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Beijing, China, 19 - 21 September, 2001

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TSG-SA WG 1 (Services) meeting #12
Lake Tahoe, USA, 9-13 July 2001

TSG S1 (010869)
Agenda Item:

Title:	**IP Based Multimedia Services Framework Report**
Source:	**3GPP SA1**
To:	**3GPP SA, T, CN, RAN, GERAN, All Working Groups**
Cc:	**UMTS Forum, GSM Association SerG**
Attachments:	**S1-010868 (TR 22.941 v0.4.1)**

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SA1 has made substantial progress in defining service examples and requirements in the IP Based Multimedia Services Framework Report (TR22.941). The report is very much still a draft and requires further refinement of the existing examples as well as elaboration of additional examples. SA1 work on the Framework Report is ongoing.

However, SA1 is of the opinion that the Framework Report is sufficiently progressed for other groups to begin consideration of input to the Report. Therefore the current version of the Framework Report (version 0.4.1 in SA1-010868) is provided for your information. SA1 respectfully requests that other groups, on which it impacts, begin consideration towards providing input and accordingly include this activity in your work plans.

3GPP TR 22.941 V0.4.1 (2001-04)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
IP Based Multimedia Services Framework;
Stage 0
(Release 5)

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1 Contents

2 Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

3 Introduction

Specifications are being developed within 3GPP, and co-operatively with other organizations (i.e. IETF) that will enable the deployment of IP based multimedia services. A variety of mechanisms are under consideration to provide the capabilities needed to meet the requirements of envisioned services.

This report provides a high level end-to-end systems framework that provides consideration of how the diverse mechanisms (enablers) being standardized will collectively integrate to effectively meet service requirements and enable the deployment of envisioned services. Additionally, this report serves to document the collective vision of 3GPP, helps to ensure end-to-end service issues aren't overlooked, and may be useful in focusing the work initiative.

4 Scope

This Technical Report provides a framework of IP multimedia services within 3GPP system. This document is intended solely for verification of ability to fulfil requirements stated elsewhere, e.g. in the TS 22.101 and TS 22.228.

As a framework report the scope of this document is broader than that of the existing Stage 1, 2, or 3 specifications. It serves as an "umbrella" that conceptually pulls together at a high level the work of the other 3GPP deliverables and indicates how the pieces fit together. It therefore contains extracts of, and reference to other specifications. While this report provides complete end-to-end view, the referenced specifications should be consulted for more detailed information. If a discrepancy exists between the content of this report the referenced specifications, the content of the referenced specifications supersedes the contents of this report.

In this TR, it is the intent to provide guidance by

- establishing a set of complete, basic and advanced service examples, described from network operator and/or service provider perspective, and by
- breaking these examples down into Generic Requirements.

These examples and Generic Requirements will be used for verification of completeness and adequateness of the defined set of Service Enablers, where the basic examples will define a minimum set of Service Enablers and the advanced examples will define a desirable set of Service Enablers for inclusion in 3GPP Release 5. Also the potential issues related to services interoperability shall be covered.

A sufficient set of Service Enablers will allow network operators and service providers to

- create new services without service standardisation
- obtain enough information to charge for these services
- offer roaming subscribers access to services based up on selected Service Enablers

Note: it is an individual choice of an operator, which Service Enablers a network will support. Similarly, it is an individual choice of a terminal vendor which Service Enablers a particular terminal will support.

Additionally, this report serves to document the collective vision of 3GPP, helps to ensure end-to-end service issues aren't overlooked, and may be useful in focusing the work initiative.

Consideration of CS domain based services is not within the scope of this specification. Interworking between CS and PS based services is within the scope of this specification.

Note that this report is viewed as being applicable not only to Release 5, but to subsequent releases as well. As such it captures not only the near term vision of IP based multimedia services, but the long term vision as well, and is intended to be a living document that crosses releases.

5 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[01] 3GPP TS 21.905: 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP Specifications.

[02] 3GPP TS 22.101: “UMTS Service Principles”

[03] 3GPP TS 23.107: “Quality of Service, Concept and Architecture”

[04] 3GPP TS 22.115: “Service Aspects Charging and Billing”

[05] 3GPP TR 23.955: “Virtual Home Environment (VHE) Concepts”

[06] 3GPP TS 33.800: “Principles for Network Domain Security”

[07] 3GPP TS 22.121: "Provision of Services in UMTS - The Virtual Home Environment; Stage 1”

[08] 3GPP TS 22.038: “SIM application toolkit (SAT); Stage 1”

[09] 3GPP TS 22.057: “Mobile Station Application Execution Environment (MExE); Stage 1”

[10] 3GPP TS 22.078: “CAMEL; Stage 1”

[11] 3GPP TS 22.071: “Location Services (LCS); Stage 1”

[12] 3GPP TR 22.928: “IP-based multimedia services examples”

[13] 3GPP TS 22.228: “IP Multimedia Subsystem; Stage 1”

[14] 3GPP TS 22.141: “Presence Service”

[15] 3GPP TS 26.226: “Global text telephony; Transport of text in the voice channel”

[16] 3GPP TS 23.221: “Architectural Requirements”

[17] 3GPP TS 23.002: “Network Architecture”

[18] 3GPP TS 23.271: “Functional Stage 2 Description of Location Services”

[19] 3GPP TS 25.305: “Stage 2 functional specification of UE positioning in UTRAN”

[20] 3GPP TS 25.857: “UE positioning enhancements”

[21] 3GPP TS 23.228: “IP Multimedia Subsystem; Stage 2”

[22] 3GPP TS 23.218: “IP Multimedia (IM) session handling; IM call model”

[23] 3GPP TS 24.229: “IP Multimedia Call Control Protocol based on SIP and SDP; stage 3

[24] 3GPP TS 24.228: “Signalling flows for the IP multimedia call control based on SIP and SEP; stage 3”

[25] 3GPP TS 29.162: “Interworking between the IM CN subsystem and IP networks”

[26] 3GPP TS 29.163: “Interworking between the IM CN subsystem and CS networks”

[27] 3GPP TS 33.203: “Access Security for IP based services”

[28] 3GPP TS 32.801: “Performance Management”

[29] 3GPP TS 23.271: “Functional Stage 2 Description of Location Services”

Editor’s note: IETF references to be provided.

6 Definitions, symbols and abbreviations

6.1 Definitions

Generic Requirement: in this TR, Generic Requirements are basic functional building blocks of service examples, in most cases common for a number of examples, intended for verification of defined Service Enablers. Generic

Requirements are defined and described from user perspective and provide functionality requested or noticeable by the user.

A Service Enabler: defines a capability of a functional entity which may be used, either by it self or in conjunction with other Service Enablers, to provide a service to the end user.

6.2 Abbreviations

<< to be provided >>

7 Verification Methods

7.1 Service Examples, Generic Requirements and Service Enablers

The example of usage of the definitions: Service Examples, Generic Requirements and Service Enablers is depicted in picture below.

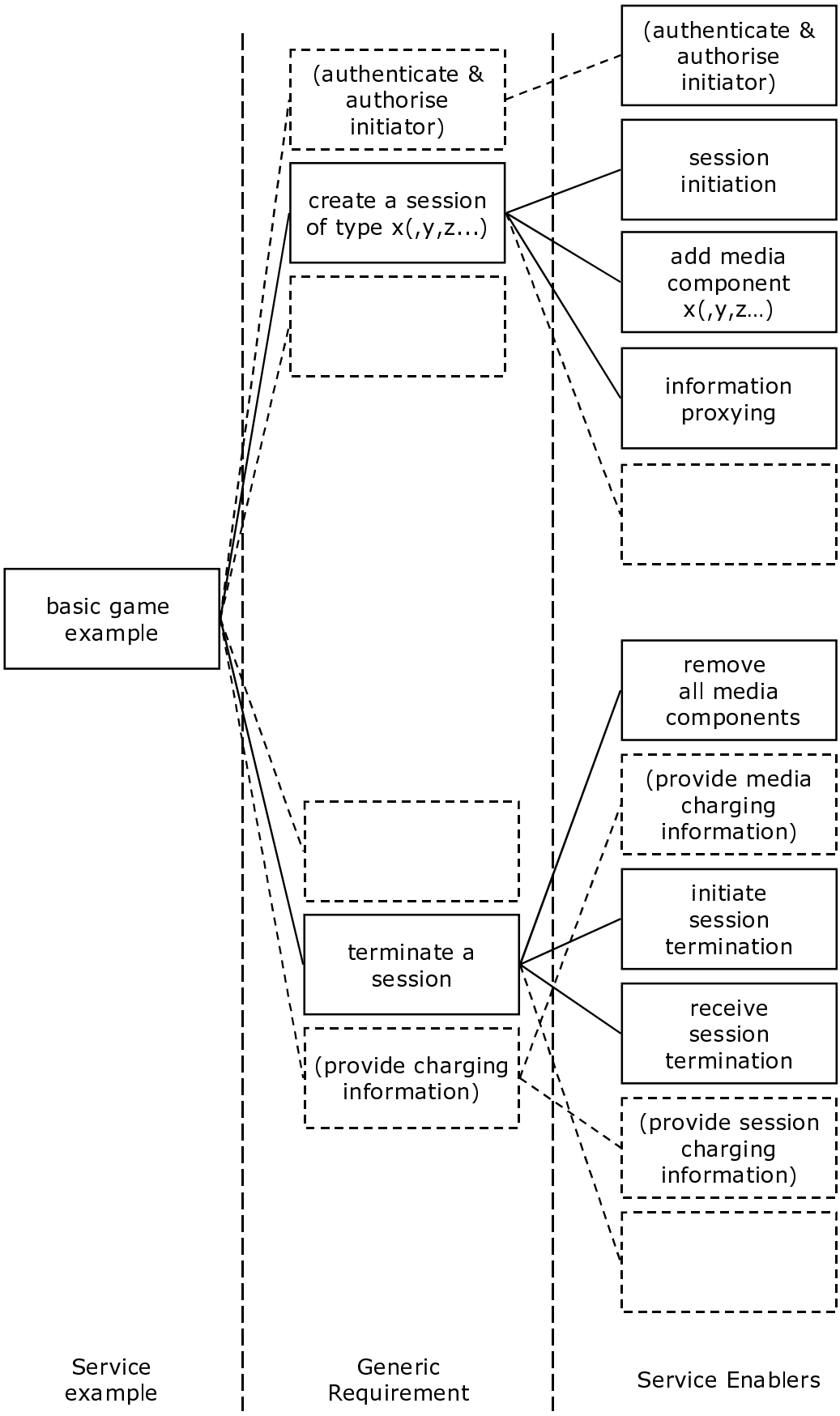

Figure 1: Examples of Generic Requirements and Service Enablers

7.2 Verification of Service Enablers

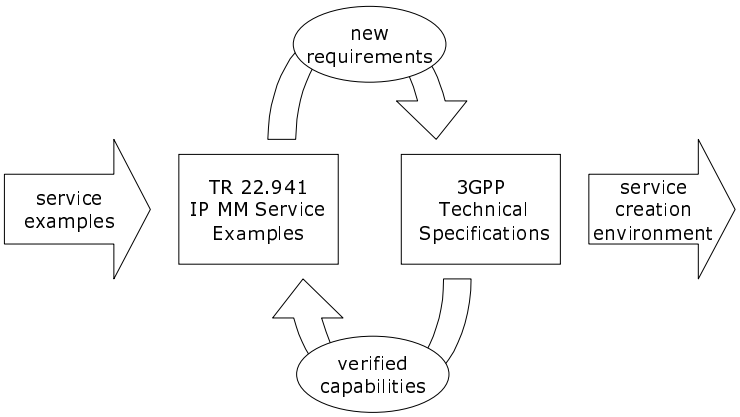

Figure 2: Verification of Service Enablers

The method, used in this TR to ensure definition of complete set of Service Enablers, consists of the following steps:

- generate a sufficient number of service examples
  - basic examples to define a minimum set of Generic Requirements for the time frame when 3GPP R5 based services are brought to market
  - advanced examples to define wish list for the 3GPP R 5 time frame
- verify the relevance and usefulness of these service for the 3GPP R 5 time frame
- break down each service example into sufficiently complete set of Generic Requirements covering
  - service aspects, including usage, initiation, user interface …
  - charging and billing
  - roaming
  - security
  - interoperability
  - other requirements, e.g. pertinent to service distribution, service marketing etc.
- verify that generic requirements are covered in 22-series specifications.
- ask SA2 and other relevant groups to develop a list of defined Service Enablers
- jointly with SA2 and other relevant groups, create a matrix to verify that a sufficient number of Service Enablers exists to build the agreed examples
  - if yes => ok
  - if not => request additional Service Enablers
- add more service examples as required to guide definition of additional Service Enablers

8 Service Examples

In order to clarify the relevance of the examples and their relation to the IMS, the example services are described shortly according to the following template:

Standard Clauses for each service example:

8.x Service Title

8.x.1 Motivation

8.x.2 High Level Service Description

- Describe who is offering what to whom
- Describe what value does the service create and who benefits from these values

8.x.3 Relation to IMS

- Describe what is the service's relation to the IMS, if any

8.x.4 Potential Revenue Streams (Business Model)

- Describe who is making profit out of the value emerging from the service and who is paying whom for what

8.x.5 User Perspective (User Interface)

8.x.6 Service Specific Considerations

8.x.6.1 Authorization

8.x.6.2 Deauthorization

8.x.6.3 Registration

Editors note: does Registration term need an alternative name?

8.x.6.4 Deregistration

8.x.6.5 Activation

8.x.6.6 Deactivation

8.x.6.7 Service Provisioning

8.x.6.8 Distribution, downloading, terminal capabilities…

8.x.7 Charging and Billing

Interworking with Other Services

Exceptions only

8.x.8 Roaming Considerations

8.x.9 Generic Requirements (for this service)

8.1 Basic Multimedia Service

8.1.1 Motivation

To use the IMS for multimedia communication that includes conversational services and object presentations, which is foreseen to emerge as the major new source of traffic and revenue. The presented object (media item?)can include a picture or a web page (in which case the presentation typically will be visual), or a user agent (in which case the presentation typically will be voice based).

