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Technical Specification

**Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
Service requirements for the Internet Protocol (IP)
multimedia core network subsystem (IMS);
Stage 1
(3GPP TS 22.228 version 8.5.0 Release 8)**

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Contents

Foreword

This Technical Specification (TS) 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:

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1 Scope

This TS defines the service requirements from users" and operators" perspective for the support of IP multimedia applications through the IMS.

IP multimedia applications are supported by IP multimedia sessions in the IM CN Subsystem. IP multimedia sessions use IP connectivity bearers (e.g. GPRS as a bearer). Examples of IP multimedia applications include speech communication, real time multimedia applications, shared online whiteboards etc.

This TS, in general, does not standardise usage of IP multimedia applications, but instead identifies the requirements to enable their support.

In order to align IP multimedia applications wherever possible with non-3GPP IP applications, the general approach is to adopt non-3GPP IP based solutions.

The existing legacy tele- and supplementary services shall not be re-standardised as IP multimedia applications, and multimedia equivalent applications may be created with toolkits.

2 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*.

2.1 Normative references

[1] 3GPP TS 22.003: " CS Teleservices supported by a PLMN".

[2] Void

[3] Void

[4] Void

[5] 3GPP TS 22.101: "Service principles".

[6] Void

[7] 3GPP TS 22.146: "Multimedia Broadcast/Multicast Service; Stage 1"

[8] Void

[9] RFC 3261: "SIP: Session Initiation Protocol"

[10] 3GPP TS 22.078: "; Customised Applications for Mobile network Enhanced Logic (CAMEL); Service definition – Stage 1"

[11] 3GPP TS 22.057: "; Mobile Execution Environment (MexE); Service description, Stage 1"

[12] 3GPP TS 22.038: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage 1"

[13] 3GPP TS 22.127: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Stage 1 Service Requirement for the Open Service Access (OSA)

[14] 3GPP TR 21.905 : "Vocabulary for 3GPP specifications"

[15] RFC3966: "The tel URI for Telephone Numbers"

[16] 3GPP TS 22.240: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Service Aspects; Stage 1 Service Requirement for the 3GPP Generic User Profile (GUP)"

[17] ETSI ETS 300 284: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Service description"

[19] ETSI TS 102 424: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements of the NGN network to support Emergency Communication from Citizen to Authority"

2.2 Informative references

[18] GSMA PRD IR.34: "Inter-Service Provider IP Backbone Guidelines"

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this TS the following definitions apply:

Access independence: the ability for the subscribers to access their IP Multimedia services over any access network capable of providing IP-connectivity, e.g. via:

- 3GPP accesses (e.g. E-UTRAN, UTRAN, GERAN)
- Non 3GPP accesses with specified interworking (e.g. WLAN with 3GPP interworking, DOCSIS®, WiMAX™ and cdma2000® access)
- Other non 3GPP accesses that are not within the current scope of 3GPP (e.g. xDSL, PSTN, satellite, WLAN without 3GPP interworking)

Conference: An IP multimedia session with two or more participants. Each conference has a 'conference focus'. A conference can be uniquely identified by a user. An example for a conference could be a multimedia game, in which the conference focus is located in a game server.

Conference Focus: The conference focus is an entity which has abilities to host conferences including their creation, maintenance, and manipulation of the media. A conference focus implements the conference policy (e.g. rules for talk burst control, assign priorities and participant"s rights).

IM CN subsystem: (IP Multimedia CN subsystem) comprises of all CN elements for the provision of IP multimedia applications over IP multimedia sessions

IP multimedia application: an application that handles one or more media simultaneously such as speech, audio, video and data (e.g. chat text, shared whiteboard) in a synchronised way from the user"s point of view. A multimedia application may involve multiple parties, multiple connections, and the addition or deletion of resources within a single IP multimedia session. A user may invoke concurrent IP multimedia applications in an IP multimedia session.

IP multimedia service: an IP multimedia service is the user experience provided by one or more IP multimedia applications.

IP multimedia session: an IP multimedia session is a set of multimedia senders and receivers and the data streams flowing from senders to receivers. IP multimedia sessions are supported by the IP multimedia CN Subsystem and are enabled by IP connectivity bearers (e.g. GPRS as a bearer). A user may invoke concurrent IP multimedia sessions.

Further definitions are given in 3GPP TR 21.905 [14].

3.2 Abbreviations

For the purposes of this TS the following abbreviations apply;

BVC Basic Voice Call
DOCSIS® Data Over Cable Service Interface Specifications
WiMAX™ Worldwide Interoperability for Microwave Access
NOTE: WiMAX™ is a trademark of the WiMAX Forum
DOCSIS® is registered trademark of Cable Television Laboratories, Inc.
cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA)

4 Introduction

IP has opened up a whole range of communication applications, which may allow operators to develop totally new value added applications as well as to enhance their existing solutions. The open architecture and platforms supported by IP and operating systems may lead to applications and new opportunities that are more difficult to replicate using a standard switched centralised solution.

A complete solution for the support of IP multimedia applications (including voice communications) shall be available. The solution consists of UEs, GERAN or UTRAN radio access networks and GPRS evolved core network. One of the main objectives for 3GPP specifications is to ensure that the availability and behaviour of these IP applications when used via the 3GPP mobile access is at least as good as when used via other mobile access types.

5 High level requirements

Support for IP multimedia sessions shall be provided in a flexible manner to allow operators to differentiate their services in the market place as well customise them to meet specific user needs. This shall be provided by the use of service capabilities in both networks and terminals, for the creation and support of IP multimedia applications.

The following high level requirements shall be supported for IP multimedia applications:-

- Negotiable QoS for IP multimedia sessions both at the time of a session establishment as well as during the session by the operator and the user

- Negotiable QoS for individual media components in an IP multimedia session both at the time of establishing a media component as well as when the media component is active by the operator and the user

- End to end QoS for voice at least as good as that achieved by the circuit-switched wireless systems shall be enabled

- Support of roaming, negotiation between operators for QoS and for Service Capabilities is required. Such negotiation should be automated rather than manual, e.g., when another operator adds new service capabilities.

- Support of roaming and interconnection shall include the capability for media to be routed optimally between IMS operators, i.e. according to criteria set by the operators.

- Possibility for a network operator to implement IP Policy Control for IP multimedia applications.

- IP multimedia sessions shall be able to support a variety of different media types. A set of media types shall be identified to ensure interoperability (e.g. default codec selection and header compression).

- Within each IP multimedia session, one or more IP multimedia applications shall be supported. It shall be possible to support multiple IP multimedia applications to efficiently provide a coherent and consistent IP multimedia service experience. Such support involves identifying which applications are invoked per subscriber, understanding the appropriate order of the set of applications, and resolving application interactions during the session.

- The possibility for IP multimedia applications to be provided without a reduction in privacy, security, or authentication compared to corresponding packet switched and circuit switched services.

