE message from S-CSC-FE, based on the called party's identity (service number). AS-FE recognizes that EUF is a terminal supporting web based TS-IVR service.

2) AS-FE sends MRC-FE the INVITE message with SDP payload of EUF in order to set up the voice call.

3) MRC-FE sends the 200 OK message.

4) AS-FE sends the 200 OK message, including the initiating URL and the "Web based TS-IVR Notification". The URL points to the initial web page of the TS-IVR service. This message informs EUF that AS-FE has a web based TS-IVR service.

5-6) EUF sends the ACK message, and AS-FE forwards the message to MRC-FE. Next, RTP voice channel is initiated and opened between EUF and MRP-FE.

7-8) EUF accesses AS-FE via HTTP to get the web content such as HTML documents and images. EUF displays the initial web page of the TS-IVR service.

AS-FE receives the HTTP request and analyses the URL to determine the web contents and voice media for the current service step.

9) AS-FE exchanges media control messages with MRC-FE. These messages include media play commands. MRP-FE plays the announcement according to the command.

10-11) The user browses the web page and listens to the announcement at the same time. The user touches a hyperlink on the web page. This action leads to submitting the user action form to AS-FE via HTTP. AS-FE analyses the user action form to make the transition to the next service step, and retrieve the web contents for the service step. EUF displays the retrieved web contents.

12) AS-FE exchanges media control messages with MRC-FE. These messages include media play commands.

Repeat Steps 10 through 12 until the user hangs up.

13-14) The user terminates the call.

15-16) AS-FE sends the BYE message to MRC-FE and disconnects the media connection.

Annex B

List of messages imported from IETF RFCs

(This annex forms an integral part of this Recommendation.)

This annex provides a list of IETF messages that are used or referenced throughout the normative part of this Recommendation.

B.1 IETF RFC 2616

The following messages used or referenced in this Recommendation are defined in [IETF RFC 2616]:

- GET for retrieving web contents like HTML documents and images
- POST for submitting the user action form to AS-FE

B.2 IETF RFC 3261

The following messages used or referenced in this Recommendation are defined in [IETF RFC 3261]:

- INVITE for initiating a call session
- ACK used during call session initiation
- BYE for terminating a call session

B.3 IETF RFC 6086

The following messages used or referenced in this Recommendation are defined in [IETF RFC 6086]:

- INFO for delivering touch control or event information

Bibliography

[b-ITU-T Q.3401] Recommendation ITU-T Q.3401 (2007), *NGN NNI signalling profile (protocol set 1)*; Amendment 1 (2008).

[b-ITU-T Q.3402] Recommendation ITU-T Q.3402 (2008), *NGN UNI signalling profile (Protocol set 1)*.

[b-ITU-T Y.2201] Recommendation ITU-T Y.2201 (2009), *Requirements and capabilities for ITU-T NGN*.

[b-IETF RFC 4240] IETF RFC 4240 (2005), *Basic Network Media Services with SIP*.

[b-IETF RFC 5022] IETF RFC 5022 (2007), *Media Server Control Markup Language (MSCML) and Protocol*.

[b-IETF RFC 5552] IETF RFC 5552 (2009), *SIP Interface to VoiceXML media Services*.

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Terminals and subjective and objective assessment methods
Series Q	**Switching and signalling**
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects and next-generation networks
Series Z	Languages and general software aspects for telecommunication systems

Printed in Switzerland
Geneva, 2012