To use the new capabilities of the multimedia enabled mobile network for delivery of information, entertainment and other multimedia services to a mobile user

IMS for conversational services include Voice, Audio, Videophone and text discussion) and can be used in conjunction with other multimedia components as described above.

Note:Object, object presentation, and user agent will be defined in accordance with the appropriate RFCs

Further note: a working assumption is that an Object consists of one or more media types that may or may not be synchronised.

8.1.2 High Level Service Description

Subscribers to the IMS Basic Multimedia Service shall be able to address, access and present in their terminals all types of multimedia objects. The media types include real-time voice and video and the non real-time capabilities listed below (this list is not intended to be exhaustive). The use of the different media will depend on the capabilities of the user device and the supporting networks.

- audio download;
- video download;
- audio streaming;
- video streaming;
- general data files;
- text messaging (e.g. SMS);
- emails;
- general web browsing;
- multi-media messaging

Servers, containing the object can be located in the network ("client/server") controlled by the network operator or external to the network ("peer-to-peer") controlled by a 3rd party. In this section the term server will be used in such general way.

A User requests a multimedia session by entering the identity of the item required. This could include for example the setting up a conversation with another user and the download of items of various media types from a server, or the download of one or more objects. Identities used can include SIP URL, MSISDN (E.164 number). These identities will allow users to identify and recognise the entities they wish to interact with in a familiar manner (e.g. people whose MSISDN they already know, friendly names of information providers).

The user initiating a presentation session is informed of its progress by tones, messages or graphic display on her terminal. During the session, other indications may be given similarly e.g. to indicate a 3rd party is trying to attach to the session. Tones and announcements may be generated locally by the terminal (subject to terminal capability) or within the network. It should be possible to personalise announcements for users own language.

During the session, the user might employ one or more simultaneous and synchronised QoS media streams, e.g. a voice comment to a graphic presentation shown on a shared screen.

While in the session, the user might select additional objects]. It shall be possible for the additional objects to be provided in a supplementary manner to the current objects or for the additional object to replace (one or more) of the current object(s). The new object's ability to replace or be supplementary to current ongoing object(s) shall be controllable by the end users in a manual or automatic manner.

8.1.3 Relation to IMS

IMS is necessary to provide the synchronisation if the object is presented using more than one media component.

IMS further simplifies the creation process of mobile access to multimedia objects.

IMS also provides the ability to provide charging, including combined data volume based, time based and service/event based charging.

Additionally IMS provides authorization, authentication, security, and privacy functionality.

8.1.4 Potential Revenue Streams (Business Model)

The network operator may receive revenue from subscribers directly (retail rates) or via 3rd parties (wholesale rates). The revenue in these cases can come from carriage of the object through the network and also in whole or in part the value of the object downloaded. Also from any other session, e.g. conversational, set up by the user. Network operators may also receive roaming revenue from subscribers roaming from other networks; network operators may pay other networks for roaming of own subscribers similarly

Network operator may receive additional revenue from personalisation of service, e.g. including an icon on session set-up, etc.

The network operator can further receive revenue from the owner of the object(s) on the server if the object creates additional value for the object owner (e.g. if the object is an advertisement).

There are revenue opportunities for the network operators in making service interoperabilty with the internet easy and effective, for example in allowing multimedia content generated over the internet be presented to the terminal, or generated on the terminal and exported, and in facilitating the user experience. This could significantly increase traffic.

8.1.5 User Perspective (User Interface)

The user shall be able to address an object using following methods as applicable:

- by entering the SIP URL using terminal keyboard, via an external device connected to the terminal, or via any other input device
- by selecting the SIP URL stored in the terminal or on a (U)SIM card
- by following a hyperlink presented on the terminal's screen (e.g. as part of a presented object or after a push of an advertisement)
- By entering or selecting a number in E.164 format

The user shall be able to suspend an ongoing presentation session in order to initiate a new outgoing session or accept an incoming session/call. The user shall further be able to present an additional object, requiring unused terminal resources (screen, keyboard, codecs etc.) without suspending the ongoing presentation session.

8.1.6 Service Specific Considerations

8.1.6.1 Authorization

Authorisation for the use of the service will be under the control of the home network operator.

8.1.6.2 Deauthorization

Deauthorisation for the use of the service will be under the control of the home network operator.

8.1.6.3 Registration

Registration onto the IMS will allow the use of Basic Multimedia Service, subject to authorisation and barring conditions.

Registration onto the object server(s) may also take place.

8.1.6.4 Deregistration

Deregistration from the IMS will prevent the use of Basic Multimedia Service.

Deregistration from the object server(s) may also take place.

8.1.6.5 Activation

The user, a 3rd party service provider and the network operator should be able to activate the various controls including redirection and barring.

8.1.6.6 Deactivation

The user, a 3rd party service provider and the network operator should be able to deactivate the various controls including redirection and barring.

8.1.6.7 Service Provisioning

The Basic Multimedia Service will be provisioned by the network operator or a 3rd party service provider.

8.1.6.8 Distribution, Downloading, Terminal Capabilities…

The Basic Multimedia Service shall be able to securely download trusted executable modules (e.g. Java applets) as part of the presented object.

The Basic Multimedia Service requires a terminal device with screen/keyboard handling capabilities (e.g. a browser) and capabilities for handling of desired QoS types (e.g. codecs).

8.1.7 Charging and Billing

The user can be charged for sessions in a variety of ways including the following methods:

a) By duration of session (including “one-off” charge/flat rate). This includes the possibility to charge only for “session connected”-time (as opposed to including the session set-up time).

b) By location of originating party

c) By data volume transferred during object presentation

d) By one-time service charge for a presented object

e) By destination of called party (eg in the case of conversational services)

8.1.8 Interworking with Other Services

A presented object might in it self automatically or manually initiate additional services, e.g. a search, a send of an m-commerce form or a voice call.

Interworking will be required to other types of network. When interworking with legacy networks, the capability to transfer media items may not always be possible e.g. the limitations of the other network. It shall always be possible, however, to set up a voice conversational session with any user on any other type of voice telecommunications network.

8.1.9 Roaming Considerations

The user can use the Basic Multimedia Service in any compatible mobile network where there is a roaming agreement. The serving network charges the roamer for the sessions he originates.

All session control functions (e.g. setting/cancelling barring etc) should be available in the roamed-to network in the same way as they are in the home network. They should also be presented to the user in a consistent way (VHE concept).

It shall be possible for the roamed to network to provide Basic Multi-media Service objects to inbound roamers. These may be used to provide multi-media access to local services provided via the roamed to network.

8.1.10 Generic Requirements (for this service)

Common, default codecs shall be mandated to ensure end-to-end compatibility.

The network should support the option to encrypt the voice component and signalling of a basic voice call.

It shall be possible to allow sessions to be originated using E.164 or SIP URL identifiers. It shall also be possible toallow sessions based upon numbers and identities that are not globally unique (for example VPN short number or friendly name ranges that only have meaning within a non-public entity). It should be possible to associate a user assigned nickname with an E.164 or URL identity. (Note: this may be a part of the User's Profile).

Create a session containing a voice media component.

Terminate a session.

Negotiate capabilities of the terminal, at session set up and at modifications (e.g. speech Codec negotiation).

Join an ongoing session (conference call) from a mobile or non-mobile (FFS) terminal.

The user can set up sessions to multiple destinations (multi-party). (Note: feasible implementations may imply network-based solutions).

Provide the ability to rate media components based upon connection time, data volume, application events, personalization, etc.

Support charging and billing of the originating or terminating entity, pre-paid and post-paid capability, by network operator or by service provider.

The ability to download, configure, and setup an application (client) in a terminal is for further study.

The user initiating the session is informed of its progress by tones, messages or graphic display on his terminal.

The terminating party is sent the identity of the caller unless specifically withheld.

The user can bar certain types of session ranging from all sessions to sessions based on type of terminating service etc.

The network operator should also have the capability to bar certain types of session. The criteria used to select the barring may differ from that used by the user.

The user can set up sessions to multiple destinations (multi-party).

The user can temporarily suspend the session (i.e. put the call on hold).

The user already busy on a call or other session can be alerted to another incoming call and can choose to accept it or reject it.

<< Further requirements might be provided >>

8.2 Basic Voice Service

8.2.1 Motivation

To use the IMS for plain voice calls, which is foreseen to remain as a significant part of network traffic.

To allow both voice and data services on one common platform. This will result in a more simplified system giving several potential benefits.

8.2.2 High Level Service Description

Subscribers to the IMS Basic Voice Service shall be able to make and receive conversational class voice calls via the IMS to/from all types of network (within IMS, GSM, PSTN etc.). This service will be offered by the network operator and will bring value to the network operator by the ability to charge for these calls. Specifically, the minimum requirements are:

Editor's note: possibly insert high level description of user's expectations.

a) Initiation

A user initiates a call to any other user or type of network by entering the identity of the called party. The identity used will depend on the scheme of the called party but could include E.164 number or SIP URL.

b) Information during the call

The user making the call is informed of its progress by tones, messages or graphic display on his terminal. During the call, other indications may be given similarly e.g. to indicate a 3rd party is trying to call one of the parties already in the call. Tones and announcements may generate locally by terminal or network. It should be possible to personalise announcements for users own language.

The called party is sent the identity of the caller unless specifically withheld. The identity used will depend on the capabilities of the networks but could include E.164 number or SIP URL or even an icon..

c) Control

See Generic Requirements subsequently provided.

Editor's note: text moved to generic requirements.

8.2.3 Relation to IMS

This service can be offered over the IMS.

8.2.4 Potential Revenue Streams (Business Model)

The network operator will receive revenue from subscribers directly (retail rates) or via 3rd parties (wholesale rates). Network operators will also receive roaming revenue from subscribers roaming from other networks; network operators will pay other networks for roaming of own subscribers similarly. Network operator may receive additional revenue from personalisation of service, i.e. including an icon on call set-up, etc.

8.2.5 User Perspective (User Interface)

The user's main interface will be to the terminal device. The terminal device's interface (e.g. menu, key functions, display etc) is proprietary to the terminal manufacturer, however, the interaction of the terminal device with the network will need to be standardised.

8.2.6 Service Specific Considerations

8.2.6.1 Authorization

Authorisation for the use of the service will be under the control of the network operator.

8.2.6.2 Deauthorization

Deauthorisation for the use of the service will be under the control of the network operator.

8.2.6.3 Registration

Registration onto the IMS will allow the use of Basic Voice Service, subject to authorisation and barring conditions.

Registration onto the application server(s) may also take place.

8.2.6.4 Deregistration

Deregistration from the IMS will prevent the use of Basic Voice Service.

Deregistration onto the application server(s) may also take place.

8.2.6.5 Activation

The user, a 3rd party service provider and the network operator should be able to activate the various controls including redirection and barring.

8.2.6.6 Deactivation

The user, a 3rd party service provider and the network operator should be able to deactivate the various controls including redirection and barring.

8.2.6.7 Service Provisioning

The Basic Voice Service will be provisioned by the network operator or a 3rd party service provider.

8.2.6.8 Distribution, downloading, terminal capabilities…

The terminal device will require basic capabilities for voice, with at least the default voice codec, signalling and user interface.

8.2.7 Charging and Billing

The user can be charged for calls made in a variety of ways. The following should be possible:

a) By duration of call (including “one-off” charge/flat rate)

b) By destination of call (including location of called party)

c) By location of calling party

d) By signalling personalisation (e.g. icons or messages at call set-up)

The following charging principles should be possible:

a) Existing GSM model where caller pays for call to originally requested destination for a redirected call and the called party on redirection pays for the redirected call

b) Caller can see destination and cost of redirected call before call is set up, caller pays for all legs of the call to final destination

8.2.8 Interworking with Other Services

All users of Basic Voice Service should be able to call any user on any telecommunications network.

Callers in 3GPP compatible systems () should be able to use default codecs to ensure end-to-end compatibility; calls from IMS to other types of network (e.g. PSTN, Internet) may need to use media gateways.

Note: Default Codec for voice is AMR within 3GPP, except for GERAN and CS combination it is FR.

The basic call features according to 22.228 [13] (e.g. redirection, barring, calling party identity etc) should work across 3GPP compatible networks including when roaming. They should also work across other types of network subject to the capability of that network.

8.2.9 Roaming Considerations

The user can make and receive calls in any compatible mobile network where there is a roaming agreement. The roamer is charged for the calls he makes (and receives, if appropriate) by the serving network.

All call control functions (e.g. setting/cancelling redirection, barring etc) should be available in the roamed-to network in the same way as they are in the home network. They should also be presented to the user in a consistent way (VHE concept).

8.2.10 Generic Requirements (for this service)

Common, default codecs shall be supported to ensure end-to-end compatibility.

The network should support the option to encrypt the voice component and signalling of a basic voice call.

Allow calls to be set up using E.164 or SIP URL identifiers. . A translation facility may be required between E.164 numbers and SIP URL identities. This may necessitate the provision of ENUM/DNS type facilities. It should be possible to associate a user assigned nickname with an E.164 or URL identity. (Note: this may be a part of the User's Profile).

Create a session containing a voice media component.

Terminate a session.

Negotiate capabilities of the terminal, at session set up and at modifications (e.g. speech Codec negotiation).

Join an ongoing session (conference call) from a mobile or non-mobile (FFS) terminal.

The user can set up calls to multiple destinations (multi-party). (Note: feasible implementations may imply network based solutions).

Provide the ability to rate media components based upon connection time, data volume, application events, personalization, etc.

Support charging and billing of the originating or terminating entity, pre-paid and post-paid cabability, by network operator or by service provider.

The ability to download, configure, and setup an application (client) in a terminal is for further study (i.e. not viewed as being critical to basic voice call in the release 5 timeframe, although critical to some applications, such as gaming).