- IMS shall be capable to provide transcoding (at least for vocie sessions) where needed when two UEs do not support a common codec.

- Interconnection between two IMS domains shall be supported.

Note: see also Section 10

- Roaming shall be supported enabling users to access IP multimedia services provisioned by the:

  - Home Environment

  - Serving Network

- The principle of access independence shall be supported. It is desirable that an operator should be able to offer services to their subscribers regardless of how they obtain an IP connection (e.g. E-UTRAN, UTRAN, GERAN, fixed lines, LAN, DOCSIS®, WiMAX™ and cdma2000® access).

  Note: Access independence principle can only be ensured by 3GPP for the access technologies 3GPP has defined or has defined specific interworking.

- It shall be possible for the users to access IM CN via an IP connection (e.g. GPRS, fixed lines, LAN) with Network Address Translation (NAT) deployed.

- It shall be possible to support session-related internet applications that have been developed outside the 3GPP community.

- It shall be possible to limit the view of an operator''s network topology to authorised entities.

- It shall be possible to support the multiple UEs associated with a single IMS service subscription. It shall be possible to share one Public User Identity between multiple UEs. It shall also be possible to identify the individual UEs with separate Public User Identities. IMS shall be able to route sessions towards the identified UE(s), e.g. based on UE capability, User preference and/or Network preferences.

- It shall be possible for a service to identify and interact with a specific UE even when multiple UEs share the same single Public User Identity. A UE shall be capable to identify and interact with a specific UE even when multiple UEs share the same single Public User Identity, except when the UE supports only limited capabilities and thus is unable to become engaged in a service that requires such functionality. Examples include a telemetry-only capable UE that only supports the capabilities for point-to-point communication.

- The IMS shall be capable to access information about the state of a user's access connection, whether the user is roaming or not. According to operator policies this information may be provided to applications.

- The IMS shall be capable to access user location information, whether the user is roaming or not. According to operator policies this information may be provided to applications.

- Where required (e.g. by regulation) the IMS shall provide the capability for the user to indicate to the network that a communication is malicious.

Note: see also MCID in [18].

- Where required (e.g. by regulation) the IMS shall provide the capability for the network, on behalf of the user, to reject incoming communications from users who have restricted the presentation of their originating identity.

Note: see also ACR in [18].

6 Standardised service capability approach

IP multimedia applications shall, as a principle, not be standardised, allowing operator specific variations. It shall be possible to enable rapid service creation and deployment using service capabilities.

It is important that commercially available IP multimedia applications are supported. In general compatibility shall be with these IP multimedia applications instead of building 3GPP-specific solutions.

The following options shall be available in the 3GPP standards to enable service delivery:

- an architectural framework shall be created that enables maximum flexibility in the end user device and network servers, similar in concept to that used in the Internet.

  This framework shall enable an operator to efficiently deploy IP multimedia applications in a network-agnostic manner without having to wait for these applications or additional enabling technology, to be standardised in 3GPP.

- service capabilities (enhanced to control IP multimedia applications), which will allow IP multimedia applications to be deployed in a vendor independent manner

  CAMEL [10], MExE [11], SAT [12] and OSA [13], should be improved to support IP multimedia applications, e.g. additions to APIs, service capability features, service capability servers, user profile etc.

- the IM CN Subsystem user related data to be stored in a standardised format and to be managed and accessed using standardised mechanisms of the 3GPP Generic User Profile (GUP) [16].

- mechanisms which allow the network or the application to understand the limitations of the mobile and thereby take appropriate actions.

Note: There is a concern that with a large variety of toolkits to create applications, service interworking between terminals and networks may be compromised and needs to be addressed.

7 User service requirements

IP multimedia sessions provide the ability for users to invoke IP multimedia applications to send and receive (where applicable) voice and data communications, even when roaming. This includes interworking with existing voice and data networks for both fixed (e.g. PSTN, ISDN, internet etc.) and mobile users.

The IM CN subsystem shall support interworking with existing fixed and mobile voice and IP data networks, including PSTN, ISDN, Mobile and Internet.

It shall be possible to have basic voice calls between IMS users and users in CS domain/PSTN-style networks. When an IM session originates or terminates in a CS telephony call, the experience of the CS telephony network user should not substantially differ from that of a call between two CS telephony network users in terms of aspects such as the delay to set-up communications and the total permissible delay in transporting speech between the end users. The IM CN subsystem does not necessarily have to support all services offered by the CS telephony network.

7.1 Identifying IP multimedia application subscriptions

There is no requirement to support standardised subscription mechanisms for IP multimedia applications.

IP multimedia applications may require to be provisioned and configured by users and operators. Since the source and variety of IP multimedia applications may not be standardised, the specific feature codes to provision, enable and configure IP multimedia applications may not be standardised either. .

Note: The standardised service capabilities, personalised Internet web pages and evolving IP mechanisms may be used to allow user (self) provisioning, configuration and enabling of IP multimedia applications.

7.2 Access to the IM CN subsystem

7.2.0 General

IMS, complying with the principle of access independence, supports IP multimedia applications via IP multimedia sessions over a multitude of IP Connectivity Access Networks. These include e.g. E-UTRAN, UTRAN, GERAN, fixed line, I-WLAN, DOCSIS®, WiMAX™ and cdma2000® access.

7.2.1 Access control

The IM CN subsystem shall be able to verify at any time that the user is entitled to use the resources of the IM CN subsystem.

7.2.2 IMS Registration and De-registration

In order to be able to access services from the IM CN Subsystem a UE shall register on the IM CN Subsystem.

- A UE that supports IMS shall be able to register on the IM CN Subsystem.
- A UE may support automated IMS registration, e.g. when gaining access to the PS domain.
- It shall be possible for the network operator to request a UE to register on the IM CN Subsystem, provided that access to the PS domain is already available.

Note: the mechanisms by which the network operator requests the UE to perform an IMS registration may be outside the scope of the IMS.

- A UE that supports IMS shall be able to de-register from the IM CN Subsystem.
- The network operator shall be able to de-register a UE from the IM CN Subsystem.

7.3 Capability negotiation

The IMS shall provide the capability for IP multimedia applications (whether it is an application of a user or the network) to negotiate their capabilities to identify and select the available media components, QoS etc. of IP multimedia sessions. It shall be possible for the capability negotiation to take place on invocation, acceptance and during an IP multimedia session (e.g. following a change in UE capabilities, change in media types etc.). Capability negotiation may be initiated by the user, operator or an application on behalf of them.

In order to support the user's preferences for IP multimedia applications, the capability negotiation shall take into account the information in the user profile whenever applicable. This includes the capability to route the IP multimedia session to a specific UE, when multiple UEs share the same IMS service subscription.