Support interworking with non-IMS (e.g. second generation, GSM, CDMA, TDMA) wireless and wireline voice networks.

The user making the call is informed of its progress by tones, messages or graphic display on his terminal.

The called party is sent the identity of the caller unless specifically withheld.

The user can redirect incoming calls according to the capabilities defined in TS 22.228[13].

The user can bar certain types of call ranging from all calls to calls based on the location of the called party, the type of service called etc.

The network operator should also have the capability to bar certain types of call as well. The criteria used to select the bar may differ from that used by the user.

The user can set up calls to multiple destinations (multi-party).

The user can temporarily suspend the session (i.e. put the call on hold).

The user already busy on a call or other session can be alerted to another incoming call and can choose to accept it or reject it.

Transmission of DTMF tones end-to-end shall be supported during a call, in order to allow the users be able to signal across the networks. Multimode handsets may support establishment of basic voice calls in both IP based networks and non-IP based networks.

<< Further requirements to be provided >>

8.3 Videophone Service

8.3.1 Motivation

To enable realtime two way conversational video.

8.3.2 High Level Service Description

Subscribers to the IMS Videophone Service shall be able to make and receive conversational class videophone calls if the user devices can support the video component and compatible codecs and all networks used by the call, end to end, are capable of supporting it. The Videophone Service also provides the same capabilities as the Voice Service.

It shall be possible to initiate the full videophone call at initial set-up, or the video component may be added to an existing voice call and removed, as the user requires.

Specifically, the minimum requirements are:

a) Initiation

As for Basic Voice Service.

Additional capability to initiate call with audio only, video only or both. The use of video will depend on the capabilities of the networks involved in the call. If a call is made to a network that cannot accept video (eg PSTN or GSM), then the call should default to voice only.

b) Information during the call

As for Basic Voice Service. Additional messages may be given by video.

c) Control

Call redirection and barring capability as for Basic Voice Service.

Additionally, the user can redirect and bar the audio and video components separately.

The network operator should also have the capability to redirect and bar the components separately

The user can set up calls to multiple destinations (multi-party call) as for Basic Voice Service. The user should be able to display the video from each party in the call either in turn or simultaneously (if the terminal is capable).

The user already busy on a call or session can be alerted to another incoming call and can choose to accept it (suspending the session, putting original call on hold) or reject it as for Basic Voice Service.

The user should be able to switch the audio or video components of the call on and off during the call as required.

d) Other features

The users of the Videophone Service should be able to signal across the networks used end-to-end using simple signalling techniques (eg MF tones).

8.3.3 Relation to IMS

This service will be offered over the IMS.

8.3.4 Potential Revenue Streams (Business Model)

As for Basic Voice Service

8.3.5 User Perspective (User Interface)

As for Basic Voice Service

8.3.6 Service Specific Considerations

8.3.6.1 Authorization

As for Basic Voice Service

8.3.6.2 Deauthorization

As for Basic Voice Service

8.3.6.3 Registration (needs alternative name)

As for Basic Voice Service

8.3.6.4 Deregistration

As for Basic Voice Service

8.3.6.5 Activation

As for Basic Voice Service

8.3.6.6 Deactivation

As for Basic Voice Service

8.3.6.7 Service Provisioning

As for Basic Voice Service

8.3.6.8 Distribution, downloading, terminal capabilities…

As for Basic Voice Service plus the requirement for the terminal to use a default video codec.

8.3.7 Charging and Billing

The user can be charged for calls in the same ways as described for Basic Voice Service. Additionally, separate charges can be raised for the audio and video parts of the call.

8.3.8 Interworking with Other Services

As for Basic Voice Service. The transmission of the video component will depend on the capabilities of the other networks involved in the call.

Also, where networks are used that can carry video, the switching on and off of the video component of the call should be recognised by all networks. Similarly for the switching on and off of the audio component.

8.3.9 Roaming Considerations

As for Basic Voice Service. The ability to use video will depend on the capabilities of the serving network.

8.3.10 Generic Requirements (for this service)

As for Basic Voice Service.

Additionally, where the audio or video component is switched on or off during a call, the network should adjust the resource required (particularly the radio resource).

8.4 Mixed Media Interactive Communication

8.4.1 Motivation

The motivation for this service is to enable communication services where the upstream and downstream communication paths are different types of interactive media.

8.4.2 High Level Service Description

A subscriber receives an urgent voice call but is currently in a situation where a verbal response is not suitable (e.g. in a meeting). Using a "special answer" option on the UE, the subscriber could accept the audio portion of the incoming call (probably delivered via an earpiece) but would only reply in a textual fashion (e.g., instant messaging, soft keys on UE with preprogrammed responses). In this manner, the subscriber could listen to the incoming voice call and could generate responses without interrupting or disturbing the meeting in progress.

In similar manner, a subscriber could also choose to initiate a mixed media interaction communications session. Under this scenario, the subscriber could initiate the call with the subscriber input is provided in a textual fashion and the return communications are provided in an audio media (again probably delivered via an earpiece).

8.4.3 Relation to IMS

This service will be offered over the IMS.

8.4.4 Potential Revenue Streams (Business Model)

As with the basic voice service, the network operator will receive revenue from subscribers directly (retail rates) or via 3rd parties (wholesale rates). Network operators will also receive roaming revenue from subscribers roaming from other networks. In a similar manner, network operators will pay other networks for the roaming of own subscribers.

Since this service provides capabilities beyond the basic voice service, network operators could also receive revenue from usage surcharges and service initiation fees.

8.4.5 User Perspective (User Interface)

The user's interface to this service will be via the terminal equipment.

For incoming calls, the subscriber would be given the opportunity to select how to answer the call (e.g., "*normal voice call*", "*receive audio and reply text*").

For subscriber initiated calls, the subscriber would be able to select the type of call desired (e.g., "*normal voice call*", "*send text and receive audio*").

8.4.6 Service Specific Considerations

8.4.6.1 Authorization

Authorization for the use of the service will be under the control of the network operator.

8.4.6.2 De-authorization

De-authorization for the use of the service will be under the control of the network operator.

8.4.6.3 Registration

Connection to the IMS will allow the use of Mixed Media Interactive Communication services, subject to authorization and barring conditions.

8.4.6.4 De-registration

Disconnection from the IMS will prevent the use of Mixed Media Interactive Communication services.

8.4.6.5 Activation

Activation of the Mixed Media Interactive Communication services would typically occur on a per communication session basis. For each communications session initiated or received, the subscriber would indicate if the call should be established as a normal call or as a type of mix media interactive communications call.

8.4.6.6 Deactivation

Since activation would typically occur on a per communication sessions basis, de-activation would automatically occur at the termination of the current communication session.

8.4.6.7 Service Provisioning

The Mixed Media Interactive Communication service will be able to be provisioned by either the network operator or by a 3rd party service provider.

8.4.6.8 Distribution, downloading, terminal capabilities…

Applications may need to be loaded into the subscriber's terminal equipment to support the Mixed Media Interactive Communication services. These applications could be loaded over the air interface at time of subscription. Network operator software distribution capabilities could be utilized to distribute revised versions of these applications to the subscriber's terminal equipment.

8.4.7 Charging and Billing

Calls utilizing the Mixed Media Interactive Communication service could be charged voice calls, data calls, or a combination of both. These charges could be based a variety of factors including the following:

- Duration of the call
- Amount of data services used for the call (e.g., number of packets)
- Destination of called party including location of called party
- Location of subscriber
- Level of QoS used for each media type
- Amount of bandwidth used for each media type

8.4.8 Interworking with Other Services

Subscribers of the Mixed Media Interactive Communication service should be able to receive any audio call from any user on any telecommunications network. However, to utilize the capabilities of the Mixed Media Interactive Communications service, the calling party must have a terminal that is compatible with the IP based protocols of the IMS.

For a subscriber to initiate a call using the Mixed Media Interactive Communication service, the called party must have a terminal that is compatible with the IP based protocols of the IMS.

8.4.9 Roaming Considerations

The subscriber should be able to make and receive mixed media interactive communication service calls when roaming in any IMS compatible mobile network where there is an appropriate roaming agreement established.

The capabilities of the mixed media interactive communication service should be available in the roamed-to network in the same manner as in the home network; within the limitation of the capabilities of the serving network.

8.4.10 Generic Service Requirements

In addition to the generic service requirements for a basic voice call identified section 8.1, the following capabilities are required:

- Capability for network and user equipment to support upstream and downstream communication paths for one communication session with different media types.
- Capability to “answer” an incoming call with an indication of the desired upstream media type.
- Capability to initiate a communication session with specification of the media types for both the upstream and downstream communication paths.

8.5 Multimedia Based Voice Response Unit

8.5.1 Motivation

The motivation for this service is to enable communication services where the media type changes during the active communication session.

8.5.2 High Level Service Description

Using terminal equipment with the required capabilities, a customer places a voice call to the customer service center. Instead of connecting the customer to an audio unit that plays announcements and prompts for input, the current session is switched from a voice call to an interactive “data call”. During this interactive “data call”, textual and/or graphical representation of the various options are provided to the subscriber’s UE. The customer can then browse through the choices and select the desired service. After selection by the customer, the current connection may again change media (e.g., switch back to voice call, receive a streaming video).

8.5.3 Relation to IMS

This service will be offered over the IMS.

8.5.4 Potential Revenue Streams (Business Model)

Subscribers would not be generating direct revenue for this service. Instead, revenues would be realized by indirect means.

For example, additional revenues could be realized from the increased airtime due to the subscriber preference for the interaction provided by the Multimedia Based Voice Response Unit service instead of the audio prompt style provided for the traditional audio only telephony devices.

8.5.5 User Perspective (User Interface)

The user’s interface to this service will be via the terminal equipment. The terminal equipment must have a visual display capability. The terminal equipment must also be able to receive user selection either via keyboard input or via programmable soft keys.

8.5.6 Service Specific Considerations

8.5.6.1 Authorization

Authorization may be under control of the network operator.

8.5.6.2 De-authorization

De-authorization may be under control of the network operator.

8.5.6.3 Registration

Connection to the IMS with terminal equipment containing the requirement capabilities will allow the use of the Multimedia Based Voice Response Unit service.

8.5.6.4 De-registration

Disconnection from the IMS will prevent the use of the Multimedia Based Voice Response Unit service.

8.5.6.5 Activation

Activation of the Multimedia Based Voice Response Unit service would occur on a per communication session basis and would be based upon the destination of the call identified by the subscriber.

8.5.6.6 Deactivation

De-activation would occur at the termination of the current communication session.

8.5.6.7 Service Provisioning

The Multimedia Based Voice Response Unit service will be able to be provisioned by either the network operator or by a 3rd party service provider.

8.5.6.8 Distribution, downloading, terminal capabilities…

The visual display of the user choices would typically be downloaded to the terminal as part of the communication session. The user choices could be displayed as a single display or as a series of hierarchical displays.

Visual displays, which are controlled by the subscriber's network operator or by 3rd parties who have a business relationship with the subscriber's network operator, could be preloaded on the subscriber's terminal equipment in advance in order to improve response time to the subscriber. The preloaded visual displays could be loaded over the air interface at time of subscription. Network operator software distribution capabilities could be utilized to distribute revised versions of these preloaded visual displays.

8.5.7 Charging and Billing

No direct charging or billing to subscribers is envisioned for this service. However, CDR information may still be required for network management and service utilization information for the network operator.

8.5.8 Interworking with Other Services

The Multimedia Based Voice Response Unit service may be combined with the Free Phone service so that the same E.164 number could be used for both multimedia based and traditional audio prompt based voice response units. Under the combined scenario, the network operator could automatically redirect the incoming call from the subscriber to the correct destination and, thereby, eliminate the need for the end destination to determine which type of interaction service is required.

For a subscriber to utilize the capabilities of the Multimedia Based Voice Response Unit service, the called party (e.g., customer service center) must be compatible with the IP based protocols of the IMS.

8.5.9 Roaming Considerations

The subscriber should be able to utilize the Multimedia Based Voice Response Unit service when roaming in any IMS compatible mobile network where there is an appropriate roaming agreement established.

The capabilities of the Multimedia Based Voice Response Unit service should be available in the roamed-to network in the same manner as in the home network; within the limitation of the capabilities of the serving network.

8.5.10 Service Generic Requirements

In addition to the generic service requirements for a basic voice call identified section 8.1, the following capability is required:

- Capability to change media type (including QoS and bandwidth characteristics) of an active communication sessions without having to establish new separate communication sessions.

8.6 Emergency Call

Regulatory requirements exist in some regions to provide emergency call capability.

8.6.1 Motivation

It is a regulatory requirement in many countries that networks offering speech service shall also offer emergency speech service. For detailed 3GPP requirements see 22.101[2].

8.6.2 High Level Service Description

Billy Bob Barracuda (a partner in the law firm of Barracuda and Sharkey) is driving down a remote back road in Utah. It's very late at night, and the car's headlights barely penetrate the heavy snowfall. His ailing mother sits next to him in the passenger seat. A dip suddenly appears in the road in front of him. He looks puzzled, this road doesn't have any dips in it. He must be lost. Wham.

He wakes up with a splitting headache, a huge bump on his head, and finds his car in a roadside ditch. A light snow covers the car. It's freezing cold, the battery is dead, and the engine won't start. His mother is unconscious and her skin color has a disturbing blue tint. Billy Bob pulls out the cell phone from the glove compartment and dials 911. The call goes through to the nearest Emergency Call Centre, and his location is automatically provided (Billy Bob has no idea where he is). The emergency operator provides instructions to Billy Bob for taking care of his mother and dispatches an emergency vehicle and a tow truck. Both are soon rescued.

A variant on above scenario: phone doesn't have a USIM.

Accuracy of location information

For example, in the USA the FCC audits all carriers to ensure compliance with Phase II Emergency Services requirements. NewCo uses a handset based positioning solution, and their records indicate more than 67% of emergency calls made in their network provided positioning within 50 meters. Their records also indicate more than 95% were within 150 meters. This implies that the network requires to maintain statistical information on the accuracy of calls.