7.4 Redirecting of IP Multimedia sessions

The IMS shall support the capability for the user, or the network on behalf of the user, to identify an alternative destination for an IP multimedia session or individual media of an IP multimedia session. Redirection to alternative destinations may be initiated by the sending party, receiving party or the network on their behalf. It shall be possible for redirection to be initiated at various stages of an IP Multimedia session. For example:

- Prior to the set up of an IP Multimedia session
- During the intial request for an IP Multimedia session
- During the establishment of an IP Multimedia session
- While the IP Multimedia session is ongoing

Redirection can be applied for all Multimedia sessions unconditionally or it can be caused by any of a set list of events or conditions. Typical causes could be:

- Identity of the caller
- Location or presence of the calling or called party
- If the called party is already in a session
- If the called party is unreachable or unavailable in some other way
- If the called party does not respond

- After a specified alerting interval

- User"s preference on routing for specific IP Multimedia session based on the capabilities of multiple UEs sharing the same IMS service subscription.

- **Time of day.**

There are other causes that could be applied that do not require standardisation.

7.5 Invoking an IP multimedia session

The user shall be able to invoke one or more IP multimedia sessions. The user shall also be able to activate concurrent IP multimedia applications within each IP multimedia session.

7.5.1 Identification of entities

Both telecom and internet numbering and addressing schemes shall be supported as public identities. IP multimedia communication establishment (both originating and terminating) depending on originator shall be able to be based on E.164/TELURI (e.g. tel:+4412345678) [15]or SIP URI (sip:my.name@company.org) [9]. It shall be possible to assign several public identities for one subscription.

Whilst not required for routing between terminals within the IMS, it should be possible for the network to recognise and treat URIs, containing 'IM' or 'Pres' prefixes, received from other networks supporting such prefixes.

Whilst not required for routing between terminals within the IMS, it should be possible to append an 'IM' or 'Pres' prefix to an outgoing URI to enable routing to the correct addressee in external networks supporting such prefixes.

Public identities shall be administered by the network operator and shall not be changeable by the user.

It shall be possible for the network operator to guarantee the authenticity of a public identity presented for an incoming session to a user where the communication is wholly across trusted network. This is equivalent to the situation for CLIP with today"s telephony networks.

It shall be possible for the network operator to use

- the same E.164 number for IP multimedia sessions and CS speech telephony (TS11) [1]

- a different E.164 number if desired for IP multimedia sessions

This allows customers who originally had only an E164 MSISDN to retain the same number for receiving communications in the IM domain and also in the CS domain when outside IM coverage.

7.5.2 Negotiation at IM session invocation

It shall be possible for the capability negotiation to take place at the time of the IP multimedia session invocation. Refer to subclause 7.3 for further details on capability negotiation on IP multimedia session invocation.

7.5.3 Emergency communications

The requirements for Emergency communications are contained in [5] for PLMN specified by 3GPP and in [19] for NGN broadband accesses.

7.6 Handling of an incoming session (by the terminating entity)

7.6.1 Automatic re-routing

IMS shall provide the capability to handle communications rejected (e.g. due to unavailability of PSTN/ISDN resources) using re-routing.

7.6.2 Presentation of session originator identity

The IMS shall present the identity of the session originator (see 7.5.1).The network shall suppress the presentation of the identity when requested by the session originator.

Operator policies (e.g. requirements for support of emergency communications) may over-ride the user request for suppression.

7.6.3 Negotiation of an incoming session

Interaction with the user profile shall be supported, and additionally direct interaction with the user may be required. Refer to subclause 7.3 for further details on capability negotiation on an incoming IP multimedia session.

7.6.4 Accepting or rejecting an incoming session

It shall be possible for the user to either accept, reject, ignore or re-direct an incoming IP multimedia session. Further, it shall also be possible for the user to accept only a subset of the offered media, not have any of the media offered to him at all etc.

7.7 Handling of an ongoing session

7.7.1 User modification of media in an ongoing session

The user shall be able to negotiate the addition or deletion of media components of IP multimedia applications during an IP multimedia session. Refer to subclause 7.3 for further details on capability negotiation during an IP multimedia session.

7.7.2 Suspending and resuming of an ongoing session

It shall be possible for the user to suspend an IP multimedia session, and resume that IP multimedia session at a later time.

7.7.3 Presentation of identity of connected-to party of a session

It shall be possible to present to the originator of a session the identity of the party to which she is connected (see 7.5.1).

However, the connected-to party shall be able to request that her identity is not revealed to the originator of the session.

Operator policies (e.g. requirements for support of emergency communications) may over-ride the user request for suppression.

7.8 Ending a session

The user shall be able to end an IP multimedia session at any time during the session. The network may end an IP multimedia session at any time during the session (e.g. in failure conditions).

7.9 Void

7.10 Handling of conferences

Conferences allow users participating in the conference to communicate with all other participants simultaneously. A conference has a "conference focus", that controls the conference.
Note that a user, participating in the conference, depending on the conference policy may be allowed to communicate with the focus (e.g. to request invitation of another user into the conference).

The following minimum user requirements for conferences exist:

- A user shall be able to request the creation of a conference.
- A user shall be able to request to join an existing conference.
- A user participating in the conference shall be able to request modification of the conference (e.g. add/remove media, manipulation of data streams, add/remove participants) depending on the conference policy.
- A user participating in the conference shall be able to request termination of the conference, depending on the conference policy.
- A user participating in the conference shall be able to receive information from the conference focus (e.g. participants in conference, participants joining or leaving the conference)

7.11 Handling of multicast services

Multicast services allow IMS users and service providers to send multimedia to a group of IMS users simultaneously in an unidirectional way of communication. The underlying network may be able to support mechanisms that optimize the delivery of multimedia to the individual members of that group (e.g. MBMS [7])

Note: an example for applicability of multicast services could be the IMS based 'Push to talk over Cellular' service, that is being standardised by OMA.

- An IMS application located on an application server in the network shall be able to request that multimedia is sent to a group of IMS users, which are specified by this request.
- Depending on the capabilities of the underlying network IMS shall be able to use optimized mechanisms of the network (e.g. multicast capabilities such as MBMS [7]) for the delivery of multimedia to the group of IMS users.

7.12 Support for Local Numbers in the IMS

If a number or short code originating from a UE corresponds to the HPLMN's numbering plan, or is recognised as a service access short code, it shall be routed by the HPLMN accordingly.

A number or short code originating from a UE in a VPLMN may have a local call indicator (LCI) added to it. The value of an LCI helps the HPLMN to route the call and, if necessary, route the call to the country/VPLMN of origin.

The HPLMN shall analyse the received number and route the call as follows:

- If the number or short code has an LCI the HPLMN should route the call according to the value of the LCI. If the HPLMN is unable to resolve or route the received number then an error message shall be returned to the originating UE.