8.6.3 Relation to IMS

This is a variation of Basic IMS voice call where specific priorities and routing is applied. Also service involves LCS functionality for geographical positioning.

8.6.4 Potential Revenue Streams (Business Model)

Not relevant.

8.6.5 User Perspective (User Interface)

No specific user interface aspects identified.

8.6.6 Service Specific Considerations

Emergency service requires a connection from terminal to emergency service centre. Due to special nature of connection requirements for delay and priority are higher than in case of basic voice call. Specific considerations is needed for example, on call set up time optimisation and priority for bearer (i.e. shall not be dropped and in case of congestion may clear other connections).

The routing shall be able to the into account the area where the call is made in order to route call to nearest emergency call centre (Note this does not require higher than cell level accuracy).

Emergency call centre is required to receive additional details like CLI (e.g. for call back purpose) as call arrives. Further in some countries it is expected to provide a geographical position of user.

Additional scenario is IMS emergency call establishment without USIM.

Due to special nature of emergency call some specific service control / management logic may not apply e.g. CLIR shall not apply.

8.6.7 Charging and Billing

Charging may be applicable on a per call basis.

8.6.8 Roaming Considerations

Emergency call shall be available in each country according to local regulations and usable for local subscribers and roamers on same way. Further, a subscriber shall be able to establish emergency call with a familiar number . For detailed 3GPP requirements see 22.101[2].

8.6.9 Generic Requirements (for this service)

TBD

8.7 Mobile Number Portability

8.7.1 Example Motivation

Number portability seeks to promote competition. Number portability, in the sense of service provider portability is a regulatory imperative in many countries seeking to liberalise the service competition, by enabling the end users to retain their telephone numbers while changing service providers.

Implementation of Number Portability at national level entails potentially significant changes to numbering administration, network element signaling, call routing and processing, billing, service management, and other functions.

8.7.1.1 Service Description

Mobile Number Portability, MNP, is defined as the process enabling a mobile subscriber to move from a network operator to another network operator without changing his mobile number. The change of network operator may or may not imply a change of service provider.

MNP is only applicable to E.164 numbers. International Mobile Subscriber Identities (IMSIs), which are used by mobile networks for the identification of mobile users and terminals, are not portable. A change of mobile network operator necessitates a change in the IMSI and in the SIM (Subscriber Interface Module) card.

There are two cases to be considered when changing the service providers:

A) both the donor and the recipient service provider are connected to the same network operator;
B) the donor and the recipient service provider are connected to two different network operators.

In the first case MNP has no impact in the set-up phase of a call to a ported number. In the second case MNP has impact in the routing process to establish the call. For both cases MNP requires that some operational actions are undertaken by the service providers and the network operators. Such actions take place off-line at the beginning of the porting process.

MNP only allows a customer to change network operator or service provider while keeping the same mobile number for the provision of the same basic service.When the network operator or service provider is changed the customer may lose or gain some supplementary services related to the basic service (e.g. voice mail).

In a case where a number has been ported between two network operators the establishment of a call cannot be based on the simple digit analysis of the called party number. Such analysis only allows the identification of the donor network that, in principle, is no longer responsible for the ported-out number. The information about the ported-out number and how to route the call resides now in the recipient network. The problem then is to identify the recipient network and to route the call to this network so that the call can be handled in the appropriate way and completed.

MNP must not preclude the provision of supplementary services, including services offered not in conjunction with a call.

The introduction of MNP implies the establishment of an operational process between the parties involved.

8.7.1.2 Monetary Flow (Business Case)

The costs of MNP (including system set up costs, administration costs and conveyance costs) could be regulated.

8.7.2 Description

The Number Portability changes the fundamental nature of a dialed E.164 number from a hierarchical physical routing address to a virtual address.

The Number Portability implementations attempt to encapsulate the impacts to the networks and make Number Portability transparent to subscribers by incorporating a translation function to map a dialed, potentially ported E.164 address, into a network routing address (either a number prefix or another E.164 address) which can be hierarchically routed.

8.7.3 User Interaction

The porting process is always initiated by the customer with his request to change service provider or network operator.

8.7.4 Charging and billing

The provision of MNP brings a number of direct and indirect benefits to the customers and also in general to the whole industry, but it implies some additional costs as well.

The distribution of the cost between the parties involved, which basically are the calling and called customers, the donor service provider/network operator and the recipient service provider/network operator has to be analyzed.

8.8 Identification Restriction

8.8.1 Example Motivation

Regulatory requirements exist in some regions to protect the identity of the calling party.

8.8.1.1 Service description

Sometimes, when using telecommunications services, a user may want to protect their privacy by not revealing their identity to any other parties. If the user is originating a call (the user is the "calling party"), a service such as Calling Line Identification Restriction is used to restrict the presentation of their identity to the called party. Such a call appears (to the called party) to come from an anonymous source. Similarly, if the user is receiving a call (the user is the "connected party"), a service such as Connected Line Identification Restriction is used to restrict the presentation of their identity to the calling party. Such a call will appear (to the calling party) to have been delivered to an anonymous destination.

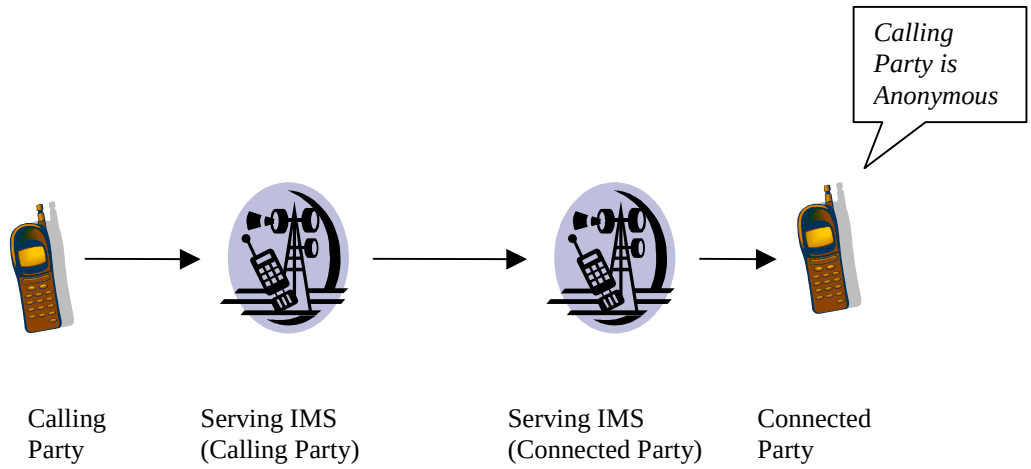

Figure 3 - Calling Party Anonymity

8.8.1.2 Relation to IMS

The IMS allows the calling party identification to be presented to the called party, and it also allows the connected line identification to be presented to the calling party. Some users may want to protect their privacy by remaining anonymous, just as they can with a pre-IMS network.

In this scenario, it the task of the IMS to allow users to restrict presentation of their identity to the calling and connected parties.

8.8.1.3 Monetary flow

The user may be charged by the network operator for invoking the supplementary services that restrict presentation of their identity.

8.8.2 Invoking Anonymity Services

8.8.2.1 Description

For Calling Party Anonymity, the restriction services may be provisioned as “permanent” or “temporary”. If permanent, then the restriction services are invoked automatically, and presentation of their identity is restricted for all calls and multimedia sessions automatically. If temporary, then the user must manually invoke the restriction service immediately prior to initiating a call or multimedia session.

For Connected Party Anonymity, the restriction service shall be provisioned as “permanent”. The restriction services are invoked automatically, and presentation of their identity is restricted for all calls and multimedia sessions automatically.

Once invoked, the restriction services are in force for the entire duration of the call or multimedia session.

8.8.2.2 Requirements

It must be possible for the anonymous user to participate in a multimedia session and to restrict the presentation of their identity.

8.8.3 User interaction

8.8.3.1 Description

Calling Party Anonymity

For permanent restriction, the user will contact their service provider who will provision and activate the service on behalf of the user, after which the user will be anonymous for all calls or multimedia sessions where they are the calling party. No further user interaction is required.

For temporary restriction, the user will contact their service provider who will provision the service and select the “default” mode which shall be either “restricted” or “not restricted”. If the default is “not restricted”, then the user who wants anonymity must manually invoke the restriction service prior to initiating a call or multimedia session. If the default is “restricted”, then the user will be anonymous unless they manually toggle the restriction service so that presentation of their identity is allowed.

Connected Party Anonymity

The user will contact their service provider who will provision and activate the service on behalf of the user, after which all calls or multimedia sessions shall be anonymous. No further user interaction is required.

8.8.3.2 Requirements

The IMS must store the user’s anonymity preferences in the user profile. The IMS must check to determine if the user has invoked the presentation restriction service prior to initiating a call or multimedia session.

8.8.4 Initiation of an anonymous multimedia session

8.8.4.1 Description

If Calling Party Anonymity is active, and the calling party initiates a multimedia session, then the identity of the calling party shall not be presented to the called party.

If Connected Party Anonymity is active, and the connected party joins a multimedia session, then the identity of the connected party shall not be presented to the calling party.

8.8.4.2 Requirements

8.8.5 Roaming

8.8.5.1 Description

Calling and Connected Party Anonymity shall continue to operate normally when the user is roaming except where the laws and regulations regarding Anonymity do not allow.

The laws and regulations regarding Anonymity may vary from one jurisdiction to the next. This may affect the way that Anonymity operates as the subscriber roams from one jurisdiction to the next.

8.8.5.2 Requirements

For Calling Party Anonymity, when the user initiates a multimedia session, the "presentation restricted" information shall be transmitted to the serving system(s) of the called or connected party. The serving system of the called or connected party shall act according to prevailing rules and regulations for the jurisdiction in which the serving system is located.

For Connected Party Anonymity, when the user becomes connected to a multimedia session, the "presentation restricted" information shall be transmitted to the serving system(s) of the originating party. The serving system of the originating party shall act according to prevailing rules and regulations for the jurisdiction in which the serving system is located.

Another requirement is that the terminating network be able to distinguish between two cases:

i. Where the originator intended the session to be anonymous;

ii. Where the identity of the originator was deleted by a transit network.

8.8.6 Charging and billing

8.8.6.1 Description

The user may be charged on a "per usage" basis or the user may be charged a flat rate for the duration of the regular billing period.

8.8.6.2 Requirements

The network should collect a record for each time that anonymity is invoked.

8.8.7 Exception Case – Override Capability

8.8.7.1 Description

IMS systems shall support an Override Capability which allows authorized parties to override the Calling and Connected Party Anonymity services.

The laws and regulations regarding Override may vary from one jurisdiction to the next. This may affect the way that Override operates as the subscriber roams from one jurisdiction to the next.

8.8.7.2 Requirements

For Calling Party Anonymity, when the user initiates a multimedia session, the "presentation restricted" information shall be transmitted to the serving system(s) of the called or connected party. The calling party identity shall not be presented to the called party unless the called party has override, in which case the calling party identity will be presented to the called party.

For Connected Party Anonymity, when the user becomes connected to a multimedia session, the “presentation restricted” information shall be transmitted to the serving system(s) of the originating party. The connected party identity shall not be presented to the calling party unless the calling party has override, in which case the connected party identity will be presented to the calling party.

8.9 Lawful Interception

8.9.1 Example Motivation

Regulatory requirements exist in some regions to provide lawful interception capability.

8.9.1.1 Service description

The scenarios proposed in this section illustrate the network capabilities that allow an authorized Law Enforcement Agency (LEA) to intercept communications between parties in a 3G network. These capabilities are required by law in some jurisdictions.

8.9.1.2 Relation to IMS

The IMS supports a variety of media – voice, data, video, text, and so on – and LEAs will need the ability to intercept all varieties. These scenarios illustrate the interception of all forms of media.

8.9.1.3 Monetary flow

The LEA may be charged for each interception request, or they may be charged based on the duration of the interception, or based on the amount of data collected, or they may be charged based on the number of interception events.

8.9.1.4 Authorisation, Activation, and Invocation

For a complete description of the authorisation, activation, and invocation of Lawful Interception, refer to 3GPP technical specification TS 33.106 “3G Security; Lawful Interception Requirements”.

8.9.2 Progress of the Interception

8.9.2.1 Description

A mobile target (the subject of the interception) is identified by the LEA and an “Intercept Request” is transmitted from the LEA to the Administration Function of the network operator specifying the identity of the target. The LEA must also specify the scope of the interception, including which types of media are to be intercepted, the duration of the interception. The Administration Function invokes the intercept function in one or more nodes in the network. Once the intercept is invoked, all appropriate media sessions shall be intercepted and delivered to the LEA via the Delivery Function.

The interception shall occur in such a manner that no indication is given to the target that the interception is occuring.

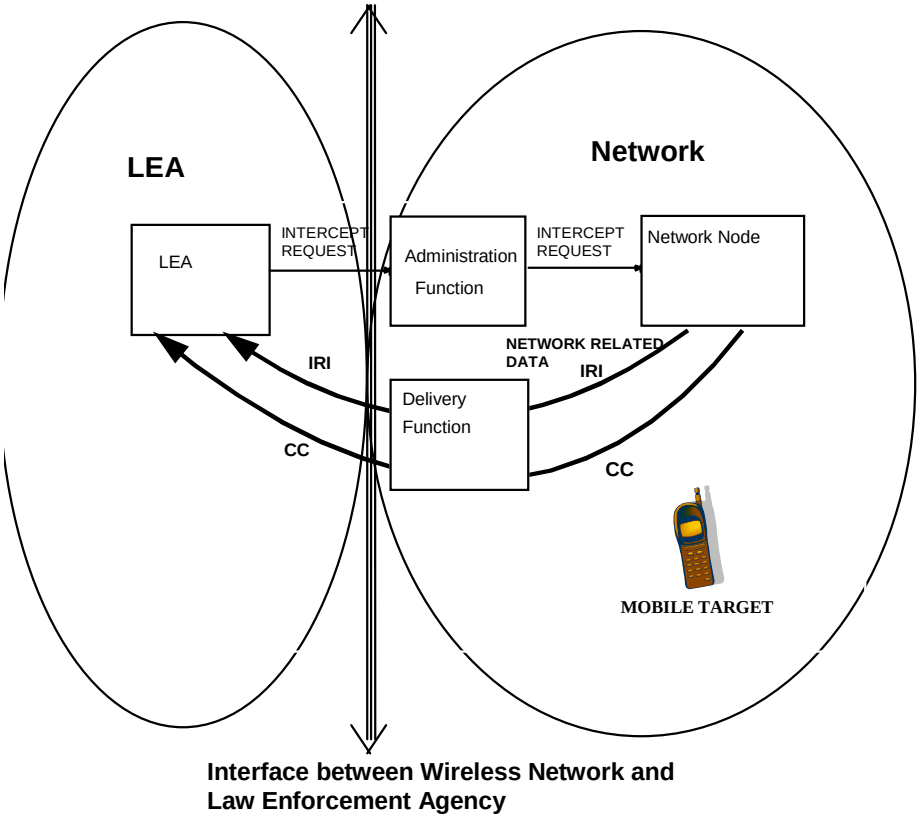

Figure 4 - Overview of Lawful Intercept

8.9.2.2 Requirements

It must be possible to intercept any type of session involving the target. The session may contain one or more media components. The media components may include voice, text, video, real-time data communication, or other supported media.

It must be possible to add and remove the intercept on demand, with negligible set-up time.

8.9.3 User interaction

8.9.3.1 Description

There are three parties involved in an intercept: the LEA, the network operator, and the target.

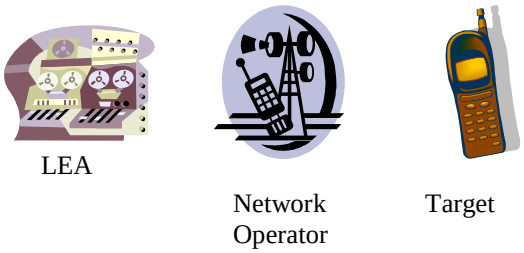

Figure 5 - Parties Involved in Lawful Intercept

The LEA sends Intercept Requests to the network operator via the Administration Function and collects the intercepted communication from the network operator at the Delivery Function. The intercepted communication may be analyzed or recorded for use in law enforcement.

The network operator receives the Intercept Requests from the LEA via the Administration Function and transmits the intercepted communication to the LEA via the Delivery Function.

The target plays no role in the user interaction. It is essential that the target not be aware of the intercept.

8.9.3.2 Requirements

When the Intercept Request is received from the LEA, the Administration Function must check the capabilities of the network and terminal to ensure that the requested interception can be invoked. The LEA should be informed if the intercept cannot be invoked for any reason. In the event that the intercept situation changes (e.g., a change of media, or handover to another network), this shall be reported to the LEA as soon as possible.

The network operator shall be able to deliver two types of information to the LEA: Content of Communications (CC) and Intercept Related Information (IRI). This is specified by the LEA at the time of the original Intercept Request. The LEA may also change the type of information required during the course of an interception.

CC may include all forms of content, including text messages, voice communication, data communication, streaming media, and all others. CC flows from the target through the network to the LEA. If there are other parties to the call, CC may also be collected from the other parties.

IRI may include all forms of call-related and non-call-related data, including addressing information (MSISDN, IMEI, IMSI, URL, DNS, etc.), call related events and non-call related events (dialled digits, call origination, call termination, call redirection, initiation or termination of a data communication or multimedia session), and other types of information (target location, start and stop times, call or session duration, radio related events), and all others. IRI flows from the network to the LEA.

Figure 6 - Flow of Information (CC, IRI) in Lawful Intercept

8.9.4 Initiation of an Intercept session

8.9.4.1 Description

An authorised LEA can invoke, modify, or terminate an intercept session at any time.

The network operator shall respond to each Intercept Request as soon as possible. When the intercept is invoked, the network operator shall deliver the requested CC or IRI to the LEA as soon as possible. The maximum number of simultaneous interceptions may be limited by the network operator.

8.9.4.2 Requirements

The intercept shall apply only to the target specified by the LEA. Additionally, the intercept may be limited by other parameters, such as:

- The intercept may provide CC only, or IRI only, or both CC and IRI;
- The intercept may apply only to specific types of media (e.g., voice) and not to other types of media (e.g., video);
- The intercept may apply only to communications between the target and other specific parties (e.g., calls to or from Randolph Wohlert are intercepted, all other calls are not intercepted);
- The intercept may apply only when the target is in specific locations.

It shall be possible for the LEA to specify the identity of the target using various identifiers such as MSISDN, IMEI, IMSI, or DNS.

8.9.5 Roaming

8.9.5.1 Description

Depending on the scope of the Interception Request, it shall be possible to provide CC and/or IRI to the LEA when the target is home or roaming.

8.9.5.2 Requirements

The LEA shall be responsible for making arrangements with the network operators where the target is roaming. There is no provision for automatic delivery of CC or IRI from the roaming network through another network to the LEA.

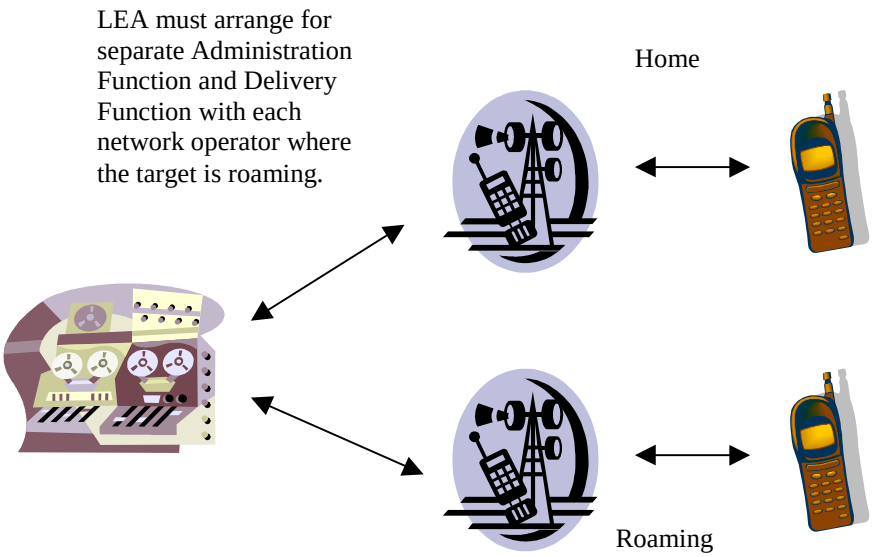

Figure 7 - Roaming Scenario

8.9.6 Charging and billing

8.9.6.1 Description

The session may be charged based on session events (e.g. call invocations, text messages sent or received) or based on information sent to the LEA (e.g. CC, IRI data).

The specifics of the charging and billing will be negotiated by the LEA and the network operator.

8.9.6.2 Requirements

The CDR's for each of the media components can be collected by the network operator. The rating mechanism must be based on bearer level information (e.g. resources requested or usage), session information (e.g. time) and application level information (e.g. CC, IRI).

8.9.7 Availability of Lawful Intercept

8.9.7.1 Description

Lawful Intercept is a government regulated activity. Availability of the lawful intercept capability depends on the local regulations and policies.

The availability of lawful intercept shall not affect the telecommunications services which are available to the target subscriber.

8.9.7.2 Requirements

Assuming that the local regulations permit lawful intercept, it shall be possible to set up a secure link across the interface between the network operator and the LEA. The CC and the IRI shall only be available to the authorised LEA and shall not be available to other (unauthorised) parties.

8.10 Malicious Call Trace

8.10.1 IMS Trace

IMS Trace is a facility invoked by the user to record all the events and services invoked by a calling party when the user deems the call to be threatening, malicious, life threatening or of use to law enforcement agencies. Invoking the trace instructs the network to alert the operator. The network should be also capable of informing Law Enforcement of the proceeding call, and allow LEA to monitor a call in progress.

8.10.2 Motivation

To provide the user with means to protect their security. To met local regulatory requirment.

A call is made to a user. The call may be voice, media, or video, in which the user is threatened by it's content (racist remark, explicit sexual harassment, bomb threat). The user invokes a feature code which is transparent to the calling party. Activation of the calling party invokes a trace on the calling parties address or location.

8.10.2.1 High Level Service Description

The operator offers to the user the capability of identifying, trace the origin of a call that is of a threatening nature. All call related information is recorded for further analysis by the operator and law enforcement. The calling party information may or may not be made available to the user (local regulatory issues). The user may be given the opportunity to bar IMS calls from the identified user (for a separate cost) or if the caller has a subscription on the network that that subscription could be removed, and or all data collected can be used in legal proceedings.

The network should be able to track (keep a record, statistics) trace related activities on its subscribers in order to warn, or terminate services.

The network should be able to resolve originating IP address and ports, and be able to bar access from those ports, or IP addresses

The network should be able to issue Trace request into other networks.

The network should be able receive trace requests from other networks. It need not divulge that information to the requesting network, but may act on it's own, or forward to LEA.

The network should also be able to track users evoking IMS trace, and related objectivity to warn or remove from service user that maliciously use the service. (Especially with intent to reverse harassment, or attempt to acquire user address or location information)

Editor's note (Is there any IETF work here?)

This service creates value for the user and the network operator.

8.10.3 Relation to IMS

This service can be offered over the IMS.

8.10.4 Potential Revenue Streams (Business Model)

The operator may receive revenue from it's subscriber on a per use basis, subscription basis, or as an administrative fee. The use of this service may lead to invocation of additional services, (call screening, call barring, CLIR, etc)

8.10.5 User Perspective (User Interface)

The user's main interface will be to the terminal device. The terminal device's interface (e.g. menu, key functions, display etc) is proprietary to the terminal manufacturer; however, the interaction of the terminal device with the network will need to be standardised.

8.10.5.1 Authorization

Authorisation for the use of the service will be under the control of the network operator.

8.10.5.2 Deauthorization

Deauthorisation for the use of the service will be under the control of the network operator.

8.10.5.3 Registration

Registration onto the IMS will allow the use of IMS Trace Service, subject to authorisation and barring conditions.

Registration onto the application server(s) may also take place.

8.10.5.4 Deregistration

Deregistration from the IMS will prevent the use of IMS Trace Service.

Deregistration onto the application server(s) may also take place.

8.10.5.5 Activation

The user, a law enforcement agency and the network operator should be able to activate the various controls including redirection and barring.

8.10.5.6 Deactivation

The user, a LEA and the network operator should be able to deactivate the various controls including redirection and barring.

8.10.5.7 Service Provisioning

The IMS Trace Service will be provisioned by the network operator.

8.10.5.8 Distribution, downloading, terminal capabilities

8.10.6 Charging and Billing

The user can be charged in a variety of ways. The following should be possible:

a) per use (for either pre and post paid)

b) per subscription to a service

c) as a global administration fee applied to all accounts

d) from a third party agency (government may fund service, interest groups may fund service (ie Battered wife's), corporate sponsors)

Note: Should the user be charged for the incoming malicious call, on those network which charge for air time in the received direction?

The following charging principles should be possible:

a) Existing GSM model where caller pays for call to originally requested destination for a redirected call and the called party on redirection pays for the redirected call (if redirection is to LEA with additional trace information, would the called party pay?)

8.10.7 Interworking with Other Services

8.10.8 Roaming Considerations

The user can invoke an IMS Trace on compatible roaming networks.

The roamer is charged for the calls he makes (and receives, if appropriate) by the serving network.

The serving operator may provide statistic to the home operator

8.10.9 Generic Requirements (for this service)

The user can redirect incoming calls according to the capabilities defined in TS 22.228[13].

The user can bar certain types of call ranging from all calls to calls based on the location of the called party, calls resulting from previous trace results, the type of service called etc.

The network operator should also have the capability to bar certain types of call as well. The criteria used to select the bar may differ from that used by the user. (ie the result of trace results, internally or externally)

The user can temporarily suspend the session (i.e. put the call on hold).

The user can invoke the trace facility without the other parties' knowledge.

Support charging and billing of the originating or terminating entity, pre-paid and post-paid capability, by network operator or by service provider or third party.

8.11 GTT

Text to be provided

8.12 Peer to Peer Gaming

8.12.1 Example Motivation

The gaming scenarios proposed in this section can be viewed to extend today's single user games by using the full capabilities of mobile networks, such as radio access and IMS.

In a basic scenario, two or a few players will organise the game amongst themselves using a peer-to-peer model.

8.12.2 High Level Service description

A player is presented with a visual representation of the game – this may be simple screens (for e.g. tic-tac-toe) seen on the phone today, or more advances screens (for e.g. "blue objects"). The content of the display is updated as the game advances.

Players can communicate with each other, using written messages or voice, without suspending the game.

A player can present himself to the other players using an id of his choice.

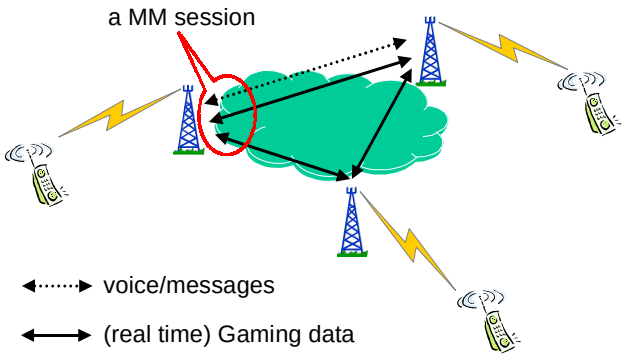

Figure 8: Basic game setup

8.12.3 Business Model

The game generates airtime in a PS network.

The players are charged by the network operator for session time and transferred data volume.