7.13 User determined user busy

The network shall support the capability of a user to reject an incoming IMS session with an indication of "user busy". This indication may be used by the network as a trigger for certain services e.g. Call Forwarding on Busy. If the session rejection is propagated back to the originator, the "user busy" indication must be provided as the cause of the rejection.

The conditions for user determined "user busy" include:

- the session is offered to a single contact that rejects with a "user busy" indication; or
- the session is offered to multiple contacts with a single public identity, and one contact rejects with a "user busy" indication on behalf of the set of contacts; or
- the session is offered to multiple contacts; and
  - none of the contacts progress the session; and
  - one or more of the contacts rejects with a "user busy" indication.

NOTE: A contact is e.g. a terminal, a UE, or some other kind of equipment in the user premises.

8 Interworking requirements

8.1 General

The IMS shall support the capability for interoperability with the following:

- PLMN CS domain,
- PSTN/ISDN networks,
- Packet Cable network,
- Internet.
- Other non 3GPP networks providing IP Multimedia sessions.

The scope of this interoperability may result in a limited service capability.

8.2 Interworking with PLMN CS Domain

The IMS shall support conveyance of voice calls and multimedia services between IMS users and users in CS domain (within the limits set by the CS domain).

If more than one IMS party is involved in a communication with a PSTN party/parties, the communication between the IMS parties shall not be adversely impacted by the presence of a PSTN party.

Note: That this boundary may still be subject to regulatory requirements associated with communications with the PSTN including, but not limited to, lawful interception of voice calls and multimedia services, and number portability.

The boundary interworking shall be able to convey the information associated with the services listed below:

CLIP/CLIR;

Call Forwarding.

Also due to regulatory reasons the subscriber identity may be required to be conveyed via the IMS-CS/PSTN boundary to enable calling line identification services on both sides.

Support of:

Call barring,

Call waiting/hold,

MPTY,

on the boundary interface is for further study.

8.3 Interworking with PSTN/ISDN networks

8.3.0 General

Interworking between IMS and PSTN/ISDN networks shall be supported. PSTN/ISDN networks in this context refer to legacy PSTN/ISDN and TISPAN NGNs supporting PSTN/ISDN Emulation.

NOTE: TISPAN NGN supporting PSTN/ISDN Emulation provide to the end-user the same experience as a legacy PSTN/ISDN and from a interconnection perspective the TISPAN NGN behaves like an IMS network.

As a network option and depending on inter-operator policies, the IMS shall support transit of traffic between PSTN/ISDN networks.

8.3.1 Overlap Signalling

Support for overlap signalling in the IMS is an option limited to the interworking with PSTN/ISDN networks that use overlap signalling. Support of this option shall be based on inter-operator policies at the interconnection point. The IMS of operators not supporting overlap signalling shall not be affected.

In the absence of such inter-operator policies, networks interworking with IMS shall select appropriate signalling mechanisms to complete the call without any impact on IMS networks not supporting overlap signalling..

NOTE 1: PSTN/ISDN networks that convert overlap signalling to en-bloc, are considered to be networks that do not use overlap signalling.

In the cases where a PSTN/ISDN network, based on inter-operator policies, provides overlap signalling into the IMS, the following requirements shall be taken into account:

- For calls terminating in the IMS, conversion of overlap signalling to en-bloc shall take place within the IMS domain.
- Impact on the IMS shall be minimized.
- The service experience for the end-user shall be similar to the PSTN/ISDN.
- When the IMS network supports transit of traffic, transit of overlap signalling may be supported towards destination networks, if the policy permits overlap signalling towards those.

NOTE 2: Overlap signalling support should not be linked to E.164 numbering schemes.

NOTE 3: Overlap signalling is not generated or terminated by an IMS UE it is only generated or terminated by devices within the PSTN/ISDN networks.

8.3.2 Subaddressing (SUB)

Where public telecommunication numbers are used, the IMS may support the Subaddress (SUB) service that allows the called (served) user to expand his addressing capacity beyond the one given by the public telecommunication number.

NOTE: Subaddressing is required for interoperability with existing users.

Subaddressing is required when at least one of the users services are provided from an ISDN.

The IMS may support the interoperability of Subaddressing with the PSTN/ISDN networks and vice versa.

8.3.3 User-to-User Signalling (UUS)

The IMS may support the User-to-User Signalling (UUS) service that enables a calling party to send and/or receive a limited amount of User-to-User-Information (UUI) to/from a called party in association with a communication.

NOTE: UUS is required for interoperability with existing users.

UUS is required when at least one of the users services are provided from an ISDN.

The IMS may support the interoperability of User-to-User Signalling services with the PSTN/ISDN networks and vice versa.

Only UUS service 1 with an implicit request is supported [17].

8.4 Void

8.5 Interworking with Packet Cable

The IMS shall support the capability for interoperability with Packet Cable networks. The scope of this interoperability may result in a limited service capability.

8.6 Interworking with Internet

The IMS shall support interworking with the Internet.

9 IP Addressing

9.1 General

The Operator of an IMS infrastructure may base the implementation on IPv4 only, IPv6 only or both. The choice is an operator option.

The IMS may support UEs using IPv4 only, IPv6 only or both at an IP-based User-Network Interface. The choice is an operator option.

9.2 IP addressing for cdma2000 access to IMS

The IMS may support UEs using simultaneous multiple IP addresses.

10 Interconnection requirements

10.1 Introduction

IMS interconnect represents the interconnection of IMS functionality between 2 IMS networks over an underlying IP infrastructure.

10.2 IP interconnect

The IP connection used for IMS IP interconnect shall be generic such that it can support all combinations of core network interconnection. E.g. the IP interconnection shall be shared between the IMS interconnection and the CS IP interconnection.

It shall be possible to handle the inter-connection of all services over this generic IP interface. The handling of security and charging shall also be generic for all IP inter-connect scenarios.

10.3 IMS interconnect

The following requirements apply at the interconnection point between two different IMS domains.

In case two UEs, belonging to two IMS domains, do not support a common codec for voice service session, the network shall be capable to provide transcoding functionality at the interconnection point betwween the twod domains.

The IMS shall support the capability for service interoperability by means of service interworking requirements defined in section 8.

The IMS shall support the capability for service identification, when such information is available.

It shall be possible to apply operator defined policy at the interconnection point..

The system shall support the capability for control the session resources when two different network domains are connected which may have different IP addressing scheme.

The IMS shall support full IP inter-connection between core networks either by direct connection or by using an intermediate carrier (e.g. GSMA IPX [18]).

The IMS shall support both bilateral interconnection between two carriers and multilateral interconnection (e.g GSMA IPX [18]) provided by intermediate carrier.

The IMS shall support service aware interconnection.

Note: service awareness could be based on service identification, media parameters etc.

The IMS shall support codec negotiation across one or multiple interconnects to minimise transcoding (and prefereably eliminate it) to provide the highest quality service to the user.