8.12.4 Relation to IMS

The IMS enhances the gaming experience by allowing multiple users to contact other users and establish synchronised peer-to-peer sessions as well as by adding and removing voice and/or messaging media components on demand.

8.12.5 User Perspective

A player uses the keyboard and display of a mobile, however if the terminal has additional capabilities, such as colour display or querty-keyboard, the game will use these capabilities. The size of the presented playfield is adapted to the size of the mobile's display.

8.12.6 Service Specific Considerations

8.12.6.1 Initiation of a game session

An authenticated and authorised subscriber can either join a game session of his choice or create a new session. Such new session can be set up in a number of ways, e.g.

- by invitation, using id's, names or mobile numbers available in the mobile terminal
- a public session
- a local, geographically limited session

In addition, the subscriber can limit the actual number of players.

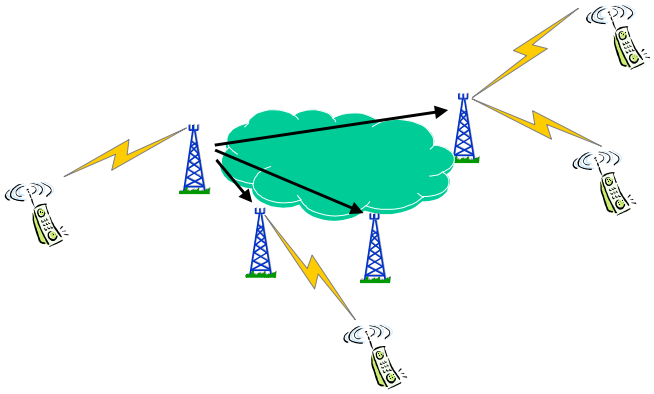

Figure 9: Parallel invitation

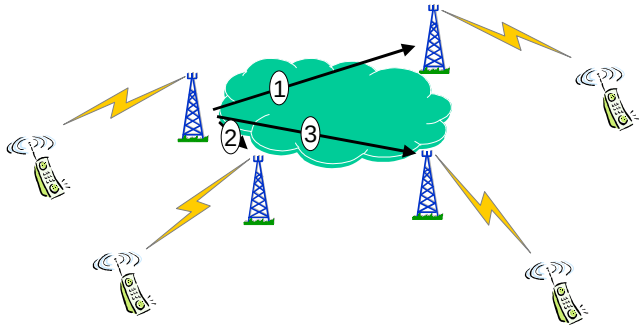

Figure 10: Sequential invitation

8.12.6.2 Distribution, downloading, terminal capabilities

The application client is either inherent to the mobile terminal, or can be downloaded from a server, provided by the mobile operator.

8.12.7 Charging and billing

The gaming session is charged based in information from the by transferred data volume, and session level information (even though in some cases, the network may not understand the media content as it may be propriatary to the game).

The player's charges will be added to his mobile invoice. A player can use a prepaid mobile subscription to cover game charges.

8.12.8 Roaming Considerations

It is possible to participate in the game independent of the actual mobile network, providing that the network offers multimedia capabilities.

8.12.9 Generic Requirements

A mobile network, offering multimedia services, must provide access to a standardised set of Service Enablers.

It must be possible to create a gaming session, which may contain one or more media components, providing connectivity with the other terminal(s). The media components may include real-time data communication for updating the games status; and optional voice or messaging, for communication amongst players.

It must be possible to add and remove the optional media components on demand, with set-up time not affecting the progress of the game ("synchronised media components").

It must be possible to join a game session from a presented list, or – if authorised – initiate a new game session. Invitations to such new session can be sent to subscribers selected in some fashion, e.g.:

- present in entire network or in desired part of it,
- to entire list at once (parallel initiation) or to individual members one-by-one until a condition (e.g. number of players) is met (sequential initiation)

It must be possible to address presumptive players using their mobile number, their URL or an id of their choice.

At the game session set-up time, the application must check basic capabilities of the terminal (e.g. screen size) and adapt the game presentation accordingly. Some of the capabilities must be re-negotiated at regular intervals, e.g. in case that the radio bearer capacity changes.

The CDR's for each of the media components is collected and rated by the mobile operator. The rating mechanism is based on session and bearer level information, e.g. time and data volume.

The mobile terminal must have the game built-in or be capable of downloading, configuring and setting up the application client.

8.13 Server Based Gaming

8.13.1 Example Motivation

The gaming scenarios proposed in this section can be viewed to extend the previous basic scenario by organisation of the game by a service provider, which might, but does not need to be different from the network operator.

8.13.2 High Level Service description

A player is presented with video background corresponding to his position on the playfield. The exact position of the player, as well as positions of other players within the same area are also indicated, using individual symbols. During the game players interact with each other, overcome obstacles and are rewarded for reaching higher levels of difficulty.

Players can communicate with each other, using written messages or voice, without suspending the game.

A player can present himself to the other players using an id of his choice.

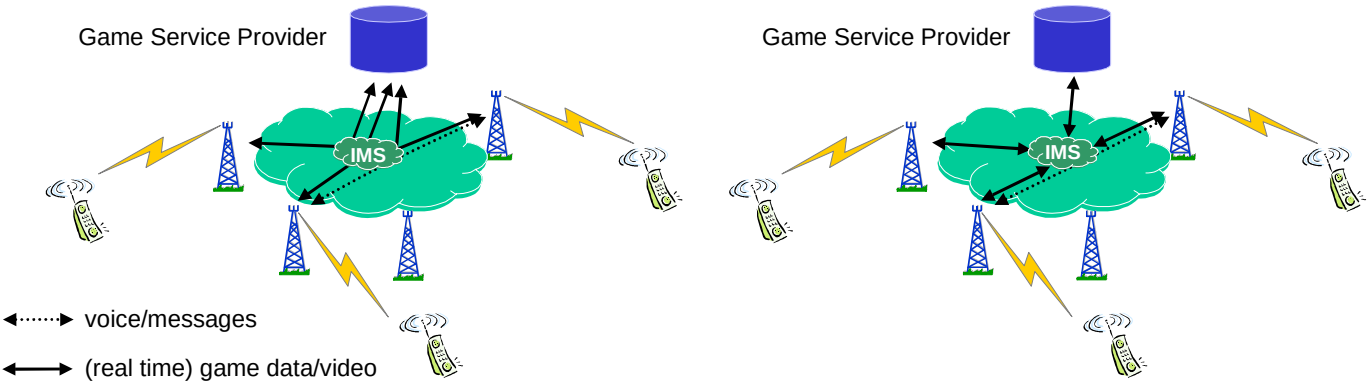

Figure 11: Alternative advanced scenarios

8.13.3 Relation to IMS

The IMS enhances the gaming experience by allowing multiple synchronised media components as well as by on demand adding and removing extra, e.g. voice and/or messaging media components.

In this advanced example, it the task of the IMS to allow users to locate and connect to the service provider.

8.13.4 Business Model

The game generates airtime in a PS network.

The players are charged by the network operator for session time and transferred data volume and/or charged by the service provider for session time and game events.

8.13.5 User Perspective

A player uses by default the keyboard and display of a mobile, however if the terminal has additional capabilities, such as colour display or querty-keyboard, the game will use these capabilities. The size of the presented playfield is adapted to the size of the mobile's display.

The player can use his mobile e.g. for answering incoming calls by temporarily suspending the game but without leaving it.

8.13.6 Service Specific Considerations

8.13.6.1 Initiation of a game session

An authenticated and authorised subscriber can either join a game session of his choice or create a new session. Such new session can be set up in a number of ways, e.g.

- by invitation, using id's, names or mobile numbers available in the mobile terminal
- a public session
- a session within a pre-set team
- a local, geographically limited session

In addition, the subscriber can limit the actual number of players.

8.13.6.2 Distribution of the game

To be able to participate in the game, a mobile subscriber connects to a download server and downloads an application client (common for many, if not all types of terminals). A game can therefore be started anytime and anywhere, with a minimum of effort.

As part of the game set-up in the terminal, the client requires authorisation to either use the current mobile account (post- or prepaid) or an account with the game SP (existing or new).

8.13.6.3 Marketing of the game

The game SP can subscribe to the most current information about subscribers of the mobile operator, fulfilling some set of criterions, such as subscription to other games, exceeding a pre-set spending limit or present in certain locations. This allows the SP to efficiently market the game to adequate audience.

A game advertisement will typically consist of a video push stream including a hyperlink. The user can obtain information about the game and set it up in his mobile simply by following the hyperlink.

8.13.6.4 Others

It is FFS whether it should be possible to join the game from a non-mobile terminal with multimedia capabilities.

8.13.7 Roaming Considerations

It is possible to participate in the game independent of the actual mobile network, providing that the network offers multimedia capabilities.

8.13.8 Charging and billing

Description

The game is charged based on session events (e.g. time) and application level information (e.g. results of the game). The players are rewarded and credited for reaching certain targets. Additional voice or messages are charged at service provider's rate.

The player can choose either to be billed by the game service provider directly or to add the charges to his mobile invoice. Possible game credits are immediately subtracted from the player's mobile account. A player can use a prepaid mobile subscription to cover game charges.

8.13.9 Generic Requirements

A mobile network, offering multimedia services, must provide access to a standardised set of Service Enablers.

It must be possible to create a gaming session, which may contain one or more media components providing connectivity with the other terminal(s) and the game server. The media components may include video, real-time data communication for updating the games status; and optional voice or messaging, for communication amongst players.

It must be possible to add and remove the optional media components on demand, with negligible set-up time ("synchronised media components").

At the game session set-up time, the application must check capabilities of the terminal and adapt the game presentation accordingly. Some of the capabilities must be re-negotiated at regular intervals, e.g. in case that the radio bearer capacity changes.

The game client must be able to seize and release terminal resources (display, keyboard) on demand.

It must be possible to join a session from a presented list, or – if authorised – initiate a new game session. Invitations to such new session can be sent to subscribers selected in some fashion, e.g.:

- present in entire network or in desired part of it,
- to entire list at once or to individual members one-by-one until a condition (e.g. number of players) is met

It must be possible to address presumptive players using their mobile number, their URL or an id of their choice previously registered with the SP.

The CDR's for each of the media components can be collected by the mobile operator. The rating mechanism must be based on bearer level information (e.g. resources requested or usage), session information (e.g. time) and application level information (e.g. game results). In case the SP caters for the billing, an on-line link between the SP and the mobile operators billing system is required.

The mobile terminal must be capable of downloading, configuring and setting up the application client, or as an alternative, to serve as a link to another terminal with such capabilities.

There must be possibility to set up a secure link between the application client and the authorising entity, whether belonging the mobile operator or the service provider.

It must be possible to sort mobile subscribers according to parameters such as Class of Service (CoS), information in the billing system or presence (attachment) in some location. It must be further possible to forward the identity of such subscriber to a service provider through an online link.

It must be possible to set up a push session from a video server (belonging to the SP), include hyperlinks in the push stream and to follow-up the hyperlinks. The hyperlink can originate a data call (download) or a voice call (to a call centre), possibly in parallel with the video stream.

Finally, it must be possible to charge both the push stream and the terminal originated follow-up session (e.g. a client download) to the SP if the SP wants to allow the user to try the game before purchase.

8.14 Mobile Virtual Private Network (Mobile Road Warrior)

8.14.1 Example Motivation

A mobile, location independent and ready to use access to the corporate information management systems (including e.g. e-mail, financial and logistic transaction systems, document stores as well as the voice communication system) is top priority of most corporate clients.

8.14.2 High Level Service description

A MVPN-service extends the desktop work environment to the mobile situation.

A MVPN offers secure single sign-on access to the company's information management systems, including access to filed documents, video clips (e.g. process descriptions) and real time transaction information, while mobile; optional ability to retrieve information while talking to company employees; and access to relevant information exactly when needed.

8.14.3 Business Model

In this scenario, a network operator offers some corporate customer a VPN-type access arrangement at agreed rating scheme. Such VPN arrangement includes access to the corporate gateway, but no services.

As an alternative, the offering could include mobile network specific services (e.g. location based services).

8.14.4 Relation to IMS

IMS offers possibility to set up a single session with the corporate environment and later use it for single or multiple media components, synchronised if of value. IMS also allows adaptation of rating arrangements, e.g. billing per transaction rather than billing per data volume or session time.

8.14.5 User Perspective

It is required that a single authentication and authorisation enables access to the full capabilities of the corporate environment.

Once the connection to the corporate systems is established, the user interface should not differ from that offered in desktop environment.

8.14.6 Service Specific Considerations

As a general requirement, no restrictions shall be imposed by being off-site.

It must be possible to address the corporate gateway using its E.164 or URL address. Once the sign on procedure has been completed, the addressing is transparent to the mobile network. A sign on shall remain effective until a deregistration has taken place, either due to sign off or due to time out.

It is desirable that the corporate customer shall be able to add a new user to the service and change the authorisation of a user to use different media components and/or possible additional services.

The corporate customer shall, as a minimum be able to activate and deactivate a known user's access to the service.

It shall be possible to adopt the security of the access to the security of the customer's corporate environment.

8.14.7 Charging and billing

It shall be possible to combine time-based and volume-based charging for each of the applicable media components. It shall further be possible to agree on chargeable evens between the operator and the corporate customer.

It shall be possible to assemble an arbitrary number of MVPN users on one invoice.

The operator shall be able to supply charging information to the customer on line.

8.14.8 Roaming considerations

It shall be possible to use the MVPN-service in home or visited networks.

8.14.9 Generic Requirements

FFS

(Requires secure bit pipe to company Intranet gateway, allowing multiple simultaneous media components of various QoS. The mobile terminal needs the possibility to be a member of a company VPN with regard to charging, billing, numbering and user administration.)

Editorial comment: enhance above example to include location service capabilty?

8.15 Local Services

8.15.1 Motivation

IMS architecture is characterized by service control by Home Environment allowing operators to create more advanced services. While this is beneficial for most services, additional consideration must be given for services offered locally also when roaming.