Annex A (informative): Example IP multimedia application scenarios

The following example scenarios describe the personalised handling of individual media in multimedia applications (note that this list is neither complete nor exhaustive):-

1) 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 mail box

2) The user is in a voice communication, and receives an incoming video communication. The user decides to accept the communication but wishes to switch between the two communications.

3) 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.

4) 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).

5) The user is busy in a communication when receiving an incoming communication, but responds to the originating party that he will respond later. The user may request that the originating party's details (if not restricted) are stored with a reminder in user's profile.

6) Hi-fi sound (nuances, character of voice)
Person(s): Marketing Manager, Rita
Situation: She is at a launch party for some customers in London. In the break she listens to her messages and one from another customer in Tokyo gets her attention. He just wants her to call, but doesn"t say if it is urgent or not.
Solution: Due to the excellent sound quality of the terminals involved and the messaging system, she picks up the faint irritation in his voice and decides to call him immediately. It was urgent and she could remedy the situation easily by emailing the information from her built in PDA storage. The customer was relieved as he was just going in to a very important meeting.
Benefit(s): Good sound quality gives more information to base judgements on, i.e. emulates real life meetings better.

7) Stereo sound (nuances, character of voice plus positions, sound-scapes)
Person(s): Purchase Officer, Gustavo
Situation: 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 gave this remark?
Solution: The excellent sound quality together with the stereoscopic sound gives Gustavo the information he needed. It was the other group that gave 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 setup at the head office was done with two synchronized UEs at each end of the table.
Benefit(s): Stereoscopic sound gives even more information than just hi-fi sound to base judgements on, i.e. emulates real life meetings better.

8) Conference/chat with "private rooms"
Person(s): A project team at an IT company: Rick, Diana, Ted, Sven and Liu
They are based in different cities.
Situation: The 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 arguing on some detailed design matters 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.
Solution: The team use a conference/chat service with the new facility "private rooms". This allows Sven to

direct a few words in privacy to Liu. 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 would 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).
Benefit(s): This service emulates virtual presence in a conference room in the best possible way without adding more visionary technologies like holographic projections, etc. The synthetic stereophonic sound projection provides good possibilities for a conference member to discriminate unwanted voices even if the meeting situation is informal and spontaneous and everyone are talking at the same time. The flexible possibilities to create one or more "private rooms" make it easy to make private comments to selected colleagues. The easy-to-use and fast responding GUI makes the needed end-user effort to create a new "room" so low, that it feels natural to use the function even for exchanging just a few quick words.
Alternative use: Exchange the IT project team with a gang of teenagers that are planning what to do in the weekend. The service works perfectly well also in that scenario and provides the same benefits.
Additional features: Easy GUI controlled addition of new participants (can be initiated by any of the participants), including addressing, notification/invitation, etc. (cf. "outgoing call" in PSTN). GUI notification of new incoming session invitations (cf. "incoming call" in PSTN) and possibility to choose action as desired (incorporate the "calling party" in the existing conference session, creating a new separate session, rejecting the invitation, diverting it to a messaging system, etc.) Whiteboarding and/or application sharing.

9) Multiplayer mobile gaming with voice channel
Person(s): Joe (age 15), Blenda (age 14), Fredric (age 15) and all their "cyber friends" in the Shoot-n-Shout v.14.0 community
Situation: In the legendary multiplayer game Shoot-n-Shout v.14.0 the most popular game mode is a team competition. The idea is simply to shoot down the members of the concurring teams. There are always a lot of active game sessions in CyberSpace. 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 team-mates can learn to know each other.
Joe, Blenda and Fredric meet on the web/WAP chat and decide to form a team to take up the fight in one of the Shoot-n-Shout sessions. They are preparing a game strategy in advance through the text chat service, but when they have started the battle it takes too long time to type text, so they the will need another way to communicate with each other.
Solution: The game application provider makes use of a conference/chat service with "private rooms" in order to provide a multi-player voice service to the players of Shoot-n-Shout. When a game starts there is one "common room" where all players can talk (or rather shout) to each other 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. (See the conference/chat scenario for details.)
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. As an example, players that are behind a wall will only be heard as a vague whisper in the distance.
Benefit(s): A voice channel will enhance the gaming experience for several popular network games.

10) Application sharing with voice commentary
Person(s): Marketing Manager, Rita and Media expert, Jones
Situation: The launch of 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 its only a prototype. Rita knows it"s not included in the presentation and she has no information with her.
Solution: 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.
Benefit(s): 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. (Emphasize mobile or fixed access as required). The customer is happy and a Letter of Intent is signed.
Comments: By adding voice and pictures in an interactive session we achieve both effectiveness and interaction, two desired components.

11) Emergency location with voice conversation, navigation and picture transfer
Person(s): Ma Beth, her children and the pet dog Bobby
Situation: The family is out driving in the country side and they take a turn on the slippery country road a bit too

fast. They 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. It may be broken, and you can tell it certainly hurts from the loud yelps that come out in a rushed stream. The rest of the family is ok. They were all buckled up.
Solution: Ma Beth reaches for her communicator as soon as she has recovered from the initial shock. She calls 112 (911 or similar). The answer comes after 23 seconds and the operator immediately confirms the identity and the location of the van. Ma Beth is a bit taken aback by this quick information and has to think for awhile, then confirms the location as possibly correct. She then states the problem and she gets connected to a vet that 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. Well there, Bobby is taken care of and things are looking up. Even the kids are smiling now that the dog is calm and free from pains, and he looks so funny with his little cast.
Benefit(s): The initial call transfers emergency information to the operator automatically. This ensures minimum delay to correct action. The Communicator transfers the picture that gives enough information to make a very accurate and fast assessment of the situation. Then the map transfer and display on the terminal together with the current position gives clear information and directions for Ma Beth to drive and make the right turns at every corner. In her still half-shocked state she can drive to the hospital without hesitation about where to go. Very reassuring for all parties including the dog that gets fastest possible help.
Comments: The call is initially just a voice call but evolves with the best of positioning in emergency situations and navigational aid together with picture and graphics transfer.

12) The Real Virtual Theatre and Foyer Chat room – Fixed Network example
Person(s): Theatre going 'cultural' group with one member (Bob) in a hospital bed.
Situation: The group is watching the play and are utterly fascinated by the first act. When they come out into the foyer in the break they remember Bob. They really want to share this first act with him since they know Shakespeare"s Midsummer Night"s Dream is his favorite.
Solution: Bob uses the theatre"s online streaming service via the hospital network. (At only half the price of a theatre ticket!). The play displays in color and stereo surround sound on his bedside TV set. In the break his friends call him up from the theatre chat room. The chat room is 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 synchronized 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.
Benefit(s): Bob can pick up every nuance in the lively discussion, including the whispered comments from Greta in the back. The group is almost feeling Bob"s presence because of the emotional clarity and distinct position of his voice. As both parties have control and visibility of the streaming sessions, it is very effective and very interactive.
Comments: Experiential services are sought after. This one can be a bit exclusive because of the equipment requirements, but the uses are many.

13) Mobile synchronized MM container
Person(s): The married couple Bill and Christine and their daughter Linda
Situation: Bill is on a business travel to Spain. He calls his wife Christine every night using his MMM terminal. Often Christine is answering at home using her Screenphone, but this particular evening Christine has arranged a baby-sitter for their children so she could go to a restaurant with some friend. When Bill is calling, she is sitting on the commuter train on her way home. Bill often show some pictures during his calls (both live pictures showing the environment where he is at the moment and pictures that he has been taking during the day with his separate digital camera).
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 make 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.
Solution: With a quick gesture on the touchscreen of Christine"s MMM 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 MMM terminal and her home server. In this way, Christine can easily pick up the picture from her Screenphone at home. If Linda is at sleep when Christine comes home, she can wait until tomorrow.
Benefit(s): The 'multimedia container' can be used for every type of MM content that one likes to have available both at home and at another location. This 'container paradigm' is very intuitive and stimulates the use of images,

video clips etc. for a multitude of purposes. The 'container' can be used both for transferring content from the MMM terminal to the home server (as in this scenario) and in the opposite direction.

Annex B (Informative): Business models use cases

The IMS supports agreements between the access network operator and the network operator providing IMS services (IMS operator).

The IMS shall be able to offer services to users that are attached to access networks owned by another operator.

The service offering may be restricted by the capabilities of the access network and the agreement between the access network operator and the IMS operator.

The IMS shall support at least the following operator's domain relationships:

a) Access network to IMS relationships

a.1) Access network and the IMS it connects to, belong to the same operator as shown in figure B.1.

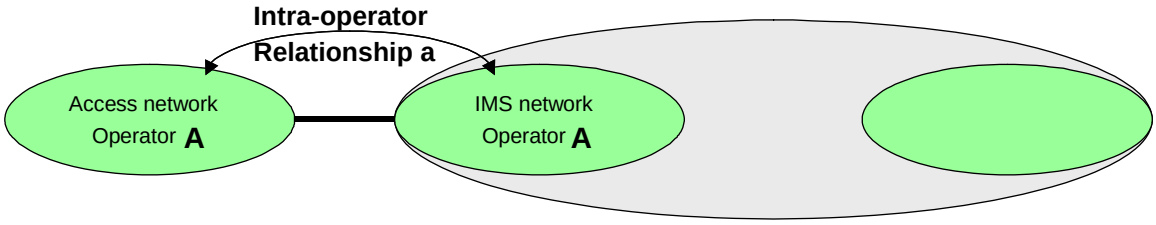

Figure B.1

a.2) Access network and the IMS it connects to, belong to different operators having an interconnection as shown in figure B.2.

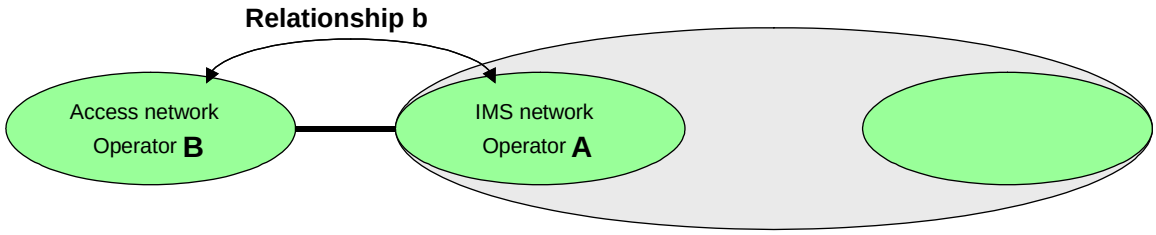

Figure B.2

b) IMS level relationships

b.1) The IMS (e.g. 3GPP or NGN) to which the access network connects and the Home IMS (e.g. NGN or 3GPP) which provides the IMS services belong to different operators as shown in figure B.3.

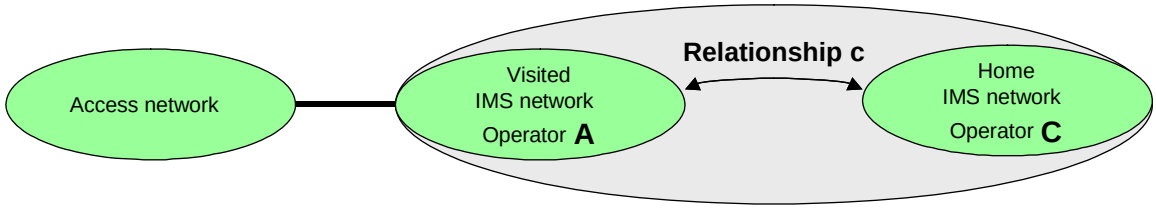

Figure B.3

b.2) The IMS (e.g. 3GPP or NGN) to which the access network connects and the Home IMS (e.g. NGN or 3GPP) which provides the IMS services are the same as shown in figure B.4.

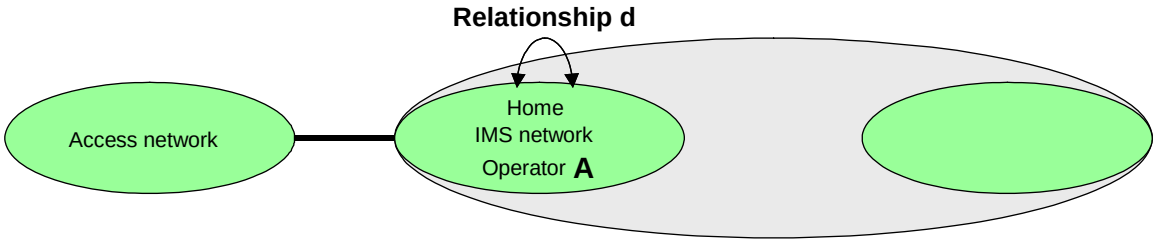

Figure B.4

b.3) The IMS (e.g. 3GPP or NGN) to which the access network connects and the Home IMS (e.g. NGN or 3GPP) which provides the IMS services belong to the same operator as shown in figure B.5.

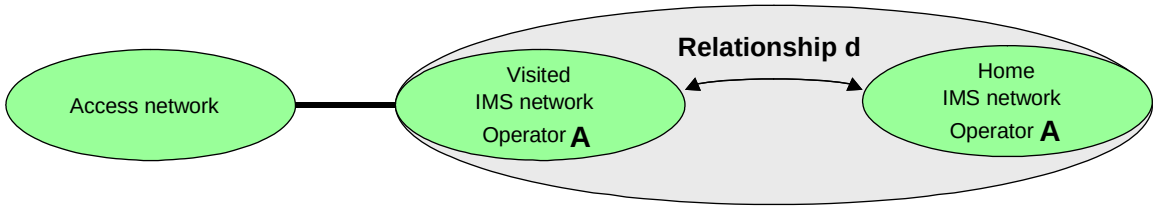

Figure B.5

An IMS operator shall be capable of connecting to other network operators via:

- an interconnect model where agreements are established between two operators;
- an interconnect model where intermediate network(s) can provide interconnect on behalf of multiple operators (and may be based on an agreement between the operators and their intermediate network provider).