8.15.2 High Level Service Description

When a user powers-on her phone where coverage is provided, the phone will select an appropriate network according to the 3GPP network selection algorithms found in 22.011. A few seconds after the user has successfully registered on a new network it shall be possible for the local network operator to provide a "Welcome" message to the user. There is a clear market need for this as witnessed by a number of networks now sending SMS "Welcome" messages to roaming users logging on for the first time.

This "welcome" message may contain links to services offered locally from the serving network, such as "Find a nearby Thai Restaurant". These links may be based on phone browser technology, or embedded addresses (such as phone numbers or SIP URLs).

At this point the user shall have the opportunity to cancel/delete the "welcome" message, however it shall be possible for the user to return to this "welcome" message at a later point should she wish to.

Case is about local numbers with specific charging.

A subscriber has restricted his access to premium rate services (e.g. 0600-numbers). He travels abroad and calls to local American Express freephone number 0800-123123, the call is managed by IMS.

The same scenario can be applied to home subscribers.

8.15.3 Relation to IMS

This is a variation of basic IMS voice call where information from both home environment and visited network information is required for call routing and charging.

8.15.4 Potential Revenue Streams (Business Model)

Offering of local special rate and other services also for roaming users in a same way as for local subscribers.

8.15.5 User Perspective (User Interface)

User dials the local number using local numbering plan.

The user might also get information about the tariff of the call.

Note: TBD, if user needs to select if call is routed via CS or IMS.

Note: it is assumed that current GSM principle is applied also in IMS, i.e. the user is assumed to dial always the local number if country code is missing. In case of calling to home network from abroad, a country code of the home network shall be included.

8.15.6 Service Specific Considerations

Call/session establishment and progress like as in basic voice call.

For routing purposes local numbers must be recognized.

For charging and home environment specific service logic (e.g. barring of premium rate numbers) purposes home environment must be aware of charging and/or a type of service applied.

The local services may utilise some local information from network e.g. geographical location data or network topology awareness.

8.15.7 Charging and Billing

American Express pays to the roamed to network operator for providing access to the service. The details of freephone call charging are outside of this example.

Both the prepaid and postpaid charging method must be supported.

8.15.8 Roaming Considerations

Local services are available in a same way for both local subscribers and inbound roamers.

8.15.9 Generic Requirements (for this service)

Authorization of local services should be under control of the home network operator.

<< Editor's note: can a more appropriate term be found for "authorization"? >>

8.16 Presence Service

8.16.1 Motivation

The use of presence-enabled information, as may be seen in the Internet popularity of Instant Messaging, is foreseen to emerge as a key new source of traffic and revenue.

The Presence Service offers both a service and a capability that can be exploited to create additional services. The types of services that could be supported by the presence service may include:-

- New communications services

  The presence service will enable new multimedia services to exploit this key enabler to support other advanced multimedia services and communications. These new services may infer the context, availability and willingness of a user to accept or participate in particular types of communications by accessing the presence information for the user's devices and services. Examples of such new multimedia services that could potentially exploit the presence service include "chat", instant messaging, multimedia messaging, e-mail, handling of individual media in a multimedia session etc.

- Information services

  The presence service may also be exploited to enable the creation of services in which abstract entities are providing the services to the mobile community. The presence service may be used to support such abstract services as cinema ticket information, the score at a football match, motorway traffic status, advanced push services etc.

- Enhanced existing services

  Existing wireless services may also be significantly enhanced by exploiting the presence information. For example a user may dynamically arrange for his wireless services to be supported through his corporate PABX whilst he is on-site, require media to be converted and directed to specific devices (e.g. user cannot accept a voice call whilst in a meeting, but is prepared to receive the voice call converted to text in the form of an SMS/MMS/e-mail message). The presence service may also be used to enable the creation of advanced versions of CS/PS services, enable terminal capabilities support etc..

8.16.2 High Level Service Description

A presence-enabled service as observed by the user is a service in which the user can control the dissemination of his presence status information to other users and services, and also be able to explicitly identify specifically which other users and services to which he provides presence status. Combined with the capability of other users' control of their own presence status, virtually infinite combinations of users and services interacting at different levels can be created.

The network, or a designated entity, maintains presence information for users, devices, services and indeed any abstract entity that it wishes. The network maintains, and controls access to, the presence information from suppliers of presence information and requesters of presence information. Owners of presence information can control the granularity (if any) to which requesters its presence information may have access. Requesters of presence information may request presence information on demand, periodically on a change in any presence information. Presence information shall be exchanged interoperably with suppliers and requesters which may be within the operator's network, in a visited network (i.e. roaming scenarios), as well as from fixed networks (e.g. the Internet).

The presence service can be supported as a capability to other services, as well as a service in its own right.

8.16.3 Relation to IMS

It shall be possible to access the presence service and presence capabilities via the IMS.

8.16.4 Potential Revenue Streams (Business Model)

The network operator may receive revenue from subscribers directly as a subscription option or as part of the subscription package to support their services with presence information (i.e. provide a presence capability). Similarly,

network operators may also receive roaming revenue from subscribers roaming from other networks; network operators will pay other networks for roaming of own subscribers similarly.

Network operator may receive additional revenue from authorised third parties to supply and access presence information (i.e. provide a presence service)., e.g. provide traffic information, sporting results, headlines, theatre ticket availability etc.

8.16.5 User Perspective (User Interface)

The user's main interface will be to the terminal device. The terminal device's interface (e.g. menu, key functions, display etc) is proprietary to the terminal manufacturer, however, the interaction of the terminal device with the network will need to be standardised.

The user may also access presence service information and use the presence capability via other access mechanisms (i.e. via the Internet).

8.16.6 Service Specific Considerations

The following administration requirements shall be supported.

8.16.6.1 Provisioning

Provisioning is an action taken by the service provider to make the presence service available to a presentity or watcher. Provisioning may be:-

- General: where the service may be made available to all presentities or watchers without prior arrangements being made with the service provider.
- Pre-arranged: where the service is made available to an individual presentity or watcher only after the necessary arrangements such as login name, password have been made with the service provider.

Editor's note: The terms "Presentity", and watcher needs to be defined.

8.16.6.2 Withdrawal

Withdrawal is an action taken by the service provider to withdraw the presence service from the presentity or watcher. Withdrawal may be:

- General: where the presence service is removed from all presentities or watchers
- Specific: where the presence service is removed per presentity or watcher.

8.16.6.3 Activation

Activation is an action to initiate usage of the presence service by the presentity or watcher, after having been provisioned.

8.16.6.4 Deactivation

Deactivation is an action to terminate usage of the presence service by the presentity or watcher.

8.16.6.5 Presentity privacy

The presentity shall be able to grant permission to access its presence information. The presentity shall be able to authorise the presentity's presence information access, per watcher or per group of watchers, with different levels of authorisation for a definitive period of time or on demand.

8.16.7 Charging and Billing

The presence service shall be able to support various charging mechanisms, including:-

- charging for a user's registration as a presentity

- charging for each subscription to presence information for a user
- charging for presence information retrieval for users
- charging for presence information notifications received for users
- charging for presence information usage when in a visited network

The above list is not exhaustive.

8.16.8 Interworking with Other Services

The user shall be able to use both the presence service and presence capabilities with other services at the same time (e.g. supplementary services or IP multimedia services).

8.16.9 Roaming Considerations

The presence service shall provide the ability for the network operator to manage the presence information of users' devices, services and service media when roaming. It shall be possible for visited networks to both request and provide presence information to the presence service to the user's home network.

8.16.10 Generic Requirements (for this service)

As for Basic Voice and Videophone

8.17 Instant Messaging

Text to be provided by (Comverse?)

8.18 Prepaid Service

Prepaid service is viewed by many service providers (carriers) as a critical component of a full service offering. It is therefore considered important that IP based multimedia services support prepaid capability. This section is intended to validate the needed billing and charging mechanisms to do so are provided.

Text to be provided (BT?).

8.19 Downloading Multimedia Objects

A user is browsing using the built-in browser on her 3GPP phone, and finds a music download page. She is able to download music samples and listen to them locally. She is also able to program them into her phone for use as ringtones. It shall be possible for operators and third parties to offer download of music objects for playing and storage irrespective of the manufacturer or model of UE. Such music objects may be of monophonic or polyphonic nature.

The same scenario shall apply to downloading of graphics for "screen saver", "wallpaper" and "skin".

8.20 Interactive Customer Care Services

A user is having difficulty with her phone MMI and something is not working properly. The user calls Customer Services. The Customer Services representative is able to scan the current UE settings, given permission by the user. The Customer Services representative is able to determine that the user has changed the ringtone volume to zero. The Customer Services representative is able to increase the ringtone volume, without needing a tailored system for specific manufacturers or models of UE.

8.21 Multimedia group call, multimedia broadcast call

8.21.1 Example motivation:

8.21.1.1 Service description:

This service is an improvement of the already existing voice group call, voice broadcast call services in the GSM world. The mobile operator would offer it. With this service multimedia information could be broadcasted from a central point, a server, to a professional group (policemen, firemen) or exchanged between the members of the group. Application of such a service could be the transmission of the picture of a suspected person to security forces, and following exchange of information between police agents, or sending of traffic information to a transport company personal.

8.21.1.2 Monetary flow:

The professional group is charged from the mobile operator.

8.21.1.3 Relation to IMS:

The IMS enables the transmission of voice enhanced video information to the professional group.

8.21.2 Running the multimedia group call:

8.21.2.1 Description:

During the call, some end users can receive and send multimedia information between each other or from/to a fixed server. Some others may just be able to receive the information.

8.21.2.2 Requirements:

Requires the possibility to build up a multimedia conference between mobile UMTS subscribers or between UMTS subscribers and a server. Requires also the multicast functionality, to subscribers, which cannot take part actively to the conference.

9 Systems Engineering Considerations

End to end systems engineering considerations are provided
(An overview of how functionality is provided with respect to the following topics)
<< to be provided >>

9.1 Customer Care

<< to be provided >>

9.2 Operations, Administration, Maintenance

(Network Care)

<< to be provided >>

9.3 Service Control

<< to be provided >>

9.4 Charging and Billing

<< to be provided >>

9.5 Consistent Delivery of Basic Services

<< to be provided >>

9.6 Capability Discovery and Service Negotiation

<< to be provided >>

9.7 End to End Quality of Service

<< to be provided >>

9.8 Interoperability Between Various Mechanisms

<< to be provided >>

9.9 User Control

<< to be provided >>

9.10 Security

<< to be provided >>

9.10.1 Integrity

9.10.2 Authentication

9.10.3 Authorization

9.10.4 Privacy

9.11 Interworking

<< to be provided >>

9.11.1 2G / 3G Interworking

<< to be provided >>

9.11.2 GSM / IS-41 Interworking

<< to be provided >>

9.11.3 Interdomain Interworking

<< to be provided >>

9.12 Handover

<< to be provided >>

9.13 Roaming

<< to be provided >>

9.14 Access Network Considerations

Different access networks will enable services to varying degrees.

To be further elaborated upon.

<< to be provided >>

10 Enablers

<< to be provided >>

10.1 Toolkits

<< to be provided >>

10.2 User Devices

<< to be provided >>

10.3 Network Architecture

<< to be provided >>

10.3.1 Radio Access Network

10.3.2 Core Network

10.4 Protocols

<< to be provided >>

11 Generic Requirements Cross Reference

Note: to be reworked after services examples are further elaborated upon.

Providers of examples are encouraged to provide material for this table.

<< Editor's note: provide as an embedded Excel spreadsheet >>

Generic Requirements	*basic game*	*advanced game*	*mobile road warrior*	*other examples*	*LS to*	*OK?*
create a session containing one or more media components	x	x	x		SA2	
terminate a session	x	x	x		SA2	
add and remove media components, with negligible set up time	x	x	x			
negotiate capabilities of the terminal, at session set up and at modifications	x	x	x			
join an ongoing session from a mobile or non-mobile (FFS) terminal	x	x	(x)			
invite to a new session						
• generally, based on the location or on membership in a list	x	x	x			
• individually, sequentially or in parallel	x	x	x			
address users using the mobile number, URL or id of choice	x	x	x			
rate media components based upon connection time, data volume, application events ….	(x) time /vol ume only	x	x			
charging & billing						
• originating or terminating entity		x	x			

• pre-paid or post-paid	x	x	x		
• by network operator or by service provider		x	x		
download, configure and set up an application (client) in a terminal	x	x			
authorise a terminal or a terminal based client (e.g. assign identity using a secure link)		x	x		
single sign-on access			x		
seize and release terminal resources (display, keyboard) on demand		x	x		
provide subscriber data to a service provider, sorted by CoS, billing information or location		x	x		
enable a push session originated from a server owned by a Service Provider		x	x		
allow sending hyperlinks to terminals, pointing at E.164 numbers, URL's or SP-owned id's		x			

12 Verification

Editor's note: this section will provide an explanation of how the various enablers meet the requirements of IP based multimedia services (as identified in the previous sections).

either

- enough Service Enablers, or
- missing Service Enablers to be identified and S2 informed about the need
- additional aspects to be defined for Service Element n

Annex A (informative): Change History

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	Work Item
			22.941					Rapporteur's initial draft skeleton		0.1.0	
								Addition of Initial Services Examples (S1-010383) from Tempe IMS adhoc meeting		0.2.0	
								Comments from 5/9/01 IMS drafting adhoc, Helsinki		0.2.1	
								Comments from 5/10/01 SA1 plenary, specification -> report, added Instant Messaging		0.2.2	
								Added emailed contributions on: Sections 8.1, 8.2, 8.9 (BT) 7.1 folded in 8 (editor) 8.10 (Nokia) 8.5.1 (Nokia)		0.2.3	
								Added email contribution on: Section 8.8 (Ericsson)		0.2.4	
								Added Comments and contributions from June Dallas Adhoc, including: Section 8.3 (AWS) Section 8.4 (AWS) 8.5.4 Lawful Interception (Rogers Wireless) Calling Party and Connected Party Anonymity (Rogers Wireless)		0.2.5	
								Additional comments provided by Dallas SA1 IMS adhoc drafting session.		0.2.6	
								Final output from Dallas SA1 IMS adhoc + Mobile Number Portability (Rogers Wireless) + additional editorial improvements		0.3.0	
								Output from Lake Tahoe Framework adhoc. Restructuring,refinement of examples, additional examples.		0,4.0	
								Removal of hidden text		0.4.1	

Annex B (informative): Additional Service Examples

Editor's note: those examples below that are elaborated upon in the body of the document should be deleted from the appendix. Remaining examples (and further examples) should be retained in the appendix.