A single IMS operator shall be able to choose to support either of the interconnect models, or both of the interconnect models simultaneously.

Annex C (Informative): Basic communication cases for IMS networks

A basic communication case can be described on a per IMS basis by stating the IMS entry point and an exit point for the communication as shown in figure C.1.

The following general types of entry/exit point can be identified:

- Access (for communication to from terminals);
- Interconnect to non-IMS network;
- Interconnect to other IMS;
- Internal network resource (e.g. a conference bridge for conferencing services).

As a general rule a network based on IMS shall support the following basic communication cases on a per network basis, as shown in Table C.1.

Table C.1

From (entry point)	To (exit point)			
	Access Network	**Interconnect to other IMS**	**Interconnect to non-IMS network**	**Internal Network Resource**
Access Network	Required	Required	Required	Required
Interconnect to other IMS	Required			Required
Interconnect to non-IMS network	Required		Required	Required
Internal Network Resource	Required			

It is not precluded that other, more complex communication cases may be provided by service level concatenation of basic communication cases, e.g. by means of call diversion services.

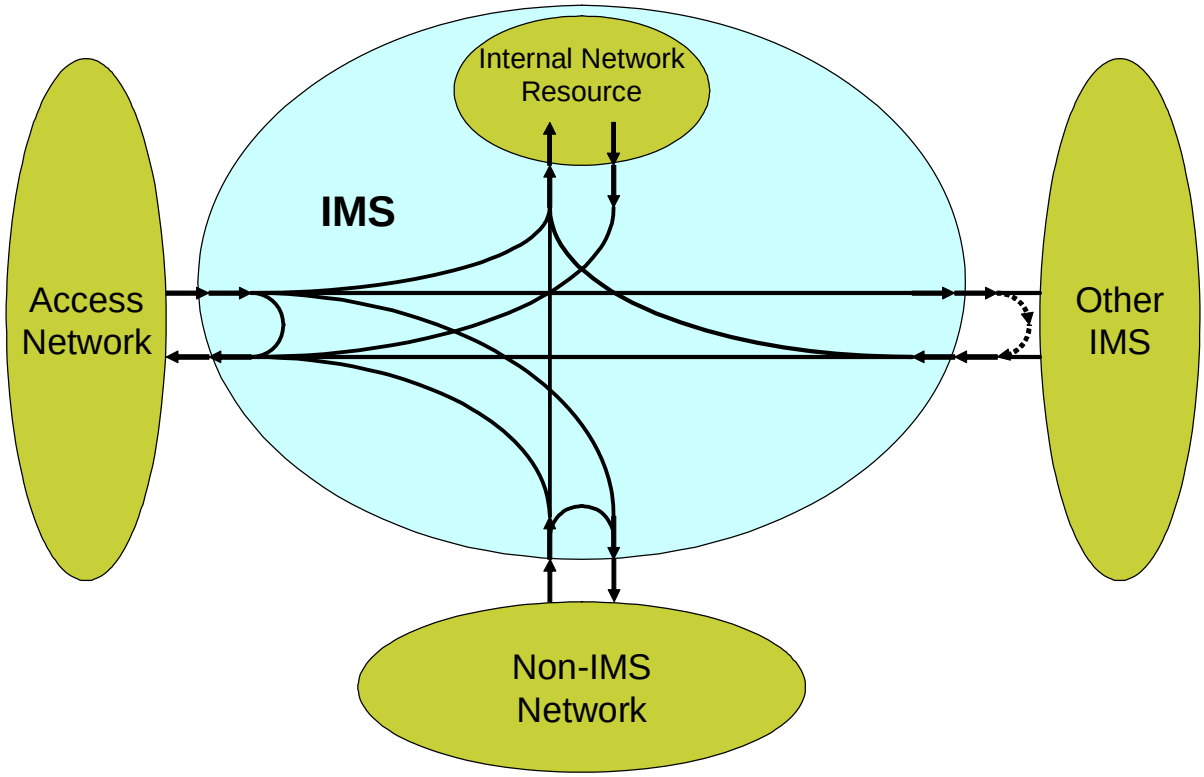

Figure C.1: Graphical representation of supported basic communication cases

Annex D (informative): Change history

Document history		
0.1.0	07/07/2000	Editor's first draft created during Goodwood, UK, Release 2000 ad-hoc 3-7/7/2000
0.2.0	14/07/2000	Editor's draft input to Release 2000 adhoc 17/7/2000, Copenhagen, Denmark.
0.3.0	17/07/2000	Output from the Release 2000 adhoc 17/7/2000, Copenhagen, Denmark.
0.4.0	06/09/2000	Produced during the Release 2000 adhoc 6-8/9/2000, Slough, UK.
0.5.0	07/09/2000	Produced during the Release 2000 adhoc 6-8/9/2000, Slough, UK.
0.6.0	08/09/2000	Produced during the Release 2000 adhoc 6-8/9/2000, Slough, UK.
1.0.0	10/09/2000	Updated to version 1.0.0 for presentation to SA #9.
1.1.0	13/11/2000	Produced during the Release 2000 adhoc 13/11/2000, Orlando, USA.
2.0.0	24/11/2000	Produced after SA1 in Orlando, USA for approval at SA#10.
5.0.0	20/12/2000	Approved at SA #10