Additional examples to be provided for:

Streaming

MultiMedia Messaging (including MMS, Push)

Selected representative IP based multimedia services, to be used for validation of requirements and capabilities, are described in the body of this report. It is anticipated that many additional services will be enabled by the capabilities developed. This appendix provides additional examples of basic and advanced IP based multimedia services for consideration. Note that this list of services is not intended to be exhaustive or complete, but rather only to provide further service examples for consideration.

1 Mobile Internet Access

A service that offers mobile subscribers access to full fixed Internet Service Providers. The offered transmission quality and functionality offered by the service shall be near-wireline. Web-casting multi-media to multiple parties.

Examples are:-

MP3 download

Background download of mp3-files from a remote server with an option to follow the progress of the download by command if the user requires. Per song charge.

MP3-downloads without UE being tied up during the transfer. Downloads are charged per song, including no charge in the case of an unsuccessful transfer.

The network must be able to deliver two or more independent simultaneous media streams to the same UE. The UE has to be able to handle two sessions at the same time. Ability to assign UE resources to either session.

2 Customised Infotainment/Edutainment

Customised Infotainment is a service which provides device-independent access to personalised content (like advertisements, Information Services, communities, etc.) anywhere, anytime via structured-access mechanisms which will allow also the support of services like mobile commerce, mobile chatting. (e. interactive entertainment). Personalised multimedia services.

Examples are:-

Games may be downloaded – need to attract the game development community

Games may be loaded at point of sale or other outlets

Interactive remote learning

Multiplayer mobile gaming with voice channel
Shoot-n-Shout is a team competition where you simply shoot down the members of the competing teams. At a web/WAP service operated by the game application provider, interested potential players can choose a game session and also find other gamers to form a team with. There is a text chat service where potential teammates can learn to know each other. Teams can prepare a game strategy in advance through the text chat service, but when in the battle they need a faster way of communication. There is a conference/chat service where all players can talk (or rather shout) to each other in a “common room” and one "private room" for each team. Players in a team can also dynamically create more "private rooms" if they only like to talk to one (or a few) of their friends. The volume (and stereophonic position) of the players voices when they are using the "common room" is controlled so that it matches the virtual surroundings in the game environment, e.g., players that are behind a wall will only be heard as a vague whisper in the distance.

The Real Virtual Theatre and Foyer Chat room
A group of people is watching a theatre play and is utterly fascinated by the first act. Bob, a friend of theirs, is in a hospital bed and they really want to share this first act with him since they know Shakespeare’s Midsummer Night’s Dream is his favourite. Bob uses the theatre’s online streaming service via the hospital network, displaying in colour and stereo surround sound on his bedside TV set. In the break his friends call him up from the theatre chat room equipped with 3D sound pick up and local display screens with streaming facilities. They set up the streaming from one of the screens to be synchronised with Bob’s bedside equipment. Their voices are also mixed into the sound streams as they talk. Bob now gets both the playbacks from the first act and his friends’ voices in 3D-surround sound. Bob’s voice is projected close to the screen as if he was standing leaning on the bench right there. His voice is very clear and full of emotions as he speaks to the various playbacks. Both parties can control the playbacks and watch their own selection in a second window on the screen.

3 E-commerce and m-commerce

Examples are:-

Follow-up of a push service

A presentation of a push announcement (e.g. based upon the user's location) can be followed up either by a voice call, using a hyperlink included in the announcement, or by an on-line m-commerce transaction. The originator of the push announcement will increase the yield of the campaign by allowing spontaneous purchases or by connecting potential buyers to a sales rep. The receiver of the push can focus on the content of the announcement rather than on how to use it. The push originator must be able to authorise the receiver to make a voice call or to perform an on-line transaction at the cost of the push originator. The push receiver's UE and network connection must be able to handle a voice call or an m-commerce transaction while receiving a push announcement. It must be possible to split charges for the call/transaction as required by the push originator, e.g. to reverse call charges.

In-store personalised shopping

Matuma is engaged in a mobile call to her mother. She goes into her local shopping mall, on entering the mall she receives information (e.g. pushed advertising information) from the store's web network on special offers (for grocery, hardware etc). Based on the advertisement she can order her goods (whilst discussing them with her mother and letting her see the goods on offer). She pays for the goods via her mobile account, and picks up her goods before leaving the store. Based on her personalised user profile Matuma only receives mall information that is of interest.

Multimedia customer care

User calls his customer service centre/repair centre to query the contents of an invoice. The invoice is shared between the two parties and modifications made online, and agreed to automatically debit from the customer's mobile services account.

4 Multimedia Messaging Information Service

Non-realtime, person-to-box type services. These services include real-time multimedia messaging services, instant messaging services (due to the always-on capabilities), messaging services target for closed user groups, specific communities defined by the service provider or the user (e.g. unified messaging).

Examples are:-

The user is idle in a network and not involved in a communication. The user modifies his user profile to divert all voice communications other than those from high priority, pre-identified callers (e.g. his boss). In this scenario all emails and text messages continue to be received regardless of the sender.

Mobile synchronised multimedia messaging container

Bill is on a business travel to Spain. He calls his wife Christine every night using his terminal. This evening Christine has been at a restaurant with a friend. When Bill is calling, she is sitting on the commuter train on her way home. Today, their talk starts off as a common voice conversation. After a while Bill likes to show Christine the lovely sunset view that he can see from his hotel room, so he takes some snapshots with the built-in camera of his terminal and sends them in real-time mode to Christine. Christine likes to show one of them to their little daughter Linda when she comes home. With a quick gesture on the touchscreen of Christine's terminal, she instantly moves the selected picture from the real-time session window to the "multimedia container" icon. All the contents of the "container" is automatically mirrored between the terminal and her home server. In this way, Christine can easily pick up the picture from her Screenphone at home. If Linda is asleep when Christine comes home, she can wait until tomorrow.

5 Location Based Services

These services offer the possibility to users or machines to find/locate other persons, machines, vehicles, resources and also location-sensitive services, as well as the possibility for users to track their own location.

Examples are:-

Traffic congestion monitoring

The user is able to download colour congestion maps showing the current traffic troublespots, with alternative routes highlighted dependent on the user's specific destination.

Interactive traffic info and Route Butler

Based on the user's location, current traffic information is downloaded specific to the user's personalised location, and alternative routes displayed on maps and verbally presented to the user to avoid delays.

Where is the nearest Pizza Parlour?

The user is informed, via maps and audio guidance, the exact route to the nearest place to buy his favourite pizza

Lost in London

Two friends who have become separated, are automatically located, and instructions/maps/verbal guidance given to find each other again

Emergency location with voice conversation, navigation and picture transfer
A family is out driving in the countryside and slide down into the ditch. Bobby the dog in the back of the van gets a heavy box of books on top of his left paw, which may be broken. The rest of the family is ok. Ma Beth calls 112. The answer comes after 23 seconds and the operator immediately confirms the identity and the location of the van. Ma Beth states the problem and gets connected to a vet who asks a few pertinent questions. She can show a close up picture of the dog's left paw and the vet confirms a possible (95%) broken leg just above the paw. He gives a few quick instructions and sends her a map of the closest emergency animal hospital. The map shows her current position and soon displays the quickest way to get to the hospital. She can now drive there and make the right turns at every corner. Once there, Bobby is taken care of and things are looking up.

Location Based Charging

Jane is billed the same low "Home Zone" flat rate if she uses her cell phone at home, at her mother's house, or work. Outside of these areas she is billed at a higher rate. Her phone indicates if she is in her "Home Zone", and it warns her if she roams outside the "Home Zone" while a call is in progress.

6 Conversational Services

High quality, person(s)-to-person(s) types of services. The conversational services are real-time and two-way. It provides advanced voice capabilities (such videotelephony), voice activated net access, and Web-initiated voice calls), while still offering traditional mobile voice features (such as operator services, directory assistance and roaming). As the service matures, it will include mobile videophone and multimedia communications.

Note that simple voice service and videophone service are examples of conversational services that are articulated in detail in the body of this report.

6.1 Simple Voice Service

6.2 simple videophone service

6.3 group browsing

(including audio/video streaming) whilst in tele- or video conference

sending pictures, video clips, text messages, documents or emails in real-time during a call

e-Postcard

This service allows a photo from a digital camera to be sent to a person while talking to her. The service guarantees delivery of the photo without noticeable delay. The service is charged per picture.

The user can significantly enhance presentation of an event or a situation by providing visual information in parallel to the verbal description.

It must be possible to attach a non-SIM peripheral (e.g. digital camera) to an UE and use that peripheral for activation and deactivation of the service. It must be possible to negotiate set-up time and other relevant attributes of the e-postcard media stream to present it without delay from the user's point of view.

Mixed media interactive communication.

A subscriber receives an urgent voice call but in currently in a situation where a verbal response is not suitable (e.g. in a meeting). Using a "special answer" option on the UE, the subscriber could accept the audio portion of the incoming call (probably delivered via an earpiece) but would only reply in a textual fashion (e.g., instant messaging). In this manner, the subscriber could listen to the incoming voice call and generate responses without interrupting or disturbing the meeting in progress.

Multimedia Based Voice Response Unit

A customer places a voice call to the customer service centre. Instead of connecting the customer to an audio unit that plays announcements and prompts for input, the current session is switched from a voice call to an interactive "data call". During this interactive "data call", textual and/or graphical representation of the various options are provided to the subscriber's UE. The customer can then browse through the choices and select the desired service. After selection by the customer, the current connection may again change media (e.g., switch back to voice call, receive a streaming video).

The user is in a voice communication, and receives an incoming IP video communication. The user decides not to accept the communication, but diverts the incoming video to a messaging system. Further, the user is given an indication that there is a video message in his mailbox

Videophone Service (Voice & video calls to/from other IMS networks & other capable networks)

On receiving a communication, the calling party's identity is displayed (if not restricted) and user shall be able to decide whether to accept the communication, or divert to a messaging system. The user shall be able to request media handling of the communication (e.g. media splitting to different destinations, media conversion).

Stereo sound (nuances, character of voice plus positions, sound-scapes)
A purchase Officer, Gustavo participates in a conference to discuss purchase of a new kind of steel for the factory in Rio. As he is on the road he calls from his hotel room in Sydney. The conference is in the head office in Rio. The local department has invited the two final contenders to have them argue their cases. The two companies are positioned at the different ends of the table. One of the groups is presenting and mentions something about deliveries. A side remark is barely audible, "we can't deliver that quality and that quantity this year !" Who made this remark? The excellent sound quality together with the stereoscopic sound gives Gustavo the information he needed. It was the other group that made the remark. The decision was made for him at that point. He gave the order to the presenting group right after they finished a very good presentation that told him everything he wanted to hear. The set-up at the head office was done with two synchronised 3G phones at each end of the table.

Conference/chat with "private rooms"
A project team has one of their weekly reporting meetings using their mobile communicators. In the middle of the meeting, Rick and Diana get lost in a lengthy argument that bores the rest of the team. Ted, the moderator, finds that it is nevertheless necessary to give Rick and Diana some minutes to finish their discussion, so he decides to not interrupt them. At the same time Sven remembers that he need to remind Liu to send a report to him on the latest findings from her research work. The team use a conference/chat service with the new facility "private rooms". Sven activates easily this feature by the GUI of his communicator. Liu is immediately notified by the GUI of her communicator that Sven is now talking privately with her (this is necessary to avoid embarrassing misunderstandings that could occur if Liu were to answer Sven in the "common room" instead of in the new "private room" that Sven has created). Since the voices of all conference members are synthetically mapped in a stereophonic projection, Liu is able to hear what Sven is saying, even though he speaks simultaneously with the other team members (the communicator will not automatically adjust the sound volume of the "common room", since it cannot know if Liu is more interested in Sven's comments or in continuing to listen to the other team members). This service thus emulates virtual presence in a conference room. The synthetic stereophonic sound projection provides good possibilities for a conference member to discriminate unwanted voices even if everyone is talking at the same time.

Application sharing with voice commentary
Marketing Manager, Rita launches a new campaign for some customers in London. Last minute feedback is that one of the customers is expecting the latest gadget to be included, even if it's only a prototype. Rita knows it's not included in the presentation and she has no information with her. Rita calls Jones, the media guru they employed for design of their important presentations. He has the information and some pictorials. He sends them over into Rita's PowerPoint application and they edit the new slide together as they discuss the textual information to be included. The process is

extremely interactive and the session takes only 5 minutes thanks to the broadband connection and the fact that they don't need to Ping-Pong the pictures and the text back and forth. The customer is happy and a Letter of Intent is signed.

7 Phone to Phone Object Transfer

User A needs to set up an appointment with User B for a meeting. This meeting is about a particular building project and User B needs to review the plans before the meeting. User A is able to send an appointment request to User B via the network, including an attached object which is the building plans. User B can transfer the appointment and object to their own UE-based calendar.

8 Phonebook Synchronisation

A user receives an SMS from a colleague saying that their phone number has changed. The user is able to update their local phonebook without needing to write the details down on a piece of paper in the meantime. Their local phonebook is now unsynchronised compared with their "backup" copy in the network. The user is able to initiate synchronisation with the network copy. It shall be possible for network operators and third parties to offer backup of phone data without a need to tailor this to specific manufacturers or models of UE.

Annex C (informative): IP Based Multimedia Services Roadmap

<< to be provided >>