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	WI
SP-12	SP-010246	S1-010455	22.228	002		Rel-5	C	CR 22.228 - Capability of the IM CN Subsystem to present the identity of connected-to party	5.1.0	5.2.0	IMS-CCR-STAGE1
SP-12	SP-010246	S1-010453	22.228	003		Rel-5	C	CR to 22.228 on Redirection of IP Multimedia Sessions	5.1.0	5.2.0	IMS-CCR-STAGE1
SP-13	SP-010435	S1-010824	22.228	007		Rel-5	D	Interworking with internet	5.2.0	5.3.0	IMS
SP-13	SP-010435	S1-010825	22.228	008		Rel-5	C	Determination of terminal capability	5.2.0	5.3.0	IMS
SP-14	SP-010671	S1-011278	22.228	005	1	Rel-5	F	Defintion of Local Services	5.3.0	5.4.0	IMS
SP-15	SP-020058	S1-020507	22.228	010		Rel-5	B	CR 22.228 Rel. 5, IMS Addressing	5.4.0	5.5.0	IMS
SP-15	SP-020058	S1-020657	22.228	011		Rel-5	B	CR to 22.228 on ISIM	5.4.0	5.5.0	IMS
SP-15	SP-020045	S1-020457	22.228	012	-	Rel-5	F	Editorial CR to correct terms and references	5.4.0	5.5.0	CORRECT
SP-15	SP-020126		22.228	013		Rel-5	F	Correction of references to obsolete SIP RFC 2543 IETF specification	5.4.0	5.5.0	IMS-CCR
SP-16	SP-020258	S1-021162	22.228	016		Rel-6	D	Revised version of S1-020846CR to 22.228 v5.5.0 on Editorial for REL6	5.5.0	6.0.0	IMS
SP-17	SP-020562	S1-021771	22.228	017		Rel-6	B	CR to 22.228 Rel 6 on IMS interworking	6.0.0	6.1.0	IMS2
SP-19	SP-030028	S1-030182	22.228	018	-	Rel-6	B	GUP for IMS subscription management	6.1.0	6.2.0	GUP
SP-20	SP-030259	S1-030522	22.228	019		Rel-6	B	Multiple UEs in IMS service subscription	6.2.0	6.3.0	IMS
SP-20	SP-030259	S1-030523	22.228	020	-	Rel-6	B	Addition of requirements to IMS to enable conference-like services	6.2.0	6.3.0	IMS2
SP-21	SP-030465	S1-030906	22.228	021	-	Rel-6	F	Clarification on the meaning of Access Independence	6.3.0	6.4.0	IMS
SP-22	SP-030706	S1-031314	22.228	022	-	Rel-6	C	Multi terminal requirement--22.228	6.4.0	6.5.0	IMS
SP-24	SP-040293	S1-040517	22.228	023	-	Rel-6	F	Deletion of duplicated scenarios of Annex A	6.5.0	6.6.0	IMS
SP-24	SP-040292	S1-040538	22.228	024	-	Rel-6	F	Editorial Correction of R5	6.5.0	6.6.0	IMS2

								reference			
SP-25	SP-040511	S1-040717	22.228	025	-	Rel-7	B	Requirements for the handling of SIP URIs with Presence or IM prefixes	6.6.0	7.0.0	IMIMS2
SP-27	SP-050060	S1-050173	22.228	029	-	Rel-7	A	Tel-URI related reference update	7.0.0	7.1.0	IMS2
SP-27	SP-050059	S1-050253	22.228	030	-	Rel-7	A	Removal of Reference to TS 22.121	7.0.0	7.1.0	TEI7
SP-29	SP-050511	S1-050778	22.228	0033	-	Rel-7	A	Removal of Local Services	7.1.0	7.2.0	IMS2
SP-29	SP-050510	S1-050882	22.228	0034	-	Rel-7	B	CR to 22.228 for allowing IMS to use multicast capabilities of the network	7.1.0	7.2.0	MBMSE
SP-29	SP-050531	S1-050941	22.228	0035	-	Rel-7	B	CR to 22.228 on CS-IMS multimedia service interworking	7.1.0	7.2.0	MITe
SP-30	SP-050748	S1-051150	22.228	0035	-	Rel-7	B	Ability for a service to address a user on a unique UE in an IMS system when multiple UEs are registered with the same IMS Public User Identity	7.2.0	7.3.0	GRUU - 32116
SP-30	SP-050752	S1-051232	22.228	0036	-	Rel-7	B	Clarify multiple applications per service	7.2.0	7.3.0	ISB
SP-32	SP-060317	S1-060560	22.228	0039	-	Rel-7	F	Identification of communication services, AI30-06	7.3.0	7.4.0	ServID
SP-32	SP-060432	-	22.228	0041	2	Rel-7	F	Support of Local Numbers in the IMS	7.3.0	7.4.0	TEI7
SP-32	SP-060323	S1-060611	22.228	0040	-	Rel-8	B	Network requested IMS session initiation	7.3.0	8.0.0	TEI8
SP-33	SP-060463	S1-060855	22.228	0043	-	Rel-8	A	Support of local numbers in the IMS - clarification and corrections	8.0.0	8.1.0	IMS2
SP-37	SP-070657	S1-070991	22.228	0047	2	Rel-8	A	Identification of a specific UE when multiple UEs share a single Public User Identity	8.1.0	8.2.0	TEI8
SP-37	SP-070658	S1-071294b	22.228	0048		Rel-8	B	TISPAN Service and Capability requirements for Common IMS	8.1.0	8.2.0	TISCAP-R8
SP-38	SP-070844	S1-071683	22.228	0054	1	Rel-8	F	NAT support in Common IMS	8.2.0	8.3.0	CIMS8-TIS
SP-38	SP-070844	S1-071684	22.228	0056	1	Rel-8	D	Corrections to definition of "Access Independence"	8.2.0	8.3.0	CIMS8-TIS
SP-38	SP-070844	S1-071780	22.228	0060	1	Rel-8	F	Any IP version support	8.2.0	8.3.0	CIMS8-TIS
SP-38	SP-070844	S1-071866	22.228	0063	1	Rel-8	F	Corrections based on LS from TISPAN and Action from SA Plenary	8.2.0	8.3.0	CIMS8-TIS
SP-38	SP-070846	S1-071787	22.228	0049	1	Rel-8	B	User determined user busy	8.2.0	8.3.0	CIMS8-TIS
SP-38	SP-070862	S1-071924	22.228	0053	1	Rel-8	C	Optimal Media Routing Support for IMS Sessions	8.2.0	8.3.0	IPinterc
SP-38	SP-070862	S1-071926	22.228	0059	2	Rel-8	B	IMS Interconnection requirement	8.2.0	8.3.0	IPINTERC
SP-39	SP-080031	S1-080184	22.228	0062	4	Rel-8	F	Enhancements on access to the IMS	8.3.0	8.4.0	CIMS8-TIS
SP-39	SP-080031	S1-080167	22.228	0064	2	Rel-8	D	Removal of abbreviations and definitions already included in 21.905	8.3.0	8.4.0	CIMS8-TIS
SP-39	SP-080205	-	22.228	0066	3	Rel-8	F	Corrections to Interworking with PSTN/ISDN networks	8.3.0	8.4.0	CIMS8-TIS
SP-39	SP-080040	S1-080238	22.228	0067	1	Rel-8	B	Additional requirements for IMS interconnection	8.3.0	8.4.0	IPINTERC
SP-39	SP-080031	S1-080183	22.228	0068	-	Rel-8	C	Emergency communication for fixed NGN	8.3.0	8.4.0	CIMS8-TIS
SP-39	SP-080040	S1-080328	22.228	0069	1	Rel-8	B	Clarification of requirements for IMS interconnection	8.3.0	8.4.0	IPINTERC
SP-40	SP-080298	S1-080610	22.228	0070	2	Rel-8	B	Service Requirements for Common IMS	8.4.0	8.5.0	CIMS_3GPP2

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